

Popular Wireless 3d

SPECIAL
CHRISTMAS
NUMBER



Popular Wireless, December 11th, 1926.

Registered at the G.P.O. as a Newspaper

Contents

The Beam: A Chat with Marconi

Looking Back By CAPTAIN ECKERSLEY

A Brighter Radio Xmas

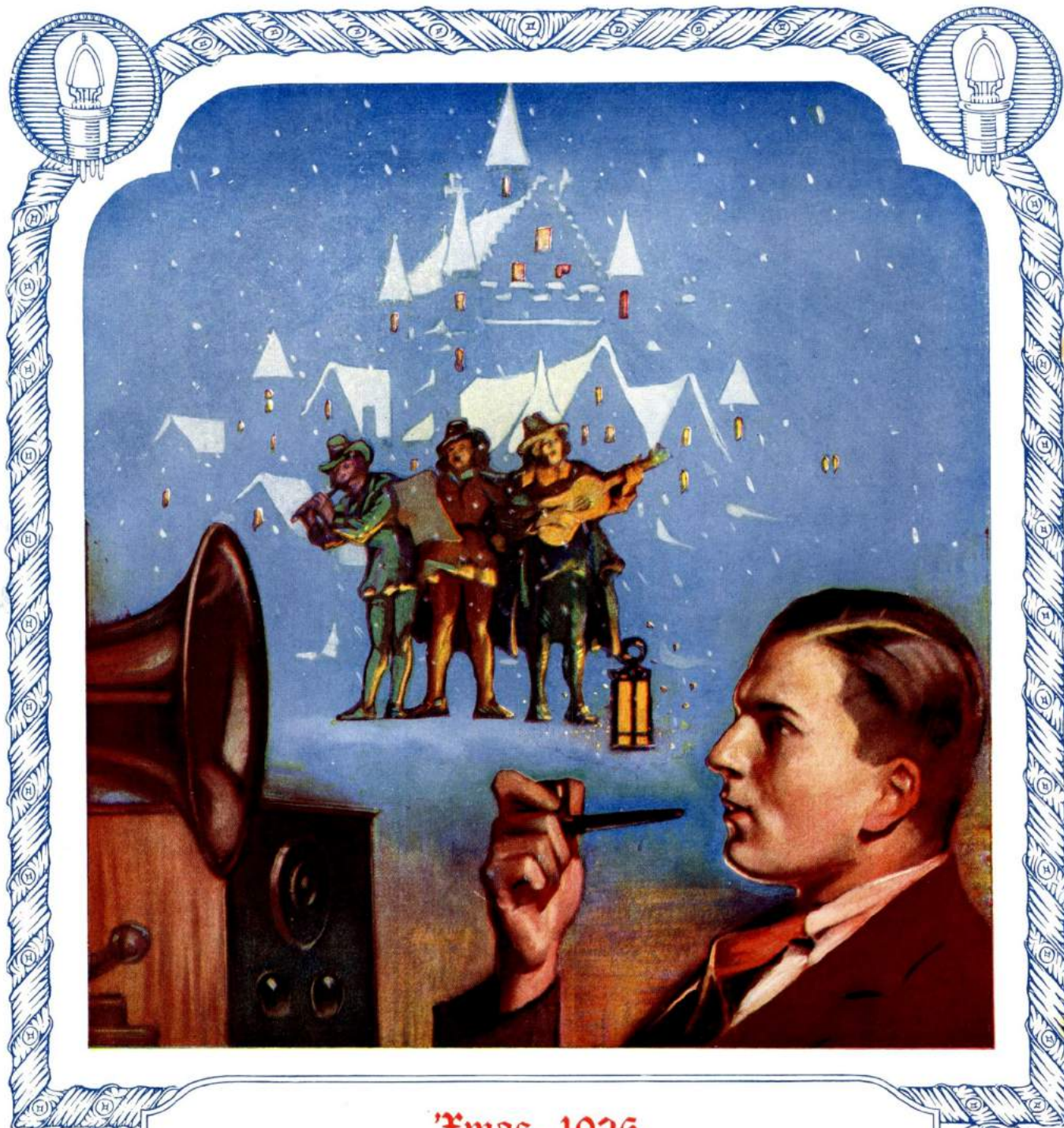
Choosing Your Wireless Xmas Presents

Notes on the "Hale" By CAPTAIN ROUND

And Many Bright and Valuable Features

No. 236. Vol. X.

ANGLEY



'Tmas, 1926.

ONCE again at this season of Goodwill we take this opportunity of expressing our thanks to those loyal Cossor enthusiasts who have continued to use—and to recommend—Cossor valves. The knowledge that such a large pro-

portion of the wireless public favour the valve with the Kalenised filament is a constant spur to our activities and an incentive to maintain the high standard which has always been associated with the name Cossor.

Cossor Valves

Red Band, No.
210H. For H.F.
use.
Black Band, No.
210D. For De-
tector use. 1.8
volts., 1 amp.

14/-

Stentor Two
Power Valves
No. 215P. For
Loud Speaker
use. 1.8 volts.,
15 amp.

18/6



Read **GEORGE ROBEY**
in the Christmas
AMPLION MAGAZINE.
A 1/- Magazine for 6d.

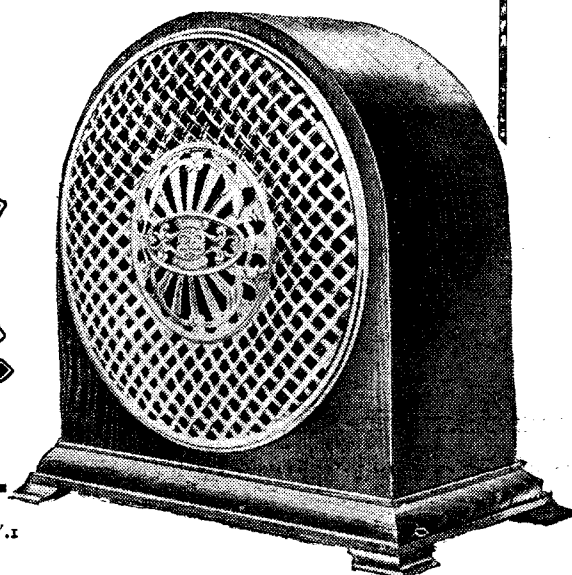
A good reception is
always assured if
the present is a
Radiolux Amplion

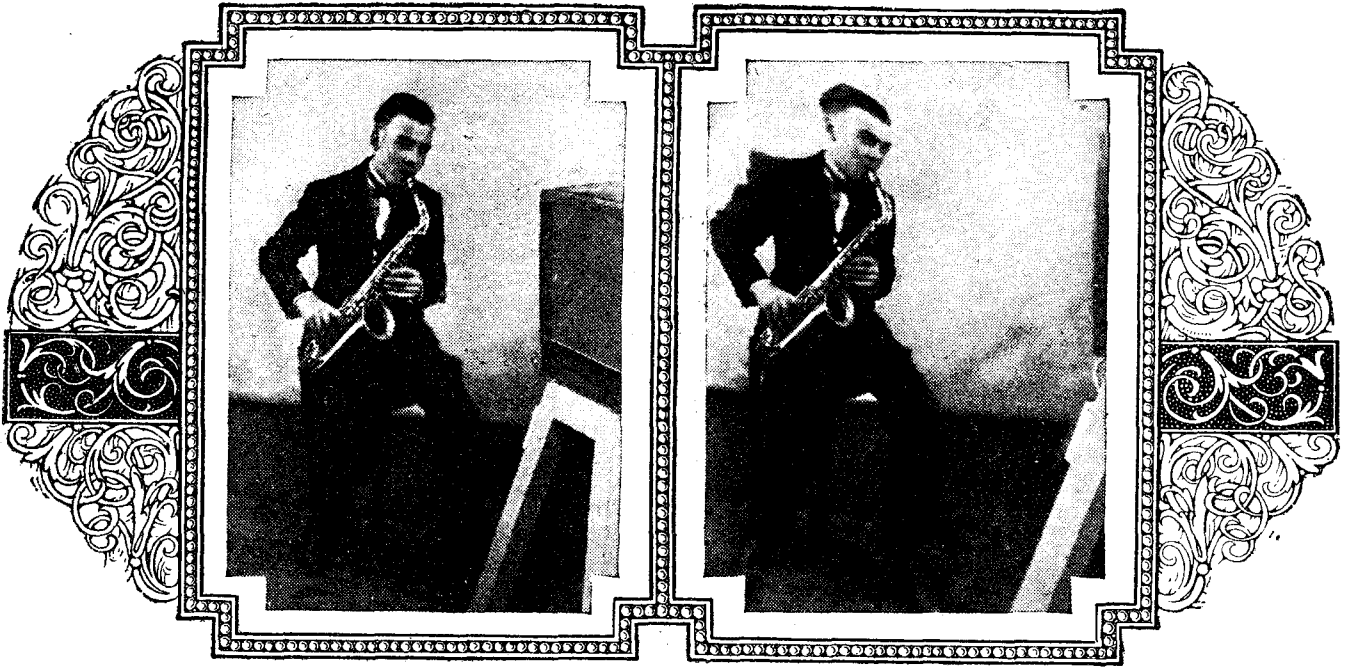
Type R.S.I.O.
(Oak)

£7 : 7 : 0

Other AMPLION
models from 38/-

**Radiolux
AMPLION**





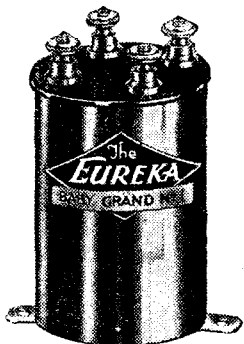
Does your Set need new 'Specs' !

EYE specialists tell us that tens of thousands of people are walking about with defective vision—but they don't know it. Because they have never seen clearly they do not appreciate what it is to enjoy perfect sight. Yet a visit to an optician and the choice of suitable glasses would effect a cure.

Much the same applies to many wireless enthusiasts. They possess Sets which can only create a travesty of the music which is being broadcast. Really good lifelike reproduction they have never enjoyed. And because they have never heard it they don't know the limitations of their own Receiving Sets. The root of their trouble lies in their transformers. Just as a good pair of 'specs' will give back the vision of

youth to the aged, so a really good L.F. Transformer like the Eureka, will rejuvenate a Receiver and enable it to "re-create the living Artists. No other alterations are required—merely take out the old L.F. Transformer and substitute a Eureka in one of its several types. The Eureka is a scientifically designed transformer. It amplifies evenly throughout the whole harmonic range. The deep notes of the 'cello, the pleasing notes of the flute, the mellow strains of the oboe come through with wonderful realism. Your Set deserves a Eureka—the long-lasting transformer which is hermetically sealed within a coppered steel case proof against the influence of the atmosphere and free from the possibility of inter-action.

Available in six different types



Eureka Concert Grand

A superb L.F. Transformer hermetically enclosed in a coppered steel case proof against atmospheric influences. For second stage use there is the No. 2 which is designed for work in perfect partnership with the Concert Grand. Designed under identical principles.

Concert Grand 25/-

No. 2 21/-

Eureka Reflex

For reflex work a special Eureka is available. Gives an exceptional volume of mellow clear tone.

Fully guaranteed 15/-

Eureka Baby Grand

For those who cannot afford the necessary higher price of the larger Concert Grand we have introduced the Baby Grand. Fully up to the same high standards of workmanship and carrying the same generous guarantee. Chosen by many manufacturers of Broadcast Receivers.

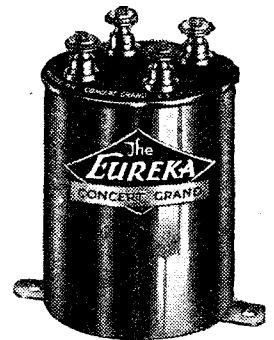
No. 1 15/-

No. 2 15/-

Eureka L.F. Choke Unit

The L.F. Choke method of amplification is gaining in popular favour among seasoned experimenters. The Eureka Choke Unit, incorporating grid leak and condenser is the finest instrument of its type.

Fully guaranteed 25/-



Portable Utilities Co., Ltd., Fisher St., W.C.1.

Sole Manufacturers of Eureka Radio Products

Re-creates the **EUREKA** Living Artiste

Gilbert Ad. 6543.



The New B.5.H.

FOR USE WITH 4 VOLT

ACCUMULATOR OR DRY CELLS

This new valve has been expressly designed to work in conjunction with the famous B.5. Valve. It is intended primarily for the high frequency stages, using a tuned anode coil or high resistance of low self capacity. The B.5.H. has a very

much higher amplification factor than the B.5. It can also be employed in the detector and low-frequency stages, with high resistance or low ratio transformer coupling. The B.5.H. will solve your high frequency problems. Buy one now.

Filament Volts 2.8
 Filament Current 0.06 amp
 Anode Volts 40-120
 Amplification Factor 17.5
 Impedance..... 55,000 ohms

PRICE

14/-

(OUTSIDE THE
 IRISH FREE STATE)

**B
T-H**
VALVES

Sold by all Good Radio Dealers

The British Thomson-Houston Co. Ltd.

2701

Evolved to meet the new conditions of Radio

THE new Oldham O.V.D. cannot be compared with any other accumulator. It is unique. It has been specially evolved to meet the new conditions created by the growing popularity of dull emitter valves. The O.V.D. is the first slow discharge accumulator which can be charged rapidly. The idea of a slow discharge accumulator is not new. They have been on the market for years. But—owing to the thickness of their plates—the greatest possible care has been necessary to ensure the full charge being given. Common sense will prove why this is so. The ordinary slow discharge accumulator holds its charge because it has two thick plates—negative and positive. But because its plates are so thick it takes many hours for the electrolytic action to penetrate its inmost recesses. And long slow charging is a nuisance.

Oldham saw the disadvantages of the thick plate and has evolved the new laminode plate possessing all the advantages of thickness but none of its disadvantages. The Laminode plate fitted to the O.V.D. is three plates in one. It uses a girder-like construction which prevents buckling. And yet because of its greater surface area it can be charged within 8 hours. Any Oldham O.V.D. will hold its charge for weeks—even months—without attention. Local action has been practically eliminated.

FACTS FOR VALVE USERS.

If you have a one-valve Set an O.V.D. will last you 180 hours at a charge if you use the new valves taking 1 amp. With a two-valve Set you will get 72 hours use. If you use 06 valves you will require two O.V.D. cells in series. Under these conditions the two-valve Set user will get 140 hours and with three valves 80 hours. The O.V.D. is thus the most economical accumulator you can buy for dull emitter use.



The new

Special Activation Process Batteries
OLDHAM

O.V.D.

*—the slow discharge Accumulator
which can be fully charged in 8 hours*

OLDHAM & SON, LTD.

Denton, Manchester

London Office & Service Depot:

: 6, Eccleston Place, S.W.1. :

: Phone: Sloane 2701 :

5/6

(Charged ready for use
—merely add acid)

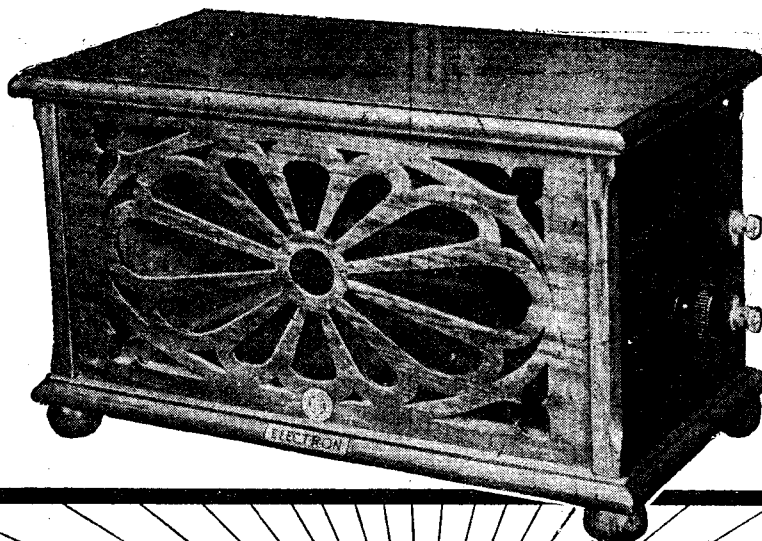
: Made by the Makers of the :
: Oldham H.T. Accumulator :

60 volts £2 10 0 80 volts £3 6 8
100 volts £4 3 4 120 volts £5 0 0

Solid oak base 3/6 extra if required.

Gilbert Ad 6548.

**AN
IDEAL
CHRISTMAS
GIFT**



**THINK OF
A BETTER
XMAS GIFT
IF YOU CAN**

ELECTRON

CABINET LOUDSPEAKER

ANOTHER ELECTRON SUCCESS

The Most Handsome Cabinet LOUDSPEAKER ever offered!

£3

CARRIAGE PAID.

**14 DAYS
FREE
TRIAL**

Try the ELECTRON CABINET LOUDSPEAKER for 14 days, then if you are not more than satisfied return it direct to us and the full purchase price will be refunded.

Here is another triumph by the proprietors of ELECTRON WIRE, the Aerial which made broadcasting popular by bringing it within easy reach of everybody.

For £3 we offer a very handsome, beautifully constructed cabinet, highly polished, thoroughly seasoned oak or mahogany, measuring 14½ by 8 by 8½ ins., enclosed within which is the very latest product of mechanical science for the reproduction of true musical and vocal tones.

After the expenditure of vast amounts of time, thought and money, it is now possible to offer the

WORLD'S FINEST LOUDSPEAKER AT A POPULAR PRICE

The sound-magnifying and diffusing apparatus has been specially devised with a regard to the true values of musical notes and speech and, by the adoption of mass production methods we are able to carry out our well-known policy of "the best at the lowest price."

Purchasers may rest assured not only of the craftsmanship of the ELECTRON CABINET LOUDSPEAKER but also of its

EXQUISITE TONAL QUALITY

No matter how poor the reception the ELECTRON CABINET LOUDSPEAKER to a very large extent automatically corrects this and sends forth a volume of the purest sound. Until you have seen and heard it you cannot know the joys of a perfect loudspeaker

Go to your dealer to-day or send remittance (£3) to us.

NEW LONDON ELECTRON WORKS, LTD.

Dept. 19.

(Members of the B.B.C.)

EAST HAM, Telegrams: "Stannum. London" Telephone: Grangewood, 1408-1409-1363. **LONDON, E.6**

THE NEW No 7



RECUPERATING AGENT IN THE HELLESEN DRY BATTERIES

Is the secret of uniform, silent and economical H.T. supply. Your wireless set will play a big part in your Xmas programme, and the burden will fall on your H.T. Dry Battery. Get a Helleesen now and set your mind at rest with the assurance that whatever else may cause you worry, your H.T. supply will not.

Again, you will probably delay buying your Xmas gifts until the last moment, and then a self-choosing gift is a blessing. Make it a Helleesen Dry Battery, and long though the battery may last, the appreciation will outlive it.

Ask your dealer for a Helleesen Dry Battery, it will cost you no more, it only gives you better and longer service.

60 volt "WIRIN" 12/6
99 volt "WIRUP" 21/-

(Postage Extra)

All types, voltages, etc., in Double and Treble capacities for H.T. and L.T. Supply. Ask your dealer for the type to suit your set and get the maximum service, or write us for full particulars.

Obtainable at all Radio, Electrical, and General Stores, HARRODS, SELFRIDGES, BARKERS, etc., or direct from

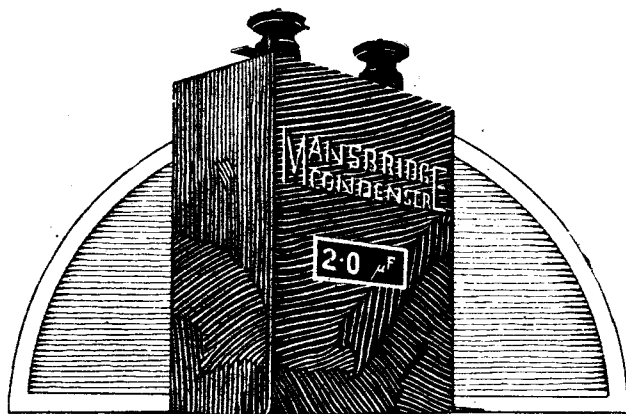
A. H. HUNT, Ltd. (Dept. 12), CROYDON, SURREY

TRADE

HUNT'S

MARK

They Last Longer



TWO HEADS....

Two heads are, proverbially, better than one. Therefore when you require a Mansbridge Condenser, see that you get a Dubilier-Mansbridge, the condenser which has been designed specially for wireless purposes.

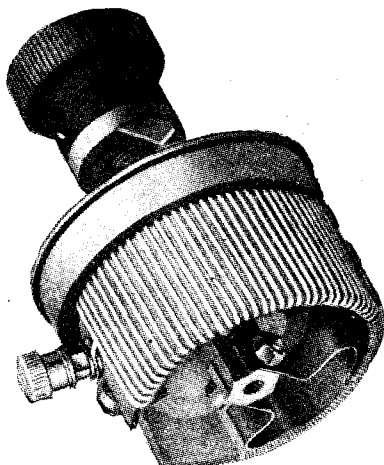
G. F. Mansbridge originated this type of condenser over 20 years ago, and his unique experience is found combined with that of Dubilier in each Dubilier - Mansbridge Condenser.

Take advantage of this combined experience which is to be found in no other condenser and ask your Dealer for Dubilier-Mansbridge Condensers.

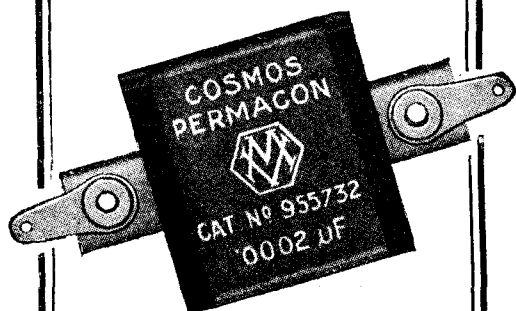
The colour of these condensers is Maroon, they bear the words "Mansbridge Condenser" embossed on the case and they carry the full Dubilier Guarantee.

DUBILIER

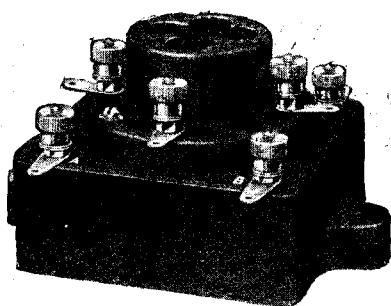
ADVT. OF DUBILIER CONDENSER CO. (1925) LTD.
DUCON WORKS, VICTORIA ROAD, N. ACTON, W.3.
E.P.S. 247



The "Cosmos" Rheostat.



The "Cosmos" Permacon.



The "Cosmos" Coupling Unit and spring valve holder.



Ask your dealer for these attractive Folders on "Cosmos" Valves, Sets and Components.

Cosmos

RADIO COMPONENTS

ensure reliable sets.

Constructors who desire smooth working and efficient sets use "Cosmos" Precision components.

The "Cosmos" Rheostat. The principal features of the "Cosmos" Filament Rheostat are its sturdy construction and reliable, smooth movement. The contact arm cannot easily be damaged, having its movement on the inner side of a porcelain bobbin which carries the windings. Other pleasing features of this Precision Rheostat are the handsome knob and dial, ONE HOLE fixing, and the small space it occupies.

Made in four types, two of which are double-wound for DULL or BRIGHT Valves and one a Potentiometer.

| Description | Ohms | Current | Price |
|---------------|------|----------|--------------|
| Single Wound | 6'0 | 1'0 amp. | s. d. 4 6 |
| Double " " | 20 | '4 " | 5 0 |
| " " | 34 | '2 " | 5 0 |
| Potentiometer | 300 | — | 6 0 |

The "Cosmos" Permacon is an ideal fixed condenser, being light in weight, of guaranteed accurate capacity, and having the lowest possible losses.

The dielectric is mica, and each condenser is tested at 500 volts during inspection. Nickel-plated cases give them a particularly neat appearance.

| | | | |
|------------------------------------|-----|-----------------|------|
| '0001 mfd. | 1/6 | '001 mfd. | 1/8 |
| '0002 " " " " " | 1/6 | '002 " " " " " | 1/10 |
| '0005 " " " " " | 1/6 | '005 " " " " " | 2/8 |
| '0003 " (with clips for grid leak) | 1/8 | '01 " " " " " | 3/9 |

The "Cosmos" Resistance Coupling Unit.—Real purity of reproduction can only be obtained with resistance capacity coupling. The "Cosmos" Coupling Unit with a suitable valve is as effective as an ordinary transformer coupled stage. It avoids all distortion and effects considerable economies in first and operating costs. Designed primarily for use with the "Cosmos" S.P. Blue Spot Valves, it can be used successfully with any valve having an amplification factor of 30 or more. Special attention is directed to the following advantages of the "Cosmos" Coupling Unit:

- (1) It takes up little space in a set.
- (2) It is not liable to be broken.
- (3) It has permanent resistance values.
- (4) It allows for simplified wiring.
- (5) It is economical in L.T. current (S.P. Blue Spot Valves consume 0.09).
- (6) It is economical in H.T. Battery consumption (less than 1/20 normal).

And lastly its use results in purity of reproduction without loss in volume.

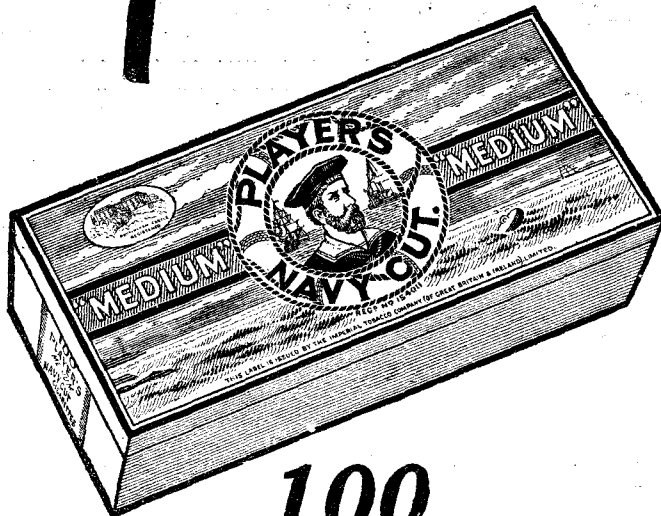
Type "O," the Unit alone 8/6
Type "V," the Unit incorporating spring valve holder (as illustrated) 10/6
Suitable valves for use with this unit are "Cosmos" S.P. 18/B at 14/- and "Cosmos" S.P. 55/BL at 18/6.

METRO-VICK SUPPLIES LTD.

(Proprietors: Metropolitan-Vickers Electrical Co., Ltd.),

METRO-VICK HOUSE,
155, CHARING CROSS ROAD, LONDON, W.C.2 R P50

Player's please!



100

**PLAYER'S "MEDIUM"
NAVY CUT CIGARETTES**

4/8

**A Gift
that gives a
Hundred Happy Memories**

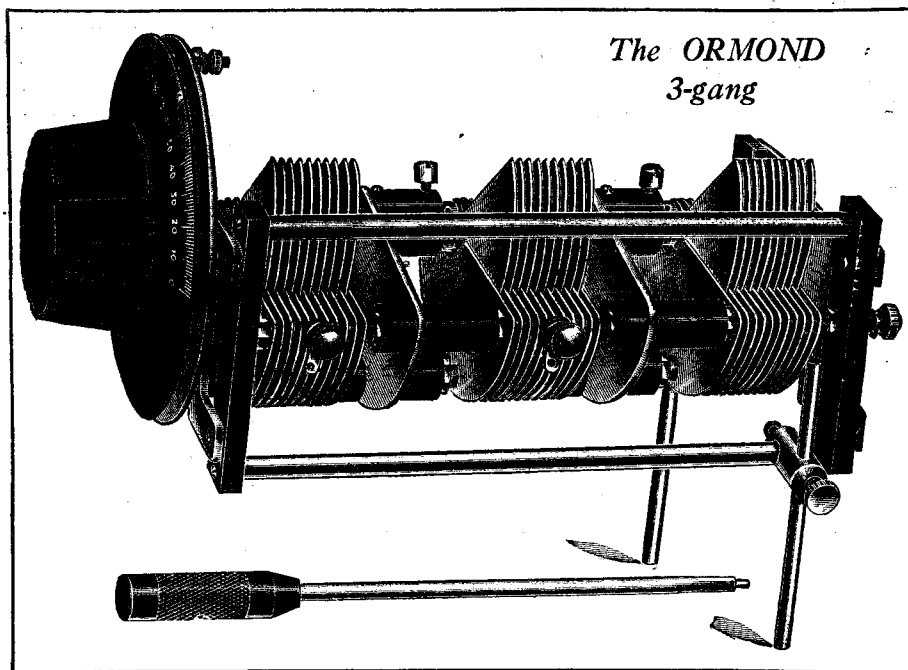
NCC 5

ALSO PACKED IN 10's, 20's AND 50's

Excellent Christmas Presents

to give or to receive

THESE CONDENSERS are similar to our Low Loss models and are designed for use in circuits of the "Single Dial Control" Type. EACH IS composed of two or more separate condensers, insulated from each other, of maximum capacity '0005 microfarad.



ORMOND GANG CONDENSERS

Mark the low prices:—

Two-Gang 32/- Tri-Gang 40/- Four-Gang 50/-

An easy independent adjustment of rotors is provided, for balancing out circuit variations.

Special ball bearings on each rotor ensure a smooth action, giving a liquid-like movement facilitating precise tuning with noiseless operation.

Construction is very rigid.

An anti-capacity earthing shield is supplied which may be insulated from Condenser and earthed by separate connection.

For panel mounting the "One Hole" fixing method is used, and two adjustable legs are attached to truss rods for rear support.

Complete with 4-in. Knob and Dial, shield, and Tommy Bar with insulated handle for bank adjustment.

Terminals and soldering tags for connections.

These Condensers are not fitted with slow-motion movement.

When fitted with 4-in. Slow-Motion Dial, ratio 55-1, these prices are 8/- extra respectively.



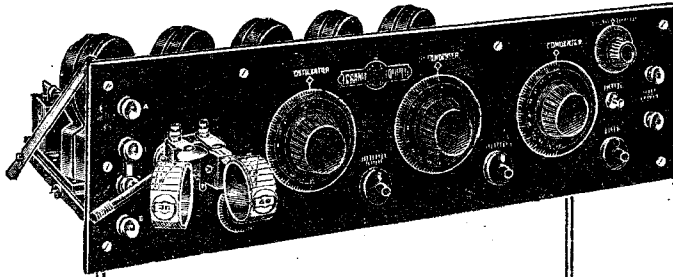
199-205, PENTONVILLE ROAD, KING'S CROSS, LONDON, N.1.

Telephone: Clerkenwell 9344-5-6.

Telegrams: "Ormondengi, Kinross."

Factories: Whiskin Street and Hardwick Street, Clerkenwell, E.C.1.

Continental Agents: Messrs. Pettigrew & Merriman, Ltd., "Phonos House," 2-4, Bucknall Street, New Oxford Street, W.C.1.



Igranic Supersonic Heterodyne Receiver

The Igranic Super-Heterodyne Outfit is the ideal present for all wireless enthusiasts. The instructions for building are so complete and the constructional work so simple that the Igranic Outfit can be built into a powerful six-valve Super Het receiver even by those who do not possess any previous wireless knowledge.

Receivers built from the Igranic Outfit are wonderfully selective, sensitive and stable. Stations can be tuned in all round the dial at full loud-speaker strength using a frame aerial only.

The purity of reproduction is of a very high order such as is seldom associated with Super-Heterodyne receivers.

By means of interchangeable units the receiver has a wave-length range of approximately 40 to 3,500 metres.

Igranic Supersonic Heterodyne Outfit £15:15:0

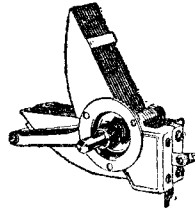
IGRANIC INSTRUCTIONAL CARTON

contains a full illustrated handbook, full-size wiring diagrams, layout drawings, drilling template and much useful information regarding the Super-Heterodyne principle.

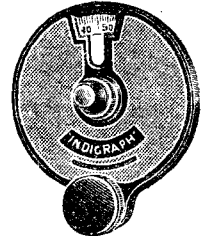
Price - - - 2/6



Give Igranic Radio Devices—the ideal Xmas Presents



WRITE FOR THE
NEW IGRANIC
CATALOGUE.
LIST No. R.38.



IGRANIC VARIABLE CONDENSERS

Igranic Variable Condensers are always acceptable, they have become known as the "choice of experts—and amateurs." Made in several different capacities and as single, dual, twin gang, and triple gang patterns. Single patterns are made for square law and straight-line-frequency tuning.

Prices are from 14/6 each.

IGRANIC "INDIGRAPH"

If you have 7/6 to spend give an Indigraph Vernier Knob and Dial. It gives smooth slow motion control entirely free from backlash. Scale readings pass under a hairline enabling very accurate readings to be made, and space is provided on the dial for recording station settings. The Indigraph is of very handsome appearance.

Price - - 7/6

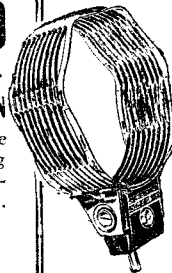
IGRANIC SHORT WAVE COILS

Igranic Short Wave Coils are particularly acceptable at this time of the year when conditions are so good for long distance short wave work. Igranic Short Wave Coils are wound with heavy gauge bare wire, rigidly supported with a minimum of solid material.

They are made in four sizes covering wavelengths of 10 to 100 metres.

Prices: 2 (turn) 2/6
4 " 2/7
6 " 2/8
9 " 2/9

Or 10/- per set of four.



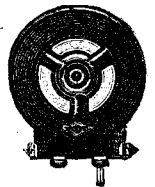
IGRANIC "XLLOS" COILS

Give a set of Igranic "XLLOS" (Extra Low Loss) Coils and you will be giving the means for better reception. They are wound in a special manner which results in very high efficiency. The winding is enclosed in a sealed Bakelite shell which excludes dust and moisture and prevents the coil being damaged.

Pin and socket are separated by an air space and the spacing is adjustable from 1/8 up to 2".

Made in 10 sizes for wavelengths 220 to 3,200 metres.

Prices from 3/9 each.

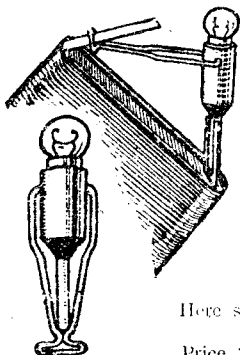


IGRANIC ELECTRIC CO LTD

149, QUEEN VICTORIA STREET, LONDON

WORKS: BEDFORD

Make your own H.T.



"C.W." (Combined).

- (1) SAFETY WANDER PLUG.
- (2) BATTERY TESTER
- (3) INSPECTION LAMP.

(Patent No. 218957).

Here shown when used as an Inspection Lamp.

Price 1/3 complete with bulb.

THERE is no better or cheaper H.T. Unit than that made up by yourself with 4 1/2 v. Pocket Lamp Batteries connected together with "C.W." Links.

When the Unit is placed in the "C.W." Extending Battery Container you have a neat, useful and Portable H.T.

Test the Batteries occasionally with the "C.W." Battery Tester, and if an emergency lamp is required disconnect a Battery from the Unit and fix to the terminals as illustration. This Tester can also be used as a Safety Wander Plug.

"C.W." Specialties can be obtained from your local Dealer.

ADVT. OF THE JEB TRADING CO.,
49, AVENUE ROAD, ACTON, W.3.

"C.W."

BATTERY LINKS. (Patent No. 217141). Actual size. Price 6d. per doz. With hole for Wander Plug. Every link stamped. Look for the name and refuse imitations.

"C.W." EXTENDING BATTERY CONTAINER.

(Reg. Design No. 709874).

Closed, holding 16 Batteries. Connected with "C.W." Links = 72 volts.

Same Container, fully extended, holding 30 Batteries = 135 volts. Price 4/6 each.



Exide

THE LONG-LIFE BATTERY

An Ideal Xmas Gift

Types DTG and DFG.

Specially designed for small discharge currents, and to hold their charge, when not in use, for long periods. Suitable for small Dull Emitter valve sets.

Capacity.

| DTG. | DFG. |
|--------------|--------------|
| 20 amp. hrs. | 45 amp. hrs. |
| Price 4/6 | 8/6 |

Type HZ.

Combines the advantages of the DTG and the CZ—a De Luxe battery suitable for all types of receiving sets.

Capacities 40 to 80 amp. hrs. Prices from 17/6

Type WJ.

Give steady, even discharge free from fluctuations.

Capacity 2,500 milli-amp. hrs. 20 volts. Price 15/-

Better batteries mean better wireless.

Better wireless means a better Christmas.

There can be no more suitable gift—to the family or the wireless enthusiast—than an Exide Battery. In the great range of types there is just that battery to fill each individual need—to suit every wireless requirement. And every one of these types is specially designed for the work it has to do by the world's greatest experts. Any reputable dealer will help you to select the best type.

Exide Batteries suit your set and suit your purse.

Type WH.

The most satisfactory source of High Tension supply, giving purity of reception against a dead silent background.

Capacity.

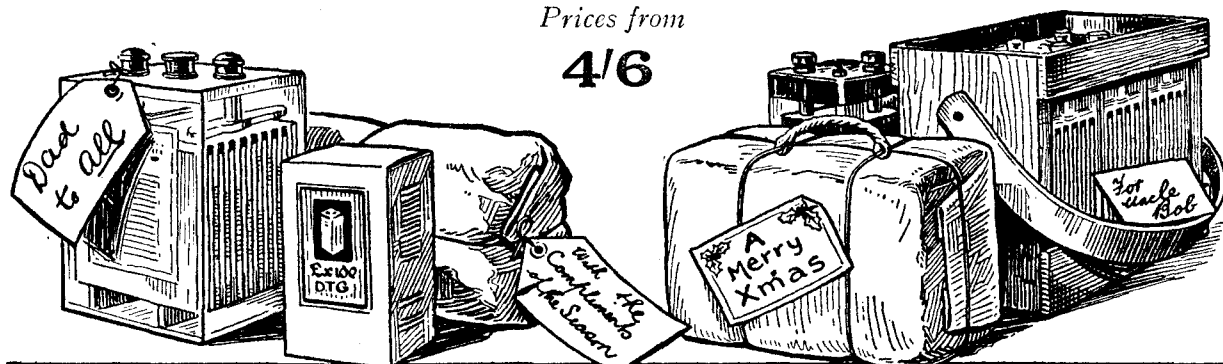
| | |
|-----------------------|-----------|
| 5,000 milli-amp. hrs. | 24 volts. |
| Price 30/- | |

Type CZ.

The standard popular type of Low Tension battery giving comparatively heavy currents for long periods, with minimum voltage drop.

Supplied in 2, 4, and 6-volt units, capacities 20 to 60 amp. hrs. From 11/3 upwards.

Prices from
4/6



"NO CRYSTAL SET IS COMPLETE WITHOUT THIS WONDERFUL ATTACHMENT"

Extract from an entirely unsolicited testimonial recently received from a customer situated 80 miles from Davenport

The WONDERFUL ATTACHMENT referred to is the

MAGNETIC MICROPHONE BAR AMPLIFIER

(Patent No. 248581/25.)

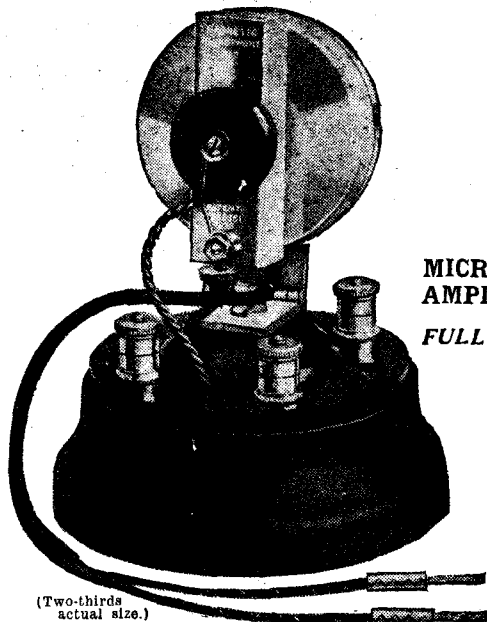
Not only will this marvellous device give really good **LOUD-SPEAKER RESULTS** from **CRYSTAL RECEPTION** of average strength, but it is absolutely the **ONLY** means of increasing the strength of weak signals in headphones without using valves.

Works perfectly on one or two dry cells.

A BOON TO DEAF PERSONS

EQUALLY EFFICIENT ON VALVE SETS

If your dealer cannot supply order direct from Sole Manufacturers and Patentees



(Two-thirds actual size.)

NOT a Microphone Button.

NO Valves, Accumulators or H.T. Batteries.
Fragile parts.
Distortion.

Simple as A B C.

MICROPHONE AND OTHER PARTS OF AMPLIFIER SUPPLIED SEPARATELY

FULLY ILLUSTRATED LISTS FREE

COMPLETE AMPLIFIER as shown PRICE post free **38/-**
3-volt DRY BATTERY lasting over three months **4/-** extra.
No other accessories required.

DELIVERY BY RETURN FROM STOCK. EVERY AMPLIFIER GUARANTEED.

NEW WILSON ELECTRICAL MANUFACTURING CO., LTD., 18, FITZROY STREET, EUSTON ROAD, LONDON, W.1. Phone: Museum 8974.

Xmas Gifts that last a Year!

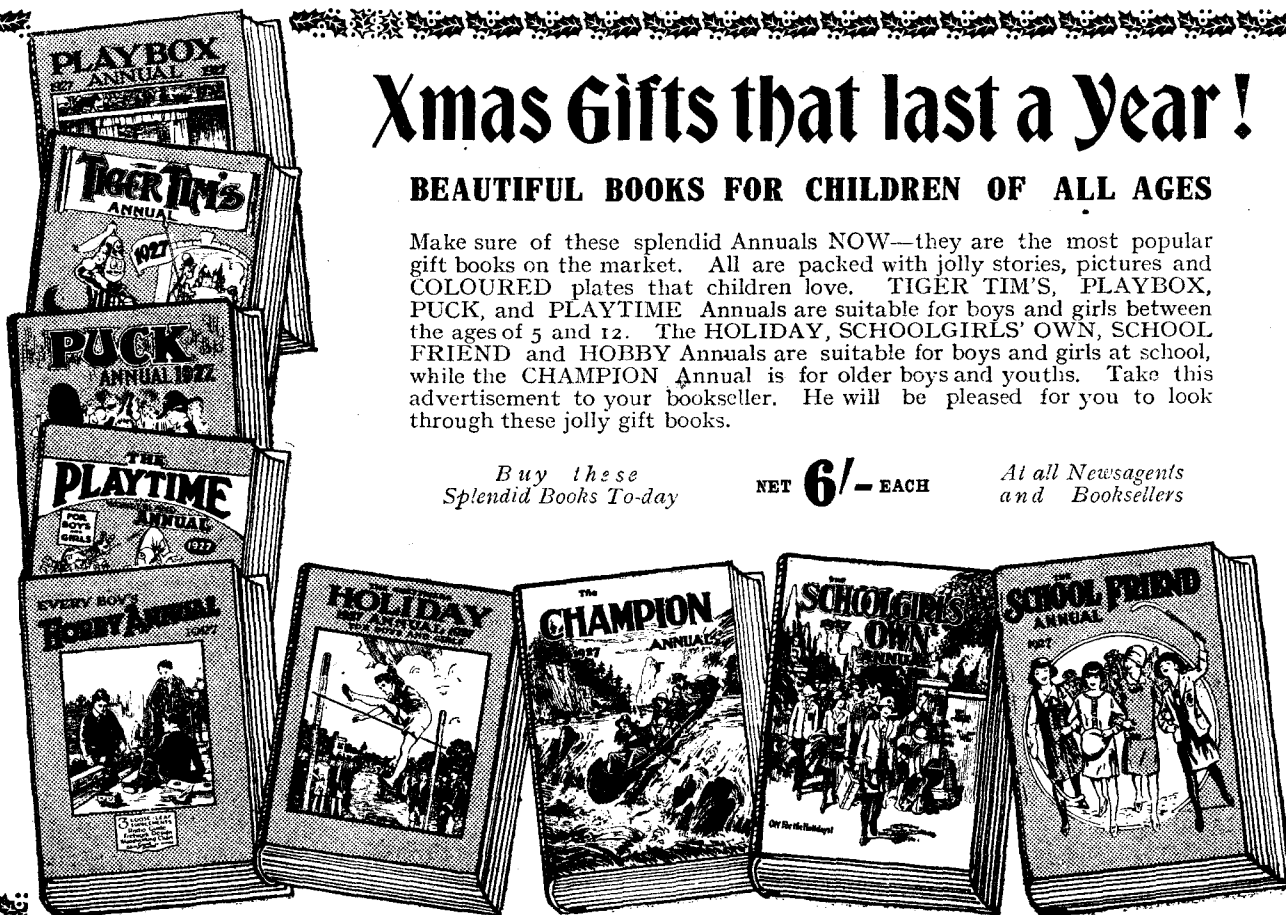
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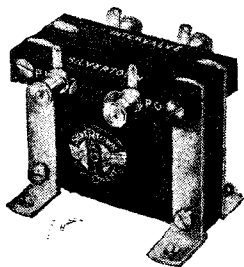
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Silvertown

WIRELESS ACCESSORIES

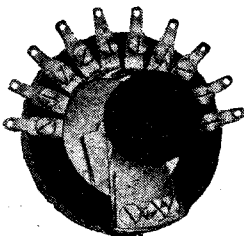
Ensure Perfect Reception



B.500. INTERVAL TRANSFORMER.

Guaranteed for 12 months.
Price **21/-** each.

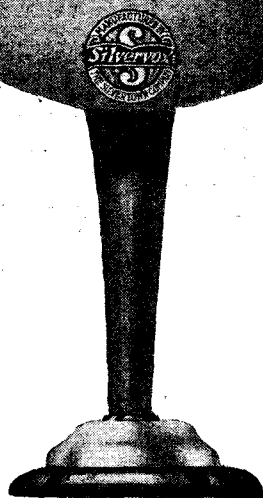
This Transformer has been adopted by leading manufacturers of Wireless Receiving Sets and discriminating amateurs in all parts of the world. Excellent results have been obtained on tests carried out by the National Physical Laboratory. Copy of the curve can be had on application.



B.570. 10-WAY INDUCTANCE OR CAPACITY SWITCH. (Patent 226245.)

This switch is of the under-panel mounting type, and is fitted to the panel by means of the two counter-sunk head screws supplied. It enables the experimenter to build up large capacities, and is an invaluable addition to any set.

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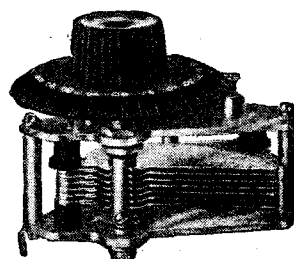
The
SILVERVOX

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 **£3-0-0** each.

AN AID TO ENTHUSIASTS.

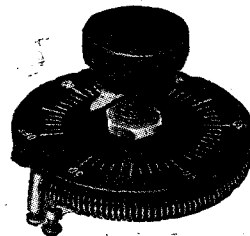
We have prepared a logging chart for recording wavelengths, condenser settings, etc., of those stations which require careful calibration to tune in. Wireless enthusiasts all over the country are being invited to apply to you for their copy. Have you sufficient stocks? Ample supplies will be immediately forwarded on request.



STRAIGHT LINE FREQUENCY CONDENSER (Low Loss)

A precision instrument, the design of which ensures perfect mechanical construction with high electrical efficiency. The rotor plates are earthed, eliminating hand capacity effects. It is also completely silent when adjustments are being made. Perfect electrical contact is obtained by means of a flexible phosphor bronze pig-tail connection.

B.615 0.00025 mfd. .. **11/6**
B.606 0.0005 mfd. .. **13/-**



B.599. SILVERTOWN FILAMENT RHEOSTAT. ONE-HOLE FIXING.

Circular pattern, on ebonite former, complete with knob, pointer, black celluloid scale engraved in white, and two terminals for connections. The resistance wire is wound on an insulating rod, thereby giving a perfectly smooth adjustment. B.599—Wound to approximately 5 ohms resistance. Price **3/-** each. B.600—Wound to approximately 30 ohms resistance. Price **3/6** each.

THE SILVERTOWN COMPANY

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

Works: Silvertown, E.16

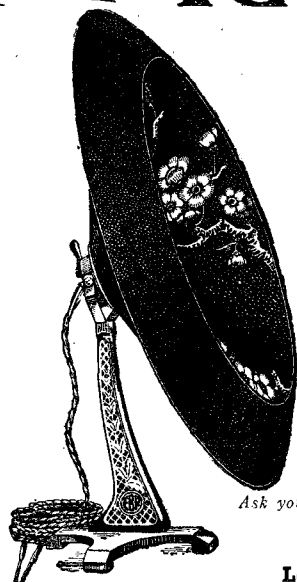
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CHARM!

Charm is expressed both in the tone and design of the

NEW MODEL EDISON BELL SPEAKER

the artistic appearance of which is second only to its tonal reproduction.

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An Ideal Xmas Present

Ask your dealer for attractive new season's catalogue, or write direct to the company for same.

EDISON BELL, LIMITED,
London, S.E.15. And at Huntingdon.

**TESTED 500 VOLTS
FLAT TYPE**



**TESTED 500 VOLTS
UPRIGHT TYPE**



INSIST ON EDISON BELL CONDENSERS

THEY ARE BRITISH MADE AND GUARANTEED BY A NAME WITH 30 YEARS REPUTATION BEHIND IT

All enquiries for Lewcos Radio Products should be made to your local dealer.

| TABLE 1 | | | TABLE 2 | | | |
|---------|----------------------------|------------------------------------|---------|--|------------------------|-------------------------------|
| Coil | Inductance in microhenries | Self-capacity in micro-microfarads | Coil | Parallel capacity in micro-microfarads | Wave-lengths in metres | Effective resistance in ohms. |
| 35 | 61 | 15 | 35 | 300 | 264 | 2.8 |
| 40 | 90 | 15 | 40 | " | 318 | 2.9 |
| 50 | 150 | 9 | 50 | " | 406 | 3.3 |
| 60 | 200 | 13 | 60 | " | 472 | 4.4 |
| 75 | 295 | 12 | 75 | " | 573 | 5.3 |
| 100 | 540 | 11 | 100 | " | 774 | 6.6 |
| 150 | 1,410 | 12 | 150 | " | 1,250 | 15.8 |
| 200 | 2,220 | 17 | 200 | " | 1,580 | 19.7 |
| 250 | 3,070 | 17 | 250 | " | 1,860 | 24.9 |
| 300 | 4,800 | 14 | 300 | " | 2,320 | 28.2 |

Results of independent H.F. tests made by the N.P.L.

Here are the figures — judge for yourself!

The National Physical Laboratory figures fully bear out our claim that the LEWCOS Coil is the most efficient produced. In the design of radio inductances, the smaller the R/L value for any circuit, the greater is the selectivity and the signal strength. This fact has predominated over all other considerations in producing Lewcos Inductance Coils with the



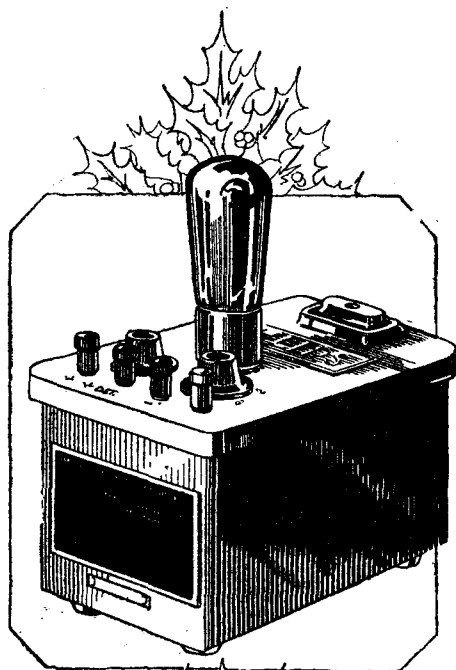
result that we can publish without fear the R/L values for LEWCOS Inductance Coils as obtained from the N.P.L. measurements together with the wave length at which measurement was made. LEWCOS Coils make all the difference in reception. Ask your wireless dealer to demonstrate the Lewcos Coil on his set. Descriptive leaflet gladly sent on application.

LEWCOS Inductance COIL

The LONDON ELECTRIC WIRE COMPANY and SMITHS, LIMITED
Phone : Clerkenwell 1388 Playhouse Yard, Golden Lane, London, E.C.1 Telegrams : Electric, London

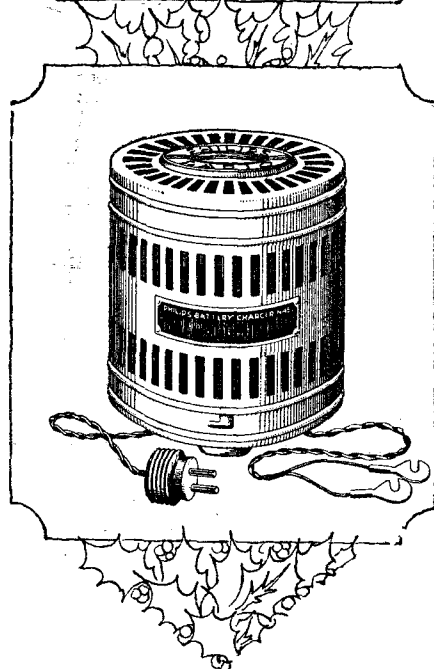
CHRISTMAS GIFTS

TWO PHILIPS PRODUCTS VERY SUITABLE FOR XMAS PRESENTS.



PHILIPS H.T. SUPPLY UNIT

Gives from 20 to 160 volts approximately. Ensures a supply of current to work any set efficiently, using standard types of valves. Consumption is approximately 5-10 watts. Output variable from 2 tapings. Safe and silent in use. Price complete **£7 : 10 : 0**



PHILIPS RECTIFIER

Type 450

Charges radio batteries from 2 to 6 volts at 1.3 amps., consuming 30 watts. A full wave valve rectifier, using the specially constructed Philips Rectifier Valve and Resistance Lamp, which automatically regulates the current supply. Needs no attention.

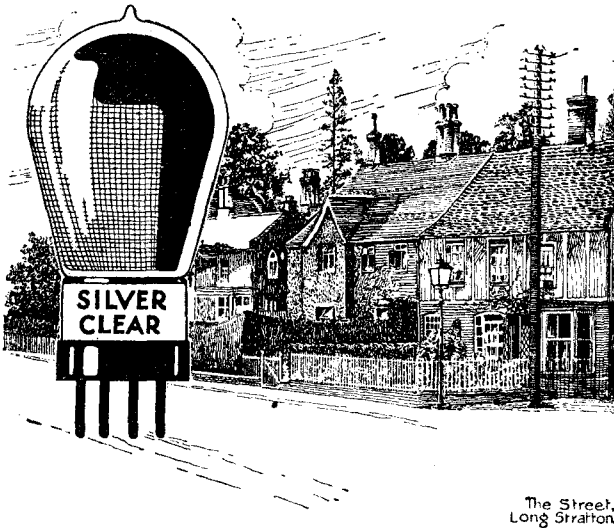
Price complete **£4 : 0 : 0**

Both Units for Alternating Current.

Ask your dealer to demonstrate.

PHILIPS

Louden Valves



"The two original valves have been working all the time."

Mr. P. Hearn, of Long Stratton, has had over 12 months satisfactory use from the two Loudon Valves in his Little Giant Set.

Like all other Loudon Valve users, Mr. Hearn is highly satisfied with the results, and he shows it by ordering two more Loudens.

Read what he says:—

"Dear Sir,
"Enclosed please find P.O. for 9/6. Please forward, if possible by return, two Loudon Valves (F1 at 4/6 each).
"My 'Little Giant' two valve set has now been in use for twelve months, and has given me every satisfaction. The two original valves have been working all the time.
"I feel that everything that bears the stamp of 'Fellows' is worthy of recommendation, and it gives me pleasure in being able to thus express my satisfaction.
Yours truly,
P. HEARN (Long Stratton)."

Louden Valves are made by British labour in a British factory with British capital and can be depended upon for the finest volume, range and silver clearness. They can only be offered at such low prices because of our well-known policy of selling direct to the public and cutting out the middleman's profit.

The list below gives prices and full particulars.

Order your Loudon Valves from us by post.

| | | |
|---|---|---|
| 4/6 Bright Emitters. L.F. Amplifier. F.1. H.F. Amplifier. F.2. Detector. F.3. 5.5 volts 0.4 amps. | 8/- Dull Emitters. L.F. Amplifier. L.E.R.1. H.F. Amplifier. L.E.R.2. Detector. L.E.R.3. 2 volts 0.2 amps. | 8/- Dull Emitters. L.F. Amplifier. F.E.R.1. H.F. Amplifier. F.E.R.2. Detector. F.E.R.3. 4 volts 0.1 amps. |
| 9/- Dull Emitters. L.F. Amplifier. F.E.R.1. H.F. Amplifier. F.E.R.2. Detector. F.E.R.3. 6 volts 0.1 amps. | 11/- D.E. Power Valves. Trans. Amplifiers P.E.R.1. Resist. Amplifiers P.E.R.2. 4 volts 0.2 amps. | 12/- D.E. Power Valves. Trans. Amplifiers P.E.R.1. Resist. Amplifiers P.E.R.2. 6 volts 0.2 amps. |

Postage and packing: 1 Valve, 4d. 2 or 3 Valves, 6d. 4, 5 or 6 Valves, 9d.

FELLOWS, PARK ROYAL, N.W.10.

Branches:

LONDON: 20, Store Street, Tottenham Court Rd., W.C. (Museum 9200).

BIRMINGHAM: 248, Corporation Street (Central 435).

BRIGHTON: 31, Queen's Road (Brighton 899).

BRISTOL: 36, Narrow Wine Street (Bristol 7972).

CARDIFF: Dominions Arcade, Queen St. (Cardiff 7685).

LEEDS: 65, Park Lane (Leeds 21479).

MANCHESTER: 33, John Dalton Street.

NOTTINGHAM: 30, Bridlesmith Gate (Nottingham 5551).

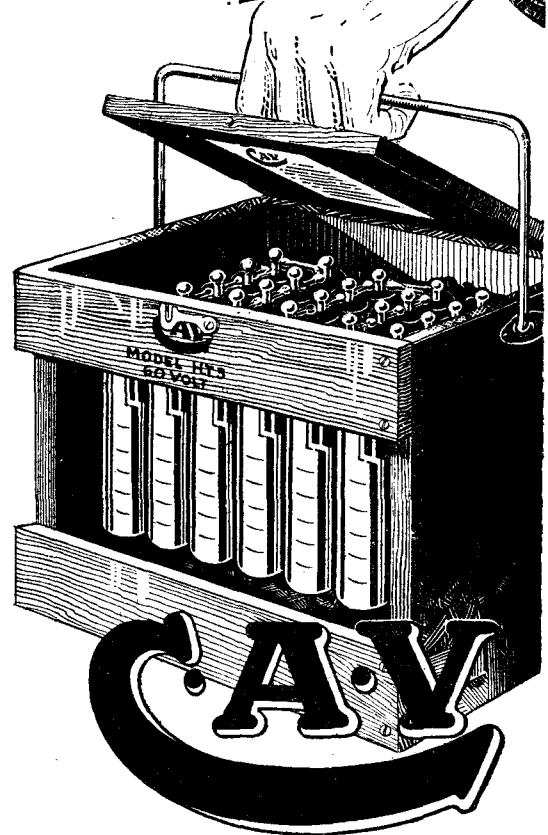
TONBRIDGE: 34 Quarry Hill (Tonbridge 172).

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ILLUSTRATED
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BUY DIRECT AND SAVE MONEY

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1927 IMPROVED MODEL H.T. ACCUMULATOR

TO prove our absolute confidence in these accumulators to satisfy you, we guarantee, if you are not satisfied, to accept return within 21 days from purchase date, and refund money in full provided battery is returned intact to the Agent from whom it was purchased.

CAV H.T. Accumulators represent an epoch-making advance as compared with dry batteries. When dry batteries are down they are done, and frequent renewals make them more expensive. CAV H.T. Accumulators will last for years, and only need recharging approximately every four months. They give bigger volume and are silent in operation.

Every Accumulator is supplied fully charged ready for use, absolutely complete in case, and with distilled water filler, all included in the price, viz.:

60 Volts 60'-

Size 8½ ins. by 7 ins. by 7¼ ins. height.

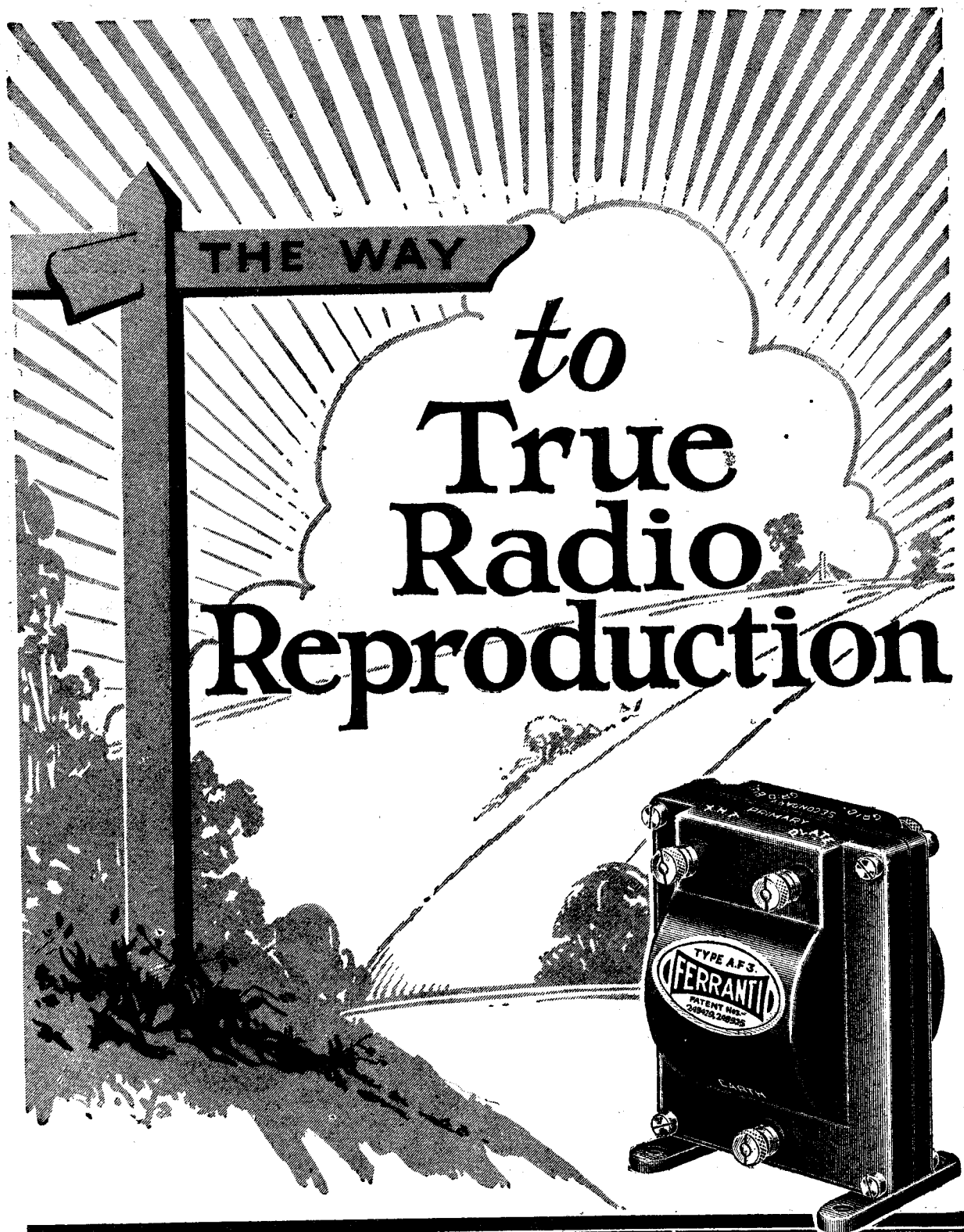
Catalogue supplied on application.

Have you entered our 100 Guineas H.T. Accumulator Name Competition?
WRITE FOR FULL PARTICULARS.

CAVandervell & Co., Ltd.
ACTON, LONDON, W. 3.

Telephone: Chiswick 3801
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FERRANTI
TRANSFORMERS



FELLOWS WIRELESS

60 Volts
8/9

THIS H.T. BATTERY

- costs only 8/9,
- is made throughout in London,
- is sent post and packing free,
- reaches you, brim full of energy, within a few hours of manufacture owing to the enormous number we sell daily,
- maintains its voltage for the longest possible time owing to the extremely generous "elements" of which it is made,
- will give you a long life of loud, clear reception free from all crackling noises,
- is tapped every 3 volts enabling you to apply the exact voltage required by your valves for best results,
- is supplied complete with Red and Black wander plugs—no extras to buy,
- is, in short, the **FINEST IN THE WORLD** because no other H.T. Battery made (except other Fellophone batteries) can come anywhere near it in performance or value.

Other Fellophone Batteries are listed below. We can only offer you this astounding value because, by supplying you direct we can save all the middleman's profits and so give you a better battery for less money.

Order from us or from our Branches to-night.

54 Volt (with 3 volt tap for grid bias). Post FREE **6/6**

60 Volt (tapped every 3 volts and supplied complete with Red and Black wander plugs). Post FREE **8/9**

108 Volt (tapped every 6 volts and supplied complete with Red and Black wander plugs). Post FREE **13/-**

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TONBRIDGE: 34, Quarry Hill. (Tonbridge 172).

Send for
48-page
Catalogue
No. 33.
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BUY DIRECT AND SAVE MONEY

E.P.S. 278

METAL FOR PERFECT INSULATION

SECRET OF T.C.C.'s. SUCCESS

THE VALUE OF TWENTY YEARS'
MANUFACTURING EXPERIENCE

THE position of the Telegraph Condenser Co. Ltd., in the Condenser world is unrivalled. In twenty years of manufacturing, millions of condensers have been made. Large Power Factor Condensers weighing over three tons. Little Mica Condensers and the famous Mansbridge Condensers only

two ounces in weight. Yet a common feature in each—the letters 'T.C.C.' stamped on the case.

Twenty years of success! Millions of the small Wireless Condensers have been sold. In every country in the World you'll find them. Long ago the Admiralty standardised on T.C.C. Power Condensers. The G.P.O. and the World's Cable Companies, too, pay tribute by choosing them year after year.

Such success is not brought about by ac-

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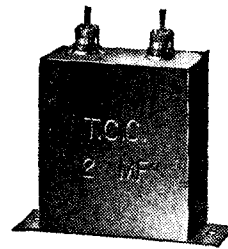
what you get when you choose the T.C.C. Mansbridge Condenser.

The secret of the perfection of the T.C.C. Mansbridge is in the experience with

which it is designed and constructed. In the high grade copper and mica used. Finally—and perhaps most important of all—in its metal case. Metal is proof against atmospheric conditions.

Metal is robust. Metal is highly efficient in its insulation properties—twenty-four hours in water is not too strenuous a test for the insulation of the T.C.C. Moreover you can use the T.C.C. with absolute confidence that it will never short circuit on to its metal case.

You can have faith in T.C.C. Faith that the qualities which have made the name famous during twenty fruitful years, will be apparent in that which you buy.



'The famous little green fellow'



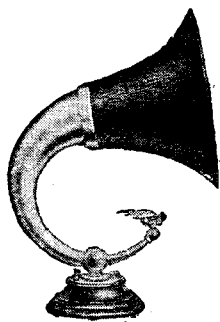
The symbol of Condenser perfection

T.C.C.

MANSBRIDGE CONDENSERS

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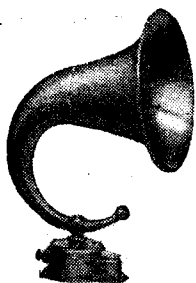
The Q.

120, 2000 or 4000
ohms.
£15 15 0



The Disc.

2000 ohms.
Black and Gold,
Brown and Gold,
White and Gold,
£7 7 0
Oxydised Steel finish,
£8 8 0



The H3Q.

2000 or 4000 ohms.
£3 5 0



The H.Q.

20 inches high.
2000 or 4000 ohms.
£6 0 0

A Gift that speaks —every day of the year—to re- mind the recipient of the donor

CHRISTMAS 1926, unlike previous years, has not the problematical question of 'what to give.' Mostly all your gift problems are solved this year by the one word 'wireless.'

Nearly every fellow, nowadays, would thank you for a Wireless gift. Here's one which this Christmas and throughout the year will be a constant testimony to your excellent of choice. When you give a **Brown** Loud Speaker or Headphone you are bestowing a real boon. The priceless possession of an instrument which day in and day out will faithfully interpret all that is best in the World's music, drama and speech.

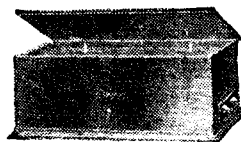
The **Brown** range of instruments is so complete that almost for whatever you wish to pay there is a Loud Speaker or Headphone to meet your needs.

Yet whether you pay 20/- for the famous Featherweights or £15 15s. 0d. for the Q. Loud Speaker, you can be certain that your gift will give accurate service—now and in the years to come.



Type A2 Headphones.

4,000 ohms. ... £1 10 0
Also
Type A. 120, 2,000, 4,000
ohms., 50/-; 8,000
ohms., 60/-
Type F. (6 ozs.) 4,000 ohms.
20/-



Crystal Amplifier.

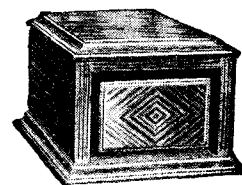
Enables a Crystal Set to work a Loud Speaker without Valves, within 15 miles of B.B.C Station or 80 miles of Daventry.

£4 4 0



The H1.

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



The Cabinet.

In Mahogany or Oak.
2000 or 4000 ohms.
£6 6 0



The H3.

2000 or 4000 ohms.
resistance.
£3 0 0



The H4.

(Only 10 inches high).
2000 ohms.
30/-

Brown

S. G. BROWN, LTD., Western Avenue, North Acton, W.1.

Retail Showrooms: 19, Mortimer Street, W.1; 15, Moorfields, Liverpool; 67, High Street, Southampton. Wholesale Depots: 2, Lansdown Place West, Bath; 120, Wellington St., Glasgow; 5-7, Godwin Street, Bradford; Cross House, Westgate Road, Newcastle; Howard S. Cooke & Co., 59, Caroline Street, Birmingham; Robert Garmany, Union Chambers, Union Street, Belfast, N. Ireland.

Pliable after 2,500 hours of Continuous Service

—a triumph for the new
Cossor Kalenised filament

HERE is a startling example of the superiority of the Cossor Kalenised Filament. The valve shown in this photograph—after a life test of 2,500 hours at 1.8 volts—was broken open and suspended by its filament. Even after this abnormal period of use—which is equivalent to 2½ years' ordinary wear—the filament was still supple and strong enough to bear the whole weight of the valve. It showed no signs of crystallisation. In fact, there was no reason why the valve would not have given satisfactory service for an even greater period.

No visible glow means long life.

Every wireless enthusiast must appreciate the significance of this test. It means that at last there is available a filament which operates practically without heat. For heat is the one great destructive force which ultimately weakens the filament and causes a fracture. Obviously the Cossor Kalenised filament is no ordinary filament.

The torrent of electrons come—not from the metal core—but from the kalenised layers surrounding it. The sole purpose of the metal core is to carry the trifling current required.

Wide range of filament voltage.

This prolific electron stream commences to flow at 1.1 volts. It reaches its maximum at 1.8 volts. But even though a fully charged accumulator (reading 2.2 volts) be used no harm will be done—although there will be little or no increase in emission. It is quite immaterial, therefore, whether you use rheostats or not in your Set.

Co-axial Mounting ensures uniformity. The second great fundamental improvement pioneered by Cossor this season is Co-axial Mounting. All Cossor valves in the same class are absolutely alike. Variation is impossible because the filament, grid and anode are secured by a seonite insulator in permanent

The valve which
serves you longest



After the
equivalent of
2½ years use

alignment. Co-axial Mounting finally abolishes microphonic noises and ensures a rich volume of tone upon a background of dead silence. Remember that only Cossor has the Kalenised filament and Co-axial Mounting—there is no substitute for a Cossor Dull Emitter.

In three types

Black Band Detector Valve. Also Red Band for H.F. use. Consumption '1 amp. Voltage 18.

14/-

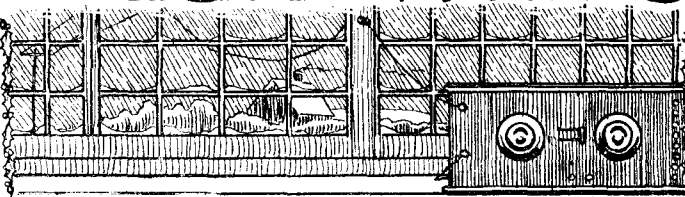
Stentor Two Power Valve. Consumption '15 amp. Voltage 18.

18/6

Cossor Point One

Popular Wireless

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RADIO NOTES AND NEWS OF THE WEEK.

Christmas Good Tidings—Radio on the Air Routes—Aerial Trespass—The Six Pips Signal—
Keeping the Aerial Warm—"P.W." Constructors' Competition.

Christmas Good Tidings.

LISTENERS, awake! Are you feeling downhearted? Do you get peeved, or peckish, or peaky? Is everything dismal, and down, and dark and dreary—and all those other d's that you know as well as I do?

Well, now. Listen! Hark to Uncle Ariel calling! Hear the glad tidings. I'm gonna put you wise. Read on, Macduff, Herbert, or whatever your name is, and your depression will vanish into thin, thin air!

A Cheerful Crowd Calling.

THERE is no need whatever for all this funeral foolishness and sepulchral gloom. For at this very moment of time, right now, and instant, the antidote is prepared. Dozens of cheery souls are busily banging drums, twanging harps, biffing lyres, and kicking up no end of a how-d'-you-do with the sole idea of amusing you, and passing your hours away happily. Laugh! Why, man, if you could only hear them you would be tickled to the point of ultimate extinction.

Tune in Your Share.

"WHERE are they?" you say. Why, they're on the ether, of course. They stand in front of microphones—hundreds of them in Europe alone—and all day they try to tickle your ears. (They regard you as John Listener, the biggest pot in the broadcasting world to-day!) And all that you have to do to hitch on to some of this fine music and entertainment is to get busy on your wireless set, and tune in your share. So pull up your socks, put up your pole, and give old Gloom the go-by!

Radio on the Air Routes.

THE new air route to India and Egypt, which is being opened by Imperial Airways at the beginning of next year, is to have a chain of wireless aerodrome

A Christmas Coincidence.

"Popular Wireless"! How true are these words

That appear on our cover each week.
The whole world is flocking to listen in herds

When funny loud speakers loud speak.
Husbands all stay at home, wives spend the day at home
Joining the radio clique.

"Popular Wireless"! And as this is so
It came as a Christmastide salve,
For my schedule of suitable presents, although

Long, was disposed of by twelve.
To friends and relations I've made presentations
Of wireless sets (crystal and valve).

"Popular Wireless"! To nephew and niece,
To cousin and uncle and aunt,
I sent off a beautifully-made set apiece
Thinking: "Now, really, I can't
Possibly do better, for how can you better
Highest-grade radio plant?"

"Popular Wireless"! I realised that,
But my estimate must have been wrong,

For now in each part of my bachelor flat
There's a talk or a waltz or a song.

With no exception, rooms all are
"reception" rooms
Going it steady and strong!

"Popular Wireless"! Each nephew and niece,
Each cousin and uncle and aunt,
Has sent me a beautifully-made set apiece

Thinking (like I did) "We can't
Possibly do better, for how can you better
Highest-grade radio plant?"

L. E. V.

ground stations. The giant D.H. 66 multiple-engined aircraft that will fly on this route will all be fitted with the latest aircraft wireless equipment, so that they are never out of touch when flying.

Even in the unlikely event of a forced landing in the desert, wireless communication could easily be established with the nearest ground station.

Aerial Trespass.

IT does not seem to be generally known that if you want your aerial to dingle-dangle across other people's property, you must get their permission. Settling a dispute between neighbours some weeks ago, the Old Street magistrate told a man: "Your neighbour owns everything above his property, right up to Heaven, and I am afraid you will have to take your aerial down."

A Trinadyne Triumph.

"I MADE up a Trinadyne, as described in 'P.W.' 145," writes a Stonham reader, "and finished it off at 11.55 p.m., just in time to catch dance-music from 2 L.O. and to hear Big Ben strike twelve.

"Then I heard an American station, just above 400 metres, and tuned in W G Y, on 379 metres. Not so bad, is it? Anyhow, it beats my four-valver for range!"

L.C.C. Wireless Lectures.

IF your aerial hangs out Streatham way, or at Balham, Tooting, Clapham, Wandsworth, or the adjacent suburbs, you will be interested to know of the L.C.C. lectures. A series has been arranged for Tuesday evenings, 7.30 to 9.30, to continue to Easter, for the attractive fee of 4s. the course!

(Continued on next page.)

A Record Radio Xmas Number.

112 Pages for 3d.!

This issue of "P.W." is the largest we have ever published, and offers unprecedented value for the low price of 3d. The editorial pages are full of matter of interest to all readers, and the advertisement pages, both in design and contents, are of the greatest credit to the Radio Industry of Great Britain.—THE EDITOR.

NOTES AND NEWS.

(Continued from previous page.)

Captain Jack Frost is the lecturer, and a very attractive syllabus has been drawn up. Full particulars are obtainable from The Bee Secondary School, Tooting, S.W.17.

Can You Contradict This?

LOOKING through the "Times" the other day, I rubbed my eyes to see the following statement. "Without a shadow of doubt, our main broadcasting stations, with the exception of Daventry, cannot give crystal reception at distances of more than 50 miles or so, at the outside."

Condemning the Crystal.

THE writer goes on to say that long-distance crystal reception is all a matter of re-radiation from a neighbouring valve set, and that this is "what undoubtedly happens in every instance."

Now there must be a good many "P.W." readers who can disprove this from their experience, and I should like to hear of cases, especially where re-radiation can be ruled out, such as those where a lucky listener can get a Continental station any old night when it is transmitting.

Now, Knights of the Cat's-whisker! It's up to you, for the honour of the crystal detector! Let's hear from you!

Did Shakespeare Listen-In?

WRITING to me all the way from Dunedin, New Zealand, the President of the Otago Radio Association calls my attention to his society's Shakespearian broadcasting motto, which is printed upon the Association's notepaper. It is taken from "The Tempest," where Caliban says:

"The Isle is full of noises,
Sounds and sweet airs that give delight
and hurt not,
Sometimes a thousand twanging instruments
will hum about mine ears,
And sometimes voices."

Sick Man's S O S for War-Time Nurse.

STAFF NURSE MARY BATLEY, for whom a dramatic appeal was broadcast last month, has not yet come forward. Mr. H. G. Hobden, on whose behalf the appeal was made, is lying seriously ill in a sanatorium at Robertsbridge, Sussex, and only his former hospital nurse, Mary Batley, can establish the fact that he was ill at Salonica, and thus secure for him an Army pension of 45s. per week. Can anyone help the B.B.C. to trace Nurse Batley for the stricken ex-soldier?

Short-Wave Transmissions.

READERS who are able to tune down to the short waves will be interested in the following, received by Mr. W. R. George, of Worthing, in a letter from the Schenectady broadcasting station. Congratulating him upon his reception of the short-wave transmissions from 2 X A F, the station director makes the following statement regarding future transmissions:—

Sending Out the Schedule.

WITH reference to the present short-wave schedules, 2 X A F (32-79 metres) transmits W G Y's evening programmes on Tuesdays and Saturdays. Transmissions from 2 X A D (22 or 26.8 metres) are subject to frequent changes,

TECHNICAL TERMS ILLUSTRATED.

The Cell.

THE burglar was getting on well,
When clean off the veranda he fell!
By police he was caught,
And next morning he thought,

"Well, this is a horrible ———"

making it impossible to keep listeners fully acquainted with all schedules; however, at 6.45 p.m. E.S.T., the complete schedule for the ensuing week is transmitted by I C W from 2 X A F."

The Six-Pips Signal.

DOTS, dots, dots. If the B.B.C. is getting many more letters than I am about their alteration of the six-dot signal from Greenwich, they must now think it was a dotty thing to do!

Everybody seems to have liked those dots. However good the music happened to be at the moment when the six pips came through, they never seemed to be intruding, did they? So I'm all for the super-imposed time-signals again, and the renewal of those pert little pips from Greenwich.

SHORT WAVES.

It is rumoured that we are to have radio carols again this year, but wireless waits will never be really satisfactory until somebody invents a method of broadcasting a pail of water. —"Punch."

Miss Hinton . . . was listening to a wireless concert and, suddenly taking off the headphones, without a word lay back on a couch. Month after month she lay like a marble statue, and doctors were completely baffled by her condition. —"Reynold's Illustrated News."

Perhaps they have never listened-in themselves.

Wireless fiends in the West End have been trying to get Pittsburg. As far as the rest of America goes, we understand, they can have it. —"The Star."

Headline in the "Manchester Guardian": "Listening in to Mr. Smith's face." This will be especially noticeable during the Christmas festivities.

Going cheap in a wireless accessories list: "Fault detectors and transformers." Great time savers in the homes of newly-married couples. —"Daily News."

Three-valve loud-speaker set, complete; first seasonable offer secures. —Advt. in Local Paper. Unfortunately these things are never out of season. —"Humorist."

With a crystal set, using no connections or crystal whatever, I have picked up the following stations: Aberdeen, Cardiff, Liverpool, Daventry, Chelmsford, Birmingham, Manchester, Bournemouth, Newcastle, London, Frankfurt and Madrid. —Extract from letter received from a Wigan reader.

We always knew that, given a chance, Wigan would one day justify its existence.

A well-known actress recently returned from Africa, where she has been for several years, said she wanted to sing over the radio badly. She did!

A gossip writer says that since a friend of his fastened one end of his aerial to a pear-tree no blossom has appeared on the tree. Perhaps that is why Blossom is sometimes broadcast by the B.B.C. —"Electrician."

An up-to-date youth, tuning his wireless set: "I wonder who's at the mike now?" Grandmother: "Don't say Mike, dear; it's Michael!"

Keeping the Aerial Warm.

SWEDEN'S huge broadcasting station, now being erected at Motal by the Marconi Co., is to be finished in the spring. It will be far more powerful than any European station now in existence, and amongst other refinements its aerial is to be kept heated by electricity! In order to prevent damage during the intense cold, arrangements will be made to run a current through the aerial wires, sufficient to keep them warm! The crystal range of the station is to be 200 miles.

A Greeting from Mr. Reith.

THE following cheery message was one of the first Christmas greetings to reach me this year.

"I hope readers of POPULAR WIRELESS will have an enjoyable Christmas season, and that in 1927 they will achieve happiness and success. No doubt the B.B.C. can contribute to these latter. —Yours sincerely, J. C. W. REITH (Managing Director, B.B.C.)."

More Low-Power Short-wave Successes.

USING a Burndy L525 valve, and 4.8 watts supplied from Hart accumulators to the anode, my signals were received in Winnipeg, on an indoor aerial, at strength 4." So says Mr. J. Ridley, alias G 5 N N, who shakes the Norwood ether to some purpose, as his bag of radio records will show!

Fifteen American stations also picked up G 5 N N, in two days, the strength of signals in every case being "the cat's pyjamas"!

"P.W." Constructors' Competition.

I AM sorry to have to announce that the result of the "P.W." Constructors' Competition—which it was hoped to publish this week—is not yet available. The awards, however, will be announced as soon as possible.

Shortage of Iron Pyrites.

CRYSTAL users who favour iron pyrites will be interested in the news that there is a shortage of this mineral. Crystal manufacturers are finding the greatest difficulty in renewing their supplies of raw material, and I see that the cost of the N.M.C. Detector has been doubled for this reason.

For a very limited period "P.W." readers may obtain supplies at the old price by means of the coupon that appears in our advertisement pages this week.

Quick Legislation.

THEY say that when Capt. Ian Fraser, the blind M.P., went to the House of Lords to hear the second reading of his Free Wireless for the Blind Bill, it was passed so quickly that he hardly realised it was through! Good Lords!

My Radio Christmas Dish.

TAKE half a dozen leaks, one pound of H.F. currents, and one pint of ether. Remove the cores from the leaks, and carefully stone and insulate the H.F. currents.

Strain the ether through a fine-mesh grid, to remove electrons. Beat well, in a heterodyne receiver, and ionize for 20 minutes. Place in a transformer until done to an ampere turn, and serve with a garnish of statics, on a hot plate!

And a very happy radio Christmas to you all! **ARIEL.**

A Merry Radio Christmas to You All

ONCE more we are able to place before our readers a bumper Christmas Number—one hundred and twelve pages! We have again followed our policy of not increasing the price for this special Christmas Number—a record number, too!

There is, indeed, not very much to say this week in connection with POPULAR WIRELESS, except that we want to wish every reader the very happiest Christmas and the most prosperous New Year. This is the fourth Christmas Number we have placed before our readers, and a glance at the editorial contents and at the advertisement contents will convince the sceptic that wireless is by no means a played-out hobby.

If anything, it is increasing by leaps and bounds in popularity, and it is obviously going to be one of those hobbies which go on for ever. It has, indeed, taken a firm hold on the imagination of a large section of the public. Whereas in the old days hobbies sprang up, achieved a certain amount of popularity, and

From
It gives me great pleasure to greeting to "Popular Wireless" and broadcasters, and listeners general—remarkable invention which for service of the public. As Chair-Vice-Chairman of the new, I can did tradition established during the trary, I believe my colleagues on Board agree with me that the best hope to do is to carry forward the on the lines already laid down.

LORD GAINFORD.

accede to your request to send a Christmas its readers. Wireless journalists, amateurs, ally are all participants in the blessings of a tunately in this country is devoted solely to the man of the old Broadcasting Authority and vouch for one thing, and that is that the splen-past four years is not in jeopardy. On the con-the new we can good work

Gainford

jeopardy. On the contrary, I believe my colleagues on the new Board agree with me that the best we can hope to do is to carry forward the good work on the lines already laid down.

That message from Lord Gainford must raise the spirits of many of us who have been dubious about the future of British broad-

casting, and we can only say that if that spirit is carried out in practice, then we shall not have any regrets about the future of broadcasting. The close of this year sees the death of the old British Broadcasting Company, although, like the Phoenix, it will arise from its ashes in its new form as the British Broadcasting Corporation.

New names have joined those in authority, but we still have, as Executive Chief and Director-General, Mr. J. C. W. Reith, the present Managing Director of the British Broadcasting Company. Mr. Reith's continuation and his decision to link himself up with the

realise that the subject of wireless does, if handled properly, lend itself to the imagination and abilities of the artistic advertiser.

Christmas presents this year are again to the fore, and in the special article in this issue, Mr. Dowling offers some very useful advice to the prospective purchaser. On this page we also print several messages from well-known radio personalities, wishing our readers a happy Christmas and a merry New Year. In particular we would draw attention to the

From SIR OLIVER LODGE, F.R.S.

To you and to all your readers, let me send a cordial greeting and all good wishes both for Christmas and for the New Year, upon which we are entering.

We have all been through troublous times together, but this last year has been by no means all bad. Friendliness among the nations is increasing, and must continue to increase now that methods of intercommunication are so rapidly developing.

All English-speaking nations are now welded together by the possibility of actual speech across the oceans. We have lived to see great discoveries, and many of you will live to see more. May all advances conduce to peace and happiness and goodwill.

Oliver Lodge



A recent photo of Senatore Marconi.

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

I send my best wishes to "Popular Wireless" and its many readers for a happy Christmas and prosperous New Year.

G Marconi

then faded away into insignificance, wireless seems to have proved an exception to all other kinds of hobbies.

It certainly did start with a bang, as they say, but the bang has gone on and it is amazing to find that year by year the interest, instead of waning, is increasing.

The reader will also find it interesting to compare this Christmas issue with our first Christmas issue, and one of the things that will strike him most forcibly is the great increase in the quality of the goods offered by our advertisers; and in connection with this it will be seen that a new art has sprung up in advertising, and that many of the advertisements in this issue are masterpieces of their kind.

Wireless advertising, the layman would think, would not lend itself to artistic display, but you have only to glance at some of the very fine advertisements appearing in this issue to

message from Lord Gainford, and it is good news to note in his message that he says: "As Chairman of the old Broadcasting authority and Vice-Chairman of the new, I can vouch for one thing, and that is that the splendid tradition established during the past four years is not in

fortunes of the new British Broadcasting Corporation is very welcome indeed, and it seems a suitable moment to wish him the very best of luck in his new post.

Most of the old staff—those who from the very beginning have built up the prestige and popularity of broadcasting—will stand by the new Corporation and on the engineering side our old friend, Captain Eckersley, will still carry on as Chief Engineer.

In this issue, by the way, Captain Eckersley writes a very interesting article on "Looking Back," and every reader who remembers his old days at Writtle, when he was the life and soul of that mushroom broadcasting station, cannot fail to wonder at the amazing progress which has been made in the last four and a half years, or to realise that much of it, from a technical point of view, has been due to the energy and progressive instincts of Captain Eckersley.

THE EDITOR.

THE P.M.G.'s Programme



I'd worried about wireless things a bit that night, I guess,
And wondered, too, if Government would make a ghastly mess
Of the policies and programmes of the good old B.B.C.
When it was taken over by a red-tape P.M.G.

And thus, when down I lay to sleep upon my truckle bed,
A lot of dark, disturbing thoughts were hurdling through my head,
And I was not a bit surprised to hear the Announcer say :
"The Telephone Quartette will sing their usual song to-day."

Ah, then began staccato sounds I oft before had heard :
"Ho ! Seving-double-thr-r-r-re-e Gerrard"—or words quite as absurd—
"Wrong Number? Sorrrree! Battersee; Thr-r-r-r-ee double Seving HO!"
All to the tune of the Whistling Coon mixed up with Poor Old Joe!

I tried in vain to ring 'em off ; those girls grew bolder still,
And turned on television—disbelieve me, if you will—
And I SAW the face behind the voice, the voice that calmly said:
"Sorrrrrr-eee to have tr-r-r-r-rubbed you!"—and then went off my head.

I seemed to hear the P.M.G. say : "Jazz is out of date,
And Lauder and his foolish like I wipe clean off the slate;
Whilst as for comic opera, I'll have your ruddy gore
And call the yeomen of the guard if you even ask for more."

"In lieu of such tomfoolery I'll give you high-brow turns,
A nightly spell in Parliament, for which the public yearns,
A digest of political and local social news,
As the brand, say, of the chewing gum which Winston Churchill chews.

"The bacca Mister Baldwin smokes, and what its price per ounce,
The little tricks of Joynson-Hicks which foolish folk denounce,
The window-pane of Chamberlain which makes him look so wise,
And what is said of Birkenhead—on whom there are no flies !

"Then, just by way of change and rest, my postmen's choir shall chant
About some dear old MOTHER or some dear old MAIDEN AUNT ;
But love and stolen kisses—even under mistletoe—
Shall never more be spoken of—that is, from 2 L O.

"And my music must be solid, with no lilt, no fal-lal-la,
And my readings will be culled from the Encyclopedia,
And you will know how careful is my choice when I remark
That not a joke is passed by me not first heard in the Ark.

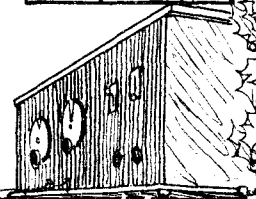
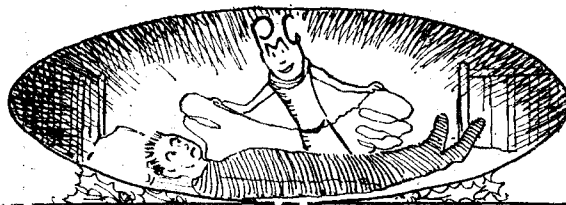
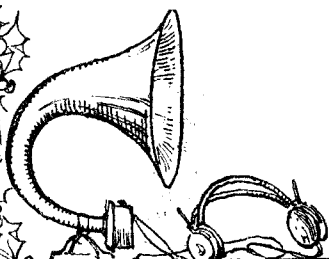
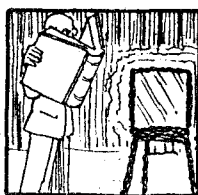
"If Noah whispered it to Ham, and Japheth unto Shem,
I'll pass the ripest chestnut or the stalest apothegm,
And should it antedate the Flood and come from Eden's shade,
It's younger than the eggs the dinosaur of Gobi laid !"

He ceased ; I cried : "Oh, save us from this fate, great P.M.G.
I grovel here before thee, grovel on my bended knee.
I care not if you sing the songs my mother used to sing,
But prehistoric jokes and gags I hate like anything !"

Then suddenly the P.M.G. bounced right into my room,
And yelled : "L. O. ! I come at last to execute thy doom !"
And straight produced ten billion miles of tape of such a hue
That poppies of the deepest dye ne'er looked so red to you.

He wound the red tape round my limbs, the fingers of my hands,
Until I woke up in a fright and burst these frightful bands,
But though I woke, I half believed the wretched dream too true,
Unless the P.M.G. bites off much more than he can chew.

A. B. COOPER.





ASK people where and how broadcasting began, and they will reply: "Oh, in America!" Possibly force of habit prompts the reply. It is difficult to find a beginning, since the term itself, when dissected, defies a definition. As a small boy I can remember my incredulous wonder at hearing that one, Mr. Marconi, had signalled without the aid of wires across the Channel; at the age of fourteen, when I was already the devoted "lab. boy" to an elder and wirelessly knowledgeable brother, I heard with some envy that the human voice had been transmitted through "wireless" space. I say some envy, because I felt that all development should be part of my brother's work!

Precursor of Broadcasting.

Early in 1919 Capt. Round, Mr. Ditcham, and Mr. Mogridge erected a 15-kilowatt set at Chelmsford, capable of transmitting the voice and music [*sic*] by wireless, and, to my mind, this station was the world's pioneer broadcasting station. Its power was sufficient to make its presence felt over most of Europe, and the occasional concerts transmitted were of great interest to the few enthusiasts who were the "amateurs" of those days. Some fine performers sang from the station, among them being Melchior, the Danish tenor, and Dame Nellie Melba. I remember the excitement when Melba came to Chelmsford. Her studio was a store-room with a concrete floor and a hired piano. To make it look better a large rug was spread on the floor, but Dame Melba would have no singing on rugs, as you who are singers may well appreciate.

The transmissions, which proved to be the full the potential value of broadcasting, received little public notice, and the Government in time withdrew the licence.

A Famous Station.

Broadcast silence fell upon Britain, and meanwhile in America a start had been made, and from 1919 to 1922 the States forged ahead, leaving us, in actual broadcasting, far behind. The flag of enthusiasm had been kept flying, however, by the "amateur" people, who in those days would sit up all night to catch a mere whiff of telephony. Eventually, they got together a petition to ask for a broadcasting station.

A Special Article for our Xmas Number by the Chief Engineer of the B.B.C.

After some delays, permission was granted to erect such a station, and by the law of chance that seems always to pitch me into these sorts of efforts, I was given the job to erect the station. No, it was nothing like 2 L O, that station; look first of all at some of the restrictions.

Power 250 watts (the power of London today is 3,000 watts, and Daventry is 25,000 watts); this power to include the power used in lighting the filaments of the valves. Incidentally, we found it took 300 watts to light our valves adequately, so really we

are owing the then Postmaster-General some watts!

Time of working, 15 minutes per week!

Shut down periods. Between every item to have to shut down for two minutes. It left us little time to transmit if we had eight items!

Call sign, 2 M T.

Memorable Programmes.

This colossal undertaking did not occupy our staff for seven days a week. The transmissions were done after hours; 8 o'clock till 8.15 on Tuesdays saw us hard at it. Writtle was the village near our station, and "Two Emma Toc Wrrittle" is probably a familiar cry to many an early enthusiast.

There were no news bulletins and special shipping forecasts, no dulcet-toned announcers; just a gramophone (sometimes with orch.), and a lively and irresponsible staff. May I say that we were never very serious, but that we foreshadowed every programme ever given! We had our Children's Hour, but it was largely technical. For instance, nursery rhymes:

Four-and-twenty B valves standing on a shelf;

Ash couldn't find 'em, I had to go myself. When the circuit opened, the 'phones began to sing.

Don't you think that I was right to smash the beastly thing?

Or:

Hey diddle dodrode,

Two grids in one quadrode;

The outer one forming the plate.

The electrons got muddled with so many grids,

But the final M value was eight.

We had some fairly highbrow poetry readings, too:

"Oh, heterodyne, why are you moaning?

Oh, stop and hear our telephoning.

As you swoo-op both high and low—" but that was never finished.

To-day they do radio drama in the B.B.C., but we began at least by having a wireless play. Two friends, Robert and Agnes Travers, and myself, did that part

(Continued on next page.)



Dame Nellie Melba broadcasting for the first time from the experimental station at Chelmsford.

"LOOKING BACK"

(Continued from previous page.)

of Cyrano de Bergerac, where the two, Cyrano and the pretty count, make twilight love to Roxane on her balcony. When they do radio drama now at 2 L O they have soft lights, a microphone that never obtrudes, wonderful noises off, a beautiful room; there are real actors now! You must imagine us in an Army hut, the walls festooned with wires, a kitchen table in the middle, and us seated round, reading our impassioned lines into hand-held microphones, which are no different from the ones you use when you ring up Hop 101, or whatever it may be. The heroine had a tendency to use her microphone as a teacup; the impassioned lover suddenly found his arm's gesture robbing the microphone of its wanted nearness to his mouth! But it was the first wireless play.

Writtle Closes Down.

The days of Writtle were numbered in August of 1922, because the great 2 L O, a station on top of Marconi House, started to give occasional transmissions. It was not until well after the B.B.C. was formally constituted, however, that the switch was pulled out for the last time, and 2 Emma Toe was but a soon-forgotten name. I still have letters, however, from listeners asking if nothing could be done to close down London on Tuesdays so that Writtle might be heard!

So I drifted back to my work and forgot about broadcasting. I had never looked upon it, I must confess, with any but a scientific interest, and had never thought of the matter broadcast other than a means of amusing a dilettante hour. Some time

in January of 1923, however, my whole outlook changed.

I heard opera by wireless. Broadcasting has given me many thrills, but I doubt if I ever had such a burst of revelation as when casually I donned a pair of 'phones one evening to hear a Covent Garden opera. Suddenly I had that spacious feeling of sitting in a great auditorium, I sensed atmosphere, and then, as silence fell to the conductor's baton and the violins crooned the opening bars, I knew I was a convert for ever. I spent a week listening to a series of operas. The sun might shine, the open road invite, the roses want pruning, tea and bridge with friends might press, but I sat, 'phones on ears, through matinées and every performance. I bought a loud speaker—that loud speaker was always dud—and with my ear in it listened with cooler ears and cooler judgment to other items; but oh, for opera!

Birth of the B.B.C.

I had heard that the Chief Engineer of the B.B.C. was to be appointed. Imagine my surprise in getting a letter to say I might put in for it with some hope of success. And so in February, 1923, I found myself in Magnet House along with Arthur Burrows and C. A. Lewis as colleagues, with Mr. Reith as my chief, and three months' arrears of work to catch up with.

Well-remembered days when work began at 9.30 and left off about midnight; when one might go off to Glasgow, sans pyjamas, toothbrush, on the midnight train, with no very clear idea how one was to deal with the other end's difficulties!

Slowly, amid a maze of detail, certain concrete ideas began to take shape. We were a public service first. Commercialism was done with; let there be more and more people who could listen with ease. Death to spark jamming! Up with the strong signal! Let us spread our service over the

land; let us bring every inhabitant within reach of what should be the greatest boon science has bestowed during an eventful century. Lord Burnham, in opening the Bournemouth station, spoke of broadcasting as bearing potentialities as great as Caxton's Printing Press in its time. His speech was, to me, truth, not rhetoric.

Chelmsford and Daventry.

The relay station developed to bring in more and more subscribers within a working range of a station, and in a year 65 per cent of the population could hear an uninterrupted programme. Many in the light of after days have attacked the relay station policy, saying that so many small stations take up valuable wave-lengths, and do in an extravagant way what one or two big stations could do. This may be so, but in those days municipalities were clamouring for their own stations, money was scarce, and as each town, so to speak, by increased subscribers paid for its own station, we mounted by easy steps rather than having to put our eggs in one most fragile and costly basket. Besides, local interest always helped, and now helps to maintain an intimacy for the local staff and station that no large, impersonal, high-power station could do as well.

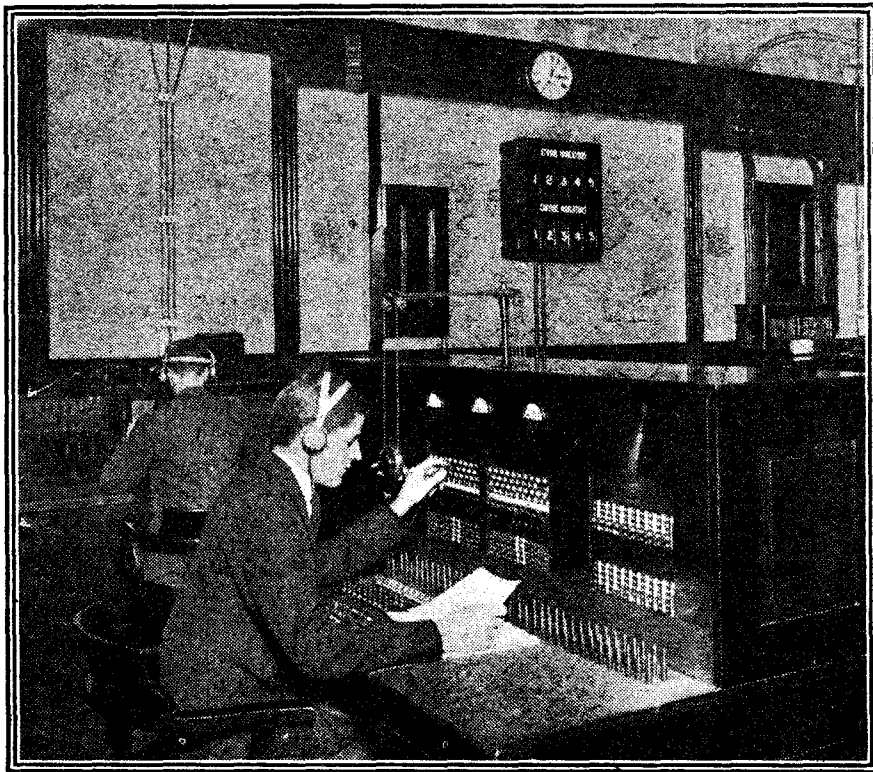
After the relay station came Chelmsford. There, on the site where, in 1919, the first broadcasting set was erected, an experimental long wave, high-power station, now finally crystallised in Daventry, began its work of interesting the country user. If the towns, with their many other distractions, find an interest in broadcasting, imagine how the country benefits from Daventry, with its twenty-two million potential listeners, its crystal range of one hundred miles, and its wave-length far removed from the ship jamming.

Between 1923 and 1925 we erected 21 stations, and made Britain one great area of "perfect" reception. I think I may say, without boasting, that unified control of National Broadcasting enabled us in two and a half years to pursue, catch up, and overtake our cousins in America. At any rate, if quantity appeals, we have a greater proportion of people listening in Britain than in America, and we require far fewer stations per unit area to have achieved that result—and we have achieved it in half the time. This is simply for one reason, that we have seen our work as a public service, as a national service; we have put this first, and we have never commercialised the service in any way. Our life-blood is the licence fee you, in your enthusiasm, have given us; that small ten shillings a year which has enabled us to build up the service.

The S.B. System.

Then, of course, to-day you are switched from Eastbourne to Aberdeen, from Oxford to the Manchester Hallé concert, back and forth, annihilating space by a movement of an engineer's wrist. It was not always thus. Well I remember in 1923 trying out, with the able help of the Western Electric engineers, the S.B. system whereby trunk lines could link all stations together. We sat in a room in Marconi House with a tangle of wires, amplifiers and such like, and we tried to relay opera to all other stations. All we got one night was an infuriated telephone subscriber asking why the — he could only get — music instead of his friend in Newcastle. Another

(Continued on page 942.)



The present-day S.B. switchboard and indicator system installed at the London broadcasting station.

THE BEAM

A Chat With Marconi

A QUIETLY furnished yet imposing room, a large globe here and there, a table with charts and graphs—these were the surroundings amid which Senatore Marconi was kind enough to grant me an interview on the beam system, for the benefit of readers of POPULAR WIRELESS.

Much has recently been written about the beam system and its success in passing the rigid tests imposed by the Post Office. It is, for example, common knowledge that by utilising the very short waves in conjunction with reflectors, the wireless wave can be projected in a chosen direction, giving not only a very useful directional effect with a large measure of secrecy, but what is just as important, a very considerable economy in the energy required to communicate over a given distance. The Marconi beam system is now working daily with Canada, while experimental transmissions are taking place between this country and South Africa and Australia. Much, I repeat, is already known about this beam system, but I was very anxious to obtain from the great inventor many details on matters which are not common knowledge.

Australia Next.

"Now that the Canadian service is under way, the South African, I presume, will be the next to be taken over?" I asked.

"No," replied Senatore Marconi, "I think I can say that the Australian will be next and the South African a little later. Although the Australian service will span the greater distance, experiments show that communication by the beam with the Antipodes will be particularly easy.

"Our agreement with the Government calls for the use of 20 kilowatts, but the beam system has proved so efficient that we have ample power to spare. The intensity of the signal received is amazing, and aural reception is completely supplanted by automatic apparatus. Having such strong signals with such regularity, we can work at very high speed; and although, for example, the contract calls for one hundred words per minute, the Canadian service has worked at two hundred and fifty words per minute without the slightest difficulty."

"This, of course, is not the limit of speed possible with the beam?" I asked.

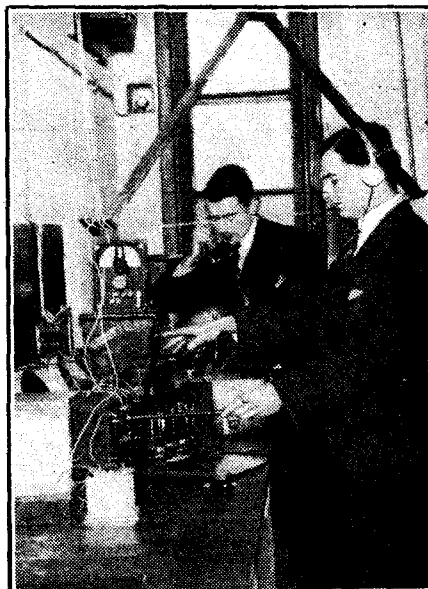
"By no means! Experimentally, in the laboratory, we have been able to record successfully speeds as high as two thousand

We publish below an exclusive interview with Senatore Marconi, by Mr. Percy W. Harris. Senatore Marconi reveals many new facts in connection with the Beam System, which have not as yet appeared in print elsewhere.

THE EDITOR.

words a minute, although on the commercial service such speeds are not yet practicable, even if they were necessary!"

"Much has been written about the short wave 'jumping' long distances, and being inaudible until they are a very long distance away from the transmitting station. Have your experiments confirmed this?"



Carrying out short-wave reception experiments at Biggin Hill.

"No, on the contrary, the experiments I have conducted on the 'Elettra' and elsewhere show that many of the wave-lengths alleged to be inaudible at certain distances are received quite well. I disagree with much that has been published in this regard. In any case, I am afraid there is not sufficient experimental data available to draw a sound conclusion on this matter."

"To what extent is the energy radiated from a beam station confined to the beam?"

How much stronger are the signals in the beam than outside of it?"

"The width of the beam, with the present arrangement, is about eight degrees, and thus the width of the beam increases as the distance increases. Our measurements show that on signals transmitted to this country from America the width of the beam would be about forty miles per degree. This indicates a total width of about three hundred and twenty miles, and opens up very interesting possibilities in the transmission of broadcasting from the United States to England. You will see that the energy could be concentrated in such a way as to cover practically the whole of England, but no more.

X's Eliminated.

"Some people have criticised the beam for not being entirely 'self-contained,' but in this matter it is interesting to take the analogy of the searchlight ray. Such a beam is frequently visible even when one is not in its direct path, but the amount of light which reaches the eye is only a small fraction of that which is actually confined to the ray itself. Using a reflector at the transmitting end only the strength of signal in the wireless beam is about ten times as great as that outside its path, but by using a reflector at the receiving end, the received energy is approximately one hundred times as great.

"One of the great advantages of the wireless beam system is the way in which it eliminated atmospheric trouble. It is now generally known that atmospherics originate in certain relatively small areas. When using a reflector at the receiving end, atmospherics which are arriving from a point not directly in the line of the beam have very little effect on reception.

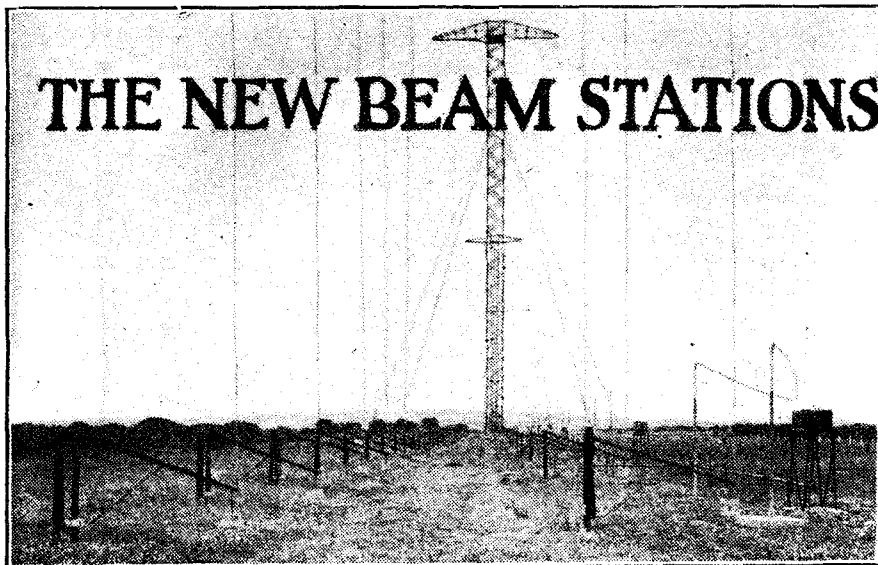
"As some of our beam stations have two reflectors facing in opposite directions, if it should happen that an 'X storm' occurs in the line of the beam between, say, England and South Africa (let us assume for the moment that it originates in the Atlantic) and it was causing trouble, we can immediately switch over and send the beam over the North Pole to reach South Africa via the longer route round the other side of the world."

"Are there any special troubles that have been encountered?"

"Very few. Very occasionally there is trouble from sunspots and the Aurora

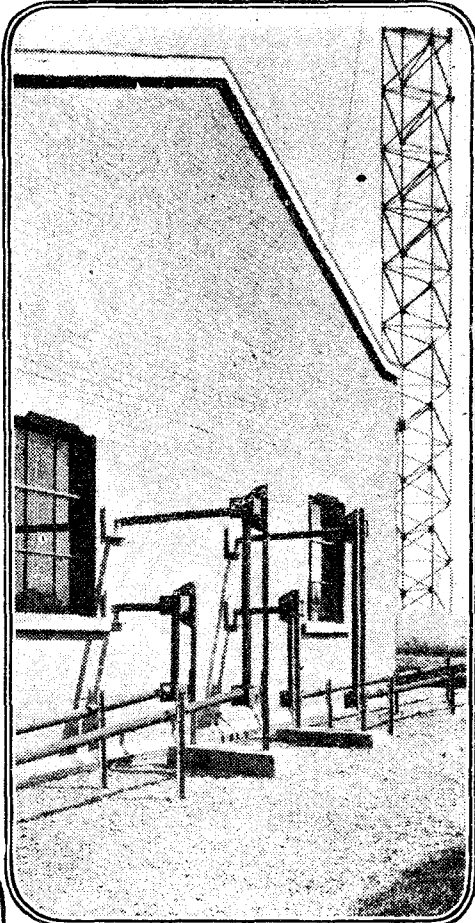
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THE NEW BEAM STATIONS

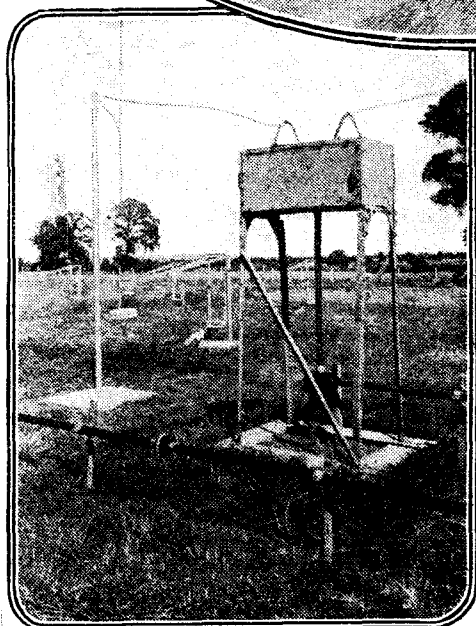
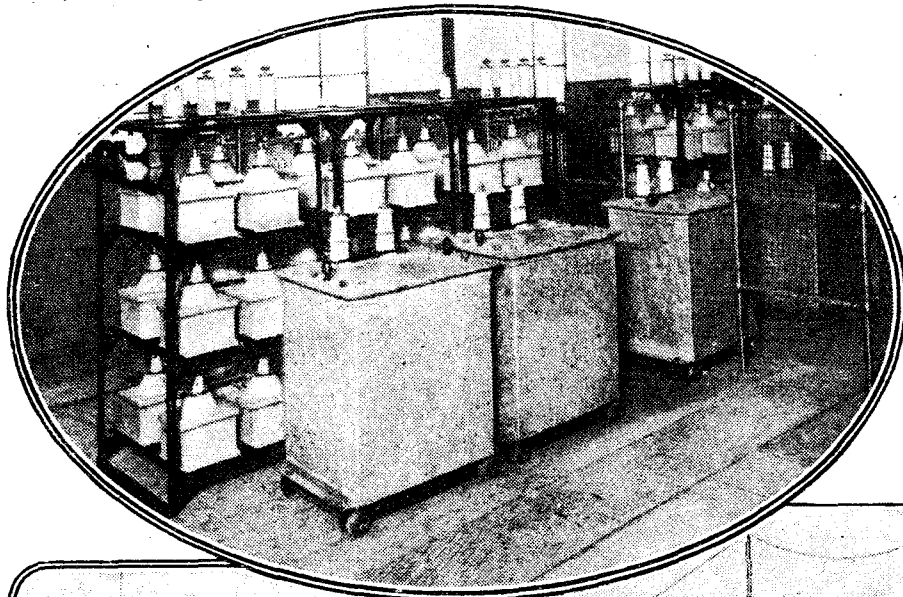


Above: The lower wave-band aerial system employed at Bodmin for the beam transmission to Canada. The aerial system is on the right and the reflector on the left.

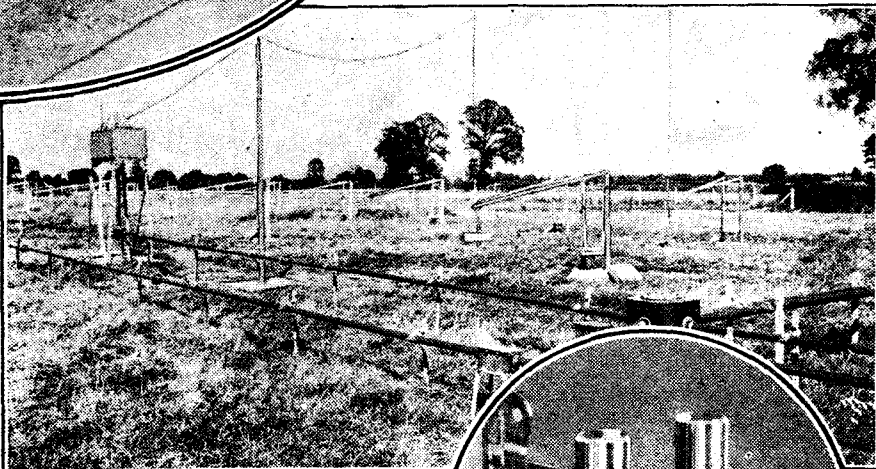
Below: Part of the transmitting gear at Bodmin. the condensers and chokes forming the smoothing unit for the H.T. supply.



The receiving station at Bridgwater showing the tubular feeder systems. The two tubes going to the left are for the aerials picking up the Canadian signals, while the other two are to do with South African traffic.

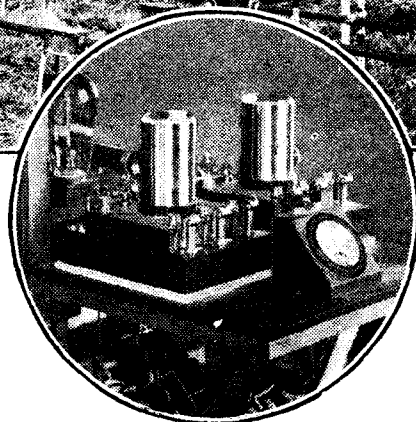


A close-up of one of the aerial coupling boxes which connect the feeder system to the vertical aerial wires. Special balance coils have to be incorporated in each box.



A portion of the feeder system at Bridgwater. Note the aerial coupling box on the left and the balance weight system (background) for keeping the wires at the same strain, regardless of weather conditions.

Two relays used in conjunction with the beam transmitter at Bodmin.



THE BEAM.

(Continued from page 879.)

Borealis. Since the Canadian service was handed over to the Government, it has been working uninterruptedly, but prior to this time there were one or two short periods—in one case for about thirty hours and in another for about a few hours—when signals were practically unreceivable, due probably to absorption by the ionised air. It is interesting to note, however, that during this time the cables were also interrupted, as they, too, are susceptible to the electrical storms which often occur when there are auroral displays.

Peculiar Effects.

"It is, however, a fact that 'fading' still exists to a certain extent on the Bodmin-Canada circuit, but, as it was noticed that signals could be received across the Atlantic when using still shorter waves, provision has now been made for the use of two waves of different length at the beam stations, so that a shorter wave can be employed during any exceptional conditions as appear to interfere with transmissions on the twenty-six-metre wave."

"With regard to the wave-length the Bodmin station is using for the Canadian service, a wave-length of approximately twenty-six metres is adopted, I believe?"

"Yes, this has proved a very satisfactory wave-length, and the other beam stations will probably work near to this figure. The Canadian wave-length is a fraction less than two centimetres longer than that from England to Canada."

"You asked whether we had noticed any peculiar effects. There are one or two of interest. For example, it has been found that engineers standing near very short-wave transmitters sometimes become exceedingly warm in, say, the arm nearest the apparatus. This effect is not caused by radiation of heat from the set, but by currents induced in the human body from the apparatus. The heat is very appreciable at times and it is possible that good use may be made of this phenomenon in medical research."

"Have these powerful short-wave transmissions been found to have any deleterious effect on the health of those operating these stations?" I asked.

High-Power Stations Doomed.

"No, I am pleased to say not only have no harmful effects been found, but I am inclined to believe that the health of the staff working in these stations has been benefited. We have had no cases of illness, and on the contrary the general impression is that those who are working the stations have distinctly improved in health. Personally, I have felt better. Possibly the presence of a certain amount of ozone in the air had something to do with this."

"You think the beam stations will supplant the present high-power long-wave stations in time?"

"Yes, it seems the logical development in wireless. On the short waves we can obtain far higher speeds than are possible on the longer waves; we are getting a reliability and economy in the use of power never

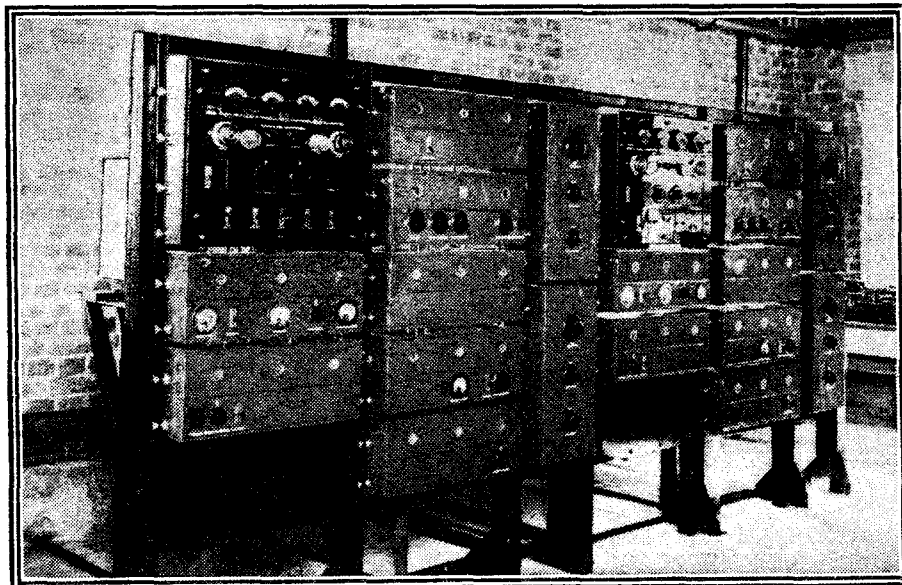
previously obtained, while, in addition, the ability to project a beam in a given direction at a narrow band of energy rather than spreading it out broadcast is a very valuable feature."

"What methods do you use for stabilising the frequency of the transmitter?"

Wave-length Variations Beneficial.

"We have found the master-oscillator method quite satisfactory and we do not use crystal control. As a matter of fact, it is doubtful whether a perfectly constant frequency is really desirable in short-wave telegraphic work. I have not come to any final conclusion on the matter, but I am inclined to believe that a slight variation of frequency is of value, as if the wave is changing slightly all the time the fading on the longer and shorter components of the wave will not be the same, and in this way we may largely overcome fading troubles."

At this point Senatore Marconi rose and walked across to a table to pick up a blue print.



The two beam receivers used at Bodmin for the reception of signals from South Africa (left) and Canada.

"This shows you the variation of signal strength on the South African service for one day. You will notice that as the route is almost directly north and south, sunrise and sunset occur at very nearly the same time in England and in South Africa. Notice that signals steadily fall in strength from midnight to about the middle of the darkest period and rise again until dawn. During daylight they are maintained at a fairly uniform strength, but two or three hours before sunset they start to rise in strength and reach a maximum late in the evening. Although this chart shows that we may have even a hundred per cent variation during the day the strength of signals at the weakest time is ample for our requirements."

"Do you think the beam system will be adopted for telephony?"

"Yes. I think it very probable for long distance transmissions and for such matters as I have mentioned—the broadcasting of speech and music from Europe to America and vice versa. I must admit that we have been so busy developing the telegraph side that we have not yet done much experimental work on telephony which may require new technique in many respects."

"Working with such short waves must require great accuracy in apparatus. Do you find, for example, working is interfered with by wind causing swinging of your aerial?"

"No. Strangely enough, even to-day when a gale is blowing, I have just heard from Bodmin that they are experiencing no trouble in this regard. Both the aerial wires and the reflector wires are swaying simultaneously and perhaps one counteracts the effect of the other."

"As the amateur transmitter has done a great deal in developing short-wave work," I said, "I am sure they would appreciate any suggestions you would be good enough to make."

"I would certainly suggest the collection of data on these short waves, and its collation," responded Senatore Marconi, "but it is, of course, essential that some kind of agreement as to standards of strength and quality should be reached. Unfortunately in the case of many experimenters one man regards signals as good and loud whereas

another would call the same signals only medium in strength."

"What is the shortest wave-length upon which you have yet experimented?" was my next question.

"We have done a certain amount of work on wave-lengths as short as half a metre, but not enough to pass definite opinions upon the commercial possibilities of these waves. Just what path such waves will take we do not know, but it is possible that we may be able to shoot them up against the Heaviside layer at a certain angle and know definitely that they will come down again at so many thousand miles away."

Further Possibilities.

"Or perhaps," he added with a laugh, "they may not come down at all! That is one of the things we shall have to investigate."

There are some matters which cannot easily be put into words, but as we shook hands I could not help forming the opinion that Senatore Marconi feels very happy about the success of the beam, and with so much already achieved, who knows what else he has still in store for us?

GEARY'S TERRIBLE CHRISTMAS EVE.

By HIGHAM BURLAC.

WHEN Geary came into my study a few days before Christmas his eyes lacked their usual glare, that predatory, ruthless shine which characterises his eyes when he is within scrounging distance of any apparatus smaller than a table-mangle. Instead his gaze was fixed like that of a scannambulist. He shook hands with himself and sat heavily on his hat. All of which argued in favour of a Geary "stunt" and an unusually fat-headed one.

"Well, Aloysius?" I said cheerily. "It's very good of you to drop in and bring back that ammeter. Sort of Christmas good deed, what?"

"N-no ammeter. Must be mistaken," he replied.

"That N.P.L. calibrated condenser, then."

"N-no—quite a mistake. L-look here, Higham, you know I've been busy for months on an improved Direction-finder? Well, it's done; in fact, two of 'em. Absolutely the friskiest things in radio since I produced my all-frequency, non-vibrating, noiseless loud-speaker."

"I see. What direction does it find? And why?"

"Dash it, Higham, you need not be so sarcastic. All directions, of course."

"All at once?"

"Ass! But seriously, Higham, I want you to come over and witness a demonstration on Christmas Eve. Tugg and Calver on their car are sending out signals every now and then from a portable transmitter, while I and Jones, with my new D.F. sets, are going to plot out their course on the map. Jones, whose place is at Highgate, will send his bearings to me by wireless telephony. That beats any show ever put up by an amateur before, doesn't it?"

Hurried Preparations.

I paused and considered, seeing in the affair far more than Geary.

"Well," I answered. "It may. Have you got any of my apparatus on you?"

"Really, Higham, you pain me."

"All right," I replied, "I'll come and help you." Geary had a £10 bet on the result with Tugg and Calver, and another with me.

When he had gone I telephoned to Tugg and Calver and afterwards to Billy Swift, who does not appear again in this narrative though some of his property does. That done, I began to chuckle so demoniacally that my wife accused me of flirting with Bolshevism.

Seven o'clock. Geary put on his telephones and I put on mine. My job was to take the bearings from Jones. At seven-fifteen Jones came through smartly with the first reading. Geary got his, too, and solemnly marked a cross on the chart somewhere in the region of Croydon.

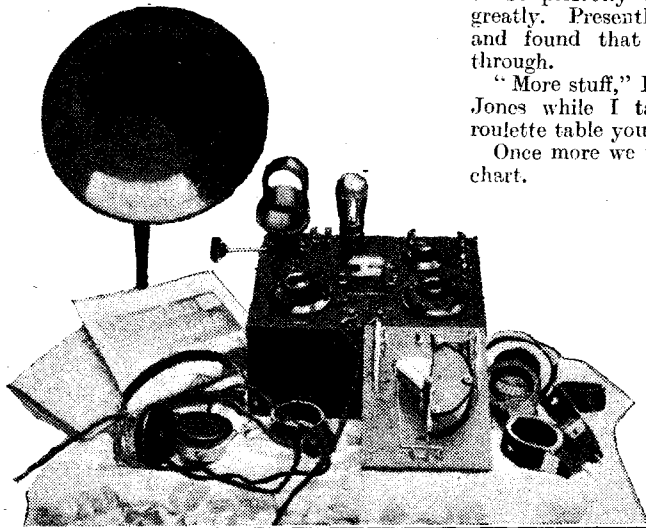
"I'm a bloodhound for tracking, Higham," he chuckled, taking a hasty sluice and a bite at a sandwich.

A quarter of an hour passed, during which Geary told me how his D.F. system could detect which side of the road a man in Ramsgate was walking and whether a car at Bath went off the white line. Meanwhile, I kept myself properly irrigated and nourished, seeing that I was in for a heavy evening.

The Apparatus Fails.

Geary started. Signals again! Then Jones came through with another bearing and we seized the chart.

"I say, Geary," I began, "your D.F. seems to be a bit previous, doesn't it? Fifteen minutes ago it told us your pals were at Croydon. Now it says they are in the middle of Windsor Great Park. What have they got? A racer?"



Two famous "P.W." sets—the "P.W." Ultra and a reflex receiver—built by Mr. C. Cope, of 55, Thorne Villas, Holloway, N.7.

"Shove it down, Higham. This D.F. is like a camera. It can't lie."

Half an hour passed. Then another bearing from Jones. I jotted it down and turned to Geary.

"Come on! What are you dawdling for? Jones has the legs of you this time. Call yourself an operator?"

Geary twiddled the knobs like a madman.

"Higham," he gasped, "the bally thing won't give a reading at all. The signals are there—but absolutely all round the dial alike. I can't think—"

"Sure you haven't been trying to D.F. a balloon? I said, hugging myself with wicked joy and splashing the siphon all over the shop.

"Well, we'll leave it blank and wait for the next bearing," said he.

In ten minutes he howled.

"Got 'em. Good and strong. Where's Jones?"

"Here he is," I replied, "and using awful language, too."

Jones, it appeared, was suffering from "signals all round the dial," just as Geary had on the previous occasion.

"Sure your pals are not up in a Zepp, Geary?" I jeered. According to the last result they must have been hovering over this house, and now, so it seems, they are over Jones'. This thing isn't a D.F.—it's a threepenny wire puzzle."

"I can't understand it, Higham," whined Geary, turning a piteous face to me. "The design is perfect. And yet—the results—"

"The results up to now are, (1) Croydon, (2) Windsor Great Park, (3) your house, and (4) Jones' house. Queer motor ride, I call it. Have another go. Perhaps you'll get Wigan or Billingsgate."

Another thirty minutes passed and more signals began to arrive. Geary got a beautiful reading and Jones was up to the mark this time. Again we grabbed the chart.

"Oh! Bountiful Mike," groaned Geary. "They're off the Nore, according to this blighted contraption. Er—would you mind? Thanks! A spot more soda."

We sat and chatted sadly for a little while, of the blasting of ambitions and the death of kings; of cataclysms, revolutions, graves, corpses and ghosts. Geary seemed to be perfectly chastened and I rejoiced greatly. Presently I put on his telephones and found that more v's were coming through.

"More stuff," I said. "You hang on to Jones while I take the reading on this roulette table you call a D.F."

Once more we waved our noses over the chart.

"This is madness," cried Geary. "Utter madness. Why—now they're near the Crystal Palace."

Poor Geary got up, wearily, creakily, like a nonagenarian with a liver and rheumatism.

"Twenty quid gone west," he murmured. "Twenty quid! Or rather, ten. Ten to the fellows in the car and ten I'll owe you. Do you know, Higham, this unmentionable

fungus, this glandered outbreak, this pestilent, festering, monstrosity of a set wants to make me believe that the car is now at Norwich. Pinch me, Higham, and tell me I dream."

Higham Settles Up.

"I'm sorry, old man," I replied, "you had better get some good elementary work on Direction-finding, and then, when you have mastered the principles, I'll show you how to make a D.F. set. It's a little bit in advance of you at present—evidently," and I pointed to the chart. "Give me a cheque, please."

I helped Geary to welcome Christmas in a manner which left him tolerably happy though none too clear as to whether he was at home or in the car, and then went off to Hendon to pay over his cheque to Tugg and Calver, those good sports who, at my suggestion, had spent the evening in Billy Swift's aeroplane, incidentally hovering over the houses of Geary and Jones in turn.

A CHAT ON VALVES.

By D. K.

Spend a few moments in considering your valves. The time will not be wasted.

OF all the wonderful pieces of apparatus that will work together (more or less) to bring us our broadcast entertainment this Christmas, probably the valve is the most amazing. It has often been described as the Aladdin's lamp of wireless, but with dull emitters getting duller and duller there is not much resemblance to a "lamp" in the modern "tube." True, some people try to brighten things up by pushing the H.T. through the filaments of their valves, but this is a somewhat expensive method of obtaining illumination, and is certainly a "blow" to the valve.

Perhaps it would be as well if, while enjoying our Christmas radio fare, we were to spend a few minutes in solemn meditation upon the wonders of those little quadrupeds perched up on their pedestals in our receivers. There they are apparently doing nothing, full of nothing, but in reality veritable hives of industry. To the eye whose detection is keen enough the interior of a valve must appear like the entrance to a Cup Final—one mass of surging movement, of electrons hurrying away from the filament, through the turnstiles of the grid and on to the plate, where they race away to the H.T. battery through the external circuit. A truly amazing state of affairs and worthy of the attention of every one of us.

Treat Them Gently.

Valves are delicate things, too. They have to be treated gently, or they may sulk for days, or even go on strike altogether. Their feeding must be regular, not too much and not too little, or the valves will object and refuse to operate properly. Try to run a dull emitter on too much filament juice. What happens? The valve gets "fed up" and refuses to emit, signals become weak, and you either have to doctor the valve back to health or else buy a new one.

The same moodiness is noticeable if the valve is asked to work with companions (or components) it doesn't like. Put a high impedance valve in the last stage of a set and ask it to carry a considerable volume, it merely distorts and refuses to function properly.

Some valves are more obliging and will work anywhere in the set, provided their companions are not too disagreeable, but these are in the minority, and if you want the best from your valves, as from everything else in this world, you must treat them properly, and care for them as you would your favourite dog—or perhaps your wife if you have one.

Has it ever occurred to you that there are over 600 receiving valves to choose from if you have an average 4-valve set? That there are over 35 main firms distributing those valves; that on the British market there are over 40 makes, and many makes have as many as 20 types?

All these valves have their own little characteristics—often portrayed by makers by awe-inspiring but, unless you intend to study them carefully, meaningless curves—



The first comedy opera to be broadcast. A scene at the Birmingham station.

YOU MUST HAVE DISTORTIONLESS MUSIC.

(Continued from previous page.)

the highest plate voltage recommended by the makers.

For the successful operation of a medium-sized speaker in a small room, this should be at least five milliamps, while twice this amount is necessary for good results from a large speaker, or from one of the many types of cone speaker now available. If we desire really loud music in a large room, or small hall, a still larger valve, such as the D.E. 5A. should be employed, and a second speaker connected in parallel with the first.

Distortion, of course, may arise from many other sources.

We may find that although there is no evidence of overrunning either valves or speaker, our set does not give life-like reproduction.

Perhaps the sopranos shriek at us, while organ music lacks body and seems to come from a glorified concertina, indicating that

and these characteristics should be taken into consideration when choosing a valve to work in your set, whatever task it may have to perform. And, by the way, when studying those characteristics don't go by the appearance of the published curves—go by the figures given. Those curves are often as misleading as a hill seen from the top of another hill. From a distance it looks steep, but when you get "to the bottom of it" it flattens out in a peculiar manner. Curves are not always what they seem.

The valve is a wonderful piece of apparatus, and we shall not do better than spend a few minutes in reflecting what it is, what it does and—what we should do without it.

we are amplifying high notes much more than low ones. On the other hand, our set and speaker combined may exaggerate low tones and cut out very high ones, with the result that the basses boom as through a megaphone, while speech is woolly, and stringed instruments sound lifeless.

Much of this distortion may be due to inherent defects in the speaker, which cannot be easily remedied, but in the first case a great improvement may be effected by shunting the loud speaker with a fixed condenser of about .005 mfd.

In the latter case, a larger condenser of from 0.1 to 0.5 mfd. may be connected in series with the speaker, the two being shunted with an iron-cored choke coil.

Too Much Reaction.

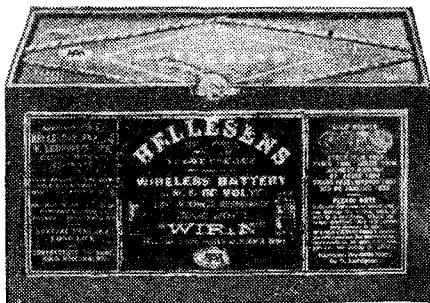
Distortion may also be introduced at the H.F. end of the set by the use of too much reaction, leading to a serious cutting off of very high notes, without undue prominence being given to the middle and lower ranges, the result being that speech is very inarticulate, and music sounds to be low-pitched. The use of reaction should be reduced to a minimum, and for really high quality reproduction should be omitted entirely.

CHOOSING YOUR WIRELESS CHRISTMAS PRESENTS.

(Continued from previous page.)

which enthusiasts have been heard to declare is "As good as another valve." It costs 25/-, but the poor amateur who has hitherto been confined to "tishy" little "foreigners" will ever be grateful to the donor who provides him with an A.F.3.

Then there is the R.I. Multi-ratio L.F. transformer, another 25/- component that will give endless pleasure to both the experimenter and the constructor listener. One cannot go far wrong when one buys things such as these, for however many transformers an amateur has he always has a use for another really first-class one. And the same applies to many other components, more especially the variable condensers. There has been a radical change in variable condenser design during the last year or so, and few amateurs would, for choice, use one manufactured before the straight line, low-loss era. Anything from 10/- to 30/- can be paid for a



A new H.T. battery, especially in the case of a multi-valve set owner, is always a welcome gift.

modern variable. The choice lies between the Bowyer-Lowe "Popular" type and the "super de-luxe" Ormond Straight Line, Gecophone, etc. Midway we have the Eureka Orthocyclic, A.J.S., Lamplugh, J.B., and many others, every one of which has distinctive features and is a beautiful piece of mechanism, besides being as efficient as this efficient age demands.

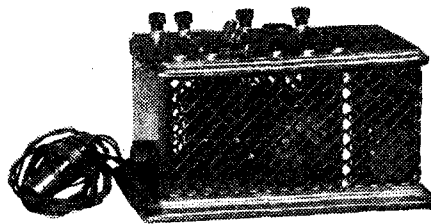
Plenty to Choose From.

Naturally, it is always advisable to obtain some idea as to the immediate requirements of a person upon whom one desires to bestow a gift before making the proverbial plunge. A chance remark may give the necessary clue. For instance, the owner of a crystal set murmurs longingly, "Not s'bad, but I wish I had a speaker going." From this one could infer that an amplifier complete with speaker and batteries would prove a welcome gift. And such an outfit need not be expensive. Messrs. S. G. Brown, for instance, have recently introduced a new microphone amplifier which operates on one small battery and gives extraordinarily good results. The instrument costs £4 4s., and is very well worth the money. Anybody could handle it, even a maiden aunt!

The speaker need not cost much. The Lissenola loud speaker unit retails at 13/6,

and fitted to a wooden horn costing another few shillings results are obtainable which seriously rival those given by loud speakers costing several guineas.

And talking about loud speakers, here is an entirely new field open to the present giver. Even a man who has one loud speaker already can do with another, especially if it be one of the new artistic efforts.



A Rectalloy Trickle Charger, which forms a modern solution to the accumulator charging problem.

Anything from one to sixteen or more guineas can be paid for a loud speaker. Some of the modern speakers are art productions suitable for a place of honour in the drawing-room of a castle. For instance, there is the Sterling Primax Statuette model at £10 10s., the B.T.H. Table Lamp model at £3 minus shade, the Amplion Radiolux, which is obtainable in different sizes at prices ranging from £4 15s., to one supplied with satin silver fittings and art pearl inlaid casing at £16 16s.

Matter of Individual Taste.

Certainly there is no lack of choice among the ranges of Browns, Brandes, C.A.V.'s, etc., although it must be pointed out that loud speakers are tricky sorts of things to buy unless one knows a good deal about them. By this we do not mean that there are good and bad speakers to choose from, for, as a matter of fact, the majority of the speakers on the market are very good and the minority are by no means bad. But where they differ is in tone. Some, mostly the wooden horn types, are mellow, but this mellowness is regarded by some people as "woolliness" or "sonority," they prefer the rather strident tones of some cones and some metal horns. Lovers of strings prefer loud speakers which do not handle the brasses as well as they do violin solos, etc., etc. And so the only absolutely safe way of choosing a loud speaker is for the person who is to use it to hear several in operation before the final choice is made.

The "Duplication" Bogey.

One endeavours to keep the traditional surprise element in one's Christmas gift schemes, but is this really wise? We have all experienced duplication, and such is a disappointment to both donor and recipient. When there is any doubt it is decidedly worth while to take the people concerned into one's confidence, although, as previously indicated, there are cases where this is not at all necessary.

Haphazard selection is very risky. Supposing one purchased a beautiful Tungstone H.T. accumulator and gave it to a friend who had in use an H.T. from the mains unit! He would not appreciate the gift; but a man who was using cheap flash-lamp batteries to run a super-hot, would be delighted with it.

Now, it is probable that wealthier folk will be considering the bestowal of fool-proof drawing-room outfits on their friends. Sets which can be switched on by pressing a button. A word of warning to these people may be as well. There is no really foolproof loud speaker set on the market. Wireless has not yet reached the point of simplicity of the gramophone. In the hands of people who know just a tiny bit about radio sets, some of the "fool-proof" sets will give reliable service over very long periods; but no valve set has yet been produced that, left in the hands of none but an elderly relation who knows nothing about wireless at all, will stand up to a year's hard use without the attention of at least a minor expert.

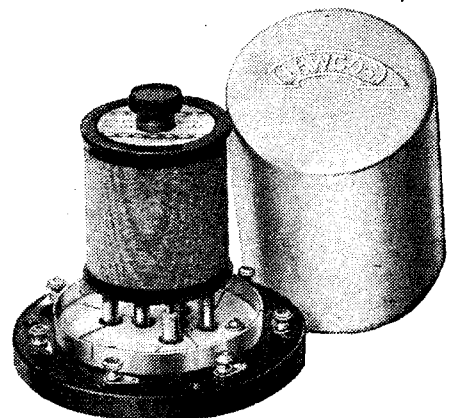
A Word of Warning.

Batteries run down, a valve may give out, a connection may loosen, and there are so many variable factors in radio, so many little things that can cause complete failure, little things obscure to the tyro, although they might be immediately apparent to the expert.

We do not wish to give the impression that broadcast reception is a very tricky business, but while salesmen are salesmen and tend to over-optimism it is as well that someone should throw in a steadying word.

But there is not so much exploitation these days, thank goodness, and honest conscientious traders are displacing the junk men who rushed into radio during the first boom. And as we have previously indicated, so long as one confines one's purchases to those products bearing the names of well-known British manufacturers one stands no risk of being let down.

We have been unable to deal with the subject of choosing Radio Christmas presents as exhaustively as it deserves, but the space available renders that impossible.



Anything new in the way of a radio component will delight the "fan." For example, here is a Lewcos screened "split primary" H.F. transformer.

The array is too enormous, including as it does thousands of items ranging between sets of parts for making a crystal detector costing 9d., and suitable as a "stocking present" for a very young enthusiast, to complete sets costing up to £100.

Therefore, in conclusion, we would draw the attention of all our readers to the many advertisement pages which appear in this issue. These give a pretty clear idea of what a lot of really fine gear there is available and should prove invaluable to the Christmas radio shopper.

RADIO IN THE ARCTIC

COMMANDER MacMILLAN was staying at the Astor Hotel, and he was in the act of taking a lift as I caught him.

"Pardon me, Commander, may I have a few words for POPULAR WIRELESS?"

"Surely you may. What would you like to know?"

"You only returned this afternoon to New York from Arctic regions," I said. "Please tell me if you have found out anything new about the Aurora Borealis?"

As I asked this question, I had in mind Commander MacMillan's statements during the last International Tests that the Aurora did not effect radio reception.

"I have not changed my former opinion that the Aurora Borealis has no harmful effect on wireless reception. In fact, if anything, I found on this trip that signals were perhaps a little better when the Aurora was at its height. I do not wish to go on record as saying

A Chat with Commander MacMillan.

By OUR NEW YORK CORRESPONDENT.

definitely that the Aurora betters radio reception under all conditions, but cer-

tainly we found signals were often louder when the Aurora was most manifest."

"When are you going up to the Arctic regions again, Commander?"

"I hope to make another trip next June, but it is to be a long one, perhaps of five years' duration. We shall certainly need wireless then more than at any other time. We are making arrangements to erect a broadcasting station for operation on short waves at Kowk, in Labrador.

"I intend to broadcast Esquimaux entertainment from this Kowk station to regular broadcasting stations in the United States, who will, in turn, relay it for the benefit of the listening public at large. Probably W J A Z at Chicago will play an important rôle in the re-broadcasting of the Kowk

programmes."

"What power do you intend using at Kowk, and what wave-length?" I questioned.

"That has as yet not been settled. Maybe we shall only use a hundred watts or so. Perhaps more. That depends upon experiments we shall carry out before the final erection. The distance from Kowk to W J A Z, at Chicago, is about 1,800 miles."

"What do you think of the broadcasting system in England?"

English Amateurs' Help.

"I really have not studied it thoroughly," replied the Commander. "I have not even been to England, although I hope to do so some day. I have often been asked to go there to lecture, but I have not been able to make the time. I certainly want to thank the English amateur for his splendid co-operation with us while we were up in the Arctic."

Several lifts had gone up by this time; the voice of a brass-buttoned starter announcing in stentorian tones "Going up," brought me to the realisation that perhaps the Commander thought to be abed.

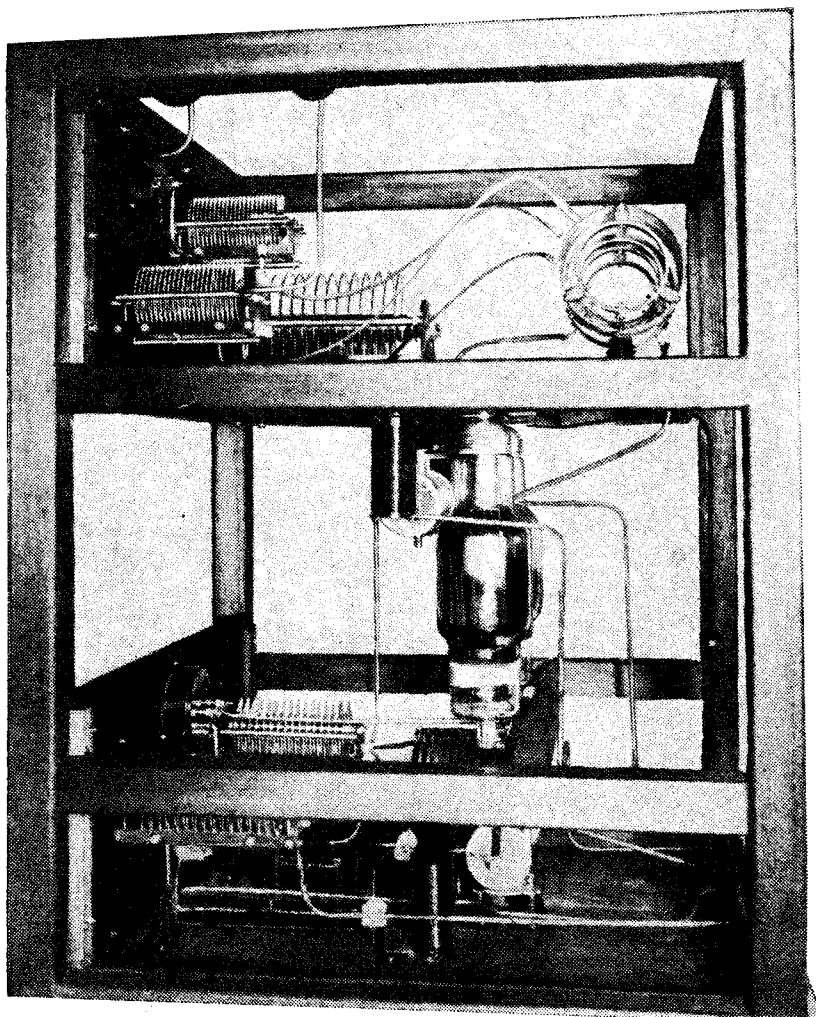
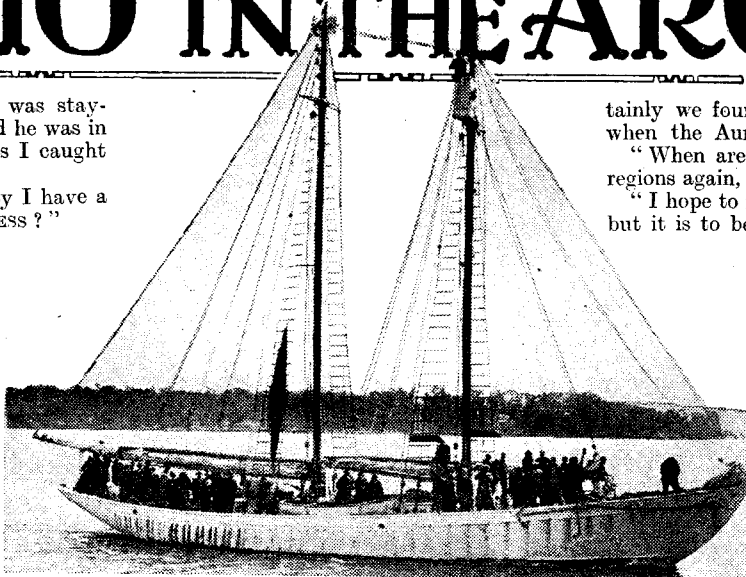
Reading my thoughts, he said:

"No, I'm not for bed; but I really must request your indulgence, for I'm just motoring down to Roosevelt Field to see Fonck off. I hear that he is starting for Paris at dawn to-morrow."

We stood chatting for a few minutes longer, while Commander MacMillan told me a few of his adventures in the Arctic, apart from the wireless aspect, and then he wished me and "POPULAR WIRELESS" readers "good-bye" and rushed out to board his car.

Your writer also spent an all-night vigil at Roosevelt Field, only to be disappointed, for, at the eleventh hour, a leak in the petrol tank prevented the hop off of the giant Sikorsky plane.

Later, of course, the huge airplane met with disaster, and the wireless operator was killed, though Fonck miraculously escaped.



An interesting photograph of the 250-watt Cardwell transmitter being used on the Roosevelt Memorial Association Expedition now exploring in Brazil.

You Must Have Distortionless Music

WHATEVER may be said against broadcasting in general, or against B.B.C. programmes in particular, no one will deny the pleasures afforded by wireless at Christmas time, or the excellence of the special fare which has been served by the B.B.C. in past years, and we may confidently expect something worth having for our Christmas season this year.

Are we ready to receive it, and to do it justice?

Whether we are giving children's parties, holding dances, or spending quiet evenings round the fireside, we owners of wireless sets all feel that now, more than at any other time, it is up to us to vindicate our hobby and make it a real pleasure to others as well as to ourselves.

Let us see to it, then, that we are fully prepared when the time comes—that our sets are in working order, and, above all, that we are getting the best possible quality from them.

We may be perfectly satisfied with our reception of the news items in the even tones of the B.B.C. announcer, but critical listeners will expect more than that. We must be able to reproduce the deepest notes of the organ, or separate the various instruments of the dance band. Drums must roll and not simply clatter, bells must chime and not jangle, and we must be able to reproduce the majestic unison in the Hallelujah Chorus without the jarring produced by an over-run valve or loud speaker.

Overhaul Your Set.

In short, we must overhaul our set, or modify it if necessary, in order to bring it as near to perfection as possible.

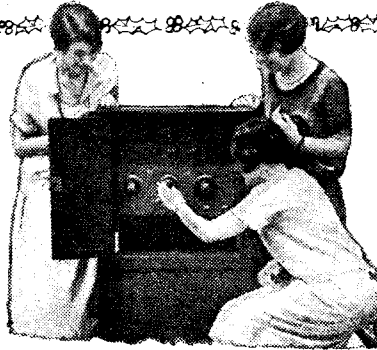
We cannot do better than commence with the batteries, first of all taking precautions to avoid the humiliation of having to close down because our accumulator requires re-charging.

The H.T. battery, the heart of our set, deserves special attention. Even though our existing battery may appear to be in good condition, we should be well advised to purchase a new one, and put the other aside for less important occasions. Here it must be emphasised that it pays to buy a battery of ample capacity, and in general it may be said that a battery costing twice as much will last about three times as long (the voltage being the same in the two cases), especially when a large power valve is being employed.

The same applies to the grid battery. Faulty grid cells will produce just as disastrous an effect upon quality as will a run-down H.T. battery and they should be changed just as frequently.

Assuming that our set is normally perfectly satisfactory, little more should be necessary in the way of an overhaul—but let us be certain that it is satisfactory.

For instance, if we switch on when nothing is coming through, there should be absolutely no sound in the speaker. If there is, distortion will be inevitable, even although the background may be apparently drowned when signals are received. These background noises can be very largely prevented by connecting across the H.T.



By C. E. FIELD, B.Sc.

(Staff Consultant.)

battery terminals a condenser of at least half a microfarad capacity.

Now, let us listen critically to some orchestral music. We may find that soft music, or instrumental solos are reproduced excellently, but that the full orchestra, or even loud pianoforte passages become confused and lose their musical quality.

This is almost certainly an indication that either the loud speaker or the last valve in the set is being over-run. If the speaker is a small one and a power valve is employed in the last stage, we are almost certainly overrunning the former, and good quality will probably be obtained by de-tuning the set, and so reducing the

volume. Alternatively, a large speaker, or a larger horn on the same unit, will enable us to obtain greater volume without sacrificing quality.

It may happen, however, that we are trying to work a large speaker from an ordinary general-purpose valve, as was common practice two or three years ago. In order to obtain good loud-speaker results, whatever the type of set or speaker, a power valve in the last stage is essential. It may safely be stated that no amateur who has once used a power valve would ever dream of being without one for loud-speaker work.

Moreover, the valve must be operated correctly.

Choosing the Valves.

We should take this opportunity, therefore, of either substituting in our last stage a really good power valve, and adjusting the grid bias and H.T. voltage to suit, or else adding a power stage to the output of our set, the 'phone terminals being connected to the primary of an intervalve transformer, or to a coupling choke.

When selecting a valve for this purpose, we must make certain that our choice will do all that is required of it. We should examine the characteristics of the valve before purchasing, and note the plate current flowing at zero grid voltage, using

(Continued on next page.)



Mr. De Groot, the famous violinist so well known to listeners, is an ardent listener.

A CHAT ON VALVES.

By D. K.

Spend a few moments in considering your valves. The time will not be wasted.

OF all the wonderful pieces of apparatus that will work together (more or less) to bring us our broadcast entertainment this Christmas, probably the valve is the most amazing. It has often been described as the Aladdin's lamp of wireless, but with dull emitters getting duller and duller there is not much resemblance to a "lamp" in the modern "tube." True, some people try to brighten things up by pushing the H.T. through the filaments of their valves, but this is a somewhat expensive method of obtaining illumination, and is certainly a "blow" to the valve.

Perhaps it would be as well if, while enjoying our Christmas radio fare, we were to spend a few minutes in solemn meditation upon the wonders of those little quadrupeds perched up on their pedestals in our receivers. There they are apparently doing nothing, full of nothing, but in reality veritable hives of industry. To the eye whose detection is keen enough the interior of a valve must appear like the entrance to a Cup Final—one mass of surging movement, of electrons hurrying away from the filament, through the turnstiles of the grid and on to the plate, where they race away to the H.T. battery through the external circuit. A truly amazing state of affairs and worthy of the attention of every one of us.

Treat Them Gently.

Valves are delicate things, too. They have to be treated gently, or they may sulk for days, or even go on strike altogether. Their feeding must be regular, not too much and not too little, or the valves will object and refuse to operate properly. Try to run a dull emitter on too much filament juice. What happens? The valve gets "fed up" and refuses to emit, signals become weak, and you either have to doctor the valve back to health or else buy a new one.

The same moodiness is noticeable if the valve is asked to work with companions (or components) it doesn't like. Put a high impedance valve in the last stage of a set and ask it to carry a considerable volume, it merely distorts and refuses to function properly.

Some valves are more obliging and will work anywhere in the set, provided their companions are not too disagreeable, but these are in the minority, and if you want the best from your valves, as from everything else in this world, you must treat them properly, and care for them as you would your favourite dog—or perhaps your wife if you have one.

Has it ever occurred to you that there are over 600 receiving valves to choose from if you have an average 4-valve set? That there are over 35 main firms distributing those valves; that on the British market there are over 40 makes, and many makes have as many as 20 types?

All these valves have their own little characteristics—often portrayed by makers by awe-inspiring but, unless you intend to study them carefully, meaningless curves—



The first comedy opera to be broadcast. A scene at the Birmingham station.

YOU MUST HAVE DISTORTIONLESS MUSIC.

(Continued from previous page.)

the highest plate voltage recommended by the makers.

For the successful operation of a medium-sized speaker in a small room, this should be at least five milliamps, while twice this amount is necessary for good results from a large speaker, or from one of the many types of cone speaker now available. If we desire really loud music in a large room, or small hall, a still larger valve, such as the D.E. 5A. should be employed, and a second speaker connected in parallel with the first.

Distortion, of course, may arise from many other sources.

We may find that although there is no evidence of overrunning either valves or speaker, our set does not give life-like reproduction.

Perhaps the sopranos shriek at us, while organ music lacks body and seems to come from a glorified concertina, indicating that

and these characteristics should be taken into consideration when choosing a valve to work in your set, whatever task it may have to perform. And, by the way, when studying those characteristics don't go by the *appearance* of the published curves—go by the *figures* given. Those curves are often as misleading as a hill seen from the top of another hill. From a distance it looks steep, but when you get "to the bottom of it" it flattens out in a peculiar manner. Curves are not always what they seem.

The valve is a wonderful piece of apparatus, and we shall not do better than spend a few minutes in reflecting what it is, what it does and—what we should do without it.

we are amplifying high notes much more than low ones. On the other hand, our set and speaker combined may exaggerate low tones and cut out very high ones, with the result that the basses boom as through a megaphone, while speech is woolly, and stringed instruments sound lifeless.

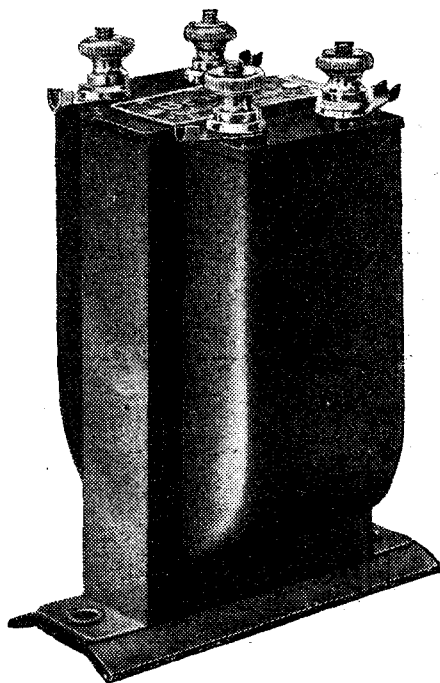
Much of this distortion may be due to inherent defects in the speaker, which cannot be easily remedied, but in the first case a great improvement may be effected by shunting the loud speaker with a fixed condenser of about .005 mfd.

In the latter case, a larger condenser of from 0.1 to 0.5 mfd. may be connected in series with the speaker, the two being shunted with an iron-cored choke coil.

Too Much Reaction.

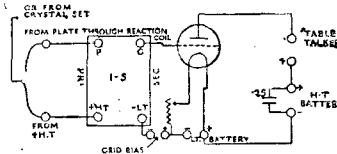
Distortion may also be introduced at the H.F. end of the set by the use of too much reaction, leading to a serious cutting off of very high notes, without undue prominence being given to the middle and lower ranges, the result being that speech is very inarticulate, and music sounds to be low-pitched. The use of reaction should be reduced to a minimum, and for really high quality reproduction should be omitted entirely.

THE BRANDES AUDIO TRANSFORMER

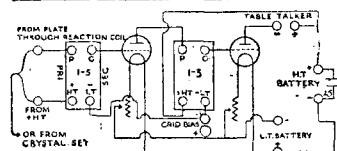


Connect it this way:—

CONNECTIONS FOR ONE STAGE OF L.F. AMPLIFICATION



CONNECTIONS FOR TWO STAGES L.F. AMPLIFICATION



- (1) Connect Pri. P. to plate of det. valve through reaction coil or direct to plate if 2nd stage L.F. connection is being made.
- (2) Pri. + H.T. to + terminal of H.T. Battery.
- (3) Terminal marked G. Sec. to grid of next valve.
- (4) Terminal - L.T. Sec. to - of grid batt.
- (5) + of grid batt. to - terminal of L.T. batt.

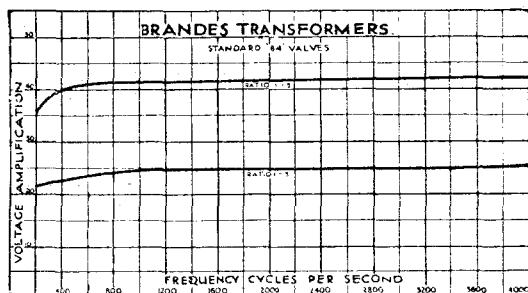
HIGH AMPLIFICATION OF APPLIED VOLTAGE AND A STRAIGHT LINE AMPLIFICATION FREQUENCY CURVE

For many years Brandes specialised in acoustical research and the improvement of the audio circuit of the receiving set which so essentially determines the quality of reception.

One result is the Brandes *Audio Transformer*. Developed along sound engineering lines, the main object in view is a high constant voltage 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. The inductance of the primary winding is much larger than usual, giving good amplification at low frequencies, and bringing beautiful reproduction more particularly in the lower registers.

No condenser need be shunted across the primary winding. When used, it may be found necessary to use grid cells for biasing purposes to obtain purest results. To use grid bias all that is necessary is to insert cells between L.T. Sec. and the negative terminal of the L.T. Battery such that the L.T. Sec. terminal is connected to negative terminal of cell, and the negative terminal of L.T. Battery is joined to positive terminal of cell. Cells from 1·5 to 8 volts should be tried.

G. P. Kendal, B.Sc., writing in the *WIRELESS CONSTRUCTOR* on the building of the "Spanspace Three" recommends the inclusion of the Brandes L.F. Transformer.



The unit is well protected mechanically, and the shielding is such that transformers may be placed close together without interaction. The insulation between primary and secondary coils and also from these to laminations is very high. Each transformer is tested against a Standard before leaving the factory at 200, 600, 1,600 and 4,000 cycles per second. The ratio of turns between secondary and primary is 1 to 5 for the First Stage Transformer and 1 to 3 for Second Stage Transformer. They are ideal in first and second stage work respectively.

As well as ordinary terminals for connection, soldering tags are provided, giving the user a decided advantage.

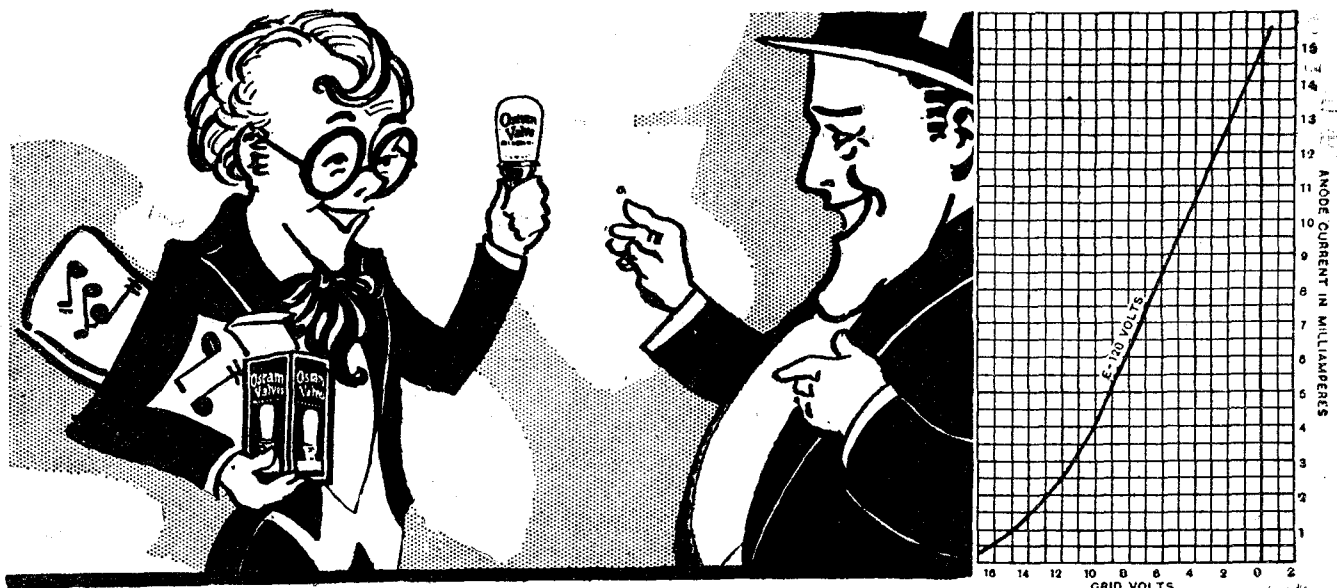
Ratio 1-5
17/6
(Black case)

Brandes
AUDIO TRANSFORMERS

Ratio 1-3
17/6
(Brown case)

BRANDES LIMITED, 296, REGENT STREET, W.1.

WORKS: SLOUGH, BUCKS.



"A Wonderful New— OSRAM VALVE" (D.E.P. 215)

'TONE' and 'POWER' examine the "STEEP SLOPE" Valve.

Said POWER to 'TONE' recently "This new OSRAM 'STEEP SLOPE' VALVE is undoubtedly the best thing yet. I like the tremendous mechanical strength, and the great overall amplification. It means even more volume for these listeners."

"More than that" replied TONE. "Do you notice the extreme accuracy in spacing between filament, grid and anode, and the carefully designed grid to control the electron stream accurately? That means that we can give them greater purity than ever."

"In every way—a wonderful valve!" was the joint exclamation of our two friends. "Listeners will be glad when they get it."

Osram Valves for TONE & POWER



TONE & POWER
The Boon Companions of
OSRAM VALVES

The G.E.C.—your guarantee

THE NEW OSRAM 'STEEP SLOPE' 2 Volt POWER VALVE (TYPE D.E.P. 215)

THE characteristic curve of this new valve is exceptionally steep, thus ensuring greater overall amplification, better volume and less distortion.

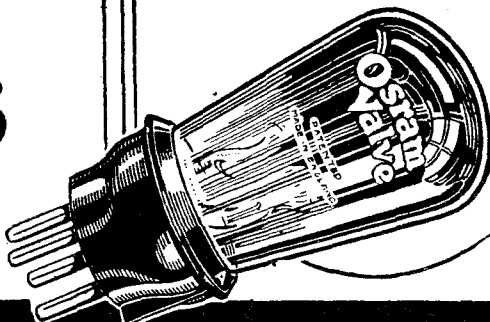
The design of this valve comprises the new OSRAM Electronised Filament giving enormously increased electron emission, lower working temperature and longer life.

This filament requires a 2-volt accumulator only, a minimum of current, and is of great mechanical strength.

The accuracy in spacing between filament, grid and anode is carefully carried out, whilst the special grid gives a fine control of the electron stream.

The valve gives a great response in the anode circuit to weak signals imposed on the grid—in other words, the OSRAM 'STEEP SLOPE' (D.E.P. 215) POWER VALVE is sensitive, stable, gives great volume and absolute purity, and possesses the added advantages of long life, mechanical strength and low current consumption.

PRICE 18/6





MY RADIO ACTIVITY

I HAVE always considered one loud speaker in a man's house sufficient, and until recently have kept my home free from the competition of a wireless installation and a "Man with a Golden Voice."

But a week before Christmas, H. T. Bee, a wireless wizard with oscillating eyes and a short-wave length tongue, led me astray.

Chancing to meet him at the station he took me affectionately by the arm.

"I say," he breathed in inviting tones, "can I tempt you to a w.s.?"

I thought it a good idea for a chilly evening and signified my assent.

"Good!" he said. "How many valves?"

Then I knew he was talking about a wireless set and not a whisky-and-soda. My heart "plonked."

"I don't like wireless," I said stiffly.

"I'll build you a set for fifteen pounds," urged H. T. Bee. "And when you've got the loud speaker going, your missus and young George will sit silent in rapture."

The idea of Hilda my wife and George my son sitting silent in anything, pleased me so much that I told H. T. Bee to get busy.

"You shall have it on Christmas Eve," he promised. "I'll send the aerial and earth along, and you can get the one up and the other down in your spare time."

I Commence Preparations.

I said I would, and when on Friday, reaching home about two-thirty, I found a larch-pole, earth-plate and coil of wireless wire awaiting me, I stripped off my coat eagerly.

"Leave those things to me, George," I said to my son who was tinkering with the insulators.

"I was only putting—" commenced George.

"Don't argue," I said with the decision of the expert.

George went off sulkily and I started digging.

At half-past four, notwithstanding a running fire of advice from George and Hilda, which I ignored, and the loss of considerable quantities of skin and sweat, I had the pole erected and rammed home with all the brick-ends from our last delivery of coal. You can guess it was firm!

"That won't move easily," I sighed

AN AMUSING XMAS RADIO STORY.

By EDWARD WOODWARD.

happily, getting the aerial wire and insulators.

Something seemed to be missing. I looked at the wire and then at the top of the thirty-foot pole. How was I going to make the two ends meet without felling the pole?

"I kept on trying to tell you," said George.

"But you wouldn't listen," added my wife.

I felt nettled, and with frigid dignity requested them to withdraw. Then, alone

with my grief, I commenced to unearth the pole. But nothing would move it, so, being dauntless, I started to climb it.

I'm a good swimmer—a regular bee, in fact—and soon reached the top, with the aerial wire in a neat coil at the foot.

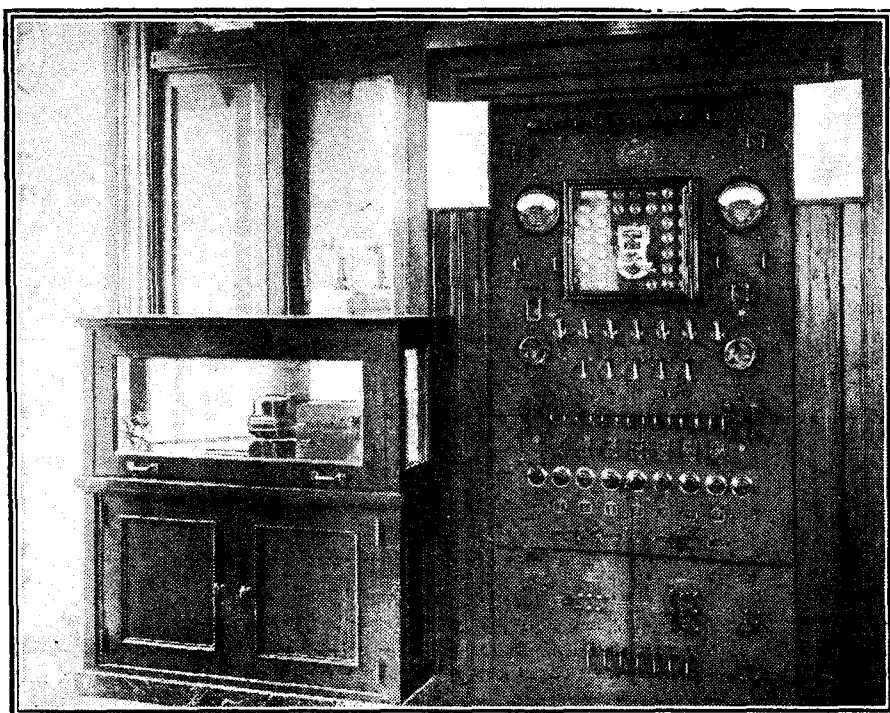
There are moments in a man's life when words fail him, at that instant I sighed for a really clever fish-porter.

Success at Last.

However, dropping down, I slipped the coil of wire round my neck, put the insulators between my teeth and climbed up again. I did it that time, and by eight o'clock had finished everything, and nearly myself, owing to my Adam's apple fouling a loop of wire as I was descending from the roof.

H. T. Bee arrived with the set at eight-thirty, and, thanks to the thorough way I

(Continued on next page.)



A recently designed radio system which is used in America for the detection of storm centres.

EXPLORING BY THE FIRESIDE.

By I. N. TREPID.

This breezy little article tells us what sort of results we should expect on our Radio sets during Xmas time.

WHAT does a wireless set think of Christmas? Of course, the question is absurd because a wireless set can't think, so let us frame another. Do the seasons affect a radio outfit? In other words, is a receiver sensitive to changes in temperature and atmospheric conditions similarly to a motor-car? And if the answer is "yes," then, again, in what condition should a receiver be on Christmas Day?

Well, in the first place, the set itself is not likely to be affected one way or another if it is kept in a nice dry room and not in the garden. In the latter case it would be advisable to provide it with an umbrella and a nice warm blanket. But the seasons

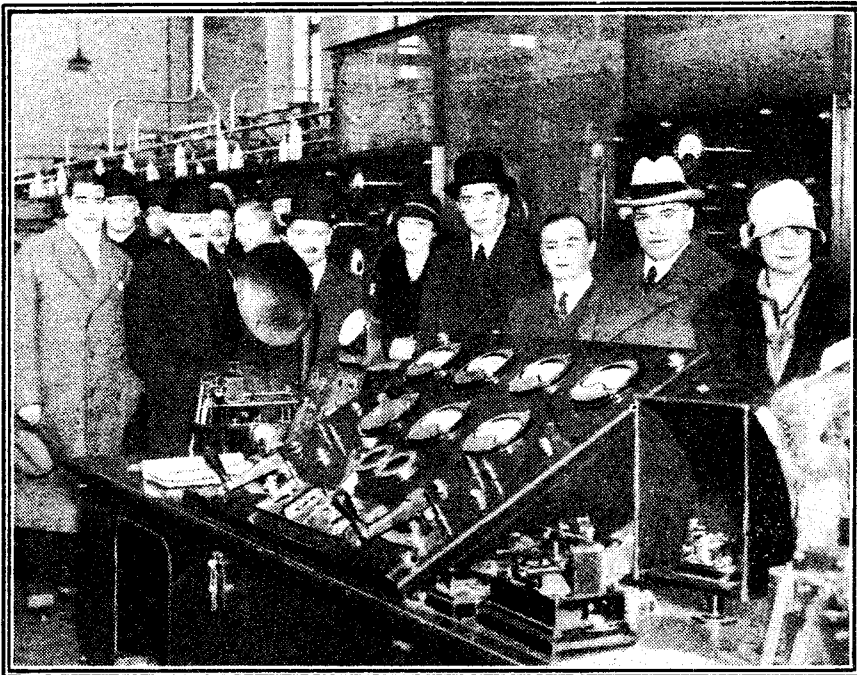
Atmospherics (grrrr! crash!) are, flylike, fewer in the winter time and, lastly, radio waves tend to penetrate very dry ground, but are reflected away from ground that is covered with moisture or snow or frost. Therefore, Christmas is right in the middle of the real radio season, so let us all join together and sing:

A fig for your dances and parties,
I've got a super-het.

Come, twiddle these dials, my hearties,
And see what we can get.

Berlin, Frankfort, Nice and fair Parsee,
Rolling home! Rolling home!

A life on the ether wave for me.
Just see how I can Rome!



A photograph of some of the control gear at the Rugby station taken during a recent visit of the Dominion Premiers.

do affect radio reception and transmission to a considerable extent. And, curiously enough, the colder and darker and wetter the night the better the ether waves wave. This is, of course, as it should be, a wise providence ruling that "the dirtier the night the better the receiver."

When Darkness Comes.

There are many reasons for this, the outstanding one being that broadcast waves, like owls and bats, modestly prefer the dark of night to the light of day. As soon as the sun sinks over the horizon (you might not see it but it always does do this) the ether vibrations of 2 L O and all the other stations start to ginger themselves up. It is as though they were dazzled by the light of the sun and had to wait until this departed before they could really start extending themselves.

MY RADIO ACTIVITY.

(Continued from previous page.)

had done my work, got everything fixed up, including the outside "tempest switch," we very quickly tested the reception with the headphones.

"Very pure," he announced; and then putting the thing "in neutral," handed me the 'phones and told me to "tune in."

I had just started when Bee was called away by his wife owing to some unimportant thing like his house being on fire or some trivial matter, and without a word he left me alone with the crackling infernal machine.

However, a man can only die once, and so steeling my heart, I twisted the off-side condenser.

I got condensed scream of the richest sort, and for a minute I believed both my ear-drums had been perforated. I dashed the 'phones off my head with a cry of anguish, and Hilda ran forward.

"What is the matter?" she cried.

"A slight shock," I murmured, in the voice of a martyr to science; and picked up the ear-phones again. The scream was still going on, but after I'd twisted some more knobs it changed to a growl, and then abruptly came music. Immediately I disconnected the 'phones and switched on the loud speaker.

Paris—or 5 X X ?

"There!" I said with pardonable pride. "That's something like, isn't it?"

"Rather faint," grumbled Hilda, with her head half-way down the loud-speaker horn.

"You haven't—" commenced George. But I cut in haughtily:

"You can't expect to get Paris very loud."

"Oh!" gasped Hilda. "Is it Paris?"

"Undoubtedly," I said. "Can't you hear that woman singing in French?"

"Wonderful!" ejaculated my wife, giving me a thrill of pride.

The whisper of music ceased, and:

"This is Daventry calling," said the "Man with the Golden Voice."

I was rather busy on Christmas afternoon, and when I woke up it was four o'clock, and I was only just in time to prevent George trying to tune in.

"Don't you dare touch that instrument," I told him. "In untutored hands it might explode and set the house on fire."

George grinned foolishly and stood watching me as I connected up, switched on, and listened.

There was nothing doing.

"Hadn't you better—" commenced George.

"Be silent!" I thundered, examining the H.T.

At seven o'clock I was without tea or sound. At nine I had tears in my eyes but no music—not even a few words of explanation—in my ears, and at eleven George came in from the other room to know whether I'd like the gramophone on. I threw the headphones at him, and rushed out to fetch H. T. Bee. He was just getting into bed, but he came back with me.

Entering the hall I heard music, and going into the room I found Hilda reclining on the settee, eating chocolates and listening to the Wireless Orchestra, whilst George was tinkering with the set.

Real Activity.

"How—what have you done?" I gasped.

Hilda looked up with a smile.

"Just lifted the 'tempest switch,'" she said. "George kept trying to tell you it was down, as you left it last night, but you wouldn't listen."

H. T. Bee started one of his ill-timed cackles, but I shut him up.

"But how did you tune in?" I asked.

"Oh, George managed that," explained Hilda. "They teach him all about Radio Activity at school."

I had to give H. T. Bee a real w. and s. to check his insane laughter.

MARCONI



THE NEW POWER VALVE D.E.P. 215 ~ Price 18/6

THE ENCHANTMENT of those after-dinner hours, spent in the cheerful warmth of the cosy fireside, are so much more intriguing when your set is capable of lucid expression while handling a wealth of volume. The new Marconi Power Valve inspires your receiver to this end: Symphony and song come to you with crystal-clear sweetness, yet filling the whole room with music. Economy is another strong point—it handles the current judiciously and lives a long and useful life. The D.E.P. 215 is for use in the last stages of Receivers and Amplifiers operating from a 2-volt Accumulator. The filament of the D.E.P. 215 is robust and rigid; the grid is unusually large and has a great emission

surface. Used with the correct H.T. and grid-bias voltage it will handle great volume with a purity of reproduction hitherto unobtainable.

A FEW RECOMMENDED COMBINATIONS:

| | Marconi Valve Type | Position | Filament | | Grid Bias Volts | High Tension | | L.T. Batt. Supply. |
|-----------------|--------------------|----------|----------|------|-----------------|--------------|---------|----------------------|
| | | | Volts | Amps | | Volts | M. Amps | |
| 2-Valve Set | D.E. 2 H.F. | Det. | 1.8 | 0.12 | +2 | 60 | 1.6 | Two-volt Accumulator |
| | D.E.P. 215 | L.F. | 1.8 | 0.15 | -9 | 120 | 4.6 | |
| Three-Valve Set | D.E. 2 H.F. | Det. | 1.8 | 0.12 | +2 | 60 | 1.0 | |
| | D.E.P. 215 | 1 L.F. | 1.8 | 0.15 | -3 | 60 | 2.5 | |
| | D.E.P. 215 | 2 L.F. | 1.8 | 0.15 | -9 | 120 | 4.6 | |
| Four-Valve Set | D.E. 2 H.F. | H.F. | 1.8 | 0.12 | 0 | 60 | 0.8 | |
| | D.E. 2 H.F. | Det. | 1.8 | 0.12 | +2 | 60 | 1.0 | |
| | D.E.P. 215 | 1 L.F. | 1.8 | 0.15 | -4.5 | 80 | 3.3 | |
| | D.E.P. 215 | 2 L.F. | 1.8 | 0.15 | -9 | 120 | 4.6 | |

Marconi Type D.E.R. or other 2-volt valves are also suitable for the H.F. detector or first L.F. stages.

Fil. volts .. 2.0 max.
Fil. current .. 0.15 amps.
Anode volts .. 120 max.
Amplification factor 6.25
Impedance .. 6250 ohms.

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Include the Bowyer-Lowe Super Heterodyne Kit in your Gifts this Christmas. It will bring lasting and constant pleasure.

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contains particulars and illustrations of all our trustworthy components, also two constructional articles of interest to amateurs. A portable set and a four-valve receiver are fully illustrated and described 1/6d. in stamps will secure your copy. Get it now.

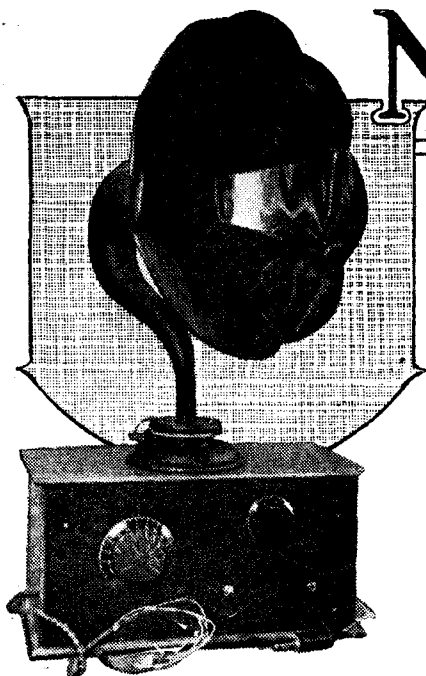
Bowyer-Lowe

Announcement by the Bowyer-Lowe Co., Ltd., Letchworth, Herts.

Notes on the Hale

by CAPT. H. J. ROUND

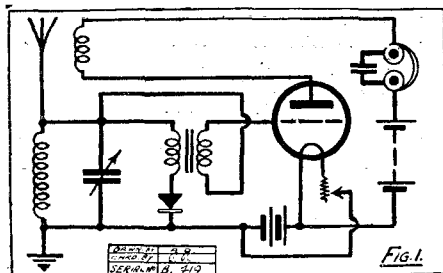
The popularity of the Hale circuit has been amazing, and in this special article Captain Round makes some valuable observations on the circuit, which should appeal to all who have built up the set as described in recent issues by Mr. Percy W. Harris.



The Hale receiver as constructed by Mr. Percy W. Harris.

MR. HARRIS asked me a few days ago if I could analyse the Hale circuit and say exactly how it worked! I took a diagram of connections home, and I was glad I had done so, because by the time dinner was over I had forgotten the arrangement.

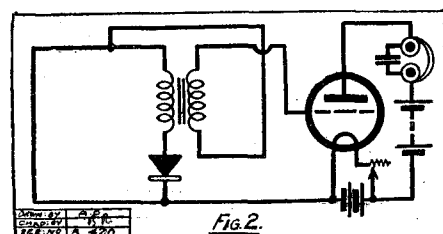
Experimenters are always hitting on comic arrangements like this, and I wonder



sometimes how they do it. Friends bring circuits to my house to make work, and the hardest work is nearly always finding out the meaning of the circuit.

A full-blown radio engineer seldom gets a thing like the Hale circuit. He would start with the general idea and build it up systematically, with the result that in this case it would probably not be so good.

Well, obviously the general idea involved in this circuit is to crystal rectify, then L.F. amplify, and finally use the L.F. valve to produce reaction, and the curious trans-



former connection is in some way a method of by-passing the H.F. into the L.F. valve.

First of all let us, by a series of diagrams, get the rectification and L.F. amplification part straight.

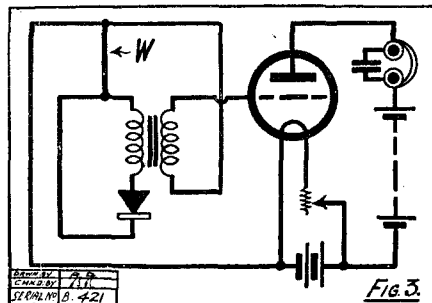


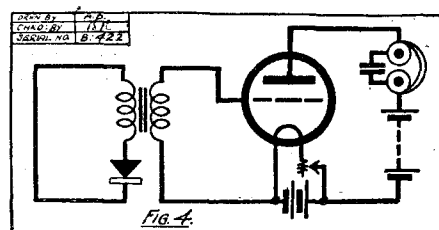
Fig. 1 is the Hale circuit, and in Fig. 2 I have cut out all the H.F. parts.

Fig. 2 is still a bit mystifying until we shift one lead to the other end of the short piece of wire which replaces the H.F. input circuit (Fig. 3), and then we can clearly see that the crystal circuit and the valve circuit are only connected at one point, W. For L.F. this can do nothing, so that we finally end with Fig. 4, which is an ordinary L.F. mag. working from a crystal through a ratio transformer, and our previous experience says use a high ratio transformer, such as 6-1 or 8-1. So much for the L.F. part; and to analyse out the H.F. part we will put a set of capacities in the diagram, representing stray capacities,

Analysing the Circuit

Now R in Fig. 5 represents the crystal resistance. C_1 the stray capacity across the transformer primary. C_3 the stray capacity across the transformer secondary. C_2 the stray capacity between the top ends of the transformer winding. C_4 the stray capacity between the bottom ends of the transformer winding.

Without altering a single connection, let



us redraw Fig. 5 as Fig. 6, and then as Fig. 7, and the arrangement becomes quite obviously a condenser arrangement to supply the necessary H.F. to the valve to enable reaction to be applied.

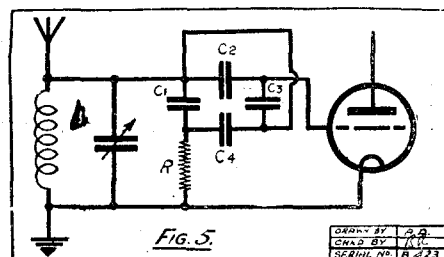
But can't we do it in a more straightforward way. Thus I suggest the circuit

of Fig. 8, where C_5 is added to give a coupling, and we can easily see why this may be not so good if we draw its H.F. part out.

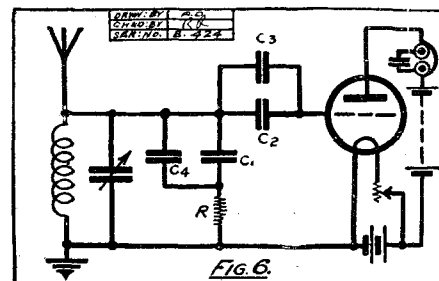
First of all the resistance (or crystal) is shunted with a condenser, and secondly, unless C_5 is kept very small, C_3 has C_2 and C_1 and C_4 in shunt across it.

And so C_5 is really an additional condenser added across the transformer secondary, like in reflex work, which always tends to spoil a transformer.

In fact, what the Hale circuit does is to use stray capacities of the transformer as a by-pass.

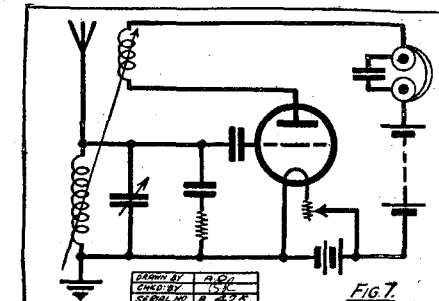


I should, however, recommend insulating the transformer and keeping it away from earth leads or plates for very best results. And I suggest the slight alteration of a grid leak and condenser to get the grid



bias on in a better way; although this may not work so well near the reaction point.

Some trick like this Hale scheme might be used to get the by-pass condenser out of



(Continued on next page.)

SHORT-WAVE NOTES.

By E. J. SIMMONDS, F.R.S.A., M.I.R.E.

(Staff Consultant.)

SINCE writing my last jottings the reception conditions on short waves have completely changed, and signals from all quarters are coming in with quite unusual strength. This is especially noticeable in the case of the American signals in the band 37 to 42 metres, many stations being heard quite early in the evening and by 23.00 G.M.T., 1st, 2nd and 3rd also 8th district amateurs can be logged in scores on a simple two-valve receiver.

In the wave-band 30 to 35 metres good signals are coming in from Australian, South African and Far East stations from 19.00 G.M.T. These signals, however, rarely exceed R.6 in strength, while the American 1st and 2nd districts, notably U I S W, often exceed R.8 at 23.30 G.M.T. This change is most remarkable in view of the conditions ruling a fortnight ago, when electrical storms were raging in many parts of the world, and in consequence the working of even high-power short-wave commercial stations was most adversely affected.

Remarkable Signal Strength.

This present period of intense signal strength has synchronised with very low barometer readings in this country and abroad, and as a point of interest, when the writer was carrying out some tests with U I S W at 23.45 G.M.T. on 8th ult., it was noted that the signals from U I S W were really too strong for comfortable headphone reception. Enquiry regarding the weather conditions ruling at U I S W at this time was made, and it was found that the local barometer readings were remarkably low, coupled with wind and rain.

The same weather conditions prevailed at G 2 O D with a barometer reading of only 28.6 inches, indicating the presence of a deep depression, and there would seem to be a close connection between these changes in signal intensity and the weather conditions prevailing at both the transmitter and receiver.

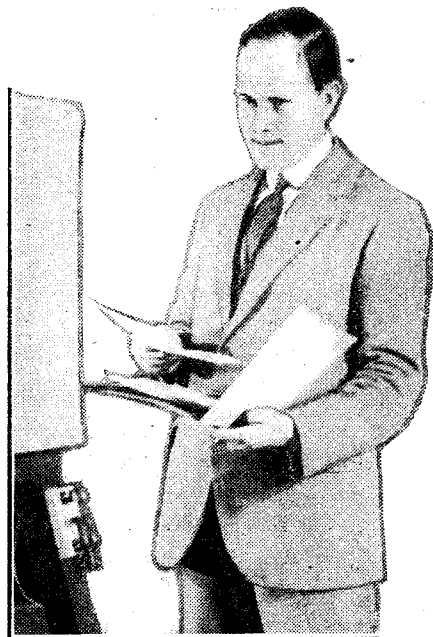
The recollection of readers is directed to a very interesting transmission which took place from the short-wave American broadcasting station 2 X A F Schenectady on 32.79 metres.

Through the courtesy of the General Electric Co., the president of the A.R.R.L., Mr. Maxim, and other prominent A.R.R.L. officials, broadcast a special international programme at 23.00 G.M.T., November 27th, and in addition to speeches, etc., some novelties which involved modulated radio telegraphy were transmitted.

In view of the ease with which telephony from this station can be received on an ordinary two-valve receiver, it is thought that listeners will find this station of especial interest, and it is hoped that many were able to "tune in" at the above-mentioned time.

While discussing the programmes of 2 X A F, I wonder how many listeners heard the relaying of the inaugural programme of the National Broadcasting Co. of America from that station some weeks ago. The signal strength and clarity on three valves enabled the programme—a remarkably good one—to be put on the loud speaker of a friend of mine who makes no pretence of being a short-wave enthusiast.

Another good one is the world-famous Pittsburg station, K D K A, which, on 60 odd metres, is coming over with great regularity and consistency.



Mr. Arthur Burrows, who became the first announcer in the B.B.C., and is now Manager of the International Radiophone Bureau at Geneva.

A SUPER-HET. AT CHRISTMAS.

WITH the advent of another Christmas the super-het. is still finding great favour among that class of amateur keen on long-distance reception. Even with the rivalry of the Neutrodyne, which came to the fore during the latter part of 1925, the super-het. still stands supreme where sensitivity is concerned. For reception in cities where it is impossible to erect an outdoor aerial, it is unapproachable in its performance. For ease of control it has yet to be bettered.

Contrary to the belief of many, it does not require an expert to operate it. What

can be more simple than two dials to tune, one potentiometer to adjust (infrequently) and a frame aerial to turn? Compare these manipulations with those on an ordinary "straight" 4 or 5-valve receiver, and it will be agreed that it is no more difficult, but probably easier, to tune than the latter.

Not the least of its assets is its reliability. With a couple of good variable condensers incorporating vernier movements, a "velvet" potentiometer, and a good frame aerial it is possible always to find a station again once it has been "logged."

Unlike an ordinary set, where there are coils to be plugged in, condensers to be reset, etc., all its coil arrangements are fixed, and therefore there is little to get out of order.

All Europe Available.

Further, with the introduction of H.T. battery eliminators, there need be no fear of the H.T. running down in the middle of a programme, nor causing crackling and other unpleasant noises on distant stations.

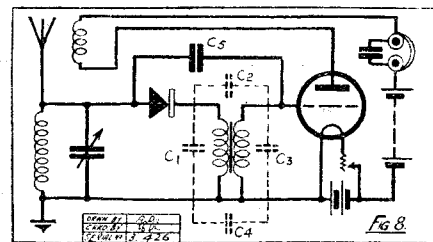
Talking about distant stations, the man with a super-het. this Christmas will have a wonderful time. Everywhere special programmes will be put out, and the Christmas party will be able to range all over Europe, pulling in dance music, songs, orchestral items, carols, as they require them. Nothing could be more convenient than a good super during such festivities, acting as it will as a veritable Father Christmas, dealing out music wherever and whenever it is required.

NOTES ON THE HALE.

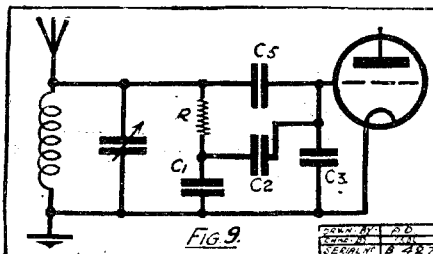
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reflex circuits, but I have had no time to think it out yet.

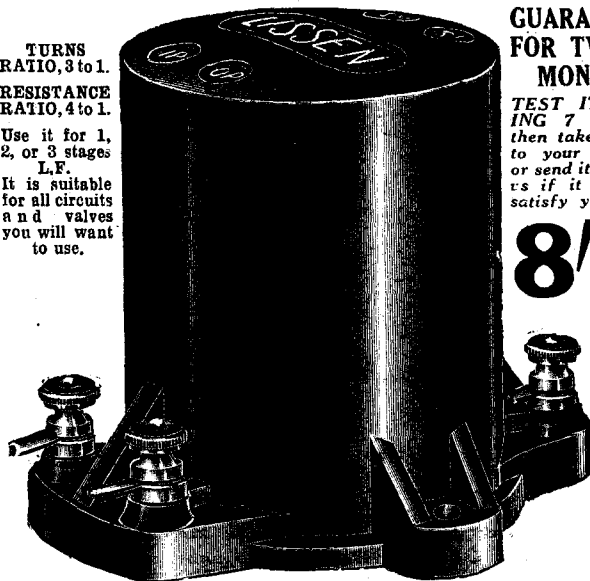
The Hale-circuit should be extremely good for short-wave telephony, and for this a modified reaction will probably be more suitable.



I am not very expert with these short-wave reaction arrangements which enable one to vary reaction without shifting the tune, so that I think it will be wiser to let Mr. Harris show you now to get K D K A on one valve.



TURNS
 RATIO, 3 to 1.
 RESISTANCE
 RATIO, 4 to 1.
 Use it for 1,
 2, or 3 stages
 L.F.
 It is suitable
 for all circuits
 and valves
 you will want
 to use.



**GUARANTEED
FOR TWELVE
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**TEST IT DUR-
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 then take it back
 to your dealer's,
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 satisfy you.

8/6

SAVING SET - BUILDERS £30,000 A MONTH!

To the set builder who wants a good transformer and is willing to pay 23/6 for it, LISSEN say—DON'T! For LISSEN now saves the set builder who wishes to pay that price 15/- on every transformer, AND GIVES HIM A TRANSFORMER YIELDING INCOMPARABLE AMPLIFICATION BESIDES.

A saving of 15/- on every transformer—multiply that by 10,000 purchasers a week of a single transformer each, and you have users of this new LISSEN Transformer actually saving on their radio bills £7,500 A WEEK — £30,000 A MONTH—ON TRANSFORMERS ALONE.

This is a staggering figure—BUT IT IS AN UNDER-ESTIMATED POSSIBILITY. And not only is this huge amount of money saved to purchasers of the new LISSEN Transformer, but better sets and better amplifiers are now being built than before. WE HAVE THE COURAGE TO OFFER YOU A 7 DAYS' TEST OF THIS NEW LISSEN—and our courage is born of knowledge. FOR WE KNOW WHAT THIS FINE LISSEN TRANSFORMER IS CAPABLE OF, and we stand behind our claims with a 7 days' test offer so that you shall prove them for yourself.

How has this remarkable achievement been made possible? Huge production, special plant, matchless ingenuity of design, our new direct-to-dealer policy of distribution to cut out all wholesale profits—our determination to place BIG, POWERFUL AMPLIFIERS WITHIN THE REACH OF ALL WHO CARED TO BUILD THEM—these are some of the things which have brought this new LISSEN within your reach.

AND IT HAS SWEEPED THE COUNTRY.

Never again pay a high price for a transformer—we have unhesitatingly withdrawn all our own high-priced transformers, which had been on the market and largely sold for several years past.

Compare this new LISSEN against the most high-priced transformer you know of. You will find it FULLY AMPLIFIES EVERY NOTE, EVERY TONE, EVERY HARMONIC, EVERY OVERTONE. Many expensive transformers will not do that, BUT THIS NEW LISSEN DOES.

Obtainable at any good dealer's, or if any difficulty, direct from factory. Please mention dealer's name and address.

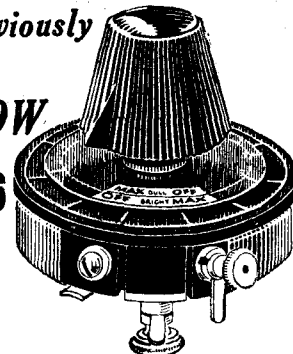
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4/-

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2/6



LISSEN quality—look how they are made—the wires cannot move and short circuit—the contact brush rides firmly yet smoothly—the heat-resisting former cannot soften—there are accessible terminals—and the combined knob and pointer will fit flush with the neat photo-engraved dial when mounted. Lastly, note the irresistible appeal of the price, made possible by our big production programme backed by our new direct-to-dealer distribution policy which cuts out all wholesale profits.

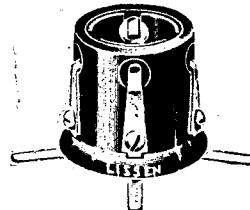
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| LISSEN 7 ohms rheostat, patented | 4 - | 2/6 |
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(patented), previously 1/8

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(Managing Director: Thomas N. Cole)

L.137.



Everybody's Xmas Tree!

Stone's Ginger Wine has good things galore for everyone at Christmas. Every glass is brimming with good cheer—every sip has a smile in it for someone!



Come on everybody! Share in its genial glow.....

Sip it—Drink it—Drain it—and warm up to the fun!

STONE'S GINGER WINE

Famous since 1740.





IT will be extremely interesting to know what the British Broadcasting Company has up its sleeve in the way of happier programmes for Christmas and the New Year. During the past few weeks there have been some very bright spots in, now, almost perfect hours of light entertainment.

There is every reason, then, that the B.B.C. will continue on the road of progress, and that the Christmas evenings by the side of the fire will prove an added delight with the help of broadcasting.

I am sure that Savoy Hill will have many good things for listeners-in during the usually dismal wet nights of December, and also as it is the last month of the present independent regime, before the government takes over, the powers that be are sure to play their trump cards.

It is interesting, however, to hear what various famous people have to say with regard to Christmas wireless programmes, and the following include some very sound suggestions which the B.B.C. might like to consider and perhaps carry out.

In every case the slogan seems to be "brighter programmes." There seems to be a general demand for laughter, and it is up to Savoy Hill to provide it.



Mr. George Grossmith.

MR. GEORGE GROSSMITH
(the famous actor-manager, and a member of the British Broadcasting Committee).

Personally, I am very fond of ghost stories, but I am afraid there will be no ghost stories in the Christmas wireless programmes. At least, not as far as any of the British stations are concerned.

Wireless programmes at Christmas will be as happy and as merry as it is possible to make them. No pains will be spared to see that the programmes will be as perfect as possible, and suit all tastes.

The energy of all concerned at Savoy Hill is concentrating on making the festive programmes full of originality and as entertaining as possible, and naturally, wherever and whenever possible, they will be of a light nature.

I think you will find that dance bands will

The slogan for the B.B.C. this Xmas is "Brighter Programmes." Below, "Ariel" reports the views and suggestions of some famous artistes in the entertainment world on "how it should be done."

form the most popular feature, and the sessions will possibly be augmented. There is more dancing done at Christmas than at any other time of the year, and it is only natural that the B.B.C. will see to it that there will be as much music as is required.

FAY MARBÉ

(the famous musical comedy actress sees Christmas radio from an American point of view).

I certainly think that broadcasting in England will do a great deal to liven up matters at Christmas. Personally, I think that there should be ghost stories on Christmas Day and Christmas Eve.

There is nothing so thrilling than to listen to a ghost story in the dark, and it is even more weird when it is only a voice from somewhere.

Of course, unfortunately there are always some people who might listen to these stories and to whom it might have harmful effect. Old people and patients particularly.

If I were to draw up a broadcasting programme I should make it as merry and musical as possible. Everyone who is in a festive mood asks for music, and therefore the more music there is in the programmes, the better.



Alice Delysia,

mum during the month of December.

In America radio entertainments round about Christmas are a very light-hearted affair indeed, and they are mostly humorous or consist almost entirely of dance music. Famous people are invited to come and give Christmas greetings, and this is an amusing originality which might be included in the British programmes.

ROY ROYSTON

(the well-known musical comedy actor).

Broadcasting has always been full of interest for me, and I would be lost without my wireless. I do not think that the B.B.C. could do better than continue with the kind of stuff they have been giving lately, which, to my mind, is original and entertaining from all points of view.

There should be as much humour and excerpts of theatrical shows as possible.

It ought to be the intention of the B.B.C. to bring the theatre to the front in their Christmas programmes, and excerpts of shows and various entertainments of the light types should be included.

All the serious stuff ought to be left out, and the complete description might be, "Humour and Dance Music."



Kreisler (the famous violinist).

ALICE DELYSIA
(Princess Charming.)

I hope to spend Christmas by my fireside, and if it is really anything I

look forward to it is my 2-valve set. I look forward also to the Christmas programmes.

I love music, and I hope there will be a lot of it at Noel.

Christmas always makes me very gay, and so I like everything else to be gay, and that is why I am hoping that the radio programmes will follow the example.

I do think, however, that there should be quite a lot of good, dreamy music, for at Christmas everyone dreams.

There should be selections from French, Italian, Spanish, Eastern and all the classics. *Ca ramene toujours les memoirs.*

And these memories brought back by music are always the sweetest, *n'est ce pas, monsieur?*

Then I shall want to hear a lot of that most pleasing contrast, jazz. I want to hear all those songs which to-day are so popular.

KREISLER
(the violinist).

I am afraid I have nothing much to tell you. I am sure, however, that broadcasting will liven up the home at Christmas.

Always, of course, it brings within the reach of all, no matter how small the purse, a great entertainment, in its own particular way.

(Continued on next page.)



By C. A. J. MEADOWS.

ALTHOUGH December the 25th comes but once a year, and is always associated with snow, holly and log fires, it is getting into step with modern forms of entertainment, and Father Christmas is now portrayed bearing his bulky sack filled to overflowing, not only with toys and games, but with loud speakers, 'phones, and all the impedimenta essential to wireless.

At Christmas, nowadays, wireless plays an important part, and if the proposed parts is to be a success, it is worth while to ensure that the set will do its best. To be let down while the fun is at its height by some slight fault which a little foresight would have prevented, is ten times worse than gall and wormwood to the real wireless man, whether he is one of the John Blunt type who calls himself an amateur and the toolshed his "workshop," or one of these highbrow persons who refers to himself as an "advanced experimenter," and is in the habit of terming his shed full of gear "the laboratory."

Making Preparations.

Imagine the sorry figure cut by a keen wireless fan, who, while entertaining a company of rich and elderly relatives, hears the signals from his loud speaker gradually fade away. You know the tragedy that ensues; the frenzied rush to the set, testing this, that, tuning and re-tuning, changing valves, coils, and colour; losing terminal heads, wander plugs and all hope of regaining a reputation as a wireless expert. And the final discovery that an almost discharged "juice-box" is connected up in place of the one delivered the previous day from the charging station.

Little things like that do not assist matters, and therefore, if you are going to rely on the set for any part of your Christmas entertainment, see that everything is in order. Have, if possible, one or two spare valves, in case one in the set burns out. Have a freshly-charged accumulator connected up; see that all leads to batteries, loud-speaker extensions, etc., are in good condition; overhaul the set and all its accessories; remove all superfluous leads and other oddments. Then, if you must go to the workshop (or laboratory) on Christmas Day, you can indulge in a little clean up. All small boxes should be stowed away neatly, and if not already labelled, mark them suitably, as for instance, "Nuts—brass. 2, 4, and 6 B.A." Small wooden boxes, if handy, can be easily divided into two or three sections. Even better containers

for metal parts are glass jars with good, tight stoppers; pickle jars are excellent.

Any pieces of mica lying about should be placed between two pieces of wood, or ebonite, and held by rubber bands; a flat tin is best to store mica, and if bound in this fashion it will be kept flat and cannot become "splintered" or split.

If a drill stand is not included in the workshop equipment get a suitable piece of wood, and make a hole with each of the drills it is intended to hold. But before putting the drills away, give them a rub over with an oily rag, as a rusty drill soon loses its cutting edge. Clean up all the tools, and place in their racks, keeping all files, say, in one group—graduated, all chisels in another group, screwdrivers in another, and so forth.

And, after all, where is the most natural place for half a dozen keen amateurs, full of the spirit of Christmas, and burning to discuss the latest "P.W." set? If your workshop is "poshed up" there is no need to hesitate; take them in.



There are lots of things to be said against wireless, but I will admit that at Christmas it will prove a great boon in the home.

Where it proves its great utility is by bringing happiness into a home where, because of poverty and illness, it had not been possible, before the advent of wireless.

I have no suggestions to make as to how the programmes should be changed, or improved. I suppose as they do please a lot of people to-day there is no reason why they shall not do so at Christmas.



Miss Evelyn Laye.

Christmas should be one long laugh from beginning to end.

There is nothing an Englishman likes so much as real good humour, and it is even more acceptable to radio audiences, who at that particular time of the year will be in search of all the funniest things.

Broadcasting ought to be able to provide some of the best entertainment over the end of the year holidays, and myself I cannot quite see Christmas this year without the radio.

I know that I shall listen in, but if I don't laugh and laugh I shall be terribly disappointed.

It is there to make Christmas more Christmassy than it has ever been. It has everything in its power to do so, so I cannot see it fail to make us really happy and amused.

The B.B.C. will not go very far wrong if it puts plenty of humour and music into its programmes on this festive occasion. Their public demand it, anyway.

CHARLES B. COCHRAN

Public taste does not change very much at Christmas, and I feel certain that if the programmes constitute real entertainment there will not be any out-of-the-ordinary demands just because it happens to be Christmas.

In my opinion broadcasting programmes have improved a great deal in the past few months.

It is simple enough to see what is most popular in a wireless programme, and the Christmas programmes should include all the most popular items.

Items such as dance music, and musical entertainment of any kind, of a bright, cheery nature, should be made the most of. Broadcasting at Christmas should make the happy revellers happier.

SIR GERALD DU MAURIER

The B.B.C. cannot do better than continue its present policy. I feel sure that the programmes have improved enormously lately, and it is those things that one likes best in the programmes of to-day that one would like to hear at Christmas.



Sir Gerald Du Maurier.

But as every desire could not be possibly satisfied, there must be a general opinion on the best items to include at Christmas.

I suggest that Fairyland should not be left sleeping. I presume that the Children's Hour will contain quite a lot about Fairyland.

EVELYN LAYE.

The Famous Musical Comedy Actress.

I think that present-day broadcasting programmes are extremely bright, and I really don't see how they can be improved at Christmas to any very great extent.

The item I like best in the B.B.C. programmes is good music, and I shall never be tired to hear quite a lot of this.

At Christmas I think a very popular item indeed would be some good organ recitals. I always think that organ recitals get over very well on the wireless, and I am particularly fond of them.

My opinion is that the Christmas entertainment should be as musical as possible; and the music should be divided between good straight symphony, and then plenty of jazz. And don't forget the organ recitals!



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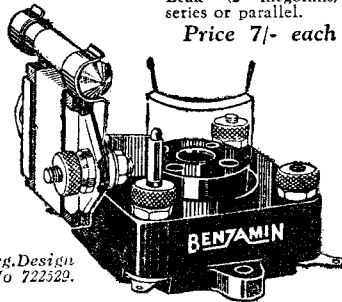
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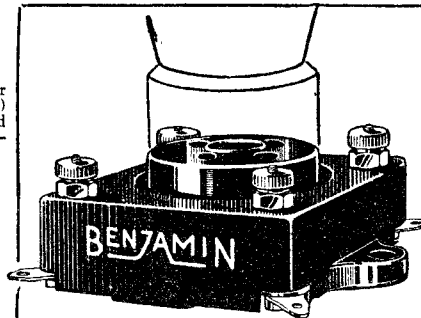
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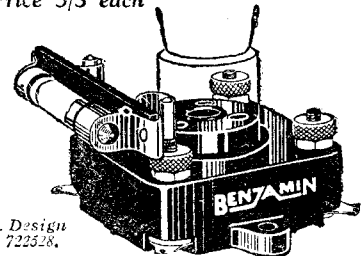
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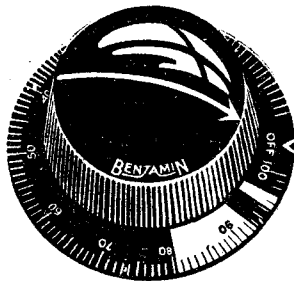


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Patent Nos. 222086—1923, 250431—1925. Registered Design No. 714847.



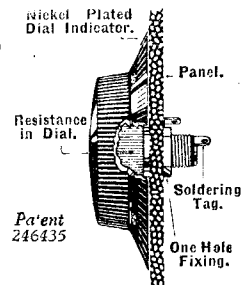
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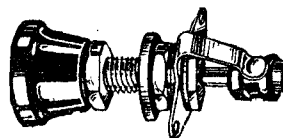
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MAKERS OF THINGS MORE USEFUL



The RADIO CONSTRUCTOR

Edited by PERCY W. HARRIS, M.I.R.E.

This valuable eight-page supplement, devoted to the interests of amateur wireless constructors, appears every week in POPULAR WIRELESS. Tell your friends about it, for it is only in "P.W." that they will find the radio articles by the leading constructor expert, Mr. Percy W. Harris.

THE new rearrangement of wave-lengths by which it is hoped to eliminate the interference problems in Europe will take some time to settle down, and listeners must not be too impatient if they still have to put up with a certain amount of interference. In any case, there is, already a distinct improvement, if only by the withdrawal of the British relays from the number of different wave-bands they previously occupied, and their concentration within one or two.

It is only natural, in view of the allocation of the new wave-lengths on a frequency rather than a wave-length basis, that many readers should desire a little information on the relative merits of straight-line frequency and straight-line wave-length condensers.

There have been fashions in radio, just as there have been fashions in other arts and hobbies. To judge by the jubilation of some variable condenser makers, the straight-line frequency condenser possesses some extraordinary merits and is even able to replace the vernier dial!

It is just as well to face the plain facts of the situation and to examine just what are the merits of straight-line frequency arrangement. To understand the relation of the various condensers, let us consider three condensers each of .0003 mfd., one of straight line capacity, one straight line wave-length and one straight line frequency.

Condenser No. 1. is of the semi-circular plate type, in universal use before the introduction of the straight-line wave-length variety. I think I can claim to have been the first constructional writer to point out the tuning disadvantages of such a condenser; for if between the 250 and 500 metre limit we have 25 stations each separated by ten metres, then the tuning positions of these 25 stations will not be evenly distributed over the dial but will have roughly half of them in the first third of the condenser and the other half in the remaining two thirds. Stations will thus be rather crowded at the bottom end and fairly widely separated at the upper end.

Truth about "Straight Lines."

Now with the straight-line wave-length condenser the distribution of wave-lengths will be far more uniform and will approximate to equal spacing, particularly if the coil is part of a loosely-coupled circuit. Some amateurs may complain that one rarely gets a dead straight line when plotting the wave-length readings against condenser degree readings, but no one will dispute the fact that the introduction of such condensers has considerably helped tuning.

A point that is not generally realised is that stations using the shorter waves tune much more sharply than those occupying the longer. Owing to the fact that the musical and speech frequencies are added to and subtracted from the fundamental frequency of the transmission, each telephony transmission requires not merely one frequency but a band of frequencies on either side of its wave-length.

Tuning and Wave-bands.

For example, the 300-metre transmission has a carrier wave of one million per second frequency. Allowing 5,000 as a useful band of frequencies for telephony transmission, it will be seen that the 300-metre wave-length really occupies frequencies from 995,000 to 1,005,000. If the frequency bands of other stations overlap the bands already occupied we shall get interference. Now translated into terms of wave-length, we can say that the 300-metre transmission really

occupies a metre or two on either side of the transmission, and round about this figure the Geneva conference has decided that a metre and a half on either side of the main frequency is needed to prevent interference, so that if you examine the new lists you will find stations on 297 metres, 300 metres and 303 metres.

From this you might imagine that it would be a simple matter to allow three metres difference all the way up the scale and thus avoid interference, but you must not overlook the fact that the longer the

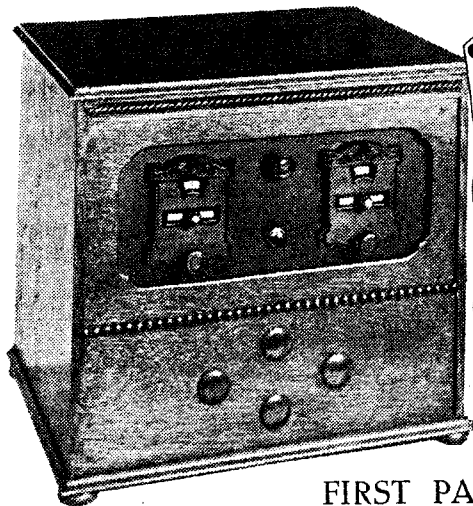
wave the wider the band needed. For example, between 300 metres and 310 metres is a frequency difference of 32,300, but between 500 and 510 metres the difference is only 11,800.

The position, briefly, is that, provided stations are uniformly spaced according to frequency difference, then to get them uniformly distributed over our condenser dial we must have a straight-line frequency condenser. Beyond this there are no special virtues in the type. You cannot get any stronger signals with a straight-line frequency condenser, and if on your set you are getting interference between two stations when using a straight-line wave-length condenser, you will get precisely the same interference when using a straight-line frequency condenser, unless you are very clumsy in handling your tuning controls.



Send your own "Wireless" greetings at Christmas! See "Radio Hints for Xmas Parties" in this issue.

Percy W. Harris



KING of the AIR

by Percy W. Harris



FIRST PARTICULARS OF A NEW RECEIVER.

I AM glad to be able to introduce to "Radio Constructor" readers in this the Christmas issue, my new set, "The King of the Air," about which I have already written and which has been occupying a great deal of my time for many months past. The set as a whole has passed through many phases, and in the process of development points have been added, changes made, and promising ideas discarded as one after the other tests have been built and substitute parts tried so that the reader shall not be tied down too rigidly to one particular set of components.

In designing a really good set so many points have to be taken into consideration, and the position of the designer who sets out to supply the needs of the home constructor is quite different to that of the man whose work it is to evolve sets for factory building. The simplicity with which a wireless set can now be built, and the multitude of designs available, may lead the reader to imagine that the subject has been shorn of all its difficulty and set designing is an easy matter to those who have a good knowledge of circuits.

In the course of many years' experience in building sets for the home constructor to copy, I have come to acquire a very considerable suspicion of all ideas that have not been practically tried out in normal and abnormal conditions. Too many good ideas have a habit of petering out in the practical application, for which reason I have always made a point of myself building up all the

sets described under my name, even to the simplest of the wiring. Even a simple single-valve circuit can give different results when wired up in a different way, and when one comes to multi-valve receivers practical considerations loom very large.

"The King of the Air" has been designed to fill the following important requirements:

THIS SET IN A NUTSHELL.

Circuit used: Neutralised H.F. stage, detector, one transformer and one resistance-coupled note magnifier with reaction.

Special points. High selectivity, purity and sensitiveness.

Set, complete with batteries, contained in one cabinet with only aerial and earth connections taken outside.

- (1) High selectivity.
- (2) High standard of purity of reproduction.
- (3) High sensitivity.
- (4) Wide wave-length range.
- (5) Compactness.
- (6) Freedom from matching parts, double condensers, etc.
- (7) Simplicity of tuning.
- (8) Handsome appearance.
- (9) Batteries and set in one cabinet.

The circuit finally chosen is that given below, and is different from that in which the set was originally made up. Later, I

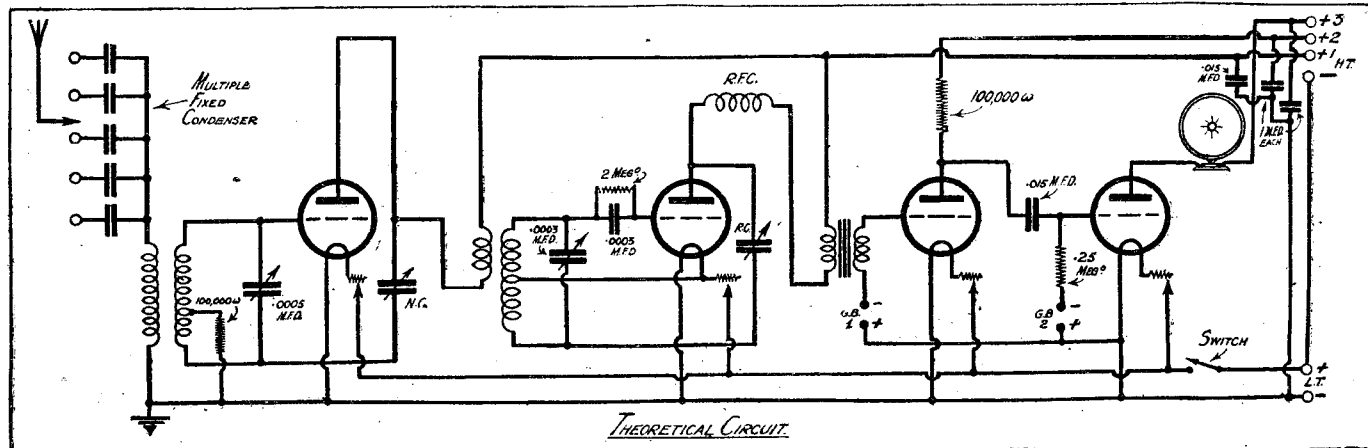
hope to tell you about the original form of the "King of the Air" which worked admirably, but in the course of a series of tests proved to be somewhat difficult to reproduce if a particular set of components was not adhered to. Furthermore, there were one or two factors which led me to think that the average constructor would not be able to carry out the balancing up necessary, and so that particular circuit had to be discarded almost at the last moment.

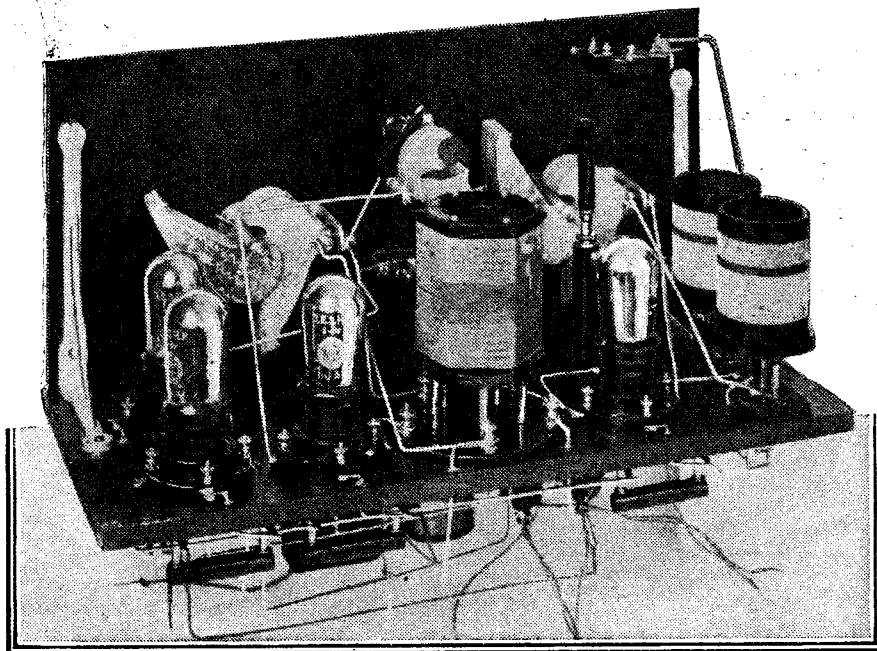
You will notice on examination that there is one high-frequency stage neutralised, a detector with reaction, one stage of transformer-coupled amplification and one resistance stage. There are but two tuning condensers fitted with vernier dials, and as these are of the single type they are both inexpensive and require no matching.

As readers of the "Radio Constructor" know, I always endeavour to keep as far away as possible from the need of buying special components which have only a limited use, but in the present case there are two which are really vital to the success of the instrument. One is the binocular or fieldless coil for the aerial coupling, and the other the special high-frequency transformer which is the result of a good deal of experiment and the windings of which have been particularly worked out for this receiver.

The idea of using one fieldless coil and one of the ordinary type is that the latter has a slightly high efficiency and, provided

[(Continued on next page.)]





Both top and underside of the baseboard are used to carry components.

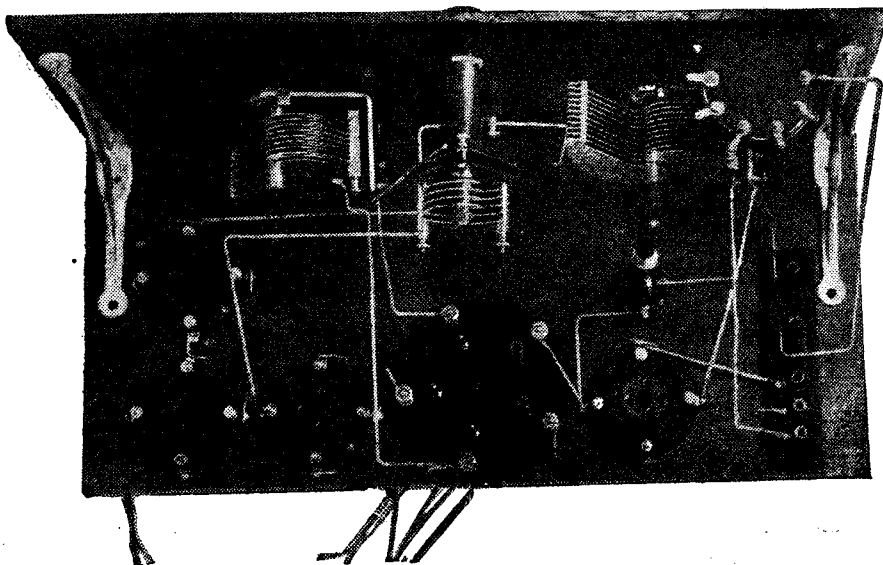
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one of the two coils in the set is of the fieldless variety, there will be no interaction between them. This interaction of the coils of the set is a fruitful source of trouble both in the production of oscillation and the reduction of sensitivity, not to mention the lack of selectivity which arises in such circumstances.

It will be noticed that quite a new style of make-up has been adopted in this receiver, affecting a considerable economy of space and leading to a greater simplification of wiring. The front panel, as is usual in modern receivers, carries the variable condensers and on-and-off switch and the reaction control only, the old-fashioned array of knobs making no appeal to the modern constructor. On the baseboard are carried (on top) the coils, four valve holders, and a neutralising condenser, while a fixed condenser in series with the aerial lead is carried on the back of the panel in one corner.

The remaining components in the set, comprising the low-frequency transformer, resistance coupling parts, Mansbridge condensers, radio-frequency choke, fixed condensers, leaks, etc., are carried beneath the baseboard, which is mounted in a special cabinet, allowing ample room underneath and a space at the back for high-tension and low-tension batteries. The conventional terminal strip has been dispensed with, its place being taken by the more modern pigtail connections, thus saving expense and trouble.

Returning now to the circuit itself, it will be noticed that the Rice method of neutralising has been adopted, a 100,000-ohm resistance being inserted between the centre tap of the first grid coil and the filament. The purpose of this fixed resistance is to obviate the generation of parasitic oscillations, and the idea of using a resistance in this way will be found in the Western Electric Company's patent which was



The "top and bottom" wiring method makes for great simplicity.

published not long ago. This company has been responsible for the development of many excellent ideas relating to wireless circuits, and is not always given the credit it deserves.

A fixed condenser in series with the aerial is often a considerable aid to selectivity, and reduces unwanted aerial damping in cases where the aerial is very inefficient. The choice of the optimum value of fixed

COMPONENTS REQUIRED FOR THIS SET.

One ebonite panel, 16 in. x 8 in. x $\frac{1}{4}$ in. Any good make of guaranteed ebonite will suit here. See note below on panel.

One "King of the Air" cabinet. Unica Cabinet Co. See note below.

Baseboard as supplied with cabinet, measuring 16 in. x $7\frac{1}{2}$ in.

One multiple fixed condenser, C.A.V.

One variable condenser, '0005 mfd.

One variable condenser, '0003 mfd.

Straight line frequency or straight-line wave-length pattern. Any good make can be used. These illustrated are the Formo S.L.F.

Two vernier dials. See note below.

One neutralising condenser for baseboard mounting. Gambrell's

Neutro-vernier or other reliable make.

One reaction condenser (Peto-Scott, etc.)

Four anti-vibratory valve sockets. Those illustrated are W.B.

One binocular coil for each wavelength range required, mounted on "Special Five" base. These are made by Peto-Scott, and Lissen, Ltd.

One H.F. transformer, Eureka. It is also possible to use the popular screened coils here.

One on-and-off switch, Bulgin, etc.

Four fixed resistors to suit the valves chosen. See later note. Any well-known type. Those shown in the set are Magnum.

One L.F. transformer of good make. I have used the Gecophone 2-1 ratio.

One radio frequency choke. See special note.

Two Mansbridge condensers, 1 mfd. These are made by a number of manufacturers. Those in the photographs are Lissen, Ltd.

Two 100,000 ohm resistances with bases. These are preferably wire wound, and can be obtained from Mullard, Varley, and Dubilier.

Two fixed condensers, '015 mfd. These must be mica insulated, otherwise any reliable make can be used.

One grid leak holder. Dumetohm holder or similar device.

One fixed condenser, '0003 mfd., with 2 megohm grid leak.

One grid leak, '25 megohm.

Two brackets for supporting front panel.

Valves, batteries, etc., to be described.

condenser is not an easy one and cannot be decided once and for all for every set. For this reason I have used a type of fixed condenser which has a number ofappings, so that all values from '0001 to '0015 mfd. are available. Methods of adjusting this fixed condenser will be described in later operating notes.

(Continued on next page.)

KING OF THE AIR

(Continued from previous page.)

The choice of a combination of one transformer and one-resistance coupled stage has been dictated by the fact that it is relatively difficult to obtain good results with two transformers, unless these are carefully chosen and matched to one another. Shortly, I hope to contribute to this paper an article dealing with a number of considerations in transformer design from which you will find that it is quite possible to obtain serious distortion from two excellent low-frequency transformers when these are improperly used.

In using one transformer and one resistance, L.F. reaction effects (the bugbear of amplifier design) are reduced, and the reader has a far wider choice of transformers than otherwise would be the case. There is, it is true, a slight reduction in volume over the results obtained with two transformers; but if suitable valves are used the reduction is not great, and the excellent quality obtained is well worth the slight sacrifice made to obtain it.

Constructional Details.

You might imagine, on first consideration, that mounting components on both sides of the baseboard makes complicated wiring and difficulty in construction; but,

on the contrary, the simplicity of work is one of the greatest charms of this method. For this reason I should be surprised if the "King of the Air" does not set a new fashion in home construction. The components are first of all screwed down in place on the top of the baseboard, and when this has been done, the necessary holes are drilled alongside the components to take the leads as indicated. These holes act as a valuable guide in placing the components on the back of the baseboard.

By the way, it is advisable, before beginning work of this kind, to construct a small stand so that the baseboard can be turned from front to back as many times as are necessary without inconvenience.

The front panel is, as indicated in the list of component parts, of a standard size, but, owing to the fact that a good portion is covered by the front of the cabinet, it can, if desired, be made smaller. However, cutting ebonite is neither easy nor pleasant, and in many cases the fine appearance of a good panel will be injured if unskilled attempts are made to cut it.

The two variable condensers and the reaction condenser are all one-hole fixing. The base of the fixed condenser is secured to the panel by screws, but as the screw heads come behind the wooden facing, they will be concealed when the panel is put into the cabinet. Once the panel has been drilled and the components mounted in place upon it, the brackets should be fixed to the baseboard, and then, by placing the panel against the baseboard, the position of the holes for securing the panel to the brackets can be found. Be careful to mark these accurately or you will have trouble in mounting. The screw heads securing the brackets to the panel are also concealed. I do not advise fitting the panel to the brackets until all of the components have been mounted on the baseboard, for it will be found

much more convenient to add the panel just before wiring.

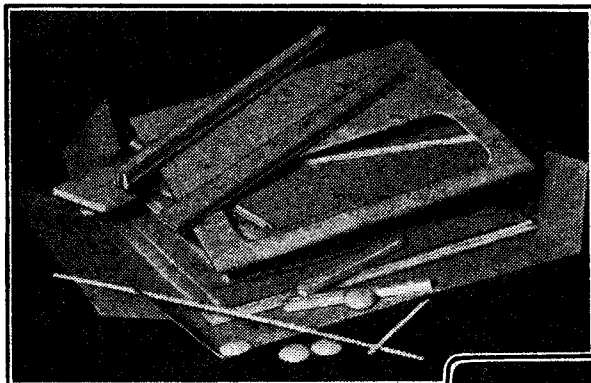
A suitable support for carrying the baseboard, while you are fixing the parts and wiring it up, can be made from a piece of board and four short lengths of broomstick secured to it by wood screws from the back of the board. The support will resemble a table with its legs in the air, and if care is taken to space the four "legs" so that when the baseboard is resting upon them they fit into vacant spaces, the board will save a great deal of time and trouble. A makeshift expedient is to use two piles of books, but my experience with this method is that, just at some critical moment in soldering, the baseboard will slide off one of the piles and cause a great deal of trouble in bending the wires.

Special Notes on Components.

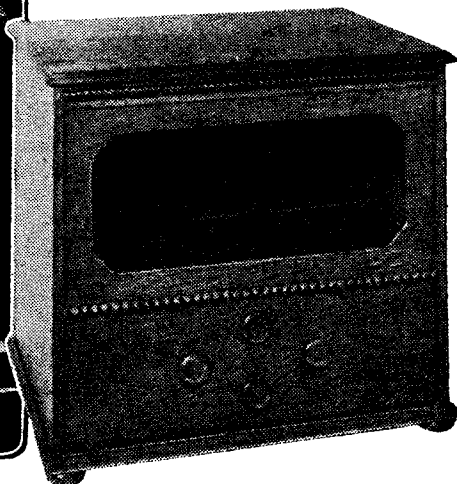
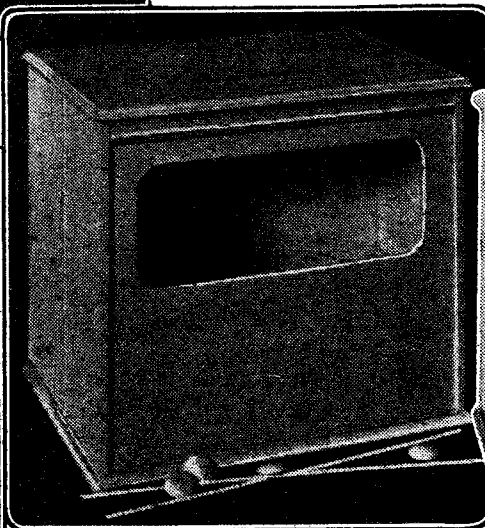
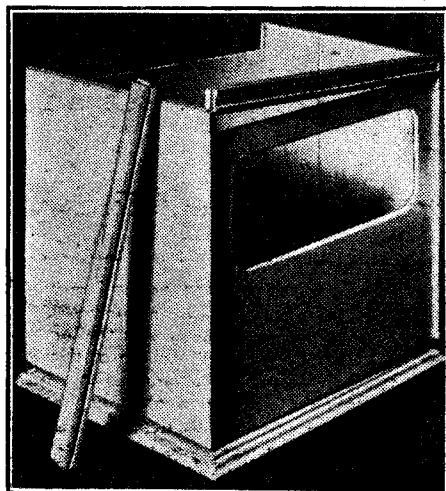
In the list of components given in this article, I have made reference to special notes on components. This is necessary, as in one or two cases substitution may not be advisable, or if undertaken must be done with great care. The great popularity of split-coil circuits and the many experiments recently carried out, have indicated the great importance of radio-frequency chokes and the difficulties which may arise in connection with them. The difficulty would not present itself if we were designing sets for the shorter broadcast wave-band from 200 to 600 metres, but as we have to include a band covering Königswusterhausen, Daventry and Radio-Paris, certain difficulties present themselves.

Without going into details, I may say that the choke chosen for this set is the Varley "split coil," which has been specially designed to overcome the difficulties which sometimes possess themselves in connection with split-coil circuits. Some otherwise excellent chokes happen to have a natural frequency which falls within one or other of the actual bands of wave-lengths which we desire to cover, and may give rise to uncontrollable oscillation or complete absence of reaction effects.

(To be continued.)



The cabinet as received. The wood is accurately cut to size.



The cabinet can be purchased much cheaper in "knock-down" form, and can be re-assembled by the home constructor quite easily. Stain and polish are provided with the outfit.

Radio Hints for Xmas Parties

By THE EDITOR.

A LITTLE attention given to one's wireless apparatus can do a great deal to add to the enjoyment of a Christmas party, particularly when the children are present. Some little experiences in organising wireless stunts has taught me some of the things which are likely to happen, and which should be guarded against, and a few of the tricks which will produce a great deal of amusement and surprise.

First of all, be sure to have a spare accumulator ready fully charged. You may make up your mind to have the battery

MYSTERIOUS WIRELESS MESSAGES FOR THE CHILDREN AND "GROWN-UPS."

For example, if you are using resistance capacity amplification and a valve designed for this purpose, there will be a great loss in volume if you substitute for this resistance-capacity coupling valve one not designed for this position.

As a change, after a few warnings of the kind which many of you will probably not need, let me tell you one amusing "stunt" which is quite simple to fix up if you have some spare apparatus handy. You will require for it the following: A complete one-valve amplifier,

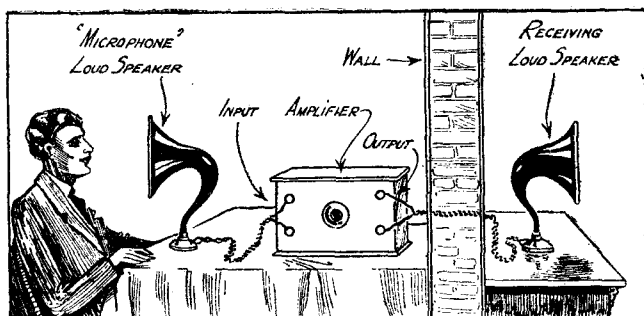
(which may be in another room) just as clearly as if you were listening-in to an ordinary wireless transmission.

This phenomenon is the basis of the following trick. Connect your loud speaker to an amplifier, as described, and take a pair of leads from the output into another room, and to terminals on a box made up to look like a pretentious wireless set. The "set," of course, contains nothing whatever, and is merely a means of connecting a pair of telephones to the leads from the amplifier in the other room, but the more mysterious it looks the better. I can leave it to the ingenuity of the reader to make something suitable for a children's party.

Now, the fact that this loud speaker and improvised microphone arrangement is in the house should be carefully concealed from the visiting party. During the children's party it can be announced that a special transmission will take place at a certain hour and that Father Christmas will send special messages to the little guests. This idea can be worked up in all kinds of ways, and after suitable preliminaries, which can include the drawing of lots for the first and subsequent "turns," the children can be taken one by one into a room where the listening set is on a table.

A special message can be given to each child, giving very intimate details, addressing the child by name, and promising that some little gift will be found somewhere in another room. Do not forget in passing

(Continued on next page.)



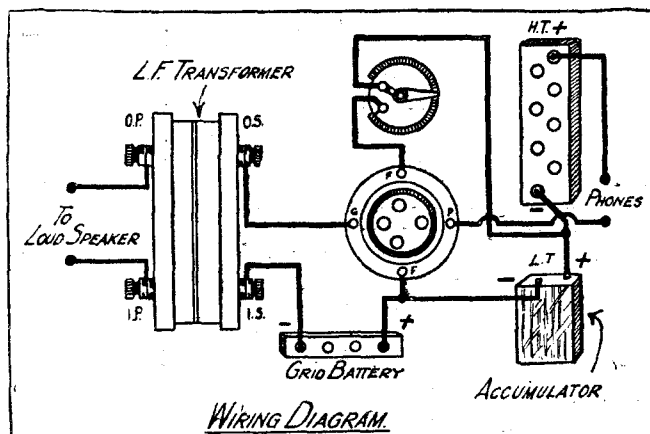
How to use the loud speaker as a microphone.

charged just before Christmas so that it will be ready for the party, but do not forget that thousands of other people will probably make the same decision, and the accumulator charging plant will be working at full pressure all through the holidays. Make sure you have a fully charged accumulator in the house before you let one go away to be recharged, even if most faithful promises are given that it will be returned in time for Christmas or the party. Even should it come back there is always a possibility that it may have been given an inadequate charge or even overlooked in the rush. If you charge your own accumulators, of course, you will have no trouble in this regard, but the majority of people have to rely on some service station.

If you can, have one or two spare valves available, or if you have valves already in stock, make sure that you have one for every purpose. I have known occasions where people have relied upon their spare valves only to find in an emergency that a much-treasured spare will not work properly in the particular position for which it is required.

to be described later, suitable box, terminals, loud speaker and a pair of telephones.

It is not generally known that a loud speaker can be used as a microphone for the transmission of speech or music, although it is very insensitive compared with the proper microphones as used in the studios. Nevertheless, let a loud speaker be connected to the primary of an L.F. transformer the secondary of which is connected to a valve in the usual way, and as shown in the circuit accompanying this article. The output side of the valve can be connected to telephones, and, when you listen in to the telephones you will hear anything spoken into the loud speaker

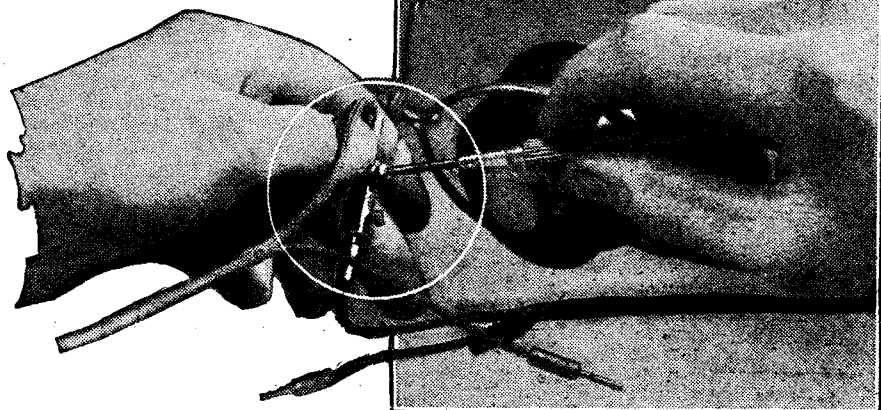


A quickly improvised amplifier.

RADIO HINTS FOR XMAS PARTIES

(Continued from previous page.)

the message to each child to refer to something which has actually happened at the party. This will create immense surprise even to grown-ups, who have not been "let into the know." So far as the grown-ups are concerned, a great deal of leg pulling can be indulged in, and do not forget that the distortion introduced by the loud speaker when acting as a microphone (however perfect this may be as a sound reproducer) will



'Phones can be quickly joined with connectors.

be in most cases sufficient to render the voice of the speaker unrecognisable, although everything said will be clearly audible.

If a really efficient two-valve amplifier is available, the telephones can be dispensed with, and the sound made to issue from a second loud speaker. A further elaboration is to arrange a change-over switch by which the input and output leads can be reversed, so that between "announcements" the operator in the other room can hear what is being said in the other room. For example, the "announcer" may have made a certain humorous statement regarding some member of the audience who is likely to make some comment. With a quick change-over to the other room, this comment will be heard by the operator, and can be replied to, creating further mystery.

Many variations of the ideas suggested are possible, and no doubt readers who ring the changes will write and tell us how they have carried them out.

MORE HALE LETTERS

Dear Sir,—I have tried out the above receiver in the de luxe form, as described in POPULAR WIRELESS, only I have used none of the components mentioned, having used others of good make. Also, it is only in the hook-up stage.

Using a B.4. valve with 100 volts H.T., Manchester (23 miles), Liverpool (16 miles), and Daventry came through at moderate L.S. strength, which many people would call sufficient.

This I consider excellent, in view of the fact that the aerial consists of some sort of covered wire

without further insulation, wedged down the door of my workshop, and attached to a metal spout at the other end.

I have had to put a '0001 mfd. condenser across the secondary of the transformer, as apparently the self-capacity was too small to bypass the H.F. current.

I am going to make it up properly, with the addition of an extra stage of L.F., and will report how it goes on.

I am using one of the carborundum stabilising units which gives an excellent vernier control of reaction.

Wishing you every success,

Yours faithfully,

ALAN DOUGLAS.

Wrightington, Near Wigan.

in, and mine looks like losing its job after next week's issue of "P.W."

I took the Hale down in the valley, and it is quite loud on London. Sixty volts H.T.

Yours faithfully,

F. CHEELD.

Chesham.

Dear Sir,—Having built up your Hale receiver, I write to say what a fine set it is. I have made it up as a Reinartz, with the coils 50 and 75 wound end to end on a cardboard former, otherwise wiring is as per your diagram.

This gives very good loud-speaker results here at 10 miles from 2 L.O., not too loud, but speaking can be heard anywhere on the ground floor and music anywhere in the house.

I have also heard Hamburg and Frankfurt on the speaker; the announcer's voice could easily be heard anywhere in a quiet room; and in addition quite a number of stations on the 'phones.

Selectivity is not very good with me, but I think my aerial is partly at fault. At any rate, I am trying to correct it. The valve is a Cossor Stentor, with about 100 volts on the plate.

I must say I like the very lucid way in which you write (everything is so clear), and I am looking forward to the two-valve set as I have a spare valve. Before building this I had a two-valve Reinartz, and the Hale gives me nearly the same volume on one valve.

Again thanking you.

Yours faithfully,

C. O. BOWLES.

Surbiton.

Dear Sir,—I am taking advantage of your invitation to write you with reference to the Hale circuit. I made it up in its first form—reaction coil—last Thursday evening with components I had handy, an old Bower-Lowe condenser '0005, a small American reaction condenser, and a 250 coil for a choke, and found it so excellent at Norbury where I live, eight miles from 2 L.O., that I decided to make up the Reinartz. I did so the following night with a Newey '0005, a junior polar '0003, a Varley choke, an R.I. crystal, Royal transformer, and Igranite coils, and found this much better. With a D.E.5 valve it worked a Brown's small gramophone attachment at decent loud-speaker strength for a small room on band performances and clear on speech. On Sunday I added an amplifying valve with a Ferranti A.F.3 transformer and using a Cleartron '25 as the first valve and the D.E.5 as the second. I got 2 L.O. much too loud to be comfortable, but clear. I found I could not cut 2 L.O. out in order to get any other station in the U.K., but when 2 L.O. was closed down I could get quite a number of Continental stations on the 'phones.

Yours faithfully,

J. D.

London, S.W.1.

Dear Sir,—Regarding the Hale circuit you published in No. 230 of POPULAR WIRELESS, my set was an ordinary reflex, so I dismantled it and wired it up as in the Hale circuit. The results were beyond my expectations. Radio-Paris came in at good strength on two pairs of 'phones. Daventry could be heard 20 ft. from speaker, also Manchester at about the same strength. The local station at gramophone strength. In conclusion I thank you for publishing such a fine circuit.

Yours gratefully,

J. F.

Belfast, Ireland.



Listening to the Christmas greetings.

IF you keep your loud speaker permanently connected to the loud-speaker terminals, as already indicated, you can plug in after the detector or first note magnifying valve with the telephones whenever you desire. I have not made any arrangement to listen on all four valves, as experience shows that it is practically impossible to obtain the strength obtained in the

One thus uses telephones for listening in on detector or one note-magnifying stage and the loud speaker on two. If you wish to connect the loud speaker to one note-magnifying valve, you can join it to

THE "4 VALVE FAMILY" UP TO DATE.

By PERCY W. HARRIS, M.I.R.E.

Last week the first practical details were given. Here we have further hints, and a complete new wiring diagram.

the work of a moment to disconnect the two leads from the loud-speaker terminals and to plug in the jack as required.

Readers will appreciate that the introduction of the switching system to change over from telephones to loud speaker as well as the jack system would involve further

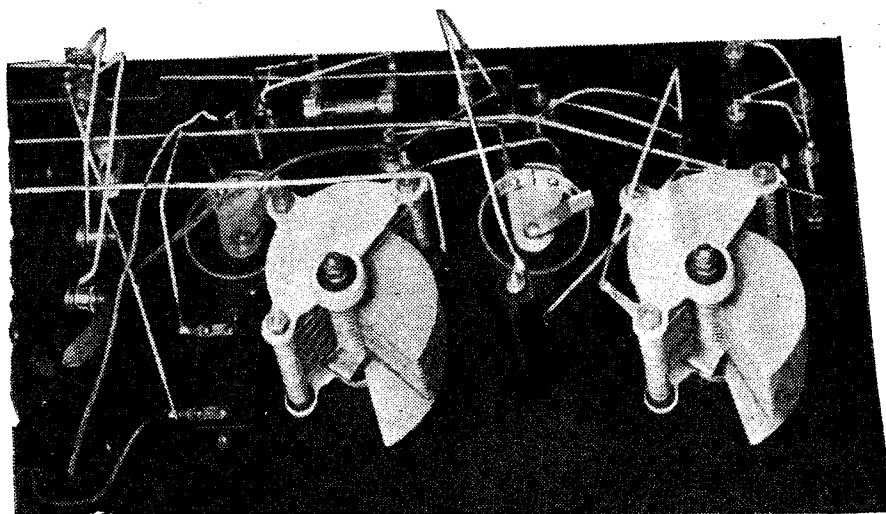
the potentiometer entirely. The .002 mfd. fixed condenser connected to the old telephone loud-speaker switch can be discarded, and in this position I suggest you mount the .015 fixed condenser referred to in the list of parts required.

The second Mansbridge condenser which I have suggested should be 1 mfd., although any expedient value from $\cdot 3$ upwards can be used, should be placed as near as possible to the existing one. When these parts are fitted you are ready for the wiring changes.

Those readers who are accustomed to read circuit diagrams will themselves be able to make the changes necessary by examining the two diagrams in the last article. The less experienced reader will prefer to work from the complete detailed wiring diagram below.

AN INDOOR AERIAL HINT.

MANY people use needlessly heavy and unsightly wire for their indoor aerials. Where it is desired to fix an indoor aerial in the picture moulding, there is nothing to equal the cotton or silk-covered electric lighting flex obtainable from any electrician's shop. There is no need to untwist this double flex, for the two ends can be joined together by baring and twisting, giving us two wires in parallel, which is a slight advantage.



A "close-up" of the rewired set.

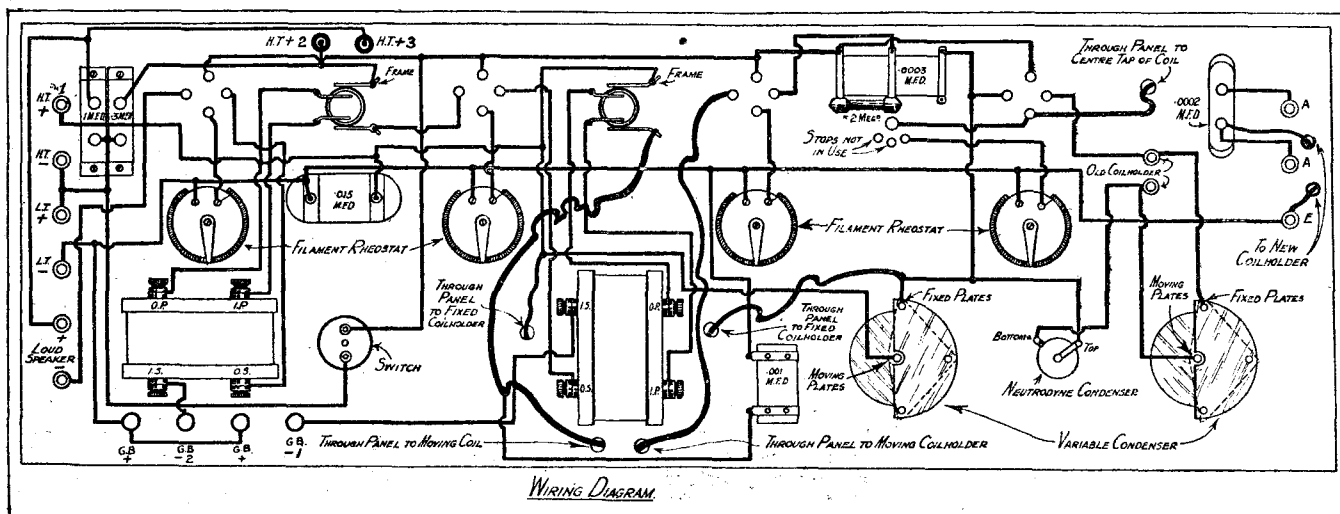
a plug, but generally the arrangement adopted will be found satisfactory all round.

For those people who do occasionally wish to change their loud speaker over, it is very simple to connect a plug in parallel with the lead going to the set. If, then, it is desired to use the loud speaker with one note-magnifying stage only, it is

complications which I did not think it warranted, as the jacks themselves provide practically all the switching that is generally required.

Very few changes.

Underneath the panel it will be necessary to mount the .0002 mfd. fixed condenser in



MY LETTER BAG



Note.—In this section Mr. Harris will discuss each week interesting points from the large correspondence he regularly receives. Readers are invited to write to him on matters of interest, and extracts from their letters, together with Mr. Harris' comments, will be published from time to time. It must be pointed out, however, that general and technical queries cannot be answered in this section, but should be addressed to the Technical Query Department, complying with the conditions laid down under the heading "Technical Queries" in each week's issue of POPULAR WIRELESS.

I HAVE before me a letter from a reader in Worcestershire who, in speaking of his Hale set, said: "I am using a B.5 valve, and I hope to be able to put on the second valve before this week's POPULAR WIRELESS. I note you say valves should be of the same type. Perhaps you will be good enough to say whether I should use another B.5 general purposes, or, if not, what would you suggest?"

In "The Guaranteed Reflex" the reason for saying valves should be of the same type is that, for simplicity, both are controlled by the same filament resistance and have a common grid bias. My correspondent can certainly use another B.5, which, as readers probably know, is a .06 ampere valve, but he is not limited to this one make, as provided he uses any other .06 ampere valve with similar characteristics (such as the Marconi or Osram D.E. 3, Mullard D. .06 L.F., or Ediswan A.R. .06 green line), he will get satisfaction, and these valves are all the same price.

More Suitable Valves.

While the .06 ampere valves are very convenient where a low consumption is desired, they do not give such good results in the Hale receiver as valves specially designed for low-frequency magnification. The Hale receiver, particularly the two-valve form, gives such strong signals that the .06 ampere cannot possibly handle the energy without distortion. This is no reflection on this type of valve, for it is not recommended by the makers for really great volume.

Here is another letter typical of many: "Dear Sir,—I am contemplating building The Guaranteed Reflex. Can I use two orange spot Weeco valves in this set?"

The orange spot Weeco valves are two-volt type, actually working at a filament voltage of from .8 to 1.1 with a filament current of a quarter ampere. The makers recommended anode volts from 17 to 60, and my correspondent wondered whether this voltage is high enough.

First of all, where the makers recommend anode voltages within certain limits you can take it as certain that the life of the valve will be considerably shortened if the maxi-

mum voltage is exceeded. In any case, as the orange spot valves are the L.F. model, they can be expected to give good results in the Hale receiver, provided they are not expected to give very great volume free from distortion. Ordinary low frequency valves (as distinct from the special power valves) are excellent for general work on ordinary room loud speakers, but practically every valve manufacturer now makes special types for use where very large undistorted volume is required.

NEXT WEEK:

Full Wiring Diagrams of

"THE KING OF THE AIR"

and

DETAILS OF ADJUSTMENT

Loud-speaker Queries.

There seems to be considerable doubt in some readers' minds on the question of loud speakers and the differences between the large and small models in various makes. Quite a number of readers apparently hold the view that a large loud speaker would "strain" their set, and they fail to realise just how these instruments work.

The output of a wireless receiver is in the form of varying electric currents carrying the modulations of the received signals. The stronger the variations of the currents, the stronger the signals that will be obtained. When these variations are very powerful they produce, when passed through the windings of a telephone, so much sound that we cannot bear the earpieces near our ears.

Now, as the sounds are being produced in the telephones and are too loud for head wear, is it not possible to distribute the sound by some other means? That is what the loud speaker does, and indeed many of the cheap and small loud speakers

consist of a single earpiece (as used in telephone headgear) attached to a loud-speaker horn. Such loud speakers are really single telephone receivers attached to a megaphone.

Now, when the volume is not too great, such devices can give excellent results, but their construction and, particularly, the small diaphragm used, is not suitable for the large variations of current obtainable from many wireless receivers. It is much better to design a special base containing the electro-magnetic portion, so that we avoid the necessity of overloading inadequate apparatus.

A Comparison.

Let us assume for a moment that we have a certain strength of output from our wireless receiver and we have before us a pair of telephones, a small loud speaker, and a full-size model.

On connecting the telephones to the output of the instrument we hear a rattling and distorted reproduction due to the gross overloading of the telephones and the vibration of the telephone diaphragm against the magnetic poles. On replacing the telephones by the small loud speaker we get quite good reproduction which will satisfy many people; but, now, on replacing the small loud speaker by the large model, we get, in most cases, an increased volume (due to the greater efficiency of the horn), and in nearly every case greater purity and naturalness.

The small loud speakers made by many manufacturers are undoubtedly excellent and splendid value for the money, but for those who care to pay extra and obtain a full-size model, the expenditure is well worth while. As distributors of sound the large loud speakers are more efficient in volume and quality than the smaller types, and if a set works well with a small loud speaker you can be perfectly certain that it will work still better with a full-size model.

A Valve Question.

"What has happened to my dull emitter valve?" writes a reader in Edinburgh. "The signals have entirely disappeared although the filament is still intact (I can see it burning), and it is not shorted to plate or grid. It was giving splendid results until recently. I thought it had 'gone off' a few weeks ago and increased the filament voltage, but the fault then turned out to be in my condenser. Soon after curing this the present trouble developed, and although I have tested every component, I cannot find what is the matter."

Dull emitter valves very rarely burn out except by accidents with the high-tension battery or really gross abuse. A filament rated at 2.8 to 3 volts will burn for some time with 4 or 5, or even more volts, but its sensitiveness will disappear in a very short time.

Dull emitter filaments as used to-day are capable of giving off a copious stream of electrons at comparatively low temperatures, and many of the filaments have a special coating on the surface which gives them this property. Running the filament at a higher temperature than normal will cause this coating to be dissipated, and the uncoated wire will fail to give any emission of a practical value.

Don't let your H.T. Battery prevent your loud speaker doing what it wants to do!

We do not advise you to discard your present battery if your loud speaker is performing moderately well, but immediately it is clear you ought to get a new H.T. battery be sure you put in the **LISSEN NEW PROCESS BATTERY**. Notice then bigger volume, purer reproduction than you have ever had—notice particularly how smoothly sound seems to flow from your loud speaker.

Your H.T. battery is the power plant behind the loud speaker—the quality of the energy it supplies is just as important as the quantity. Two or three hours' use of an ordinary battery alters the quality of the loud speaker reproduction. Not so with the **LISSEN NEW PROCESS H.T.** This goes on hour after hour yielding its steady, unvarying, quiet yet forceful flow of energy, whose quality purifies your loud speaker utterance, keeping it crystal clear all the time. And when you shut down, the **LISSEN Battery** immediately begins to build up through the night ready to perform the same unvarying service the next night, and night after night after that, until it really almost seems to go on for ever.

This new **LISSEN Battery** excels all others because we have discovered a new combination of chemicals not hitherto used in battery making. The unique new process, which naturally is a closely-guarded secret, yields far clearer loud speaker reproduction than any previous H.T. battery, and the success of the new process is now a definitely established fact.

We could not have sold this battery under 13/- but for our putting into operation a new policy of direct-to-dealer distribution which cuts out all wholesale profits; besides which the **LISSEN BATTERIES** go straight into dealers' shops—they are actually on sale within three days of being made in our Richmond factory. **LISSEN New Process Batteries**, therefore, have yet another supreme advantage in being absolutely fresh—every one is brimful of *new* energy when you put it into your set.

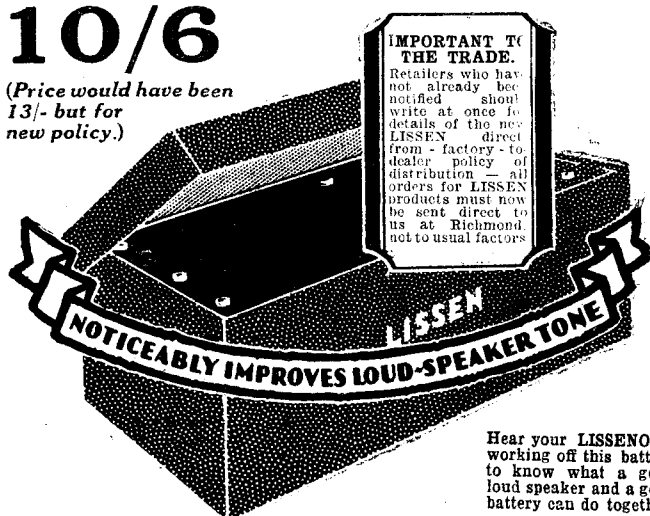
Made only in the popular block type with socket tappings—an additional advantage are the four 1½-volt tappings provided for grid bias use at one end of the battery, while the other usual tappings give any voltage required.

Obtainable at any dealer's—but if any difficulty, send direct to factory. Include nothing for postage, but please mention dealer's name and address.

LISSEN NEW PROCESS BATTERY is rated at 60 volts, but goes considerably over.

10/6

(Price would have been 13/- but for new policy.)



Hear your **LISSENOLA** working off this battery to know what a good loud speaker and a good battery can do together.

Improve Your Xmas Radio With This Better Battery.

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LISSEN Mica Type CONDENSERS

Small energy-conserving condensers—note the new case which enables the condenser to be used upright or flat. At present the new case is available only in the most used capacities, but will quickly become a **LISSEN** standard.



Capacities—

.0001 to .001 1/- each (much reduced).

.002 to .006 1/6 each (much reduced).

Accurate to 5%—they never leak—they never vary.

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| | |
|------------|------|
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| .1 | 2 6 |
| .2 | 2 8 |
| .25 | 3 - |
| .5 | 3 4 |
| 1.0 | 3 10 |
| 2.0 | 4 8 |

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Users'

"UNEQUALLED,"

says 1st International Prize Winner

May I be one of many to congratulate you on your valves. I have now tried them out thoroughly and words fail me to express my admiration. I really think that they should be labelled "S.T." a second time, the first "S.T." standing for Superb Tone.

I have used them in the Solodyne circuit with which I was lucky enough to be awarded first prize in Chicago, U.S.A.; and I find the combination of S.T.61 in the first three stages, S.T.62 for the first low frequency, and S.T.63 in the last stage, are not to be equalled by any other valve made.

Wishing you every success, which I am sure you deserve, and also rest assured that I shall recommend them to every wireless man who seeks the best results.

H. H. ANSPACH.

(Who won with a Solodyne the 1st prize at The Chicago International Wireless Competition).

"Lorraine," 18, Watling Street, Dartford.

TESTS

- (1) The filament current must be right for a given filament voltage.
- (2) The total emission of electrons from the torodium filament must exceed a certain figure which gives a very big factor of safety.
- (3) The voltage amplification of the valve must be right.
- (4) Every valve is tested for mutual conductance, i.e., slope (milliamps. per grid volt).
- (5) The merit of the valve as indicated by $\frac{M^2}{R}$ must reach the very high standard established by the designer.
- (6) The impedance of the valve must be within certain limits.
- (7) The straightness of the dynamic curve is ascertainable from the readings.
- (8) Uniformity of the valves and correct relative spacing of the electrodes are tested by ascertaining the position of a given characteristic curve relative to the grid zero ordinate.
- (9) The very high vacuum obtained by the Barguet process is measured by the ionisation system, using a special meter which reads to a fraction of a microampere.
- (10) The perfect insulation, internal and external, of the valve is ensured.

SILVER CUP Winner Speaks of "Extraordinarily Good Results"

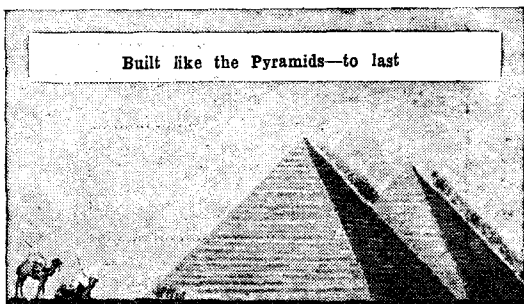
I have just tested your new S.T. valves and find them in every way most satisfactory. Their main features are economy in both filament and anode current (the readings in each case being extremely low), a high standard of efficiency, and they are inexpensive. On a very old 3-valve set (on which very unsatisfactory signals were usual) both the 2-volt, 4-volt, and 6-volt types gave extraordinarily good results. On the whole I can thoroughly recommend these valves for all receiving purposes, and I am highly satisfied with the results obtained from them.

J. A. E. BLACK.

(Winner of a 2nd prize and silver cup at the New York International Wireless Amateur Competition, 1926).

School House, Mill Hill School, London, N.W.7.

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| 2 VOLT. | | 4 VOLT. | | 6 VOLT. | |
|------------------------|-----------|------------------------|-----------|------------------------|-----------|
| S.T.21 (H.F.) | 14/- | S.T.41 (H.F. and Det.) | 14/- | S.T.61 (H.F. and Det.) | 18/6 |
| S.T.22 (L.F. and Det.) | 14/- | S.T.42 (Power) | 18/6 | S.T.62 (Power) | 18/6 |
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| | 0'15 amp. | | 0'25 amp. | | 0'25 amp. |

S.T.LTD.,

Views

America on One S.T.

You may possibly be interested to know the results of a few days' tests of an S.T.61 valve in a single-valve receiver (with condenser-controlled reaction) on the normal broadcast band.

On Friday morning, November 19th, I received the U.S. Municipal Broadcasting Station at Atlantic City, between the hours of 12.15 a.m. and 2.30 a.m. (G.M.T.). The programme heard included the following:

A portion of the news bulletin.

Organ Soli (including the "Londonderry Air.")

Morton Hotel Quartet.

A talk (one of a series) on "The Sphinx."

A lecture recital by Mr. S. Thunder, "From Beethoven to Liszt" (arranged by the Board of Education). Items heard included "Moonlight Sonata" and "Liebestraume."

Songs: "O dear, what can the matter be?" and "Mighty like a rose."

I have received U.S. stations on previous occasions on single valve receivers, but have never had such excellent signal strength on the 300/500 metre band.

On Sunday and Monday last I continued with tests on B.B.C. and Continental stations and heard, among a host of unidentified stations, the following: 2 L O, Belfast, Dublin, Glasgow, Newcastle, 5 W A, 6 B M, Stuttgart, Hamburg, Barcelona, Milan, Toulouse, E A J 7, Madrid, Dortmund.

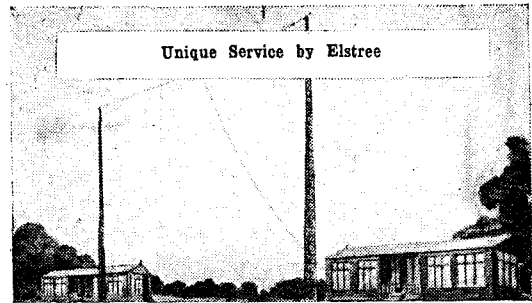
I think that the above results are highly creditable to one of your valves, which assisted the reception by its extremely smooth reaction control and absence of parasitic noises.

I. B. MILLER.

St. Andrew Street, Wells, Somerset.

If you are unable to obtain an S.T. valve from your local retailer write direct to us, or call. All valves will be sent by post and insured by us against breakage. C.O.D. orders executed on receipt of post card.

2, MELBOURNE PLACE,
ALDWYCH, LONDON, W.C.2
(Next to Australia House).



WATCH OUT!

Due to the fact that the terms on which S.T. valves are sold to the trade are different from those of other leading manufacturers, be prepared for attempts to persuade you to buy substitutes which may be represented as "just as good" or "much the same." This may particularly happen where we confine the sale of our valves to certain retailers in a town. There is no other valve which can be substituted for an S.T., and you will, no doubt, oppose any attempt to stop you buying the valve you want.





A Complete Radio course is contained in these two Volumes

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by G. G. Blake, M.I.E.E., A.Inst.P.

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Every effort has been made on the part of the authors to include in these two books all available information on their subjects. You, who may be reading this advertisement, are assured of spending many interesting hours with the volumes, and we recommend any reader anxious to improve his wireless knowledge rapidly, easily, and pleasurably that he purchases both—either from his usual newsagent or bookseller. Should any difficulty be met, we shall, of course, be pleased to send copies direct.

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This book comprises an alphabetical arrangement of over 2,000 Wireless Technical Terms and Expressions. However unfamiliar any word you encounter may appear, reference to this volume will provide its meaning and application both clearly and concisely.

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XMAS RADIO GIFTS



What could be more acceptable Christmas present? This and the following pages give suggestions in pictorial form.

One of the well-known Ediswan valves is shown above, and below is a handsome "Lamp-shade" Loudspeaker. (B.T.H. Co.)

Above:—The Lissenola Loudspeaker Unit, built into a wooden cabinet.

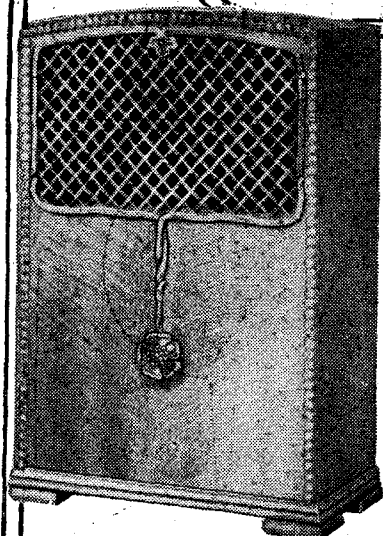
On the left:—An attractive cabinet set, of the Period style. (Ward & Goldstone.)

On the right is an "E k c o" H.T. Unit. (E. K. Cole & Co., Ltd.)

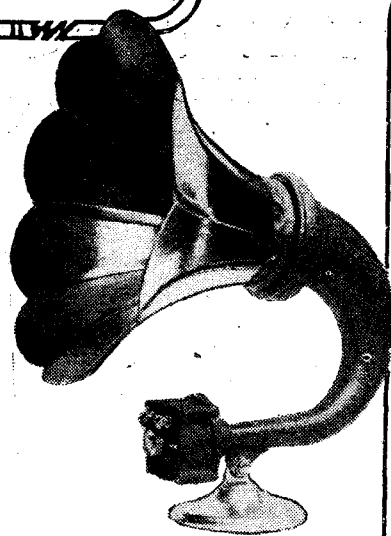
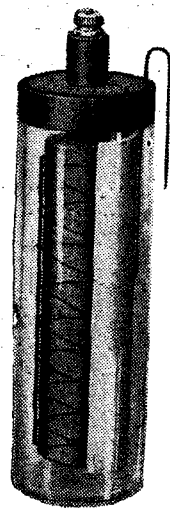
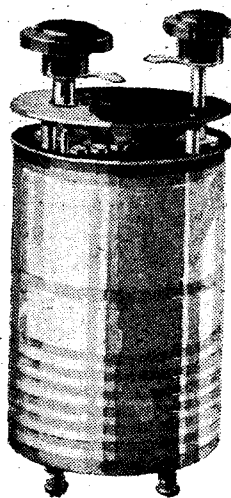
Sir Oliver Lodge's 2-valve "N" circuit complete with Loudspeaker, as marketed by Cleartron Radio Ltd.

The "Hiloton" Battery Eliminator (below) is made by the Dubilier Condenser Co., Ltd.

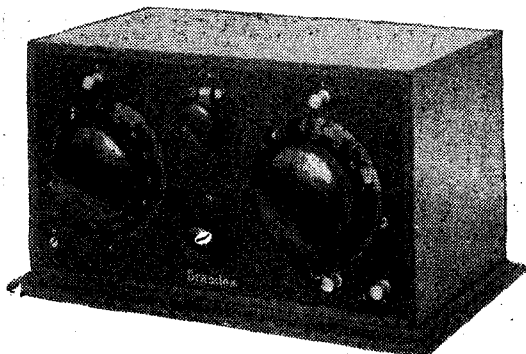
To the left is illustrated one of the new "S.T." Valves, a very complete range of which is available at standard prices.



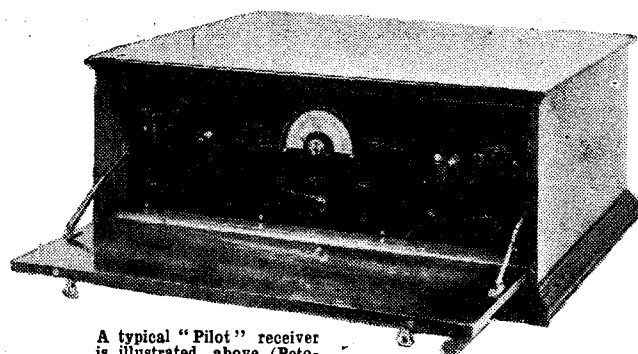
Distinctive design marks the Touchtone Loudspeaker (Gent & Co., Ltd.) Beside it is the well-known R.I. Tuner.



The fluid cell for H.T. is by Siemens Ltd., and the "Amplion Dragon" Loudspeaker is the latest A.R.19 model (Alfred Graham & Co., Ltd.)

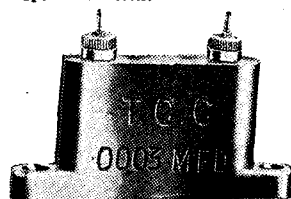
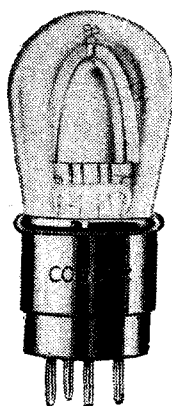


The Brandeset II is shown above, whilst below is the famous Marconiphone "Straight Eight."



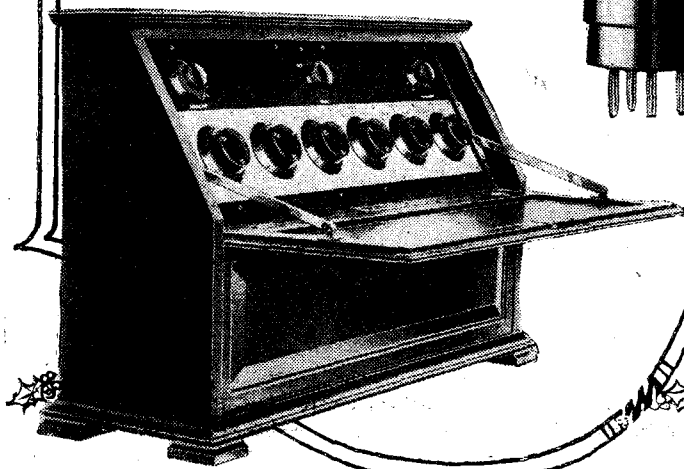
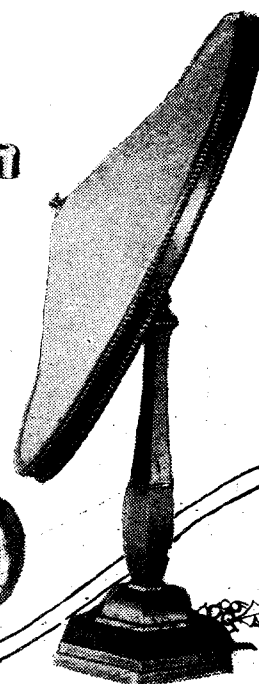
A typical "Pilot" receiver is illustrated above (Peto-Scott, Ltd.).

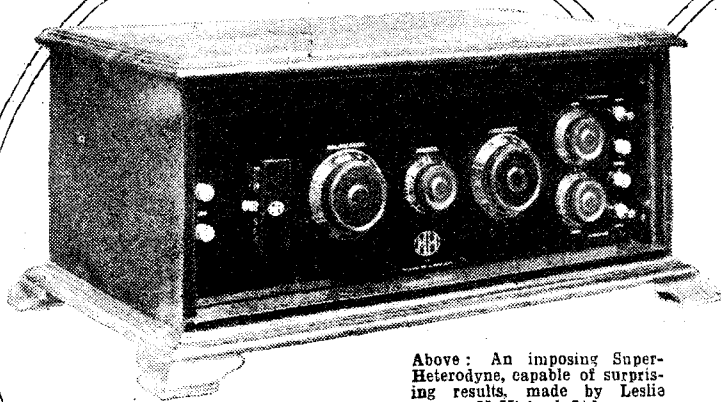
The T.C.C. fixed condenser "speaks for itself."



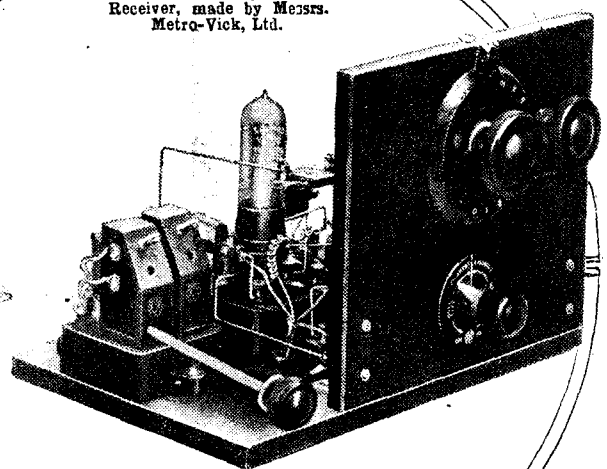
The valve on the right is the "Cossor, Point One."

Examples of the Mullard P.M. Valves and a G.E.C. Cone-type Loudspeaker are illustrated on the right.

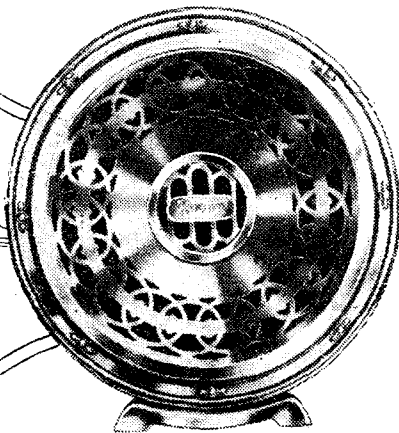




Above: An imposing Super-Heterodyne, capable of surprising results, made by Leslie McMichael, Ltd.

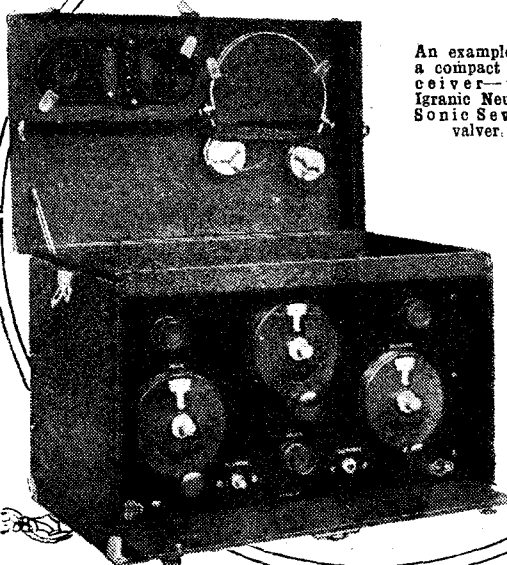
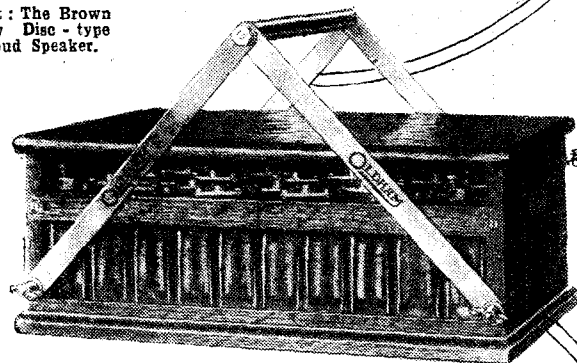


Below: An easily operated Receiver, made by Messrs. Metro-Vick, Ltd.

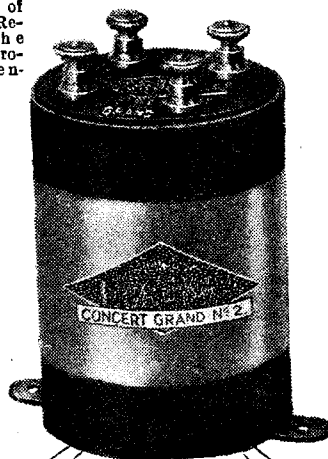


Below: A compact H.T. Accumulator by Oldham & Co.

Left: The Brown New Disc-type Loud Speaker.

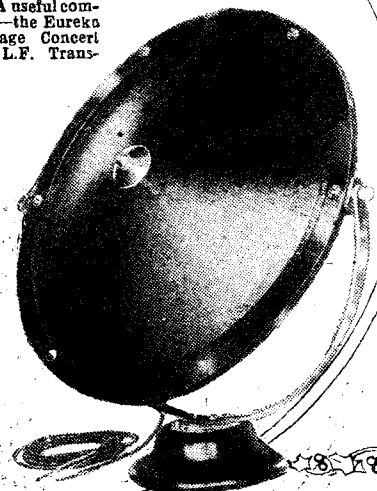


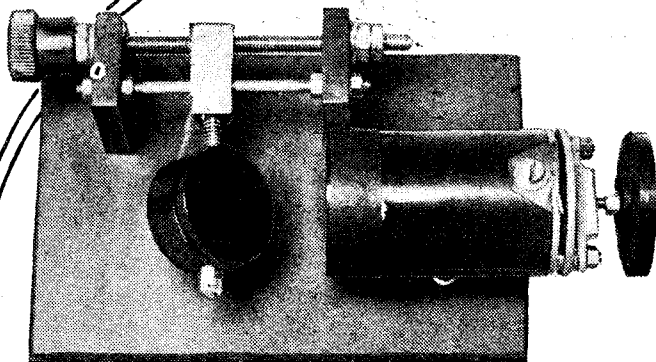
An example of a compact Receiver—the Igranio Neutro-Sonic Seven-valver.



Below: The new type C.A.V. Cone Loud Speaker.

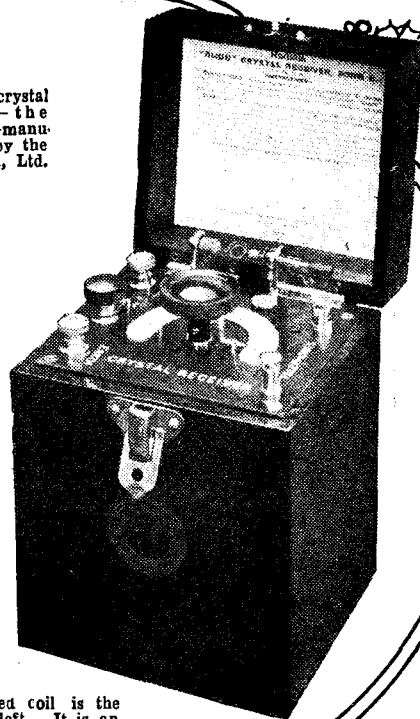
Left: A useful component—the Eureka 2nd stage Concert Grand L.F. Transformer.



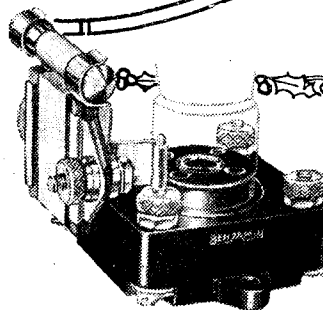
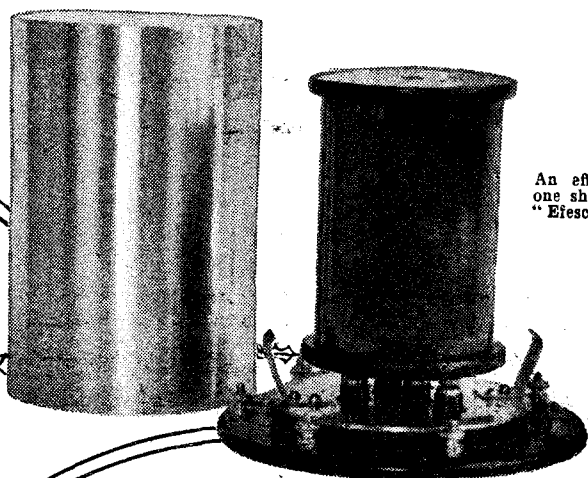


An Ormsby R.T.C. Unit which provides a Universal Aerial Tuner with variable reaction.

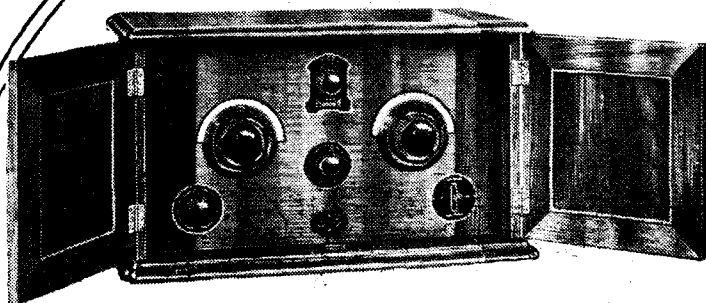
A neat crystal receiver — the "Bijou"—manufactured by the B.T.H. Co., Ltd.



An efficient screened coil is the one shown on the left. It is an "Efesca Centadyne" with detachable screen.

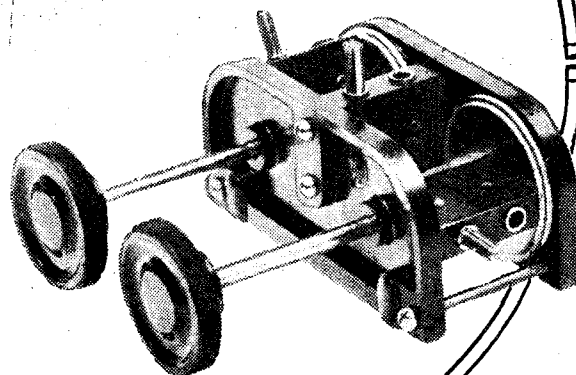
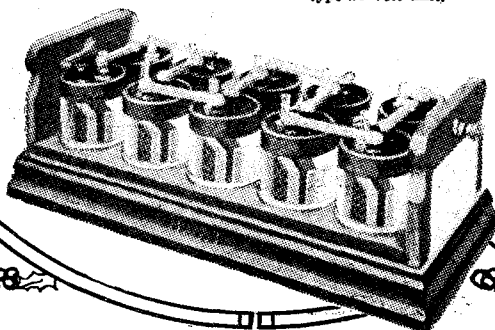


Above: A recent valve holder made by the Benjamin Electric, Ltd., incorporating a special grid leak and condenser fitting.



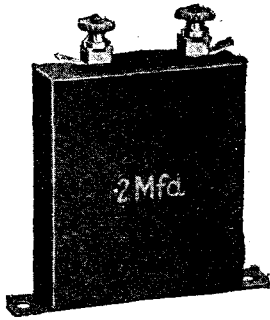
Left: The "Ethophore" Four is a hand-some instrument and makes an ideal Xmas present.

Below: A new type of H.T. accumulator—the Hart "Ray" type 20-volt unit.



The "Lotus" vernier coil holder is a very popular component of high-class construction.

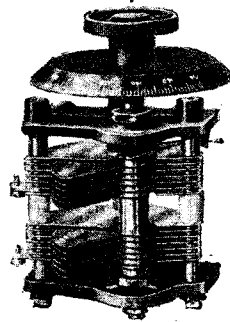
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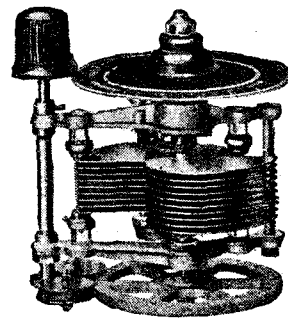
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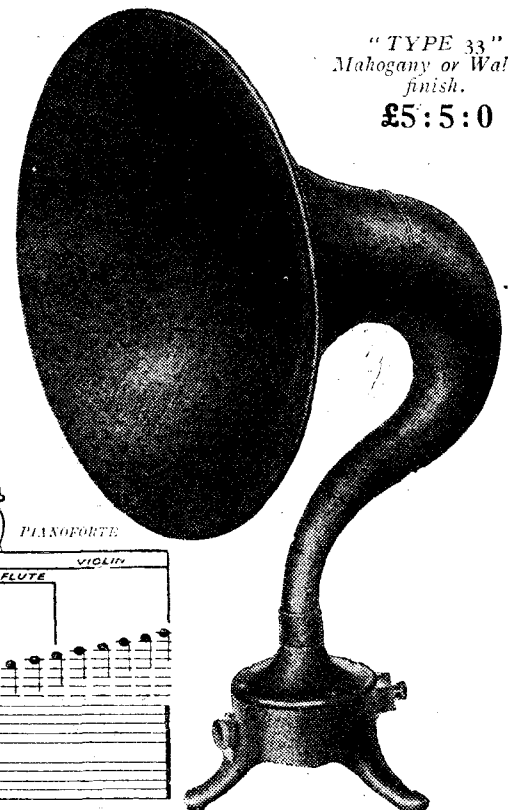
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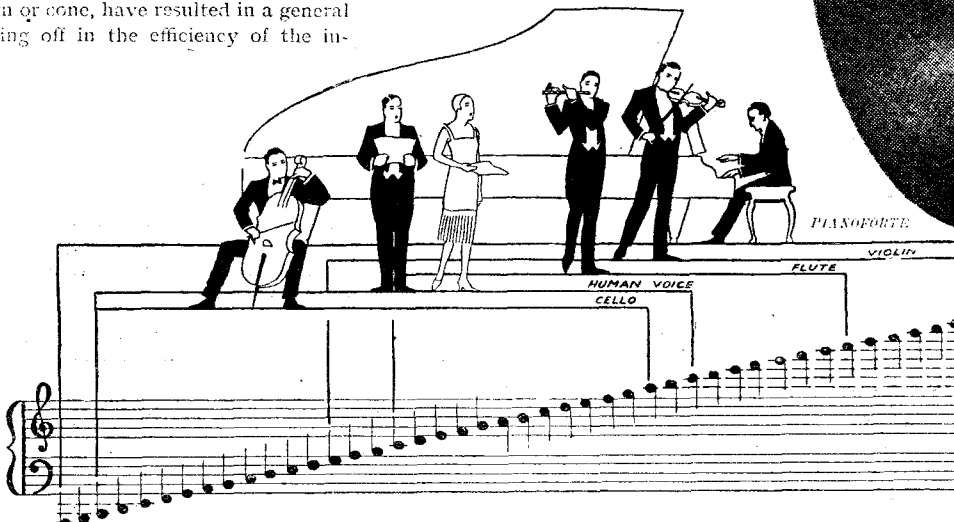
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Mahogany or Walnut
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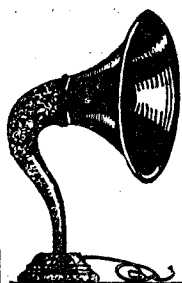
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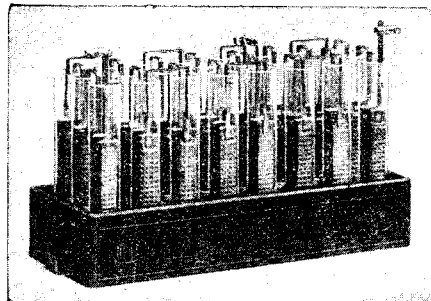
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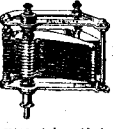
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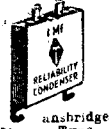
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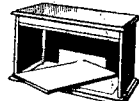
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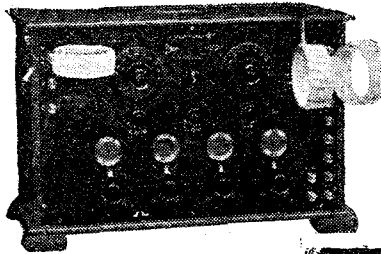
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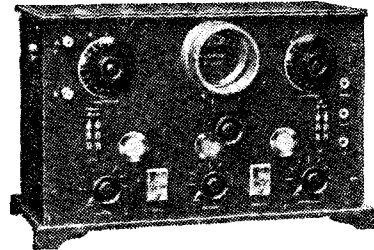
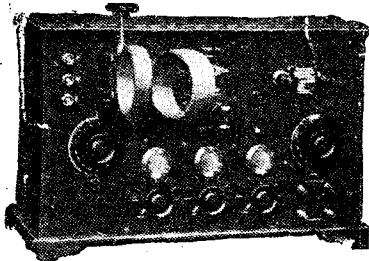
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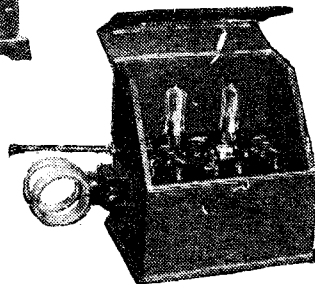
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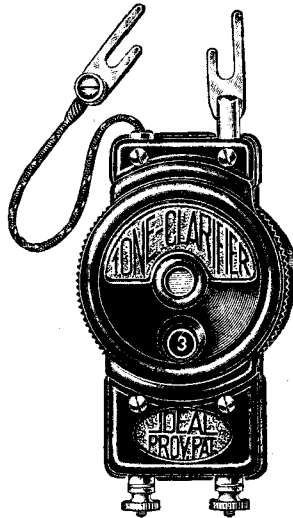


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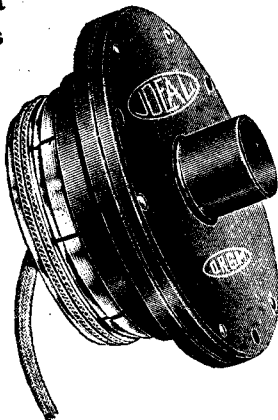
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Why the Crystal Interests Me

An article that will prove of absorbing interest to all readers whether they be users of the humble Crystal or pin their faith on super-hets. Mr. Corrigan is one of the foremost authorities on the Radio Crystal.

By J. F. CORRIGAN, M.Sc. A.I.C. (Staff Consultant).

UNDUE reminiscences, they often say, savour of garrulous old age and decrepitude. Well, that may be so. But surely, if at any time of the year one feels inclined to cry halt to the usual order of things and to indulge in the gentle art of reminiscence, the present season of festivity is the most favourable. For, indeed, with the spirit of Christmas in the air, few amateurs are inclined to give their minds over wholly to technicalities.



Fig. 1. The Abbé Haüy, the founder of crystal science.

Christmas is a season of goodwill. Still more in the modern world, it brings with it a period of relaxation, a brief respite from the ordinary duties of existence. One expects even the most fiendish oscillator to relax his efforts at Christmastide, and to reduce his soul-shattering disturbances to a minimum. I say one *expects* such a gentleman to effect this temporary change in his behaviour.

My First Introduction.

Anent the main subject of my article, however. It is rather a peculiar fact that nearly every wireless enthusiast I meet trots out the one question, "Look here, old man, why are you so jolly interested in crystals; why don't you give more specialised attention to valve circuits, and what not, instead of bothering over fiddly bits of minerals?" I suppose, in some ways, it is a natural sort of question to ask, especially in view of the fact that nearly all the main commercial developments taking place in the science of radio within the last ten or fifteen years have been concerned with the

perfectly and efficient application of the thermionic valve.

Now, it is an extraordinarily difficult matter to set down briefly the reasons why you are interested in a thing. It's like being in love. What adoring Romeo ever did attempt to account dispassionately for the mental disturbance afflicting him? In fact, such an introspective task. I am credibly informed, is rarely attempted—in pre-matrimonial periods, at any rate! And so, in some ways, one attains a somewhat similar mental attitude with regard to any material interest. Nevertheless, so many people seem to be interested in my interest in the crystal, and in, may we put it, matters crystalline, that I think the present opportunity is suitable for attempting to account for my attitude concerning these matters.

My first introduction to the crystal as a radio rectifier took place, if my memory serves me correctly, during the autumn months of the year 1907. For some time previous to this period I had been experimenting with a small home-made spark transmitter, employing a 2-3 in. induction coil, and running off a 12-volt accumulator. The whole affair worked well so far as the transmissions were concerned, and, of course, at that time it was considered wonderful.

Early Experiments.

The great bane of the whole thing, however, was the receiver. This simply would not work in a reliable manner. It contained a coherer—a professionally-made instrument—together with the necessary decohering or tapping device. It was the tapper which caused all the trouble. At times, it would tap the coherer wonderfully well, but at other times, and especially during demonstrations, the wretched thing would, metaphorically speaking, lie down like an obstinate mule and simply refuse to take any part in the game at all.

In the midst of all these vexations, a naval wireless operator sent me a carborundum crystal, and, shortly afterwards, one of the silicon variety, together with accounts of the trials which had then recently been made with them. I gave these crystals a test. They gave remarkable results, so much so that I threw the miserable coherer into the dustbin, an action for which I am now heartily sorry, for such an article is an interesting historical curiosity in these days.

Thus came my introduction to the crystal of radio science. Naturally, in those days crystals were only employed by amateurs for Morse reception and for Eiffel Tower transmissions. I think I am right in saying that fused silicon was the most popular crystal among amateurs at that period. It was more sensitive than carborundum, and, although it was not so stable, it retained its sensitive properties excellently: I have, in fact, even now a number of silicon crystals whose working history dates back to the year 1909, and which still rectify efficiently.

Origin of the Cat's-whisker.

Surprising as it may seem, galena crystals were not very greatly used during those days. For one thing, the popular brands of galena—that is to say, the brilliantly glittering, silvery-grey crystals of the present day amateur—were unknown. The galena to be had took the form of dull grey cubical crystals, very often of indifferent sensitivity. Moreover, such crystals, were used in conjunction with a rigid steel, brass, or copper contact, which, of course, made them even less efficient.

Cat's-whiskers, I think, were invented about the year 1910. The first type of cat's-whisker had the redeeming feature of bearing some resemblance to its namesake. It took the form of a curved piece of wire, fastened down at one end, the other end making light contact with the crystal.



Fig. 2. A specimen of fine grained galena.

Then somebody or other hit upon the brilliant idea of making the contact wire of the crystal into a little spiral.

The rectifying crystal became completely overshadowed by the introduction of the valve as a radio receiver. In fact, one supposed at the time that it had passed into
(Continued on next page.)

WHY THE CRYSTAL INTERESTS ME.

(Continued from previous page.)

the limbo of the forgotten to keep company with the coherer. However, as the present reader will be well aware, the case turned out otherwise. The introduction of broadcasting after the war not only resurrected the crystal as a rectifier, but it also gave to that formerly discarded article a tremendous lease of really serviceable life. The radio rectifying crystal of the present day has



Fig. 3. Galena crystal dust.

brought more real happiness and knowledge into many of our country's homes than possibly any other creation of science.

That, I think, is one of the main reasons why my interest in wireless lies to such an extent in the direction of crystal reception. If you consider things dispassionately, it becomes very evident that the crystal set of the present day is really an extraordinarily remarkable and wonderful instrument. Without demanding any technical knowledge of wireless science on the part of its owner, the crystal radio set brings into the home a stream of broadcast news, speech, and music. It provides an ever open door for the local broadcast.

Many Advantages.

The advantages of the average crystal set are well known—low initial expense, no cost of upkeep, efficiency, and reliability—and there is no need for me to enlarge upon them. Surely, therefore, facts such as these are sufficient to make any average individual interested in such methods of obtaining broadcast reception.



Fig. 4. Crystal dust highly magnified.

We know so much about the radio-sensitive crystal, and about crystals in general, and yet we know so little. It seems to me that Nature has made use of the crystal as a safe in which to store many of her most treasured secrets. At the present time, we are merely utilising a mere handful of the numerous powers present within the crystal. We use certain naturally-occurring crystals and minerals for the purpose of rectification. More recently we have discovered that some crystals are capable of acting as oscillation generators and radio amplifiers.

Still further, other varieties of crystals are now being rapidly brought into use for the purpose of accurately controlling the wavelengths of transmitting stations. Again, crystals can be used as sound-wave amplifiers, and it is now being strongly suspected that many of them possess the capability of converting light waves into electric currents, thus acting as miniature photo-electric cells.

Various Uses.

Crystals of one substance or another form the basis of other useful applications, as well. For instance, the sensitivity of the photographic plate or film depends upon the crystalline structure of the silver salts which are incorporated into its emulsion. Crystals can be used as heat indicators, as weather recorders, light analysers, and as a host of other things. The crystal's influence, therefore, in the modern scientific world is very nearly universal, and thus the rectifying properties of crystals, which we radio enthusiasts dwell so greatly upon, form but one of the many-sided capabilities of these wonder creations of Nature. There are many other powers inherent in crystals, discovered and undiscovered. Is it, therefore, a matter for wonder that scientists, as a whole, are becoming more and more interested in crystal phenomena? The first individual to undertake the scientific investigation of crystals was Haüy, an Abbé, who lived a little over a hundred years ago. Haüy separated natural substances into two divisions, crystalline and non-crystalline, or amorphous. He measured the sides and angles of crystals, classified them according to their natural shapes, and so forth. But, of course, he knew nothing about the many electrical properties which they possessed. Such knowledge has only come within the last twenty years or so.

Haüy's view that everything material could be divided into crystalline and non-crystalline substances was followed up to very recent times. Lately, however, it has been fairly conclusively proved that there are no such things as entirely non-crystalline or amorphous bodies. Everything solid in the whole realm of Nature possesses a very definite crystalline structure. Metals, rubber, glass, cements, flour, paper, cotton, silk, wood, and hundreds of other similar materials which were until recently thought to possess no crystalline structure at all are now fairly well known to be entirely crystalline.

Nature's Crystalline Structures.

The atoms of the elements, with their internal constituent protons and electrons are Nature's bricks. Nature, however, does not effect her constructions by heaping her bricks together anyhow. On the contrary, she constructs everything solid on a regular plan, and a crystalline structure is the result.

The series of photographs, Figs. 2, 3, and 4, will perhaps go some way to illustrate this statement. At any rate, it will show how thoroughly ingrained and indestructible is the crystalline structure of Nature's creations.

Fig. 2 is a photograph of a crystal of fine-grained galena taken from the detector cup of an ordinary crystal set. In the illustration, the crystal is enlarged to about twice its natural size. Now, after photographing, the crystal was broken up into small pieces. A few of the fragments were then taken and ground up very finely in an agate mortar. The resulting blue-black powder was then sifted through coarse muslin cloth, this process giving a practically impalpable powder.

Next, a small quantity of this powder was sandwiched between two thin slips of glass, and subsequently photographed. Fig. 3 is the result. Here, again, the photograph is on an enlarged scale, a necessity arising out of the practical difficulty of reproducing an extremely fine-grained image.

Finally, a speck of this powder was mounted on a microscope slip, and photomicrographed under high magnification. Fig. 4 depicts the photomicrograph of the impalpable crystal powder. Clearly, from the photograph it is evident that all the powdering, grinding, and sifting of the original crystal have not destroyed its crystalline nature in the slightest degree. All that such processes have effected is to split the original crystal up into a multitude of infinitely small crystals, each separate one of which retains its definite crystalline proportions and characteristics.

A crystal, therefore, is an imperishable thing. You cannot destroy it, any more



An original crystal.

than you can, by any practical means, destroy an atom or an electron. There are forces within the crystal which hold it together. Forces, the applications of which are possibly undreamt of at the present day.

Immense Possibilities.

I know that many of my readers will imagine that the possibilities which I hold forth for the crystal are too brightly painted. I do not think they are, however. "The secret of all who make discoveries is to look upon nothing as impossible," says the eminent chemist and scientist, Liebig; and even our own poet Tennyson, who knew nothing at all about modern science, has intuitively stated that:

"Men, thro' novel spheres of thought,
Still moving after truth long sought,
Will learn new things."

Such, therefore, are some Christmas considerations on the crystal which I offer to my readers. And I would be guilty of a great neglect of opportunity if I did not seize upon this occasion to offer my reader-friends, known and unknown, the time-honoured greeting—a hearty good Christmas and still further prosperity in the New Year.

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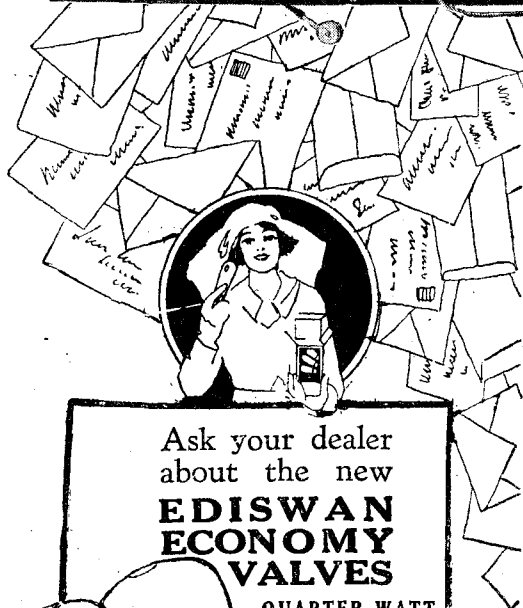
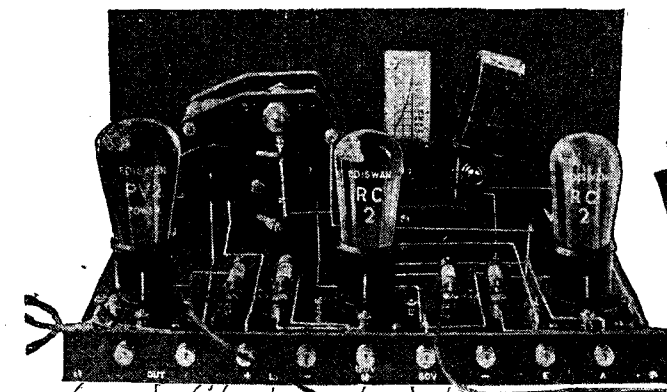
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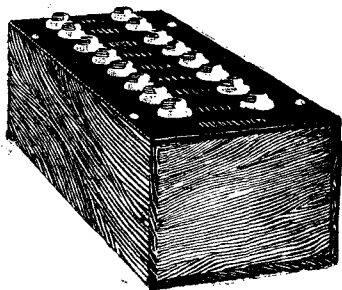
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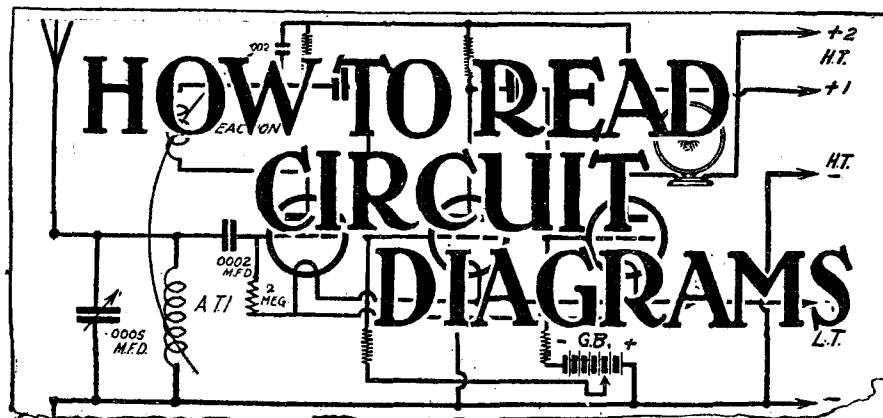
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By C. E. FIELD, B.Sc. (Staff Consultant).

PART II.—Showing how the various symbols can be grouped together.

ALTHOUGH nearly all wireless circuit diagrams will be found to consist of the symbols which were given in the previous article, there are certain combinations of components which frequently recur in receiving sets, and it is a great help to

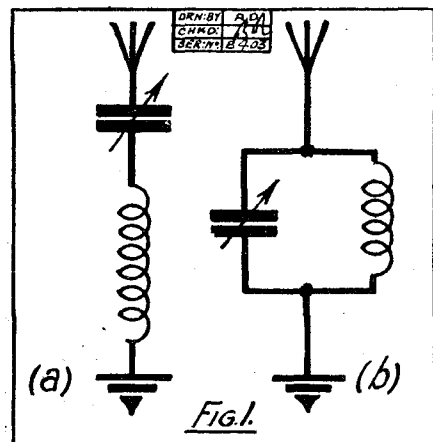
the signal currents can divide between the coil and condenser, and part flow through each.

One or other of these arrangements, or something very similar, is present in nearly every set, because they constitute the most usual means of tuning-in, or selecting, the required signals.

The combination is known as the *aerial circuit*, and the coil and condenser, when used in this position, are referred to as the *aerial tuning coil* and *aerial tuning condenser* respectively.

In the first case, the two are said to be connected in *series*, and in the second case in *parallel*. In the latter instance the condenser is sometimes said to be connected *across* the coil or the coil is said to be *shunted* by the condenser.

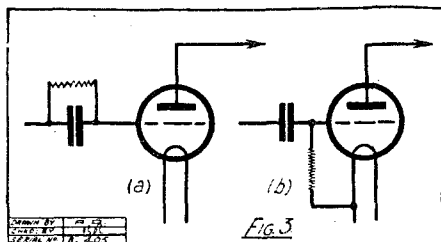
The aerial circuit, by the way, is nearly always shown at the left-hand side of a diagram, because it is the point at which signals are received, and we can then



the understanding of a diagram if the group of symbols representing these can be readily recognised.

For instance, at the left-hand side of most diagrams will be seen one of the two arrangements shown in Fig. 1, which consist of an aerial, variable condenser, inductance coil, and earth, connected in two different ways.

In Fig. 1a they are so arranged that the received signals in the aerial, which always endeavour to flow to earth, must pass first through the condenser and then through the inductance. In the second diagram



follow their progress through the circuit from left to right, just as in reading a book.

A coil and condenser connected in parallel, as in the second sketch, constitute an *oscillatory circuit*, sometimes called a *rejector circuit*, which has the property of selecting, and passing on, only signals of a certain wave-length, to which the circuit is tuned by means of the condenser.

Tuned-Anode Coupling.

An arrangement which is very frequently employed consists of a rejector circuit connected in the lead joining the plate, or anode, of a valve to the high tension battery, as indicated in Fig. 2.

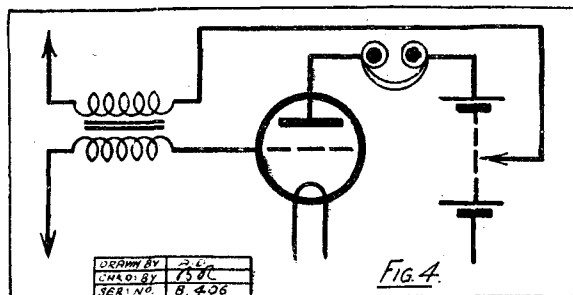
This circuit selects—i.e. *rejects*, signals of the wave-length to which it is tuned, and forces them to pass along to the grid of the next valve, or to a crystal detector.

When such a circuit couples two valves—i.e. to pass signals from one valve to another, the arrangement is referred to as *tuned-anode coupling*, because the plate, or anode, circuit of the valve is tuned.

This is an expression which is constantly occurring in wireless articles, and the experimenter should be able to see at a glance, from a diagram, when coupling of this kind is employed, by recognising the oscillatory circuit in the valve plate lead.

An Important Group.

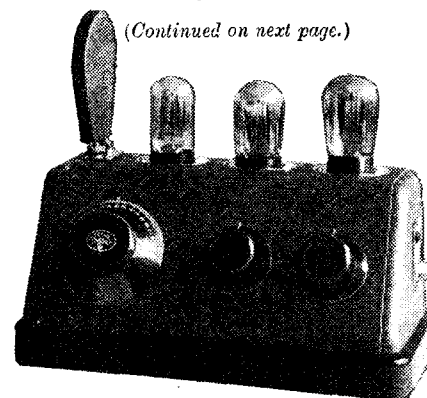
Fig. 3 shows another combination occurring in the majority of circuits, comprising a small fixed condenser, usually with a capacity of about 0003 mfd., connected in the lead to a valve grid. A high resistance, generally of about two megohms, is joined either in parallel with this, as in a, or between the valve grid and one filament connection, as in b. This condenser and resistance are known respectively as *grid condenser* and *grid leak*, and their presence in the form shown in Fig. 3a indicates that the valve in question is the detector. This is often the case when the second arrangement is shown, but not always so, for it is sometimes necessary to supply an



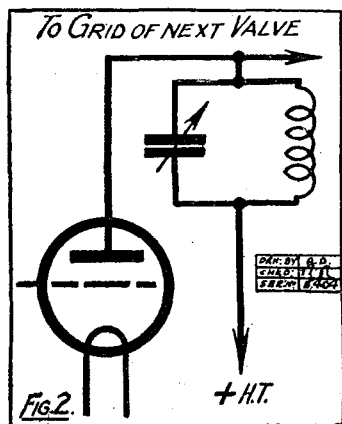
amplifying valve with a grid leak and condenser arranged in this way.

When confronted with a complicated diagram of a multi-valve set, the understanding of the circuit is simplified if we can at once spot which is the detector valve, for we know then that all valves to the left of that are dealing with impulses similar to those picked up by the aerial, whilst valves to the right of the detector are handling low-frequency impulses like those which pass through the telephones.

At the right-hand side or bottom of a circuit diagram we sometimes find an arrangement like that shown in Fig. 4, in which a lead, usually from a transformer winding, terminates in an arrow, which points somewhere between the ends of the high-tension battery.



Recent design in German receivers tends to provide metal casing for the whole of the set, as the above photo shows.



HOW TO READ CIRCUIT DIAGRAMS

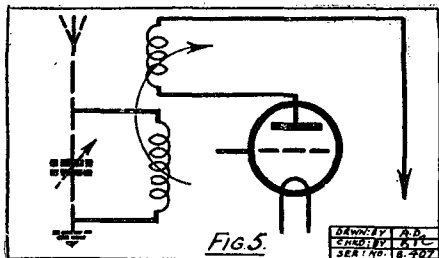
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The arrow here represents a wander-plug or other connection taken to a tapping point on the battery, in order that the high-tension voltage applied to the valve from which the lead is taken may be varied at will, and extra voltage may be applied to the last valve.

Various Styles.

In Fig. 5 is shown a diagram of connections which very often appears as part of a valve circuit diagram, and ought to be easily recognised. A lead from a valve plate goes *back* (i.e. towards the beginning of the circuit) to a coil, which is variably coupled to some other coil in the circuit, such as the aerial tuning coil, or the coil of an inter-valve oscillatory circuit.

The coil in the valve plate lead is known as a *reaction coil*, and its use and abuse are probably well known to readers. The

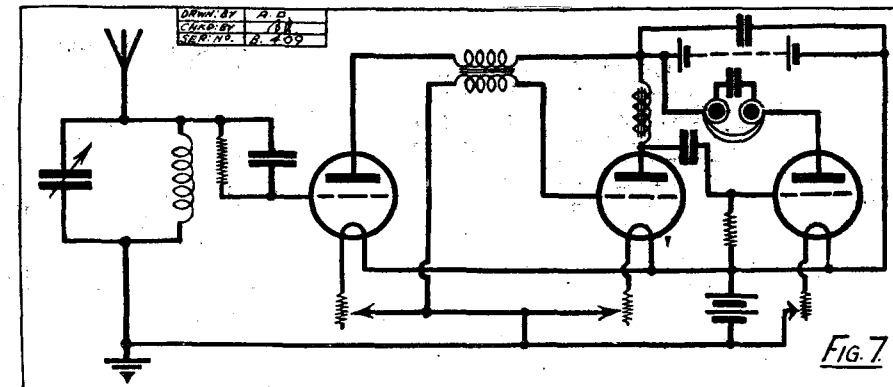


occurrence of these connections in a circuit diagram tells us, therefore, that the set employs reaction, with the consequent increase of sensitivity and volume, lack of stability, and so forth.

As has been previously pointed out, there are many ways of drawing the diagram for a particular circuit.

The particular style employed, of course, makes no difference to the wiring of a set which might be constructed from the illustration in question, but some diagrams are much easier to follow than others.

Mention may be made of one method of making a diagram which is becoming increasingly popular, and which is largely employed in articles in "P.W." Although at first sight these diagrams may appear a little difficult for the constructor to work from, once they are understood they are



very easy to follow, especially when we wish to find out just how a circuit is supposed to work.

Their chief feature is that three or four horizontal lines are drawn, usually at the bottom of the diagram, each one representing a battery lead, either high or low tension, and designated accordingly. Then all wires which are in direct connection with a battery are shown by lines dropping vertically on to one or other of these, without having been previously joined to

condensers, etc.), no circuit diagrams should present any difficulty.

In a final article we will take some examples of practical circuits, and see how it is possible for the more advanced amateur to analyse the theoretical diagrams.

MAKING POLE INDICATING PAPER

THE manufacture of pole indicating paper is one of those spare time jobs which can readily be undertaken by any amateur. The materials which are necessary for the job are few and simple, and they are not expensive.

Obtain a quarter of an ounce of phenolphthalein (the current price of this substance at any large firm of chemists being ninepence per ounce) and dissolve it in about an eggcupful of *rectified* spirit (not methylated spirits). After the phenolphthalein has completely dissolved in the spirit, add to the liquid approximately three times its bulk of clean, cold water.

Prepare a number of strips of clean white blotting paper, and soak them for a few minutes in the above solution, afterwards taking them out, and allowing them to dry thoroughly.

Then prepare a solution of sodium sulphate by dissolving half an ounce of sodium sulphate in a teacupful of warm water.

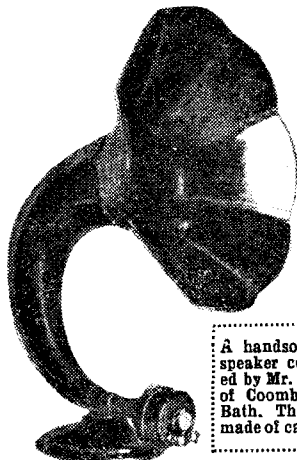
Useful Accessory.

Soak the above strips which have been treated with phenolphthalein in the above solution for two or three minutes. Then take them out and allow them to dry.

The pole indicating paper will now be ready for use, and if it is kept between the leaves of a book, out of the influence of any fumes, it will retain its properties for an indefinite time.

In order to use the paper for the purpose of discovering the polarity of a battery or accumulator, moisten a piece of the paper with a little clean water, and place both leads of the accumulator or battery in contact with it, and at a distance of about an inch apart. The area of paper which is in contact with the *negative* pole of the battery will turn bright red.

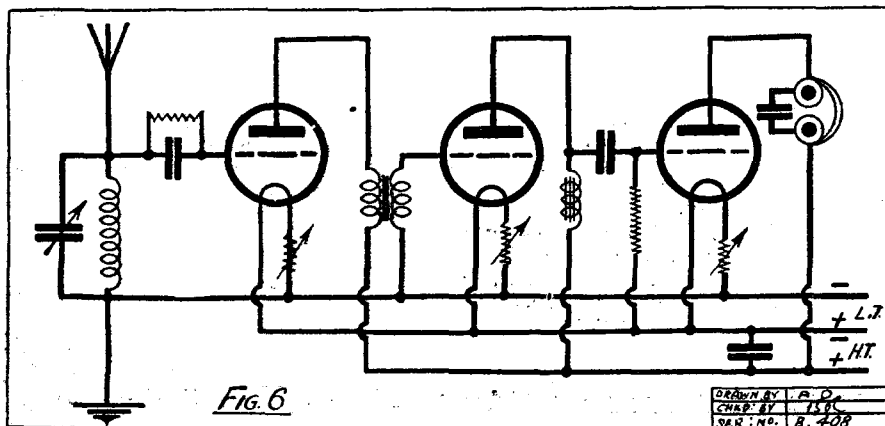
This test is a perfectly good one for use with any cell, battery, or accumulator of average voltage, but for E.M.F.'s below one volt, the test is not to be relied upon. However, a supply of this readily-made paper will be found to be of the very greatest use to the busy amateur.

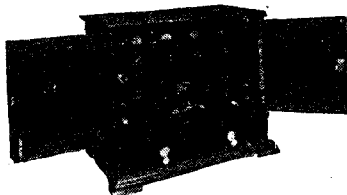


A handsome loud speaker constructed by Mr. B. Willis, of Coombe Down, Bath. The horn is made of cardboard.

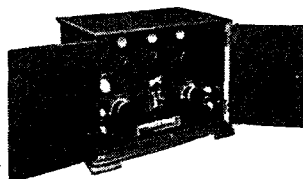
one another. By this means crossing and branching wires, which tend to confuse a diagram, are largely avoided, as will be seen from the example shown in Fig. 6. An alternative symbol representing the variable filament resistance is shown in this diagram. Fig. 7 shows another diagram of exactly the same circuit.

If a reader can fully appreciate that these two diagrams are electrically identical, and could construct a set from either of them (knowing, of course, the values of coils,

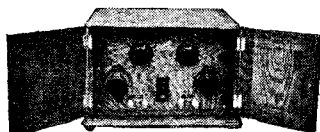




A triumph of multivalve set construction. In beautiful mahogany case. All parts enclosed. Switches for selecting 2, 3 or 4 valves and from "1.s." to 'phones. Dual resistances. Very fine reaction control. Incorporated wave-trap for cutting out "locals." All B.B.C. stations at full "1.s." strength and most Continentals. **£25** (Royalties included).



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Probably Britain's most popular "2-valve" or "1.s." reception—the Ericsson "Family Two." Extraordinarily powerful and gives reproduction of a beautiful quality. Parts totally enclosed. In highly polished oak cabinet. Will bring in any main B.B.C. station at full "1.s." strength up to 30 miles and 5 X X up to 150. Price **£8-15-0** (Royalties included).



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For small rooms or where great volume is not required, select the Ericsson Super Tone Junior Loud Speaker. 15½ in. high. Very sweet and clear. Complete with lead. **32/6**



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Ericsson Headphones are comfortable and really wonderful for tone, and matchless for sensitivity. Three resistances one price (120, 2,000, 4,000 ohms). **20/-**



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Ericsson

TESTED
APPARATUS

A GOOD deal is heard about efficiency and selectivity in relation to a wireless set, but it is not usually pointed out that these two qualities, although not of course identical, are to a large extent dependent upon one another; in actual practice the connection is so close that they may be said to amount more or less to the same thing. If a set is efficient, the losses being reduced to a minimum and damping eliminated, the set is likely to be, or can easily be made, very selective. The set cannot, however, be selective if the losses are high, that is, if the efficiency is low.

When designing a wireless circuit or building a receiver, the experimenter has to consider whether he is desirous of obtaining reception of volume and purity, or whether he looks forward to extreme selectivity and to separating weak or long-distance stations whose wave-lengths may be close together.

Distance or Quality?

It should be borne in mind that although there is a great fascination in receiving distant stations and in hearing them come in one after another with comparatively small movements of the tuning dial, at the same time this type of reception is not the best from the point of view of purity, and certainly not from that of volume. Where exceedingly fine tuning is employed, that is to say, in the ultra-selective set, there is apt to be distortion or roughness.

For the best loud-speaker results it is certainly preferable to have fairly broad tuning, as this gives much more scope for proper adjustment. Magnetic reaction had better be avoided for the best results, so far as purity is concerned, and where H.F.

TECHNICAL NOTES

A Weekly Feature
Conducted by

Dr. J. H. T. ROBERTS, F.Inst.P.
(Staff Consultant.)

amplification is used it is better to employ some form of aperiodic coupling rather than a tuned circuit coupling.

But, as already mentioned above, a great deal naturally turns upon the question as to whether you are seeking for distance on the one hand, or quality and volume on the other hand.

Different Points of View.

If you are intent upon long-distance reception, then, of course, the set must be as efficient as possible, especially upon the H.F. side. Here magnetic reaction or capacity reaction is desirable, and very sharp tuning should be used. The experimenter who is looking for distant reception gets his satisfaction from tuning-in the desired stations without a great deal of regard to the quality or to the signal strength.

Any experimenter who has, for example, listened in to American stations, will

readily agree that it is not much use expecting quality over such a great distance. I know that this observation will bring me many letters from enthusiastic all-night experimenters to the effect that they have had "perfect reception" on different occasions. This may be true, but the fact remains that in the vast majority of cases reception over such distances as I have indicated above is only just *reception*, and nothing more.

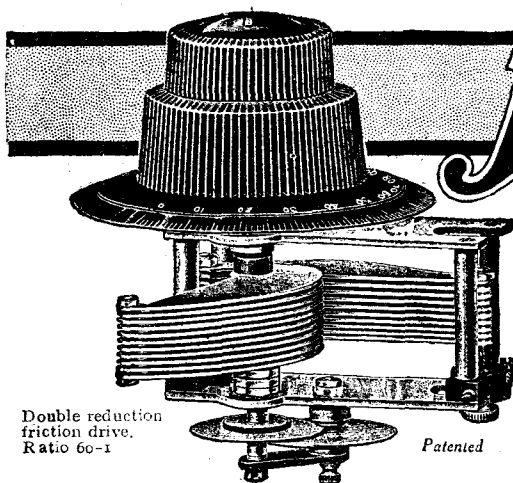
Bright Emitter Valves.

Although the dull emitter valve is now rapidly ousting the bright emitter, there is still a section of the wireless public who believe, rightly or wrongly, that for careful experimental work, where questions of filament efficiency are not of great importance, the old-fashioned bright emitter is to be preferred.

It is true that in the earlier days of dull emitters considerable variations in their performance were common, but in the modern types now on the market a very high standard has been reached, and in spite of the greatly reduced wattage consumption the performance of the modern dull emitter is, in my opinion, in every way equal to that of the bright emitter.

After all, there is no particular virtue in a high filament temperature; it is necessary to raise the filament of a bright emitter to a high temperature in order to cause it to emit electrons in sufficient quantity, and the simple fact is that if it would emit electrons in the same quantity at a lower temperature, or without heating at all, it would serve its purpose equally well.

(Continued on page 932.)



JACKSON CONDENSERS

The Ideal Gift for Christmas

GIVE your friends a Condenser that not only looks a perfect job, but is as efficient as it looks. A combination of the three essentials—precision, efficiency, finish—that's what has made JACKSON CONDENSERS foremost on the market to-day. J.B. Condensers embody all the most modern developments in Condenser design, and their inclusion in practically all the Star Sets of 1926 is an indication of the value placed on them by the scientific radio experts of the present day.

THE J.B., S.L.F.

PRICES, complete with 4" Bakelite Dial.

·0005 mfd. .. 11/6 ·00035 mfd. .. 10/6 ·00025 mfd. .. 10/.

J.B. Condensers are precision instruments, made to last a lifetime, and designed to simplify tuning and yet possess that selectivity which marks a really good condenser. In both the original J.B., S.L.F., and also the True Tuning S.L.F., the vanes are designed on a new principle to avoid crowding at any part of the scale. In addition, the vanes are supported at tips to ensure correct spacing. Friction surfaces are machined to a fine limit of accuracy, preventing all possibility of lost motion.

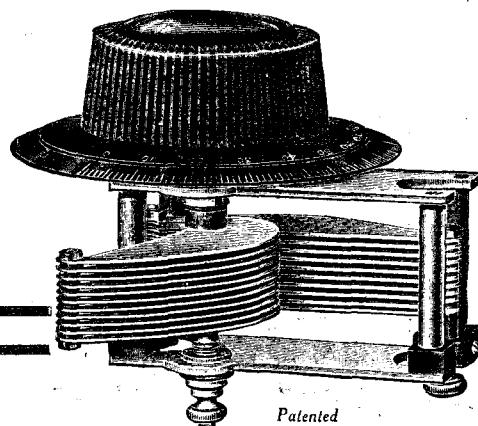
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ROSE BOWL.
10½ in. diameter.
Brim: 7½ in. high.

DE-LUXE.
13 in. high, 11½ in.
wide, 7½ in. deep.

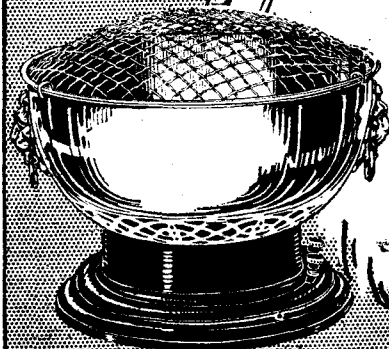
JUNIOR.
6½ in. high, 5½ in.
diam., 2½ in. deep.

**"BECO"
ROSE BOWL.**
Nickel Plate :
£5 : 5 : 0
Oxidised Silver or
Antique Bronze :
£5 17 6

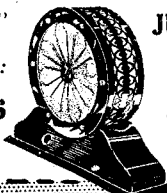
If you use
BECO

**"BECO"
DE-LUXE.**
Jacobean Oak :
£5 : 0 : 0
Mahogany :
£5 : 5 : 0

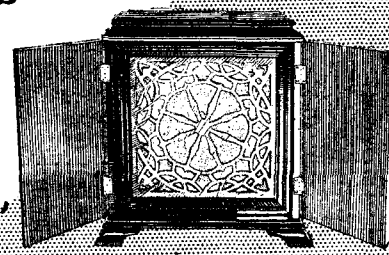
Hornless Loud Speakers



"BECO"
Nickel Plated :
£2 : 12 : 6



JUNIOR.
Oxidised Silver
or Copper :
£2 : 15 : 0



TECHNICAL NOTES

(Continued from page 930.)

The only drawback, therefore, from which a dull-emitter filament has ever suffered has been, as already mentioned, the unreliability in the earlier stages, when the manufacture of specially treated filaments was not well understood. The bright emitter simply dissipates a large proportion of the filament watts supplied to it in the shape of heat and, of course, a small proportion in the form of light, the proportion which is represented by the electron emission being a very small percentage of the whole. In the case of the dull emitter filament, since for the same electron emission the heat and light dissipation are very much smaller, it follows that the overall efficiency is much greater.

Useful Soldering Advice.

Probably there is none of the experimenter's tools which is more abused than the soldering iron. This is continually left in the flame to burn, and is then subjected to a drastic and ruinous filing in order to remove the consequent scales of oxide.

Not only is the copper bit soon reduced by this treatment, but the tip of the copper becomes pitted and altogether unsuitable for good work. This raises the question as to the correct temperature at which the soldering iron should be used, and also the question as to how the experimenter is to know when the iron has attained the proper temperature.

Of course, as in so many practical matters, an experienced eye is the best guide,

and anyone who has done much soldering is able to tell at a glance when a soldering iron in a blue bunsen gas flame is getting beyond a safe temperature. If the temperature of the iron is about right it will be noticed that the flame is *beginning* to be tinged with a characteristic greenish yellow coloration. (Those readers who have some knowledge of science will know that this is due to the vaporisation of the metal and constitutes an elementary experiment in spectroscopic analysis.)

If, however, the greenish yellow coloration is masked by an ordinary whitish flame, this shows that the iron is burning and it should be removed from the flame.

If the iron has become red hot it is quite useless to attempt to use it in that state, and even if you can succeed in getting the solder to wet it, the solder itself will be immediately burnt. It is necessary, therefore, to cool the iron to the right temperature, then to file and clean up the tip, and finally to "tin" the iron by means of flux and solder.

A.C. Main's Interference.

A simple test which may be of use to those constructors who are not very much accustomed to using a soldering iron is to remove the iron from the flame and to press it into contact with a sheet of ordinary white paper such as notepaper. If after a second or two in contact with the paper the latter shows a brown discoloration the temperature of the iron is about right. If the discoloration is much too rapid the iron is too hot, of course; whilst if an insufficient discoloration results it is an indication that the iron requires further heating.

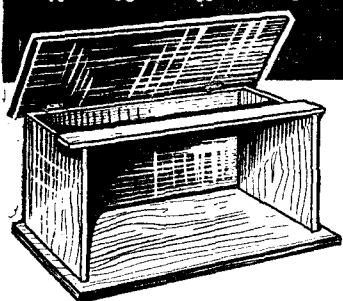
Readers in whose homes the electric light supply is of the A.C. variety may often experience trouble with their receiving sets, owing to induction and the consequent production of a hum in the loud speaker or headphones. This hum, of course, corresponds exactly in frequency with the periodicity of the A.C. supply. It is more likely to arise if the aerial or any part of the H.F. side of the set comes into close proximity with any of the electric light cables or such-like conductors.

Methods of Elimination.

There are several ways in which this difficulty may be reduced or eliminated. For one thing, the cabinet containing the set may be pasted inside with tinfoil, the tinfoil being secured in position by means of wax or other suitable adhesive, and the six sheets on the six sides of the cabinet being electrically connected together and connected also to earth. This amounts to placing the whole of the set within a closed metal conductor connected to earth and, as is well known, such an arrangement provides an excellent shield.

Of course, any form of shielding of this kind is apt to detract from the efficiency of a set, and therefore in some cases it may be more desirable to employ some other method for overcoming the interference.

A loose-coupled tuner will be found to be helpful in this direction, but a connection should always be taken from the L.T. battery to earth. Another point to remember is that if very much L.F. amplification is used in the set the A.C. hum will be amplified at the same time.



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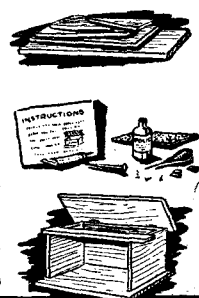
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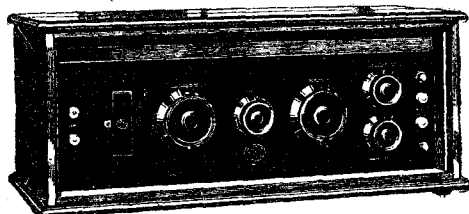
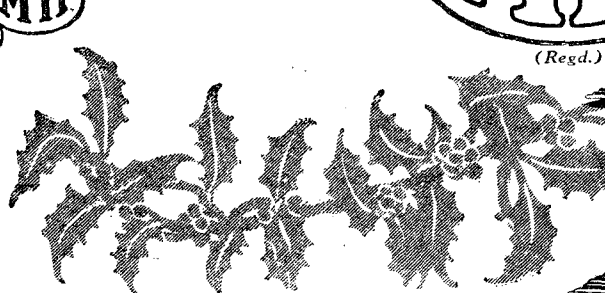


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Bowerman's
SUPER
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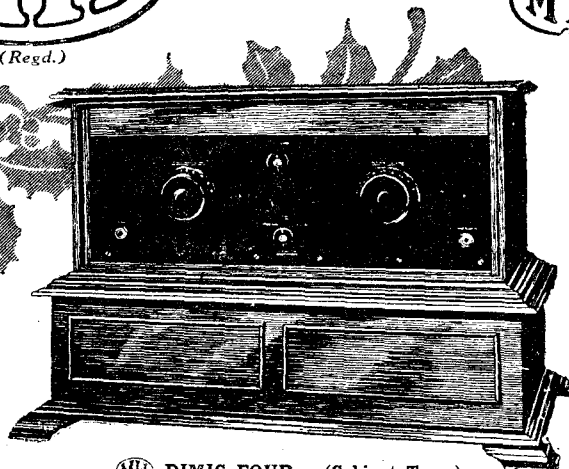
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PRICE: Without Cabinet .. £17 17 0

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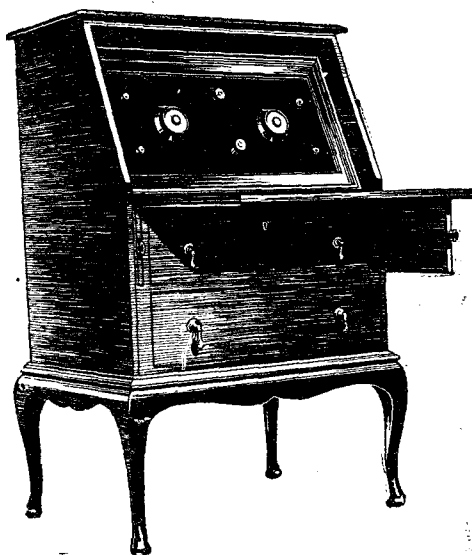
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The simple movement of a switch transfers reception from the lower broadcast band (British, Irish, Continental and American stations), to the upper broadcast band (Daventry, Radio-Paris, etc.)

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Xmas—the time of good cheer—is upon us. The Xmas spirit—that feeling of well-being which makes us feel at peace with all the world, has taken its grip on us. A cosy room—all sitting round the fire—a good radio set and loud-speaker pouring forth strains of music in keeping with the atmosphere. And what better than an MH—whether it is a one-valve or eight-valve set. The fact that it bears the sign MH is our guarantee to you.

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BROADCAST NOTES.

Olczewska at Christmas—A Star Variety Broadcast—Mr. Cochran and the B.B.C.—An Albert Hall Incident—Character Reading by Radio—A New Musical Treat—Comedy Actor in a New Rôle—Captain Eckersley's Programme—Three New Songs—The Eckersley Versatility—A Wessex Programme—Better Broadcast News.

BY OUR BROADCASTING CORRESPONDENTS.

Olczewska at Christmas.

OLCZEWSKA is likely to be the star singer of the Christmas programmes. It is hoped to include this great artiste from 9 to 9.30 p.m. on December 27th.

A Star Variety Broadcast.

Turning to account the valuable experience of National Wireless Week, the B.B.C. are organising a special variety hour from 8 to 9 on December 28th.

Mr. Cochran and the B.B.C.

It appears that fresh trouble is brewing, this time between Mr. C. B. Cochran and the B.B.C. The immediate cause is the refusal of the B.B.C. to pay £100 for an excerpt from the "Faust" film which Mr. Cochran is producing at the Albert Hall on Sunday, January 2nd. Mr. Cochran sought the broadcast, and was amazed when he was turned down. First of all the offer was declined on the ground of Sunday policy in

broadcasting. Then when the offer was renewed for a weekday it was found to be too expensive. In all the circumstances most listeners would be disposed to agree that the B.B.C. should have the right to use discretion in these matters.

An Albert Hall Incident.

On the morning of November 20th, after the B.B.C. engineers had installed and tested the gear required for broadcasting the "Daily Express" Community Singing concert from the Albert Hall on that evening, the wires were disconnected and the apparatus forcibly disengaged by persons professing to be acting under the instructions of a certain society. Considerable unnecessary damage was caused, and the success of the evening broadcast was gravely imperilled. There was also a lamentable display of spleen against the B.B.C. This was a most unfortunate incident, and it is to be hoped that the society in question will lose little time in disclaiming its official cognizance of such vandalism.

Character Reading by Radio.

Manchester Station is toying with an idea for developing scientific experiments in character reading. Under the guidance of Professor Pear of Manchester University, the Manchester B.B.C. people hope to devise a system whereby a listener may appraise the character and personality of a broadcaster.

A New Musical Treat.

Sir Frederic Cowen will conduct a special orchestral programme from London early in the New Year.

Comedy Actor in a New Rôle.

Mr. Seymour Hicks is reading portions of Dickens' Christmas Carol on Sunday afternoons during December.

Captain Eckersley's Programme.

After a programme entitled "Reminiscences of 1926" in which some "Kites" music will be featured, Captain P. P. Eckersley will broadcast the final programme of the B.B. Company. He is writing the music, the words, and the patter all by himself. He will introduce characteristic imitations of early attempts at Writtle. No doubt this will be an amusing farewell for listeners, but it is to be hoped that the purely "domestic" side does not predominate. The great listening public of December, 1926 is not much interested in the broadcasting of even a year ago, let alone four years ago. What listeners want all the time is first-class entertainment. They take a mild interest in the personalities of the announcers,

(Continued on page 936.)

INVITATION

COME and SEE for yourself how BURNDEPT SUPER VALVES ARE MADE IN OUR OWN FACTORY

YOU have had experience with many valves since you first installed a wireless set—now come and see our manufactured. Every Thursday afternoon, for the next few weeks, we are arranging to give a practical demonstration to 100 wireless enthusiasts of how Burndept Super Valves are made. If you would like to come fill in the coupon below and post it at once. One hundred will be selected each week, and the senders will receive invitation tickets giving full details. The following facts about Burndept Super Valves will interest you in any case.

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FACTS ABOUT BURNDEPT Super VALVES

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Every valve is tested twice before it reaches the user.

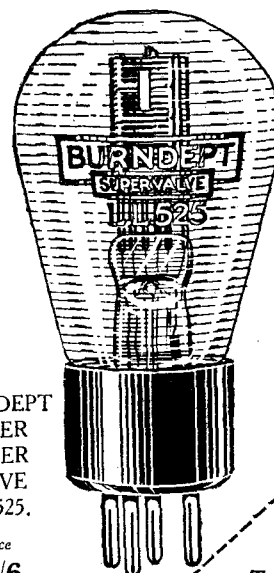
The factory limits, strictly improved, ensure uniformity in characteristics and mechanical construction. Burndept Valves are good valves, honest values and absolutely reliable—and we make them ourselves.

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SUPER
POWER
VALVE
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Price
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One of the
famous
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I should like to be included in the party to visit your Valve Works on Dec. 16th.

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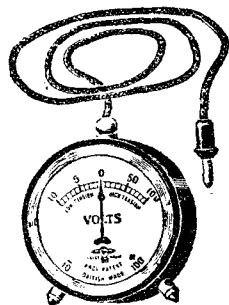
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Mr. G. J., Acton, London.

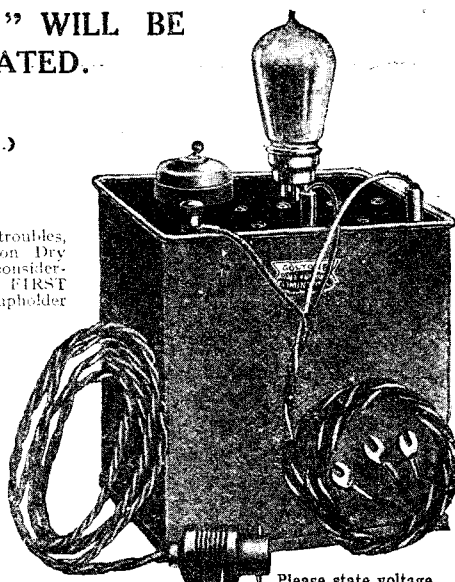
"The H.T. Eliminator is giving great satisfaction. It is the best we have seen."

Mr. L. M., Great Crosby.

"It is without doubt the best I have handled."

Mr. H., Kirkby Stephen.

"We have had several which have given every satisfaction."



Please state voltage and frequency of Lighting Mains when ordering.

WRITE!

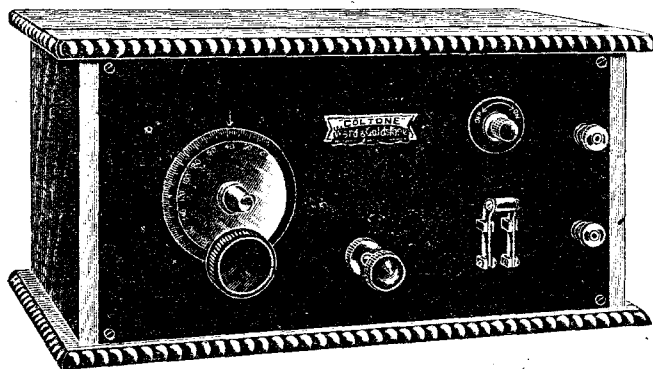
Mr. J. W. G., Fulwell, Sunderland.

"I am delighted with results. I did not think my set could do what it does. The increase of volume is great."

Mr. P. S., Westcliff-on-Sea.

"I have found it far superior to dry batteries, and the increase in volume and clarity is surprising."

"Goltone" Pentlodyne Receiving Sets



**SIMPLICITY OF CONTROL
MAXIMUM VOLUME AND PURITY
LONG-DISTANCE RECEPTIVITY**
Jacobean Oak Cabinet

The Valves and Tuning Coils are concealed inside the Cabinet, giving the "Outfit" a neat and refined appearance. The Top of the cabinet is hinged, permitting easy access to all the components. Prices include Set of 5 Basket Coils covering all B.B.C. Wavelengths, including "Daventry."

TWO - VALVE SET £5 : 10 : 0

Marconi Royalties 25/-

THREE - VALVE SET £7 : 10 : 0

Marconi Royalties 37/6

FOUR - VALVE SET £10 : 0 : 0

Marconi Royalties 50/-

See Catalogue R/116 for full details, free on request.

ACCUMULATOR CHARGING SETS for Home Service

**NO TECHNICAL KNOWLEDGE
OR ATTENTION REQUIRED.**

**CLEAN, ECONOMICAL, AND
EFFICIENT.**

Plug-in to any Convenient Lampholder. Supplied complete with Adaptor, Flexible Cords and full instructions.

The "ALTERNO" (As illustrated).
Alternating Current.

Charges the High Tension Accumulator at negligible cost ... Price 21/-

The "INDISPENSO." Direct Current.

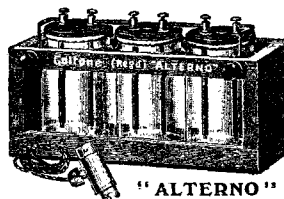
Charges the High Tension Accumulator at no extra cost when light is in use ... Price 6/-

GOLTONE "PENDLETON." (Patent App.)
Alternating Current.

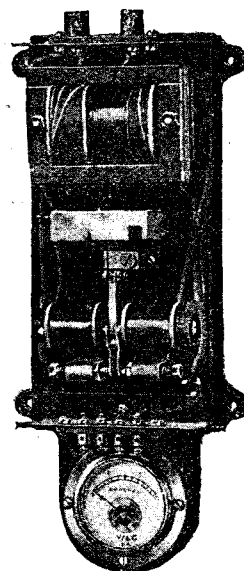
Charges the Low Tension 2, 4 or 6 volt Accumulator economically and effectively. No Valves or renewals. Charging Rate approx. 2 Amps. ... Price £2:12:6

Fitted with Ammeter for ascertaining rate of charge (as illustrated) ... £3:7:6

State voltage and frequency of Lighting Main when ordering.



"ALTERNO"



"PENDLETON"
CHARGER with
Cover Removed.

Extract from POPULAR WIRELESS,
Sept. 11th, 1926:

**"GOLTONE ALTERNO"
CHARGER.**

"It is highly efficient in operation and will rectify up to a charging rate of 2 amp. with the greatest ease and freedom from heating. It is, moreover, quite easy to handle."

Mr. J. W. D., Ormskirk Road, Aintree:
"I bought an 'Alterno' and was quite surprised at the results. I think it the most wonderful and simple arrangement I ever saw for so little money."

Ward & Goldstone
PENDLETON. MANCHESTER LTD.

FREDERICK ROAD,
PENDLETON, MANCHESTER.

BROADCAST NOTES.

(Continued from page 934.)

and in that of the popular chief engineer, but they are inclined to resent the assumption that this is more than a mild interest.

Three New Songs.

The Three Arts Club has carried out a competition for song writers, offering prizes for unpublished songs which may be demonstrated to have a wide, popular appeal. The selection of the prize-winning song will depend first on the approval of the musical committee of the Club, and then on the verdict of the public represented by the audience in attendance at a public concert to be given on December 28th. The three successful songs will be broadcast between 8.50 and 9 o'clock on the night of December 28th, just before the beginning of Sir Landon Ronald's popular concert in the London studio.

The Eckersley Versatility.

There seems no end to the possibilities of the Eckersley family. Peter, still, is probably more popular and better known than many Cabinet Ministers. Roger, now head of the B.B.C. programmes, came to broadcasting much later than his brother, but has made such rapid progress that he, too, is now a public character.

As a side-line Roger Eckersley composes light music. One of his recent fox trots, "Pig-Tail Alley," is doing very well both here and in the United States. Roger, of course, is a recognised poultry expert. His place at Farnham Royal attracts visitors from all over the country and from abroad as well. He has about four thousand hens, and the system applied to their maintenance is considered ideal.

And then, when Roger is not building programmes, writing fox trots, or looking after his hens, he is going round Stoke Poges well under bogey. He was for some

time secretary of the Stoke Club, and during his term in this job he set up several course records that have not yet been touched. Incidentally, few people know that the Eckersleys are first cousins of the corresponding generation of Huxleys.

A Wessex Programme.

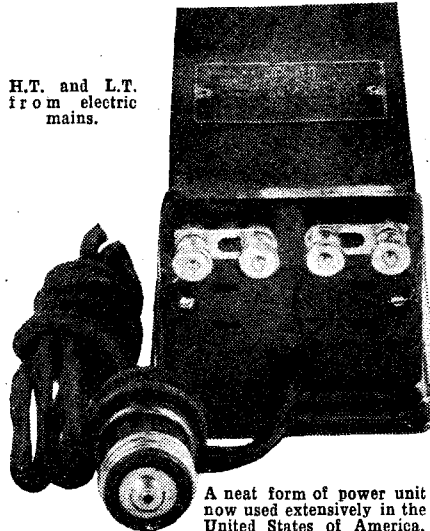
To-night (Thursday, December 9th) there is a special Wessex Programme S.B. from Bournemouth. This has been arranged by Mr. Thomas Hardy, O.M., and it will be introduced by Mrs. Hardy. A one-act play, "The Three Wayfarers," dramatised by Mr. Hardy from his well-known story, will be the principal item. It will be presented by the Hardy Players. Old-time songs, dances, and carols from the old records in the possession of Mr. Hardy will be included.

Petter Broadcast News.

There is as yet no official news of the progress of the negotiations between the B.B.C. and the Press. It is understood, however, that while the danger of a rupture is not entirely eliminated, the two parties have managed to clear up a good many of their preliminary difficulties.

Listeners are more concerned about getting a better service, particularly of sporting events, than they are about the persistence of good relations between the Press and the B.B.C. The B.B.C. are alive to this fact. Whatever eventuates it can be confidently reaffirmed that listeners will be given running narratives of all the chief sporting events of 1927.

H.T. and L.T.
from electric
mains.



A neat form of power unit
now used extensively in the
United States of America.

Do not risk disappointment for your Xmas reception

We have made special arrangements to carry a huge stock of EXIDE W.J. 20V. and Oldham H.T. Accumulators fully charged and ready for immediate use—also Dry—for dispatch by rail.

Full Range of all LOTUS goods, Coil Holders, Switches, Packs, etc., etc.

T.M.C. Units Loud Speaker, 13s. 6d.

AMPLION CABINET LOUD SPEAKER, £3 3s. 0d.

NEW BASE BOARD. Variable Fixed Resistance Microstats, etc.

SPECIAL—THE AMPLIFEX LOOP.

The only loop aerial adapted for the reception of all European Broadcasting, £3.

Don't fail to send that little 6d. along for our new Tannerlogue—the real guide to wireless.

WILL DAY, Ltd. (Dept. 14),
19, LISLE ST., LEICESTER SQUARE,
LONDON, W.C.2.

Telephone:
Regent 4577

Telegrams:
Titles. Westrand, London.

Well Worth Giving -

Waterman's Ideal Fountain Pen

For over 40 years Waterman's has been recognised as the Pen of all Pens. It is a gift that everyone likes to have—Father, Mother, Sister, Brother, Relative, Friend, or Employee. Pens from 12/6, Pencils from 3/-.

See the new Ripple Rubber Pens, and the Ripple Rubber Pencils with expanding tip and Rigid lead. Ripple Rubber Writing Sets, 32/6, 42/6, 47/6.

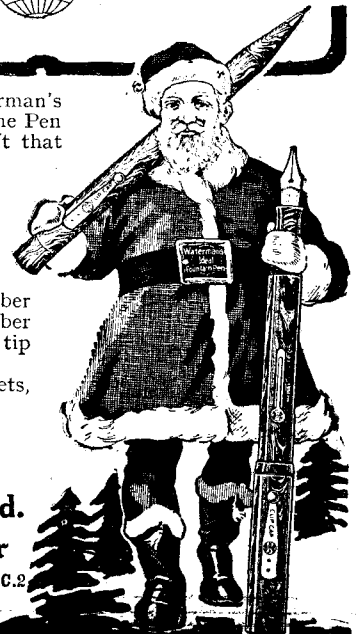
Of Stationers and Jewellers.

The Pen Book free from

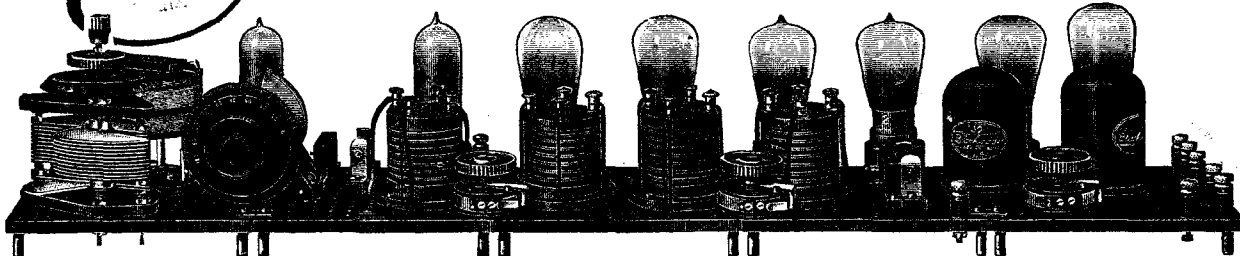
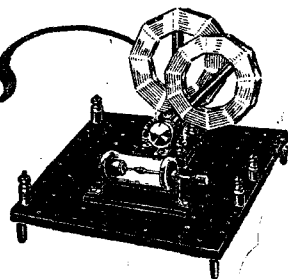
L.G. Sloan, Ltd.

The Pen Corner

Kingsway, London, W.C.2



You can construct this or this with equal ease



If you adopt

BLACKADDA

RADIO BUILDING SYSTEM

As an example of prices the cost of the complete set for constructing a 1-valve Receiver is £2 12/6, made up as follows:—

| | |
|-----------------------------|------|
| Base or "table" | 3/6 |
| Seven Terminals | 3/6 |
| Variable Condenser | 14/6 |
| Fixed Coil Holder | 1/- |
| Swivel Coil Holder | 4/6 |
| Air-spaced Coil | 5/- |
| Ditto | 5/6 |
| Fixed Condenser '0003 | 2/- |
| Resistance Holder | 1/8 |
| Grid Leak | 2/6 |
| Valve Holder | 2/6 |
| Rheostat | 5/- |
| Box Spanner | 6d. |
| Set of Connectors | 10d. |

It will be of interest to constructors to know that the Blackadda "table" included in the above list can be used as a base board for any cabinet set, since it can be added to and extended in any direction to make up multiples of 6 in. This "table" is composed of first-class insulating material already drilled.

*Any Circuit
Constructed
Without
Technical Knowledge*

Write for advance particulars of new sub-panel system, possessing the new Blackadda advantages of ease of construction, and enabling you to make recently-described receivers giving marvellous results. The most interesting radio proposition of the season.

**THE BLACKADDA RADIO
Co., Ltd.,
SADLER GATE, DERBY**

Phone: Derby 1823. Grams: "Blackadda, Derby."

If your dealer is unable to supply, we will forward direct on receipt of remittance or C.O.D.

Agents Wanted in London and Provinces.

THE MODERN METHOD.

From our previous advertisements in "Popular Wireless" you will have gathered some idea of the advantages of our system. Too much stress cannot be laid on its simplicity and economy. It is difficult to realise the ease and speed of constructing even the most intricate set until you actually try our method.

RECEIVING SET MADE IN 20 MINUTES!

"At 7.40 p.m. I commenced building a Crystal receiver, at 8 p.m. that same evening I was listening to the programme from Daventry on the completed set. The only implement I used was a small box spanner"—BARTEX. (Extract from the "Derby Daily Express," March 16th, 1926.) The foregoing is just an example of an actual user's experience. A multi-valve receiver can be constructed, without effort or tools, in a minimum space of time.

WHAT "CONSTRUCTION BY NUMBERS" MEANS.

To the average amateur the descriptions of new circuits with their technical details present a considerable amount of confusion and difficulty. With our system, and on our service sheets, all components, wiring points, etc., bear numbers, as also do the ready drilled holes in the base or "table"; it is only necessary to place the components indicated in their correct positions as shown by the numbers, and connect in the same manner from point to point with our standard lengths of wire, the points also being plainly indicated by numbers. Nothing could be more simple, no tools, no soldering, no drilling, nor cutting. Anyone who can read will be able to follow our instructions without the slightest difficulty.

FOR NOVICE AND EXPERT ALIKE.

To those with little or no technical knowledge, the Blackadda System will hold a strong appeal, in addition to making the task of the home constructor easy and removing any doubts as to the ultimate efficiency of the finished set, it enables him or her to gradually acquire a valuable knowledge of the principles of Wireless and consequently increases interest and arouses enthusiasm such as the purchaser of a ready-made set cannot experience. For the expert, the Blackadda System offers opportunities for countless experiments, various new circuits can be built and "tried out" the same evening under the same conditions and valuable data obtained from the results. Again, being able to make use of the same components, base board and wiring when conducting experiments, without "scrap," the facility with which components of various makes can be tested and compared by using our adaptors, these are advantages that only the Blackadda offers.

HELPFUL SERVICE.

So that Blackadda enthusiasts shall be afforded every assistance, we publish regularly Service sheets illustrating and describing new circuits. These are issued in loose leaf form, price 3d. each.

THE REAL DELIGHTS OF WIRELESS.

The growth of interest in radio and the perfecting of transmission and reception has caused a wireless set to be regarded as an indispensable part of the modern home. The full enjoyment from this delightful form of entertainment, however, is for those who keep their receivers up-to-date. Every week one reads of new and improved circuits: how keen is frequently the desire to put these to the test, but how often in the case of a possessor of a ready-made or home-built set that has been laboriously

constructed, drilled, screwed and soldered, is the wish to experiment unfulfilled owing to the time, trouble and expense involved? Change over to the Blackadda System and you can always be up-to-date, as well as save money.

Let us send you the Blackadda Circuit book, price 1/-. This volume contains details and illustrations of over 50 modern circuits, as well as a fund of useful radio information, also description and prices of Blackadda parts and components.



Traders and manufacturers are invited to submit wireless sets and components 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.

The Marconi D.E.P.215.

It will be observed that a new style of nomenclature has been adopted by the Marconi people, and one that is directly informative. As the letters imply, the D.E.P.215 is a dull-emitter power valve, and the figures give its filament voltage as 2 volts and its current consumption as .15 amps. Two parallel straight filaments are used.

It will be interesting to compare the characteristics of the D.E.P. 215 with the Marconi D.E.6, which is, of course, also a 2-volt power valve. First of all, the filament voltage of the D.E.P.215 is less than one-third of that of the D.E.6, while its amplification factor is 6.25, as against 5.5. Even so, its impedance is only 6,250 ohms, while that of the D.E.6 is 10,000. Therefore it will be seen that the D.E.P.215 is a great advance in every respect.

At 120 volts H.T. and 9 volts grid

negative the emission is 4.8 milliamps. as against 4.2 for the D.E.6, while the total emission is also higher at about 18 to 20 milliamps.

All the above ratings are on the conservative side; for instance, the amplification factor from the curves being 6.5, as compared with the stated value of 6.25.

The D.E.6 could not be regarded as anything else but a first-class 2-volt power valve, but the D.E.P.215 is superior to it and delivers a slightly greater volume, and can deal with larger inputs. In our opinion, the addition of this valve to the already pre-eminently comprehensive Marconi range will do much to bring the 2-volters greater popularity than ever.

Two Brandes Components.

Messrs. Brandes recently sent us one of their new S.L.F. variable condensers and one of their L.F. transformers. The

variable will be of unique interest to constructors in that although it gives true S.L.F. variations of capacity, it retains a compact form, and its vanes do not describe a large arc when moving towards the "out" position.

It is provided with a very efficient slow-motion movement, a large central milled knob smoothly operating the moving vanes through a semi-friction gearing. The control of the dial, which provides a direct drive, is equally smooth and free from backlash. Ball-bearings are employed.

The variable is practically all metal, very little solid dielectric, indeed, being used. The vanes are of hard, springy brass. The variable is designed for one-hole panel mounting, but the nut has a knurled face to prevent the component turning, and to ensure that a hold is retained on the panel.

Throughout this Brandes variable is a most excellent piece of workmanship, both from a mechanical and from an electrical point of view. It retails at 18s. with a .0003 mfd. capacity, and at 18s. 6d. with a capacity of .0005 mfd.

The Brandes audio (L.F.) transformer is supplied complete with an excellent little instruction book in which are given amplifier diagrams and much useful operating data. With a ratio of 1 to 5, it costs 17s. 6d. It is a "shrouded" type of very distinctive design, and has four well-spaced, clearly marked terminals (with soldering tags) fitted to an insulating panel on its top. We gave the sample sent us a series of careful tests, and obtained results quite as good as those with other transformers of the same make and price.

(Continued on page 940.)

IMMUNE FROM VIBRATION

Banishes Ringing Noises



The new Nelson Non-Phonic Valve eliminates all "ringing" noises caused by shocks and vibration and which are increased by the use of dull emitter valves.

Perfect reception is assured by "floating" the glass envelope on a rubber cushion so that the greatest shocks to the set cannot be transmitted to the delicate internal parts of the valve. You will find Nelson Non-Phonic far superior to the combination of valve and so-called anti-microphonic valve-holder.

THREE TYPES ARE AVAILABLE:—

For 2 Volt Accumulators For 3-4 Volt Dry Cells (or 4 Volt Accumulators)

TYPE G220.

TYPE G306.

2 Volts, .2 amps. 3 Volts, .06 amps. Impedance 20,000 ohms. Impedance 25,000 ohms. Amplification Factor 7. Amplification Factor 7.

11/-

11/-

For 1 Volt Accumulator TYPE G410. 3.8 Volts, 0.10 amps. Impedance 20,000 ohms. Amplification Factor 7. 11/-

If unable to obtain from your dealer, apply direct to actual manufacturers.

NELSON ELECTRIC Co., Ltd. 138, Kingston Rd., London, S.W. 19.

NELSON NON-PHONIC

Single Filament VALVE

Branch Offices: 1, Cathedral Gates, Manchester, and 11, Bothwell Street, Glasgow.

"EKCO"

H.T. UNITS

SCRAP DRY BATTERIES!

By obtaining H.T. Current from Electric Supply Mains (D.C. & A.C.) by just attaching adaptor to Electric Light Lampholder.



Model 2A-D.C.

SAFE!

SILENT!

SOUND!



Model 2A-A.C.

"EKCO" H.T. UNITS ARE:

THE BEST OBTAINABLE as we SPECIALISE solely in their manufacture. THE "EKCO" IS NOT A "SIDE LINE!" AT A REASONABLE PRICE because our enormous output enables us to cut the manufacturing costs to a minimum. THE MOST POPULAR on the WORLD MARKET as proved by huge sales at home and abroad.

READ WHAT THEY ALL SAY!

THE PRESS.
"Amateur Wireless," 9/10/26.
"We have tested this Unit. No trace of 'hum' could be heard."
"British Trade Jnl." 1/10/26.
"We have tested the 'EKCO' H.T. Unit and found the instrument efficient in every way. It is one of the few exceptions that has reached the commercial stage."
"Wireless World," 11/8/26.
"No 'hum' was discernible—the Unit is a good practical proposition and can be relied upon."

USERS.
S. B., Doncaster: "The reception was first-class."

W. W., St. John's Wood: "Your 'EKCO' H.T. Unit has been a great success with my 'Marconi Straight 8.' I think the reception is more silent than with dry batteries."

H. J., Newcastle: "H.T. worries are over for everyone who possesses an 'EKCO' H.T. Unit."

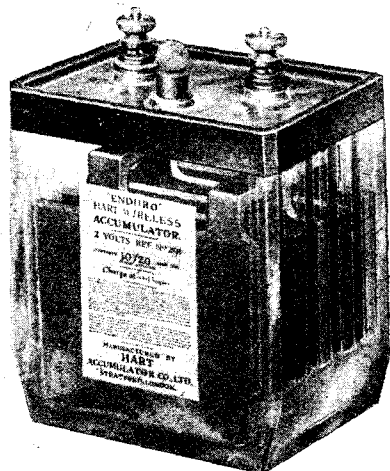
ILLUSTRATED CATALOGUE FREE.

UNITS TO SUIT ALL SETS from 42/6 Obtainable from all the leading Wireless Stores or direct from

E. K. COLE, Ltd. (DEPT A), 513, LONDON ROAD, WESTCLIFF-ON-SEA.

A Perfect Accumulator for 6/-

ENDURO



THE "HART" "ENDURO" 2-VOLT
ACCUMULATOR. PRICE 6/- ONLY.
(Carriage Paid)

USERS of both dull and bright Emitter Valves are welcoming this really efficient accumulator, having in mind particularly its very moderate cost. Assembled in an attractive glass container, with a capacity of 10 ampere hours (at the 20 hour rate of discharge), the 5 plates of the "HART" 2-Volt "Enduro" Cell are designed specifically to give steady discharge and long life—both of which essential features they embody in a marked degree. The "HART" "Enduro" Cell is safely and easily sent by POST, and forms

AN IDEAL CHRISTMAS PRESENT
FOR YOUR WIRELESS FRIENDS

HART

THE BATTERY OF QUALITY

Write to Dept. "P.W." 6 for Free Booklet, "The Right Way to Use Your Wireless Batteries."

HART ACCUMULATOR COMPANY, LIMITED,
STRATFORD, LONDON, E.15

APPARATUS TESTED

(Continued from page 938.)

A CHEAP S.L.F. VARIABLE.

We recently received a .0005 mfd. straight-line-frequency variable condenser from Messrs. The Ison Radio Stores, 47, Orford Road, E.17. It is quite well made and, due to the ball-bearing which is fitted, its action is smooth and free from "backlash." It is fitted with ebonite-end plates, and is minus a "pigtail," but in other respects it is an excellent piece of work. It costs only 7s. 6d. (post free), complete with dial, so that it brings the S.L.F. variable within the reach of the most impecunious of constructors.

AN INTERESTING COMPONENT.

Over a mile of wire is stated to be used in the Watmel Auto-choke. And the method of winding this wire is very interesting. The Watmel people recently sent us some samples clearly illustrating the system which, by the way, must be a rather expensive one, and must necessitate the use of very special machinery. Each layer is perfectly insulated with an interweaving of cotton. It is re-assuring to discover what scrupulous care manufacturers are paying to the unseen "innards" of radio components these days.

THE MULLARD D.U.5.

To their already very comprehensive range of valves, Messrs. Mullard have

recently added the D.U.5., a low temperature filament, low power rectifying valve. It is of the half wave, three-pin base type, and consumes .77 amperes at 2.7 volts. It is very stoutly constructed and should safely resist very rough handling (to which it should, of course, never be subjected!).

When used as an ordinary half-wave rectifier the D.U.5. proved very satisfactory, the filament adjustment not being critical (as is the case when an ordinary three-electrode receiving valve is used for half-wave rectification). The receiver used was a straightforward detector and two L.F.

When two D.U.5.'s were used together to give full-wave rectification the result was almost perfection. Even when a four valver was employed (H.F., Det., 2 L.F.) there was no "hum." As the total power consumption, even with two D.U.'s, is only a matter of two or three watts, such a system is a particularly economical one.

We believe the D.U.5. is the lowest wattage valve of its type on the market, and as it is also exceptionally efficient, it should prove a very popular rectifier indeed. The retail price of the D.U.5. is 15s.

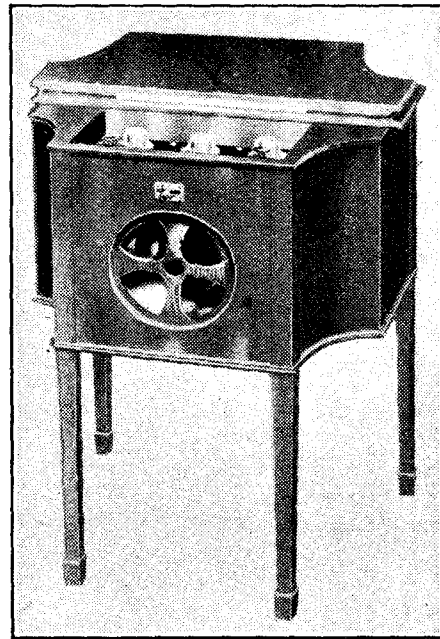
REDFERN'S EBONITE PANELS.

We recently received an "Ebonart" radio panel from Messrs. Redfern. It is provided with a brilliantly polished surface, but this is obtained without employing tin-foil or any other metallic agency. Thus its sheen is free from suspicion, and does not need to be removed in the interests of "low loss" edicts.

It works freely, is not too brittle, and, from an electrical point of view, is as high-

class an ebonite as we have tested. Despite the fact that "Ebonart" is of the highest grade, it is not expensive. For instance, a panel measuring 10 in. by 7 in. by $\frac{1}{8}$ in. costs 4s. 3d., and this, it will be agreed, represents excellent value for money.

Redfern's "Ebonart" is also supplied with a mahogany finish at a slightly higher price. A large range of standard sizes is available.

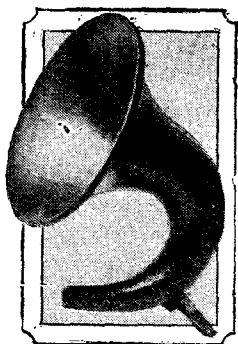


This handsome set is one of the latest C.A.V. models.

(Christmas in Two Weeks)

TWO GIANTS IN PERFORMANCE—

Now a LISSENOLA HORN as well as a UNIT!



12" flare 13/6

14" flare 17/6

Sold separately or
with LISSENOLA
Unit complete.

THE CHALLENGE:

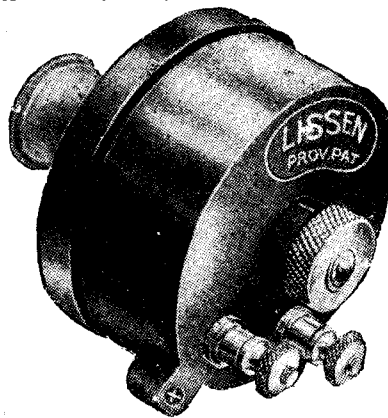
Try the LISSENOLA Unit now
with the LISSENOLA Horn
fitted to it—made in 12-in.
and 14-in. flares—we challenge

comparison of this fine combination against any loud
speaker selling at any price up to £20—that means *any* loud
speaker on the market *irrespective of price*. Yet
this LISSENOLA combination will only cost you 31/-.
Compare what you pay for an expensive loud speaker
with what this fine LISSENOLA combination costs you.

13/6

Sold separately
or with
LISSENOLA
horn complete.

If you do not
prefer the
LISSENOLA
Combination to
any other loud
speaker for
tone, quality
and volume,
your money
will be will-
ingly refunded,
if you ask your dealer within 7 days of purchase.
If you already have a LISSENOLA Unit, now get this
handsome factory-made LISSENOLA horn, 12-in. or
14-in. flare—GET IT NOW BEFORE CHRISTMAS. If
unable to obtain from your dealer send direct, and add 2/-
to price to cover part cost of packing and carriage. AND
PLEASE MENTION DEALER'S NAME AND ADDRESS.
YOU CAN NOW OBTAIN THE LISSENOLA UNIT
COMPLETE WITH FINE HORN—or purchase either
separately. Any dealer will obtain for you.



LISSEN LTD., 8-16, FRIARS LANE, RICHMOND, SURREY

(Managing Director: Thomas N. Cole)

L.127a

If you are making the R.C. Threesome—

TO get the wonderful results obtained with the original R.C. Threesome Set, you should use identical components.

The Coil Holder used is a "Lotus" Left Hand Two-Way Coil Holder; the three Valve Holders are "Lotus" Buoyancy Valve Holders, with terminals.

Wireless experts decided that these were best for a very important experiment; that they would get most out of the set on which depended the very high reputation of the famous Ediswan Valves.

They were not disappointed. YOU will be more than pleased with the R.C. Threesome performance, if you fit "Lotus" Valve Holders and Coil Holder.

From all Radio Dealers.

LOTUS COMPONENTS

"LOTUS" COMPONENTS USED IN THE R.C. THREESOME RESISTANCE COUPLING SET:

| | |
|---|-----|
| Two-Way Inside Mounting Left Hand Coil Holder | 7/- |
| "Lotus" Buoyancy Valve Holder with Terminals | 2/6 |

GAXTON WIRELESS CABINETS

All Polished with new enamel that gives a glass hard surface that cannot be soiled or scratched. Ebonite or Radion Panels Supplied and Perfectly Fitted at low extra cost. **SENT FREE.**—Catalogue of Standard Wireless Cabinets in various sizes and woods.

THOUSANDS OF SATISFIED CUSTOMERS.

ELSTREE SOLODYNE. Panel 21" x 7" fitted 16" Baseboard, drop down Beaded Front Door. Fumed Oak 61/-, Dark Oak 65/-, Mahogany polished 68/6. Raised Panel 5/- extra. Packing Case 5/- extra.

ELSTREE SIX. Panel 42" x 9" fitted 13 1/2" Baseboard. Open Type. Fumed or Dark Oak 80/-, Mahogany polished 90/-, Packing Case 7/6 extra.

MONODIAL. Panel 14" x 7" fitted 14" Baseboard. Fumed Oak 33/6, Dark Oak 35/-, Mahogany polished 39/6. Packing Case 6/- extra.

NIGHT HAWK. Panel 16" x 8" fitted 14" Baseboard. Open Type. Fumed Oak 33/6, Dark Oak 35/-, Mahogany polished 39/6. Packing Case 7/- extra.

FIVE FIFTEEN. Panel 24" x 7" fitted 8 3/4" Baseboard two Front Doors. Fumed Oak 40/-, Dark Oak 42/6, Mahogany polished 48/-, Packing Case 7/6 extra.

THE 1927 FIVE. Panel 27 1/2" x 7" Sloping Front, as originally described. Fumed or Dark Oak 38/-, Mahogany polished 48/-, Packing Case 7/6 extra.

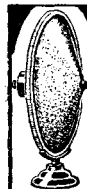
EVERYMAN THREE. Panel 20" x 8" fitted 8" Baseboard. Fumed Oak 33/6, Dark Oak 35/-, Mahogany polished 39/6. Packing Case 6/- extra.

EVERYMAN FOUR. Panel 26" x 8" fitted 8" Baseboard. Fumed Oak 35/6, Dark Oak 37/6, Mahogany polished 41/6. Packing Case 7/- extra.

CASH WITH ORDER. CARRIAGE PAID U.K. PROMPT DELIVERY.

Packing Case Money repaid if Case returned within 14 days
Carriage paid to Works.

GAXTON WOOD TURNERY CO., MARKET HARBOROUGH



BUILD A LOUDSPEAKER

WITH OUR NEW
SEAMLESS MOULDED CONI
(Prov. Patent 25069/26.)

and a BROWN A or LISSNOLA. You will obtain PERFECT RESULTS. Successful Construction for a minimum outlay is ensured with our Specialities. Illustrated List and full particulars for Stamp.

GOODMAN'S 27 FARRINGTON ST. E.C.4

EASY PAYMENTS

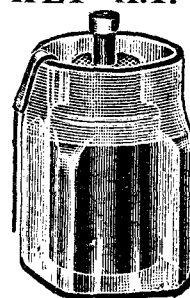
Finest 2-valve amplifier set, including loud speaker, 120 H.T. D.E. valves, £7 10s.; or 18/9 down and 11 instalments of 15/-.

CASH BARGAINS.

Amplifiers, 17/6 and 21/-, 'Phones, Telefunken type, 7/9; Fr. T. Houston, 11/-, Good H.T. 60-volt, 5/9, or 4/- v. (laboratory test) 4/- doz. Famous Metal Valves (French), 2-v. 2/5; 2-v. 0/6, 5/9; 2-v. 5, Power, 8/9; 4-v. 0/6, 5/6. Straight Line Condensers, 5/9; Dittos, 4/- dial, 7/3. Transformers: Habana, 3/6; Radios, 3/3; Fr. T. Houston, 8/3; Brunet, 7/9. Also Ferranti, Eureka, Formo, etc. Postage extra. Everything in wireless, reliable and cheap. Satisfaction or cash refunded.

MUSIC ROLL EXCHANGE, 29, High St., Clapham, London, S.W.4.

The High Tension System of the Future WET H.T. BATTERIES



Due to the silent background and great economy of working, WET H.T. Batteries have almost everything to recommend them. They offer all the advantages of an H.T. accumulator, with none of the disadvantages such as the inconvenience of charging and the liability to sulphate if left run down. The cost is less than 3d. a volt, and up-keep 1d. per volt per annum.

Send 1d. for full details.

Jars 2 1/2" high, 1 1/2" x 1 1/2", waxed, dozen 1/3
Sae Elements, " 1/6
Zincs, " 1/-

Carriage Extra.

WET H.T. BATTERY CO., 23, Coldharbour Lane, Gunpowder Green, S.E.5.
Phone: BRISTON 2539.

WIRELESS.—Capable, trustworthy men with spare time who wish to substantially increase income required where we are not fully represented. Applicants must have practical knowledge of installation of Set and Aerial, be a householder or live with parents, and be able to give references: state age and experience. Address: Dept. 32, General Radio Company, Limited, Radio House, Regent Street, London, W.1.



EVERY COMPONENT IS PERFECT.

R.D. 40 Perm. Detector, 2/- each.
Also in Red Mottled (R.D. 40A), 3/- each.



Of all High-class Radio Dealers or Sole Makers.
JEWEL PEN CO., LTD., Radio Dept. 46,
21/22, Gt. Sutton St., London, E.C.1.



MEANS DOUBLE POWER
For use in both H.T.-less and ordinary circuits, B.E., D.E. and '06, 10/6 to 14/-
Send card for Radio press reports and booklet. This valve can be used in any set without alteration and will give 50% to 150% increase in power.

ANELOY PRODUCTS,
Eton Works, East Dulwich London, S.E.22.
CALLERS: 35a, Forest Hill Road, East Dulwich.

LOOKING BACK.

(Continued from page 878.)

time, by a mistake, the whole of the conversation between the station directors in Aberdeen and Glasgow was radiated from every station. The Scottish directors were discussing how to economise in orchestras. I dare not put down what they said.

At last it worked, and for the first time one Sunday afternoon a voice actuated every transmitter simultaneously, and we looked at one another and beamed. My wife might have been the first S.B. feminine talker, but refused even to say "Hullo!" She sought not the bubble reputation even in the (microphone's) mouth.

An Epic Transmission.

Of the more epic transmissions I always think of the radiating of the opening of the Wembley Exhibition as the greatest. Everywhere demonstrations by loud speaker had been arranged in little village halls, in huge parks, in Trafalgar Square; the newspapers, one and all, ran some demonstration.

To say I was nervous, with the King to speak, with the difficulties of picking up all the noises of that vast arena, of working out the switching systems, the visual and telephone signalling, was to put it mildly. But I have a staff that never lets me down. All through a broiling Easter I left them to rig up the scheme on the lines of a long-discussed plan.

"Imagine My Agony——"

Need I say that the show went off marvellously? I had a good seat and had nothing to do with operations. Imagine my agony on seeing, ten minutes before the show, one of the engineers double up to the dais and start talking. I sat like a broody hen; nothing that I could do was of any use now!

Plans were made. The agony to see a drummer beating for dear life about one foot from the microphone. To hear the speeches and the prayers; to realise the wonder of the occasion; to hope, to pray that all this great thing was being heard by hundreds of thousands. The show over, I ran to the kiosk and saw the face of Mr. Bishop—the top of his head was nearly off, he was smiling so. I dropped my umbrella on the grass and danced. I even drove our Ford van home. I met Round at lunch, and he had a great tale to tell of the Trafalgar Square demonstration. "Round," I said, "you'll get a knighthood. You will be called Sir Cumference." One person, at least, saw my joke and published it later as someone else's.

There have been many other great transmissions, but never a one to compare with Wembley.

Future Plans.

Now we face the future with more confidence, because all has logically developed. We are recognised and respected, but there is to be no rest. We shall not be content until everyone in Britain has a choice of two or three programmes on the simplest set. Even now plans are laid that this shall be done. Perhaps I shall be asked to write again of our doings in three years' time. Doubtless to-day will seem to that to-morrow as crude as yesterday seems to to-day.

ALL APPLICATIONS FOR ADVERTISING SPACE IN "POPULAR WIRELESS" MUST BE MADE TO THE SOLE ADVERTISING AGENTS JOHN H. LILE, LTD., 4, LUDGATE CIRCUS, LONDON, E.C.4.

All About H.T. From the Mains



Whatever you want to know about H.T. from the mains, either Alternating Current or Direct Current, you will find it in the new Climax Brochure. These components were chosen by "Popular Wireless" when describing how to build A.C. and D.C. Units.

CLIMAX AUTO-BAT TRANSFORMER

| | | |
|-------------------|---------------|--------------|
| Ref. No. CN 257. | 200-250 volts | } Price 39/6 |
| " " CN 258. | 100-125 volts | |
| Double-wave Model | | |

| | | |
|-------------------|---------------|--------------|
| Ref. No. CN 259. | 200-250 volts | } Price 27/6 |
| " " CN 260. | 100-125 volts | |
| Single-wave Model | | |

CLIMAX SPECIAL CHOKE

| | | |
|-----------------|---------|------------|
| Ref. No. CN 256 | | Price 10/6 |
|-----------------|---------|------------|

CLIMAX POTENTIAL DIVIDER

| | | |
|------------------|-------------|-----------|
| Ref. No. CN 200. | 20,000 ohms | Price 5/- |
| Ref. No. CN 201. | 10,000 ohms | Price 5/- |

CLIMAX

CLIMAX RADIO ELECTRIC LTD.,

Head Office and Works:
Quill Works, Putney, London,
S.W.15.

All communications to above address.
Telephone: Putney 2599.

Showrooms:
257, HIGH HOLBORN,
LONDON, W.C.1.

Telephone:
Holborn 2538.

Please send me
post free, Brochure
describing all about
H.T. from the mains
and particulars of com-
ponents as recommended
by "Popular Wireless," Sep-
tember 11th and October 10th.

NAME.....

ADDRESS.....

CLIMAX RADIO ELECTRIC LTD.,
Quill Works, Putney, London, S.W.15.

Appreciation!

TYLDESLEY.

11th October, 1926.

"Your letter to hand regarding the Leclanche Cells. You are quite at liberty to publish the extract from my letter regarding your Leclanche Cells. I consider they are the best and cheapest H.T. yet on the market. I have my bill from you dated October 8th, 1923. I can recommend them to all wireless fans. I may add that I have been interested in wireless long before broadcasting started. I have had your Leclanche Cells with my set in several large halls in the district, and they have been highly recommended."

Extract of a letter from MR. HARRY PARR

READING.

11/11/26.

Dear Sirs,—

Will you please send me one of your new Catalogues No. 650 (Siemens' Radio Batteries), and oblige. May I say that out of about half a dozen different H.T. Batteries I have used on my set, Siemens' Batteries last 1½ times as long as any of the others.

Yours truly
V. G. HUSSEY.

BIRMINGHAM.

November 19th, 1926.

Dear Sirs,—

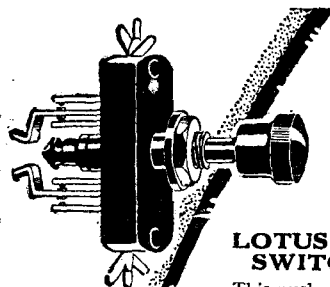
Please forward Catalogue 650. I am a regular user of your excellent batteries, and would value very much your valuable information on the care and maintenance of these batteries. I have found none to equal them.

Yours, etc.,
W. H. E.

A copy of our Catalogue 650 will be sent, post free, on application

SIEMENS BROTHERS & CO., Ltd., WOOLWICH, S.E.18

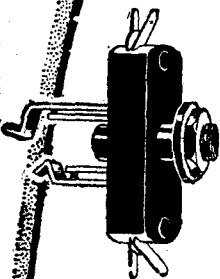
The latest in Jacks & Plugs



LOTUS JACK SWITCHES

This push-pull switch is designed to occupy the minimum space, being only 1½ in. deep. Of the finest Bakelite, it has nickel silver springs and contacts of pure silver. Soldering contacts can be made to suit any wiring.

PRICES:
No. 9, as illustrated .. 4/-
Others from .. 2/9



LOTUS JACK

Designed to take up the least space, the depth back of panel being 1½ in. Made from best Bakelite mouldings with nickel silver springs and pure silver contacts. One-hole fixing. Soldering contacts can be brought into any position.

PRICES:
No. 3, as illustrated .. 2/6
Others from 2/- to 3/-

LOTUS JACK PLUGS

Designed for use with Lotus Jacks. Made from best Bakelite mouldings and nickel-plated brass. To fix, the wires are placed in slots and gripped in position by a turn of the screw cams.

PRICE 2/-

LOTUS

JACKS-SWITCHES-PLUGS

Garnett, Whiteley & Co., Ltd.

LOTUS Works, Broadgreen Road, Liverpool.

RADIOTORIAL

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

As much of the information given in the columns of this paper concerns the most recent developments in the Radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

Readers' 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. The envelope should be clearly marked "Patent Advice."

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.)

BACK OF PANEL DIAGRAMS can be specially drawn up to suit the requirements of individual readers at the following rates: Crystal Sets, 6d.; One-Valve Sets, 6d.; One-Valve and Crystal (Reflex), 1s.; Two-Valve and Crystal (Reflex), 1s.; Three-Valve Sets, 1s.; Three-Valve and Crystal (Reflex), 1s. 6d.; Four-valve Sets, 1s. 6d.; Multi-Valve Sets (straight Circuits), 1s. 6d. Except **SUPER-HETERODYNE DIAGRAMS**, all of which, irrespective of number of Valves used, are 2s. 6d.

If a panel lay-out or list of point-to-point connections is required an additional fee of 1s. must be enclosed.

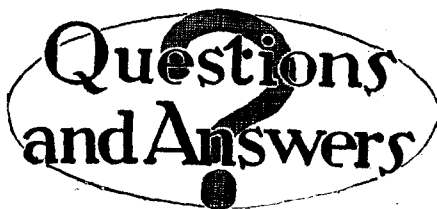
Wiring diagrams of commercial apparatus, such as sets of any particular manufacture, etc., cannot be supplied. (Such particulars can only be obtained from the makers.)

Readers may submit their own diagrams, etc., for correction or for criticism. The fee is 1s. 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.

BLUE PRINTS.

Details of the "P.W." 6d. Blue Prints will be found on page 946.



WIRING DIAGRAM WANTED.

A. M. (Edinburgh).—I have a copy of "P.W." of February 13th, 1926, and the relative blue print circuit No. 19 describing the construction of an H.F. detector and L.F. receiver. I am desirous of making such a receiver, but on the "all-enclosed" pattern, and would be glad to know if such has been described in detail in any recent issue of "P.W." or blue print. If not, would you undertake to furnish me with a panel and baseboard lay-out incorporating provision for grid bias, etc., and any recent improvement in the above-mentioned receiver?

A set of this type, in an "enclosed" cabinet, was fully described in "P.W." No. 226 (The Imperial Three).

The full conditions under which diagrams can be specially drawn up by the Query Department will be found above.

(Continued on page 946.)

Put on a little—
FLUSOLDA (Recd.)
(Patent Applied For)
—and Heat it—That's All

The Secret of Simple Soldering

One clean handy fluid—no tinning, no flux—now enables expert or novice to handle any soldering job with complete confidence.

"Flusolda" has made soldering simple at last. Just apply "Flusolda" and then apply heat and a perfect joint must result.

In tins at 1/3 from Wireless Dealers and Ironmongers.

Trade Enquiries to the Sole Manufacturers:—

THE TRANSPORT SUPPLY CO., LTD., WARRINGTON.

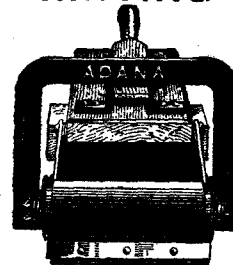
Telephone: Warrington 459.

(S.A.S.)

2-VALVE AMPLIFIER, 35/-
1-Valve Amplifier, 20/-, as new; Valves, D.E. -06, 7/-; Headphones, 9/6 pair; new 4-Volt Acorn motor, 13/-; new 60-Volt H.T. guaranteed 7/-;
2-Valve All-Station Set, 24/- Approval willingly.
Write for free bargain list.
P. Taylor, 57, Studley Rd., Stockwell, London.

ADANA AUTOMATIC SELF-INKING PRINTING MACHINE

45/-
Complete Plant.



THIS massively constructed Printing Machine is the most wonderful of its kind. There are now over 10,000 users of these plants, many saving enormously in their own work, others making an excellent living.

Will print any class of matter from a **CHEMIST'S LABEL TO AN ILLUSTRATED MAGAZINE** including Perforating, Creasing and Box-making. The finest malleable iron and mild steel used in construction. Simplicity to the extreme. No special skill required. Large numbers of boys are producing their School and Scout Magazines. Printers' metal type, case, complete accessories, and excellently illustrated instructional book included. Illus. particulars in two colours and sample of work, sent on receipt of stamped addressed envelope. Also sold by small weekly instalments. Ask for Terms. The "ADANA" AGENCY (Dept. P.W.5) 34, King Street, Twickenham, Middlesex.

Printers should write for particulars of new system of supplying First-Class Founders' Type.

EVERY LOUDSPEAKER

**DESERVES
MULLARD
MASTER
VALVES**

— Ask for —

Mullard P. M. Power Valves.

*Will interest everyone
who "listens-in."*

PITMAN'S 1927 RADIO YEAR BOOK

Contents of the 1927 Year Book include:

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Recent Advances in Theory and Practice.

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A DIRECTORY AND COMPLETE LIST OF
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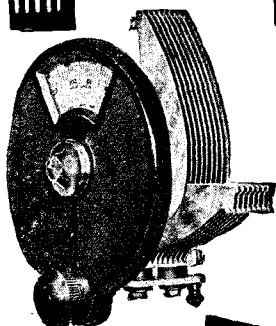
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ULTRA LOW-LOSS

Straight Line Frequency Condenser

Cone Bearings Braced Vanes, Positive

Collector. A real precision job.

Condenser only, .0003uF., .0005uF. .. 9/-

Condenser with plain Dial, Standard 10/6

1/2" dial shaft 6/-

New Vernier Dial 6/-

Reduction Ratio 16-1, No Backlash.

THE FORMO COMPANY.

Crown Works, Cricklewood, N.W.2

Phone: Hampstead 1787. e.

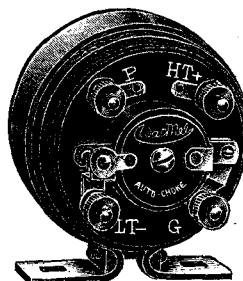
Manchester: Mr. J. B. Levee,

23, Hartley St., Levenshulme.

Phone: Heaton Moor 475

**A Mile of Wire,
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Way, in the**

WatMel



AUTO-CHOKES

The special windings are done by expensive and absolutely up-to-date machines which lay the wire exactly parallel and interweave cotton strands between each layer. Cotton acts as binder and ensures perfect insulation. Get to know the other reasons for the fine amplification and natural-toned reproduction, possible only with the **WATMEL AUTO-CHOKES**. Write for N.P.L. Curve 103/1, and Booklet describing Auto-Choke.

Price **18/6**. From your dealer or direct from

THE WATMEL WIRELESS CO. LTD.,

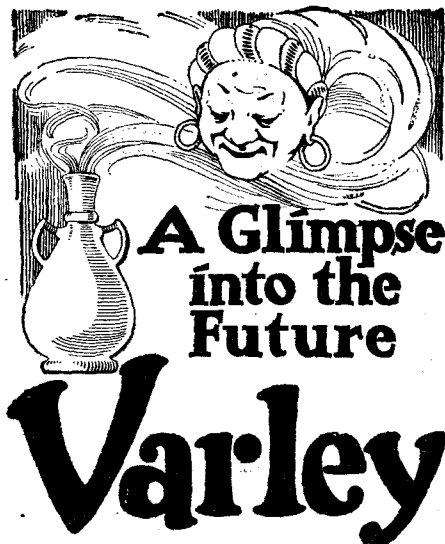
332a, Goswell Road, London, E.C.1.

Telephone: Clerkenwell 7990.

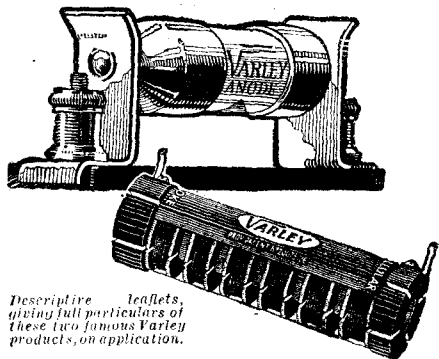
Lancs., Yorks., and Cheshire Representative:

Mr. J. B. Levee, 23, Hartley Street, Levenshulme,

Manchester. Telephone: 475 Heaton Moor.



After all, this was only to be expected. Wireless enthusiasts having tested for themselves the wonderful purity of tone obtainable with Varley Anode Resistances, and also the remarkable efficiency of the Varley Multi-cellular H.F. Choke, began to clamour for the extension of this famous Varley Bi-duplex winding to other wireless components.



Descriptive leaflets, giving full particulars of these two famous Varley products, on application.

Already the Varley Magnet Company has acceded to numerous requests and has marketed a *Special Tapped Resistance*, and also a new form of H.F. Choke suitable for use in circuits of the *Split Coil Type*.

This is only the beginning. Realising the value of our long and successful experience in every form of coil winding, we have decided, in the interests of the Radio public, to increase the number of our wire-wound components so as to enable wireless enthusiasts to reap the full benefit of the Varley Bi-duplex winding.

Full particulars of later products will be announced in the Wireless Press from time to time. Readers who have not yet taken advantage of existing Varley Radio components are strongly advised to do so without further delay. All the best Dealers stock Varley products. If you have any difficulty send us the name and address of your Dealer; we will supply immediately.



THE VARLEY MAGNET CO.
(Proprietors: Oliver Peil Control Ltd.)

Granville House, Arundel Street, London, W.C.2.
Telephone: City 3293, V11.

RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 944.)

NUMBER OF LAMPS IN CHARGING CIRCUITS.

E. M. P. (Worthing).—I have direct current lighting, and wish to charge accumulators off the mains, regulating the charging rate by the insertion of lamps between the accumulators and the mains. How do I find out how many lamps I need?

In the first place, the current required depends upon the charging rate desired, and this is regulated by the insertion of suitable lamps or "banks" of lamps in series with the mains, so that only the required current shall pass. In order to find out what arrangement of lamps is necessary, you must pick on the lamp you are going to use, and then work out how much current it will pass. For instance, the best lamp to use for charging is the carbon filament type, because this class of lamp passes more current than the metal filament type. You want to choose

"P.W." 6d. BLUE PRINTS.

A Series of 20 Blue Prints can be obtained from the Query Dept., PRICE 6d. PER BLUE PRINT. (A stamped addressed envelope must accompany each application, and the number of the required Blue Print must be given when ordering.)

The following are the numbers, and the circuits covered.

P.W. BLUE PRINT

1. DETECTOR VALVE WITH REACTION.
2. UNIDYNE DETECTOR VALVE WITH REACTION.
3. 1-VALVE L.F. AMPLIFIER.
4. CRYSTAL DETECTOR WITH L.F. AMPLIFIER.
5. H.F. (Tuned Anode) AND CRYSTAL, WITH REACTION.
6. H.F. AND CRYSTAL (Transformer Coupled, Without Reaction).
7. 1-VALVE REFLEX WITH CRYSTAL DETECTOR (Tuned Anode).
8. 1-VALVE REFLEX AND CRYSTAL DETECTOR (H.F. Transformer, without Reaction).
9. H.F. AND DETECTOR (Tuned Anode, Reaction on Anode).
10. H.F. AND DETECTOR (Transformer Coupled, with Reaction).
11. DETECTOR AND L.F. (Switch to Cut Out L.F.).
12. DETECTOR AND L.F. UNIDYNE (Switch to Cut Out L.F.).
13. 2-VALVE REFLEX (Valve Detector).
14. 2-VALVE L.F. AMPLIFIER (Transformer-coupled with Switch).
15. 2-VALVE L.F. AMPLIFIER (Transformer-Resistance Coupled with Switch).
16. H.F. (Tuned Anode). CRYSTAL DETECTOR AND L.F. (With Switch for Last Valve).
17. CRYSTAL DETECTOR WITH TWO L.F. AMPLIFIERS (with Switching).
18. 1-VALVE REFLEX AND CRYSTAL DETECTOR, with 1-VALVE L.F. AMPLIFIER, controlled by Switch.
19. H.F. DETECTOR AND L.F. (with Switch for the Last Valve).
20. DETECTOR AND 2 L.F. AMPLIFIERS (Switches for 1, 2, or 3 Valves).

Note: All these sets are of the flat panel type.

a lamp of the same voltage as your mains (say 220 volts) and rated at about 32 candle-power. The current that this lamp will pass is determined by the following formula:

VA (watts supplied) = c.p. × c.p. rating for this type of lamp. In this case the lamp will rate from 3.5 to 4 watts per c.p., so that VA = 32 × 4 = 128 watts.

Now the current that this lamp will pass is found by

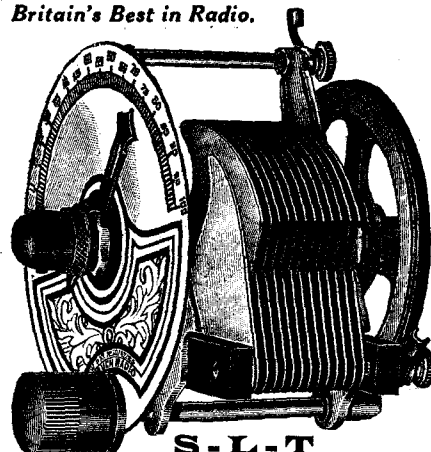
$$A \text{ (amperes)} = \frac{VA}{V} \text{ where } V = \text{voltage of mains.}$$

$$\therefore A = \frac{VA}{V} = \frac{128}{220} = .58 \text{ amp. (approx.)}$$

Now we find that one lamp passes .58 amp. and for the sake of example, let us say we wish to charge at a 3 amp. rate. One lamp in series with the mains will only give us .58, and if we place two together in series with one another, we shall have still less, so that evidently we must arrange the lamps in parallel so that though each lamp only passes .58 amp. the whole "bank" will pass somewhere about 3 amp.

(Continued on page 948.)

Britain's Best in Radio.



S-L-T STRAIGHT LINE TUNING CONDENSERS

separate stations on all wavelengths. Lowest minimum capacity and the most positive slow-motion control.

Prices:—.0005 13/- .0003 12/6 .0002 12/-
Gang of Three .0003 50/-



VARO-FIX FILAMENT RHEOSTAT

Interchangeable elements and each one adjustable. More positive than automatic devices.

6 ohm, 2/3; 15 ohm, 2/6; 30 ohm, 2/9

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King's Road, Tyseley, BIRMINGHAM.

Our high-grade components are obtainable from all first-class Radio Dealers

REPAIRS SETS. PHONES. TRANSFORMERS

Officially Approved by Radio Association.
ALL WORK GUARANTEED LOWEST RATES 24 HOURS SERVICE
Cash on Delivery if Desired.
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A Set before Christmas— payment after!

YOU can have that new Set in time for Christmas. Under the New Times system you can have any Receiver upon a small initial payment—the balance in easy monthly instalments. Components and Accessories, too! Send to-day for Catalogue "P" to:
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G.A. 6551

"HARTEL" WET H.T. BATTERIES

Cannot be equalled for reception, and charge themselves. As recommended by "Popular Wireless," Aug. 14th.

60 volts, in Case with lid 25/- Post 1/-
30 volts " " 13/6 " 10/-

If you wish to build your own—
Glass Containers 2/- doz. } Send 6d.
Racks " " 2/- doz. } stamps for
Zincs " " 1/6 doz. } Sample Cell.

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3, Broomhall Street, SHEFFIELD.

Trade and Factor Supply d.

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100 per cent. cheaper than others. Jacobean Oak Side-board RIFANCO-PHONE as shown, size 32 x 30 x 16, with double spring motor, 3 records one winding, 12-in. Velvet table, Swan tone-arm, full tone sound-box, needle cups.
£6 15 0 Carr. Paid or 18/- down and 11 monthly instalments of 11/9 indirect. All the above fittings, less Cabinet, £2 2 0. Cash only.

No. 18a. £6/15/0
Approval 7 days. Money back.
Other Gramos. from 22/-
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Motors, 9/- Accessories,
Accordeons, Violins, cheaply.
Agents wanted. Lists Free,
64-p. Catalogue, Hints and
Drawings. How to Make
Gramophones, 3d. Estab.
23 years. Thousands Testi-
monials.
No. 114a. £2/5/0.
Regent Fittings Co., P.W., 120, Old St., London E.O.1.

XMAS BARGAINS FOR ALL!

Have a "PILOT" Set this Christmas
and be sure of your entertainment!

FINISHED INSTRUMENTS.

SETS OF PARTS.

If you want to be absolutely certain of your wireless entertainment this Christmas, you cannot do better than purchase one of these "Pilot" Sets. They are designed by acknowledged experts, made by skilled workmen, and thoroughly tested on a large number of stations under normal working conditions. Moreover, we will install any one of these sets free of charge within 50 miles of any of our branches. Order at once for installation before Christmas.

On the other hand, if you prefer to assemble your own set—and there is no finer hobby for the long winter evenings—the famous "Pilot" Service is a veritable insurance against failure. Our Technical and Service Department, under the supervision of a skilled Radio engineer, is ready to help you at all times should you encounter any little difficulties. This service is entirely free of charge.

IN EITHER CASE WE GUARANTEE YOU
GOOD RESULTS!



A Typical "PILOT" Set—
THE SOLODYNE
(5 Valves—1 Dial—50 Stations)

Easily the most popular set this season. Merely rotating the one dial brings in station after station at full loud-speaker strength. The set is so simple that a child could operate it, and yet its range includes all the important B.B.C. and Continental Broadcasting stations, which can be heard with amazing clarity.

BEST-WAY "DE LUXE" LOUD-SPEAKER SET (4 Valves)

Another receiver designed for simplicity of operation, with tuning arrangements covering all normal broadcasting without the necessity for changing coils. For all-round work at a moderate price, this is the receiver "par excellence."

BEST-WAY "EUROPEAN" LOUD-SPEAKER SET (3 Valves)

In this receiver is embodied the four important qualities which every really efficient Set should possess, namely:—Sensitivity, selectivity, stability and simplicity. Although the set employs only three valves, with the resultant low cost of upkeep, it is capable of giving full, mellow-toned loud-speaker reproduction over very excellent ranges.

"P.W. CONTINENTAL"—THOUSANDS SOLD.

This famous receiver is absolutely ideal for the man who wants an inexpensive set, which will give him reception on a number of Continental stations as well as the principal B.B.C. ones. Whilst it is not designed for use with a Loud Speaker, we can supply a two-valve Amplifier to bring the signals up to the full loud-speaker strength. We can thoroughly recommend this fine set to the man of moderate means.

2-VALVE AMPLIFIER.

Specially designed for use with the "P.W. Continental."
Finished Instrument, £2 6s. 0d.

THE IDEAL XMAS GIFT.

If your friend is a wireless enthusiast, he will appreciate an "Emerald" Wavemeter—calibrated to within 1 metre, and guaranteed accurate within that limit. A delightful precision instrument. Price, including Royalty, £8 2s. 6d. Valve extra, 14/-. Full details on request.

| | | | |
|--|----|----|----|
| Finished instrument, complete with B.B.C. coils, but less valves, etc., Marconi Royalty paid | £ | s. | d. |
| Complete set of parts | 27 | 7 | 6 |
| Polished and drilled Ebonite panel | 13 | 17 | 0 |
| Polished Mahogany Cabinet | 11 | 6 | |
| | 4 | 5 | 0 |

| | | | |
|--|----|----|----|
| Finished instrument, Marconi Royalty paid, but less valves, etc. | £ | s. | d. |
| Complete set of parts | 19 | 10 | 0 |
| Polished and drilled Ebonite panel | 9 | 2 | 6 |
| Polished Mahogany 2-door Cabinet | 11 | 6 | |
| | 2 | 5 | 0 |

| | | | |
|--|----|----|----|
| Finished instrument, Marconi Royalty paid, but less valves, etc. | £ | s. | d. |
| Complete set of parts | 14 | 5 | 0 |
| Polished and drilled Ebonite panel | 5 | 1 | 6 |
| Polished Mahogany Cabinet | 10 | 6 | |
| | 1 | 10 | 0 |

| | | | |
|---|---|----|----|
| Finished instrument, complete with B.B.C. coils, Marconi Royalty paid | £ | s. | d. |
| Complete set of parts | 6 | 0 | 0 |
| Drilled Ebonite panel | 1 | 16 | 9 |
| Polished Mahogany Cabinet | 6 | 0 | |
| | 1 | 1 | 0 |

If a complete set of parts is purchased Marconi Royalties are payable at the rate of 12/6 per valve holder.

Details of the above and many other up-to-date sets appear in the new edition of the "Pilot Manual." Fully illustrated and containing much useful advice, this book should be in the hands of every enthusiast. 6d.



THE PILOT MANUAL

PETO-SCOTT CO., LTD.

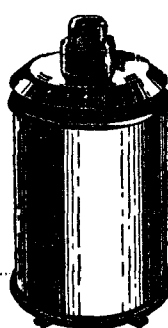
Head Office & Works: 77, City Road, LONDON, E.C.1
Branches: 82, High Holborn, London, W.C.1. WALTHAMSTOW—230, Wood Street. PLYMOUTH—Bank of England Place. LIVERPOOL—4, Manchester Street.

P.S. 6554

Give EFESCA Gifts this Christmas!

HERE are a few selections from the extensive and all-embracing range of EFESCA Wireless specialities.

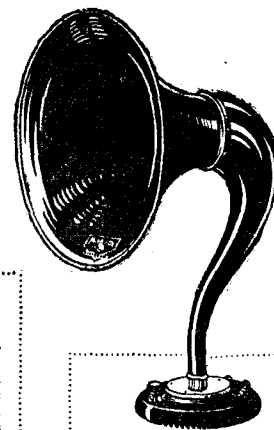
Famed for their unfailing reliability and efficiency, they are absolutely certain to delight any wireless enthusiast who may receive them as presents this Christmas. There are scores of novel components described in Catalogue 573/6 which you can obtain free on application.



THE EFESCA REGENERATIVE AERIAL TUNER

has an inductance equal to a whole range of plug-in type coils, from No. 30 to No. 300. In addition to possessing the tuning range of a whole set of coils in a single self-contained unit, it has the following advantages: A turn of the switch covers both low and high wavelengths; obviates the bother of choosing coil combinations; losses eliminated; reaction under perfect control; convenient to mount and simple to operate.

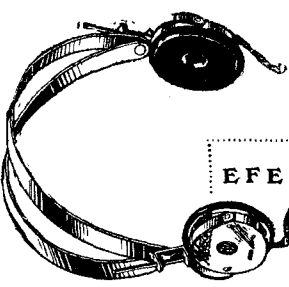
Price 35s. complete.



THE EFESCA "PURA VOK" LOUD SPEAKERS

are constructed with specially robust pole piece carriers, fitted with fine adjusting screw with positive stops. The horn is symmetrical and acoustically correct in design; the principle employed ensuring quite exceptional purity & volume.

| |
|---------------------|
| Standard Model 80/- |
| Medium - - 48/- |
| New Junior - 38/- |
| Miniature - 25/- |



EFESCA HEADPHONES

are exceptionally clear and evenly matched in tone. They provide both faithful reproduction and full volume of sound. 4,000 ohms with 6 ft. of flexible cord.

Reduced to 15/-

Ask your retailer, or write to-day for
CATALOGUE 573/6 of Efesca Components,
with diagrams illustrating their use and
various circuits.

It is more than a list—it is a fine 72-page book of great value, containing much technical information which you will greatly appreciate.

FALK STADELMANN & CO., Ltd.

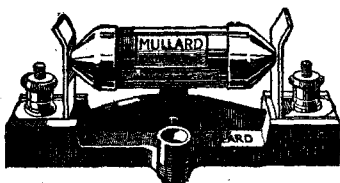
83-93, FARRINGDON ROAD, E.C.1.,

and at Glasgow, Manchester, Birmingham, Newcastle, and Dublin.

Use Efesca
High Tension Batteries



Above the snow-line



Constancy, silence and strength, planned to nature's generous scale, the very qualities which are essential in a small wire wound anode resistance if it is to achieve its object—purity of reception. The Mullard EVER-REST Wire Wound Anode Resistance is constant in value and silent in operation, and possesses a degree of mechanical strength which is unique, inasmuch as it is achieved without sacrificing efficiency or bulk.

A Resistance wound on a textile fibre core, perfectly covered and interlaid with the same material, eliminating all self-capacity, with this advantage, that the fine metallic wire is rendered absolutely free from every particle of mechanical shock. The temperature coefficient is negligible, the resistance is not set in wax but simply covered with a thin layer to allow perfect dissipation of heat.

Ask for the resistance which has behind it all that is behind the finest valve.

Mullard EVER-REST Wire Wound Anode Resistance (80,000 and 100,000 ohms) - 5/-
Complete with Holder 6/6

Other Values to Specification.

Mullard Grid Leaks and Condensers.
 Type Grid B 0.5 to 5.0 megohms - 2/6
 Type Grid B combined with .0003 mfd. Condenser Type MA - 5/-
 Type MA Condenser .0001 to .0009 mfd. 2/6
 Type MB Condenser .001 to .01 mfd. - 3/-



WIRE WOUND ANODE RESISTANCE

The MULLARD WIRELESS SERVICE Co., Ltd.
 Mullard House, Denmark St., London, W.C.2.

QUESTIONS AND ANSWERS.

(Continued from page 946.)

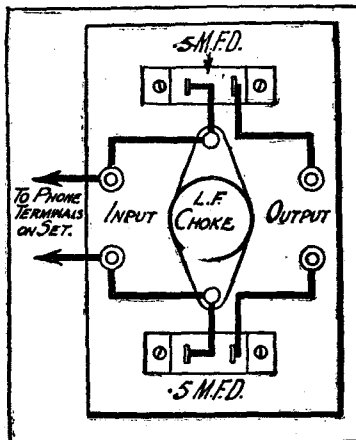
Two in parallel will give $.58 \times 2 = 1.16$ amp.; but we need nearly three times that amount. Five lamps will give us $.58 \times 5 = 2.90$ amp., which is just below the maximum charging rate of our accumulator. It is better to be below the given rate than above it, and so if we use five lamps in parallel with one another, but the "bank" or collection of them in series with the accumulator and the mains, we shall be able to charge the battery at a convenient and safe rate. The formula given above holds good for any kind of carbon lamp and any voltage of D.C. main, provided that the lamp and main voltages are the same or thereabouts, and that the wattage of the lamp is 4 watts per c.p.

NOVEL RECTIFICATION.

S. K. (Aldgate High Street, London, E.).—In the article on "Novel Rectification" ("P.W.," No. 232, Nov. 13th) the first diagram seems to have a short between aerial and earth.

Should not the earth connection be taken from the left-hand corner of diagram, under

For the Constructor



No. 11.—SHUNT LOUD-SPEAKER OUTPUT.

The method of "shunting" the loud speaker, as shown above, is extremely useful where long extension leads are employed.

All the steady H.T. current, to the plate of the last valve, passes through an L.F. choke, and is excluded by condensers from the long extension leads to the different rooms.

The varying potentials at the ends of the choke, which are due to the speech or music, are not stopped by the large fixed condensers; but they cause fluctuating "output" currents that operate the loud speaker, or loud speakers, just as well as if these were in the direct path of the current.

The connections for a "shunt-output" unit are shown above. The choke, condensers, and terminals, may be made up on a separate unit, as shown, or may be included in the present set, if there is room.

the variometer—i.e. between the variometer and the metal plate?

Yes. The earth connection should be made at a point between the variometer and that metallic plate which is not connected to the telephones.

CUTTING OUT THE LOCAL STATION.

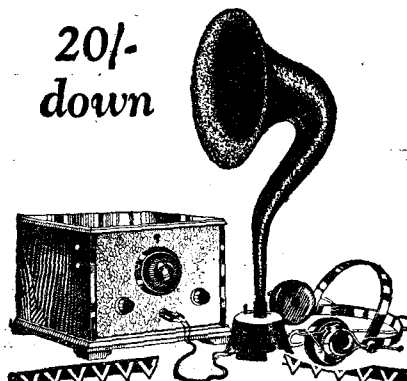
E. J. (Romford Road, Forest Gate).—In an endeavour to cut out the local station I have tried several wave-traps, and was recently advised to use "The Complete Eliminator." I have obtained a diagram of this instrument from the Queries Dept., but should be glad of advice as to how to use the Eliminator, as the number of POPULAR WIRELESS giving these details is now "out of print."

Connecting up the Eliminator.

Aerial to the terminal marked A. Earth to the terminal marked B. For all interference on waves longer than the desired one, the terminal marked G2 should be connected to the aerial terminal on the set instead of G1, as usual.

(Continued on page 950.)

20/-
down



Great New Wireless Offer

Our wonderful 2-valve set with loud speaker and headphones installed free in your own home—anywhere—by our own Installation Engineers for £12 cash; or £1 down and 20/- a month for twelve months only. And we guarantee satisfaction.

There is nothing else to buy—the set is complete with all accessories.

When our Engineers have installed the set just switch on and enjoy perfect and powerful loud-speaker reception. You are also entitled to two free calls from our Engineers after the set is working.

The General Radio set is British made, unsurpassed in efficiency and purity of tone. It has no superfluous controls and is as easy to work as turning on the light.

Send a postcard to-day for free illustrated catalogue No. 6W and full particulars of this offer.

General Radio

GENERAL RADIO CO. LTD

RADIO HOUSE

235 Regent Street, W1



HEADPHONES REPAIRED

Re-wound and re-magnetised 5/- per pair Loud Speakers repaired 5/- Transformers re-wound 5/- each. All work guaranteed and tested before delivery. Write for Trade Prices. Phone: Clerk 1795. MASON & CO., 44, East Road, City Road, N.1.

Valves Repaired

AS GOOD AS NEW!!

HALF
LAST
PRICE

(Except Weco, S.P.'s and low capacity types). Minimum D.E. Current 0.15 amps when repaired. ALL BRIGHT & DULL EMITTERS Listed at less than 10/- Minimum charge - 5/- VALCO LTD., Dept. P.W. Tabor Grove, Wimbledon, S.W.

EBONITE BUSHES

FOR MOUNTING ON WOOD.

Orders under 1/- send 14d. postage.



PERFECT INSULATION

Two required for each hole.

NUMBER 0 1 2 3 4 5 6
 Hole in Bush—.6BA, .4BA, 2BA, 1/4" 5/16" 3/8" 7/16"
 Price each: 1d. 1d. 1d. 1d. 2d. 2d. 2d.

DAREX RADIO CO.

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TRADE SUPPLIED

1/9 DON'T PAY MORE AERMONIC



VALVE HOLDER.

Anti-capacity. Anti-phonics.

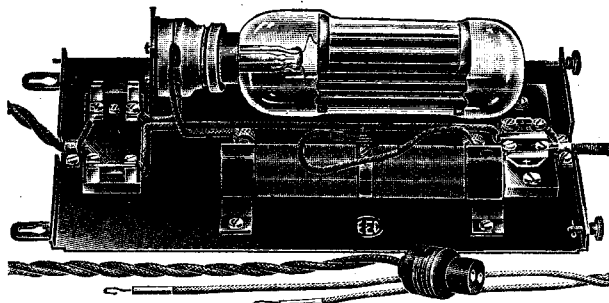
Don't pay more than 1/9.

If hard to get, drop us a line.

James Christie & Sons, Ltd., 246, West Street, Sheffield.

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**ABSOLUTELY NEW—
—WONDERFULLY EFFICIENT**
The **"Z"**
FILAMENTLESS VACUUM TUBE RECTIFIER
for H.T. ACCUMULATORS.



Don't go on buying dry H.T. Batteries when you can save time and money by using E.E.C. Monoblock H.T. ACCUMULATORS, and *charging them at home with the new "Z" FILAMENTLESS VACUUM TUBE RECTIFIER*. Remember E.E.C. Monoblock H.T. Accumulators immensely improve the quality of your reception—much of the noise attributed to atmospherics emanates from your dry battery—and the saving effected wipes out the initial expenditure in a very few months. The new "Z" Rectifier works *SILENTLY* and *AUTOMATICALLY* and consumes only 1 UNIT in 50 hours. Unlike other rectifiers it operates perfectly on 200-220 Volt A.C. mains, irrespective of the periodicity; further, by using a special Transformer which we can supply, the "Z" Rectifier can be used with any voltage.

PRICE complete with input and output leads, variable resistance and fuses **£3-0-0**

We stock components, valves and accessories of every description for sets described in this and in all other Wireless Publications. We have a highly organised and efficient Mail Order Department and guarantee not only safe but prompt delivery. Why waste time and money when you can send your order direct to us? Your enquiries will receive our careful and prompt attention.

Economic Electric Ltd., 10, FITZROY SQ., LONDON, W. 1.

**LOUDSPEAKER Strength
on a CRYSTAL**

With the new E.E.C.

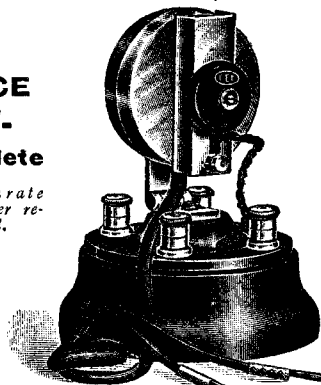
**MAGNETIC MICROPHONE
BAR AMPLIFIER**

PRICE

38/-

Complete

*No separate
Transformer re-
quired.*



An efficient NON-VALVE NOTE AMPLIFIER which yields Three- to Tenfold Amplification from the 'Phone Terminals of any Crystal or Valve Set. **NO ACCUMULATORS REQUIRED. NO H.T. BATTERIES.** Six pairs of Wireless Headphones, or any 2,000 ohms Loud Speaker may be operated from a single 3-volt Dry Battery.

LOW CURRENT CONSUMPTION.

The Magnetic Microphone Bar Amplifier uses less than $\frac{1}{2}$ of an ampere, one 3-volt dry cell, at a cost of 3/-, lasting upwards of 300 working hours. **No Diaphragms. No Distortion. No Fragile Parts. Nothing to get out of order. No microphonic noises. Unaffected by vibration. Compact and easily portable. ANYONE CAN ADJUST IT!** Amplified Speech and Music as clear as from a good Valve Set. A boon to persons of impaired hearing.

CROSS JOINS

BUTT JOINS

TERMINAL JOINS

See how it joins.

JUNIT
PATENTED
Needs no Solder

17 S.W.G. In coils (in cartons), per coil 1/- (Square section) In 2 feet lengths, per length 2d.

**DON'T SAY WIRE
— SAY JUNIT !**

If unobtainable at your local dealer, send P.O. for coils required (Post Free) to :
REXO ENGINEERING CO.,
2, RAVENSCOURT SQ., LONDON, W.6.

"Money saved is Money earned—
So when your 'VALVES' get old or burned
Send them to us—and we, to you,
Will send them back 'MADE GOOD AS NEW.'"

Manufacturers of Auto-
veyors Thermionic Re-
lays, and new valves of
all types. Write for par-
ticulars and list price.

**Restored to function
with original charac-
teristics.**

**EFFICIENCY MAINTAINED!
RESULTS GUARANTEED.**
on application.

**B.E. 4/-; D.E. 2v. 3
7/6; D.E. '06 8/-.**

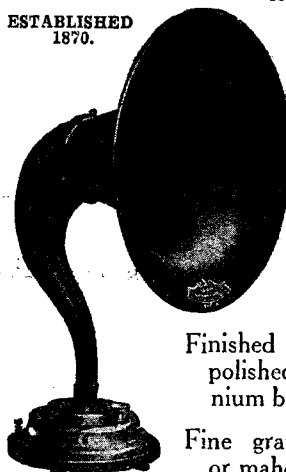
Price List for Power Valves
We return the actual Valve you
send us, post free, within 3 days.

THE NORTH LONDON VALVE CO., LTD.,
22½, Cazenove Road : Stoke Newington, N.16.
Liberal Discounts to Wireless Agents

**"RELIANCE"
LOUD SPEAKER**

ESTABLISHED
1870.

Height 22½ in. 14 in. diam. flare.



This excellent speaker
is the last word in
quality and tone at
a price which will
appeal to all.

Finished ebonite black on flare and
polished alumi-
nium base - - **£3: 5: 6**

Fine grained oak
or mahogany - **£3: 12: 6**

PROVISIONAL
PATENT.

The Public are requested to communicate
with the makers for further information.

CHATHAM & SON, LD.,
RELIANCE WORKS, WOLVERHAMPTON



USE DRY CELLS INSTEAD OF ACCUMULATORS

COLUMBIA Dry Batteries are much safer, cleaner and convenient to handle besides eliminating trouble and expense occasioned by the frequent recharging needed by the ordinary accumulator. You can eliminate the inconvenience of storage batteries entirely—there is a Columbia Dry Battery for every radio battery need.



Send for our useful and informative battery instruction books "How to get the most out of your radio batteries" and "Choosing and using the right radio batteries." They are sent post free on request.

Columbia Dry Batteries

Ask your Dealer for full particulars concerning the complete range of Columbia Batteries or send direct to us.

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Phone: Gerrard 3038.
Scottish Representative: John T. Cartwright,
7, Cadogan Street GLASGOW

RADIOTORIAL QUESTIONS & ANSWERS.

(Continued from page 948.)

The L.T. — terminal on the eliminator should be joined to the earth terminal on the set.

For interference from ships on 600 metres the terminals E and E1 should be short-circuited, earth joined to E, aerial to A, while G2 should be connected to the aerial terminal on the set instead of G1. This latter arrangement holds good for 5 X X providing the coils are substituted by larger ones.

Using the Eliminator.

There are several ways of using the Complete Eliminator according to the type of interference experienced, as described above. For ordinary cases, such as interference from the local station, the switch should be placed at A, and the interfering station tuned in to maximum strength, on the set itself, without touching the eliminator. Then the switch should be moved to B, and the adjustment of coils and condensers in the eliminator should be made until the interfering signal is reduced to a minimum, or completely cut out. Leave the eliminator for the time, and return to the tuning arrangements in the set proper, and tune in the desired station. The interfering station will not be heard so long as the adjustment of the eliminator remains unaltered.

By attaching the eliminator to any set, apart from cutting out interference, it is possible to materially strengthen signals. This should be done in the following manner. Switch at A, tune in the desired station on existing tuning arrangements. Move switch to B, leaving tuning arrangements on set, and manipulate eliminator coils and condenser until signals are increased.

"P.W." COIL TABLES.

No. 6.—Honeycomb Type Coils.

(c) ANODE COILS WITH PARALLEL TUNING CONDENSERS.

| No. of Turns. | Gauge of Wire S.W.G. | Wave-length, in Metres. | | | | Suitable No. of turns in reaction coil |
|---------------|----------------------|---|------|---|------|--|
| | | Capacity of Parallel Condenser in microfarads = .0002 | | Capacity of Parallel Condenser in microfarads = .0003 | | |
| | | Max. | Min. | Max. | Min. | |
| 20 | 24 | 155 | 65 | 185 | 70 | 20-40 |
| 40 | 24 | 265 | 115 | 315 | 125 | 20-40 |
| 60 | 24 | 420 | 185 | 500 | 195 | 20-60 |
| 80 | 24 | 550 | 240 | 660 | 255 | 20-60 |
| 100 | 24 | 690 | 300 | 825 | 315 | 40-80 |
| 125 | 26 | 865 | 380 | 1030 | 400 | 40-80 |
| 150 | 26 | 1030 | 455 | 1230 | 480 | 40-80 |
| 175 | 26 | 1210 | 530 | 1445 | 560 | 40-80 |
| 200 | 26 | 1400 | 615 | 1675 | 650 | 40-80 |
| 250 | 28 | 1780 | 780 | 2130 | 825 | 40-80 |
| 300 | 28 | 2145 | 940 | 2560 | 990 | 60-100 |
| 350 | 28 | 2450 | 1070 | 2925 | 1130 | 60-100 |
| 400 | 28 | 2775 | 1210 | 3310 | 1280 | 60-100 |
| 450 | 30 | 3100 | 1360 | 3700 | 1450 | 60-100 |
| 500 | 30 | 3540 | 1550 | 4230 | 1640 | 60-100 |
| 600 | 30 | 4280 | 1880 | 5120 | 1980 | 100-150 |
| 700 | 32 | 5090 | 2230 | 6080 | 2350 | 100-150 |
| 800 | 32 | 5830 | 2550 | 6970 | 2690 | 100-150 |
| 900 | 32 | 6610 | 2980 | 7900 | 3050 | 100-150 |
| 1000 | 36 | 7330 | 3210 | 8760 | 3380 | 100-150 |
| 1250 | 36 | 9100 | 3980 | 10860 | 4190 | 100-200 |
| 1500 | 36 | 11100 | 4860 | 13250 | 5120 | 100-200 |

Wind coils on a former having two rows of 23 spokes separated by 1 inch, with an inside diameter of 2 inches.

The table assumes the use of a normal P.M.G. aerial, general-purpose valves, and conventional moving-plate variable condensers. The values would be considerably modified by the use of special anti-capacity valves and valve-holders, or condensers with specially low minimum capacity.

CAPACITIES OF VARIABLE CONDENSERS.

T. S. (Southampton).—I have purchased several variable condensers which have no capacities stated on them. Can you oblige me by giving a rough table showing the number of vanes required for various capacities, as I shall be able to gauge from such a table the approximate capacities of my condensers.

Assuming the spacing of the vanes to be 1-inch the following numbers of plates will be required for the capacities stated:

| No. of Fixed Plates. | No. of Moving Plates. | Capacity in microfarads approx. |
|----------------------|-----------------------|---------------------------------|
| 29 | 28 | .001 |
| 22 | 21 | .00075 |
| 15 | 14 | .0005 |
| 10 | 9 | .0003 |
| 7 | 6 | .0001 |

(Continued on page 953.)

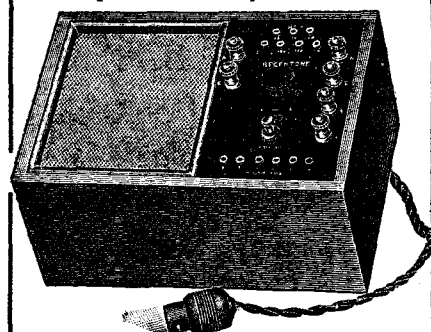
THE MODERN
WAY

THE EFFICIENT
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THE

"REGENTONE"

Complete Battery Eliminator



5 AMP. MODEL £6 10

Supplying combined High-Tension, Low-Tension, and Grid Bias current for the operation of your receiver from your Household Electric Supply (D.C.) by simply attaching adaptor to electric light lamp holder.

Why use H.T. Batteries and Accumulators?

No Replacements Necessary.

No Attention Required.

H.T. MODEL (FIVE TAPPINGS)

£2 10

A COMPLETE SET OF PARTS OF "REGENTONE ELIMINATORS" ARE SUPPLIED FOR HOME CONSTRUCTION.

Price List and Descriptive Leaflets FREE on Application.

150-page catalogue, 2,000 illustrations of components and accessories, post free 4d. stamps.

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REGENT RADIO SUPPLY CO.,

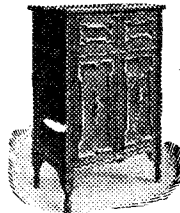
45, FLEET STREET, E.C.4.

Phone: Central 9661.

A HOME FOR YOUR WIRELESS SET

OUR STANDARD
CABINETS

are DUSTPROOF and house the whole apparatus, leaving no parts to be interfered with. All you do is UNLOCK & TUNE IN. Made on mass production lines, hence the low price. Provision is made to take panels from 16 x 7 up to 30 x 18 in.



From £4 15 0 Write to-day for descriptive literature and suggestions for adapting your receiver or panel in our Standard Cabinets. Immediate Delivery. Dept. 5, Melville Chambers, 56a, Lord St., LIVERPOOL.

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EASY PAYMENTS

We supply apparatus of the following brands for 10% down. Balance spread over 10 months.
Lotus Watmel Benjamin Radion Valves
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and many other Brands.

LONDON RADIO SUPPLY COMPANY,
11, Oat Lane, London, E.C.2. Phone City 1977

TRUMP ELECTRICAL Soldering Iron

Bit projects 3". Diam. only 1". Loading 240 watts. 22/6

BARREL GETS RED HOT. Slip in element and replaceable by anyone.

LONG LIFE GUARANTEE.

ARDEA VULCANIZER SYNDICATE LTD.,
318, King Street, Hammersmith, W.6.

KINGSWAY RADIO, LTD.,

92, CANNON STREET, LONDON, E.C.4.

*The City Firm for Wireless.***The Famous Ericcson Loud-Speaker Set.**Complete with all Valves, Batteries, and Loud Speaker **£10 10***A high-class instrument at a popular price.***Loud Speakers in Stock** by Amplion, Brown, Priory, Beco, B.T.H. Special lounge for testing above.Battery eliminators, **Echo D.C. £2 15s.**; A.C. **£6 15s.**Croxonian Panels, every size in stock, $\frac{1}{4}$ d. square inch.

First quality Ebonite, machine cut, ground edges, any size cut, polished and matt.

Cabinets—over 50 sizes in stock.

Micro-Radio Valves: '06, 6-; 2 Volt., 6-; Power, 10 6.

H.T. Accumulators: 20 volt, Exide, and Ever-Ready, 15- each.

H.T. Batteries (delivered from Works weekly): **Adico**, 36 v., 4 6, 60 v., 7 6,100 v., 13 6; **Ever-Ready**, 36 v., 7 6, 66 v., 12 6, 108 v., 21-;**Lissen**, 60 v., 7 11, 10 6 (with Grid Bias).

L.T. Accumulators, 2 v. 40 . . . 10/- 4 v. 40 . . . 17 6 6 v. 40 . . . 26 -

2 v. 60 . . . 12 6 4 v. 60 . . . 21- 6 v. 60 . . . 33 -

Charged Accumulators always in stock.

Solodyne components in stock: Cydon Triple, 70-; dual '0005 25/-, '0005

27 6. Single condensers. Ormond Triple, 40/-

Lewcos, Colvern, and Melbourne Screened Coils.

Variable Condensers (special line) straight line frequency, '0005 6-; '0005 5 9.

Coils. Igranite, Edison Bell, Lissen, and Finston.

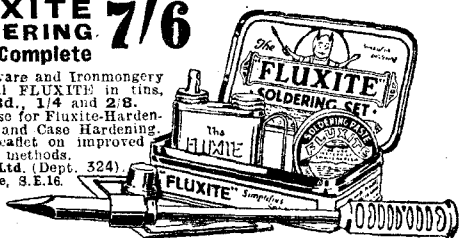
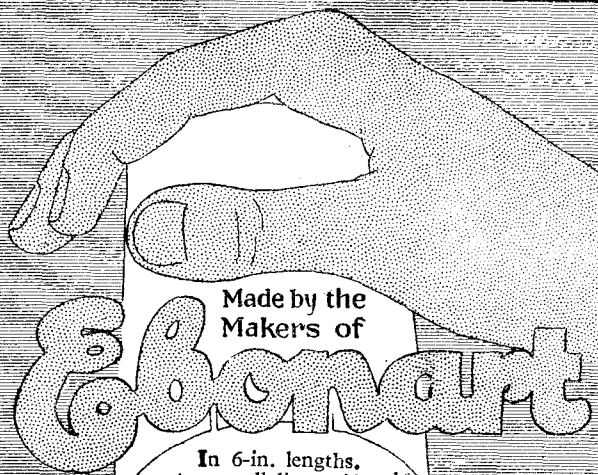
THE LATEST AND GREATEST NOVELTY.A perfect Miniature Cinematograph Projector, using Pathé Films, worked by a Pocket Flash Lamp **37 6****Come and see it.**We keep in stock components by all the leading Makers: **DUBILIER, ORMOND, G.E.C., MARCONI, B.T.H., ERICSSON, BURNDIPT, EVER-READY, AMPLION, BROWN.**
Baby Pathe Cinema, etc. Send for Complete List.**Weak Joints
need Strong
Treatment**

An imperfect joint . . . a tiny leakage . . . gone are the chances of good, long-distance reception.

The Fluxite Soldering Set will fix all joints quickly, and for ever. No trouble . . . no mess . . . and so simple.

**FLUXITE
SOLDERING 7/6
SET—Complete**All Hardware and Ironmongery Stores sell **FLUXITE** in tins, price 8d., 1/4 and 2/8.

Another use for Fluxite—Hardening Tools and Case Hardening. Ask for leaflet on improved methods.

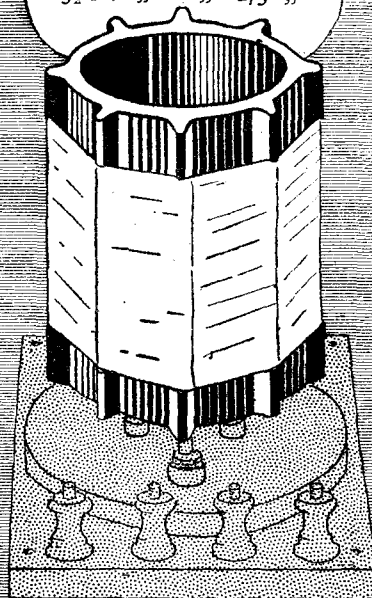
FLUXITE Ltd. (Dept. 324), Rotherhithe, S.E.16.**FLUXITE****REDFERN'S COIL FORMER**Made by the
Makers of**Ebonart**

In 6-in. lengths.

2-in. overall diam. 1/6 each

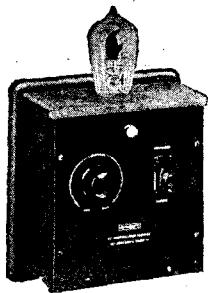
2 3/4-in. " " 1/9 "

3 1/2-in. " " 2/3 "



WITH this soundly designed low-loss former you can construct any kind of solenoid coil—coils for screening, loose couplers, low loss single-layer coils, H.F. transformers and other types demanded for the most modern circuits. These formers have numerous ribs of such height that the winding is almost circular and the air space unusually big, while the ebonite is of a "horny" consistency which makes working easy and accurate.

Write for Folder A262 to
REDFERN'S RUBBER WORKS, LTD.,
Hyde, Cheshire.



"ETHOTRON" Rectifying VALVE

The Valve without a Filament.

Not a rectifying valve for wireless sets but for rectifying Alternating Current (changing it into direct current) so that the house mains (A.C.) may be used for supplying high tension current needed by all valve sets.

Charge Your H.T. Accumulators at home with a **BURNDEPT High Tension Accumulator CHARGER**

If you have Alternating Current house mains charge your H.T. Accumulator regularly without moving the Accumulators from their usual position. Using a Burndept H.T. Accumulator Charger this can be done with ease, with certainty, and *without skilled knowledge.*

The charger is screwed to the wall and *wired up permanently* to (i) electric mains, (ii) accumulator and (iii) H.T. Terminals of the Receiving Set. Key switch connects accumulator alternatively to mains for charging or to set when charging is finished. *It is impossible to connect the mains to the set.* It will charge any H.T. Accumulator from 40 to 150 volts, at a rate of about 60 milliamperes.

The rectifying element is a special BURNDEPT TYPE U695 RECTIFYING VALVE.

Beautifully finished in polished mahogany cabinet, with ebonite control and valve panels. Price **£6:17:6**

Very little more than it would cost you to make one for yourself, and in return for which you have a guaranteed charger of proved reliability,

WRITE TO US FOR FULL PARTICULARS, OR

Ask your Local Burndept Dealer about it.

Head Offices and
Factory:

Blackheath,
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BURNDEPT

WIRELESS LIMITED

London
Showrooms:

15, Bedford St.,
Strand, W.C.2

AGENTS AND BRANCHES EVERYWHERE



Trade "NIGHTINGALE" Mark

PHOSPHOR BRONZE—GOLDITE! THE WONDERFUL "Nightingale" Master Crystal Detector

Trade Mark.

Patent applied for.

COUPON

VALUE 2/6. Available for seven days (thirty days for overseas).

Owing to the great demand for the N.M.C. Detector and the extremely limited supplies of "Goldite," the price has now been raised from 2/6 to 5/-. We are pleased to be able to announce, however, that arrangements have been made to give "P.W." readers the opportunity of obtaining the N.M.C. Detector at its original price. This Coupon may be presented to your dealer, or forwarded direct to N.M.C. Detectors, 30, Princes Parade, London, N.3, together with 2/6 only.

NAME

ADDRESS

CLEAR
BLOCK
CAPITALS,
PLEASE.

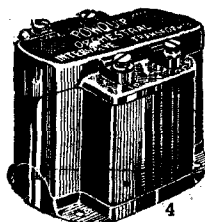
UTMOST TONAL PURITY—ELECTRICAL AND MECHANICAL STABILITY—VOLUME.
THE FINEST DETECTOR IN THE WORLD—AND GUARANTEED FOR FIVE YEARS!

"All through the night, until the hour before the dawn, that marvellous voice shall hold the woodland spellbound."

Have a "POWQUIP" Transformer this Christmas.



OF sound design and workmanship—of unequalled performance—"POWQUIP" Guaranteed Transformers are now reduced in price, and are better value than ever. Ask to see these popular models at your dealers.

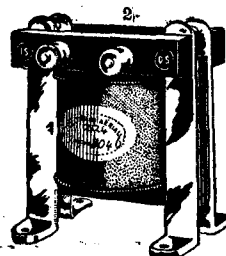
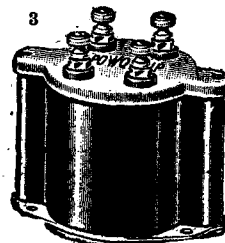


- POWQUIP - COMPONENTS

If any difficulty in obtaining "POWQUIP" Transformers write to:-

THE POWER EQUIPMENT COMPANY LTD.
Kingsbury Works, The Hyde, Hendon, N.W.9.

| | Old Price | New Price |
|------------------------|-----------|-----------|
| 1 Standard Model | 14/6 | 10/6 |
| 2 Manchester " | 15/6 | 12/6 |
| 3 Shrouded " | 18/- | 12/6 |
| 4 Orchestral " | 31/6 | 22/6 |



RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 930.)

CONNECTIONS FOR 1-VALVE REFLEX.

I have the parts for a 1-valve reflex set mounted on a 10 x 10 in. flat panel. The set will use two aerial terminals (series parallel tuning), a 2-coil holder, 2 variable condensers, and a crystal detector, etc.

I have a '001 condenser for the 'phone terminals, another for the primary winding of the L.F. transformer, and a '0002 for the secondary.

What are the point-to-point connections?

Aerial parallel terminal to one side of '0005 variable condenser, one side of A.T.I., and to grid socket of valve holder.

Aerial series terminal to other side of '0005 variable condenser. Earth terminal to other side of A.T.I., one side of '0002 fixed condenser, and to one secondary terminal of L.F. transformer. Other side of '0002 and other secondary terminal to L.T. negative, which also goes to H.T. negative, and to one side of rheostat. Other side of rheostat to one filament socket of valve holder, other filament socket to L.T. positive.

Plate socket to one side of '0003 variable condenser, one side of anode (moving) coil, and to one side of crystal detector. Other side of anode coil and '0003 variable condenser to one primary terminal of L.F. transformer.

Other side of crystal detector to other primary terminal. A '001 fixed condenser is joined across the primary terminals. The lead connecting the anode coil to the primary of the transformer is also taken to one 'phone terminal; other 'phone terminal to H.T. positive.

A '001 fixed condenser connected across the 'phone terminals completes the wiring.

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.

2 VALVES D.X. RESULT.

The Editor, POPULAR WIRELESS.

Sir,—I thought I would write and let you know the results I get with my two-valve set (detector and L.F. amplifier), the construction of which was in POPULAR WIRELESS, dated October 25th, 1925. I have had two American stations as yet (K D K A and W B Z), and other distant stations on 'phones, including Rome and Berlin, Warsaw, and dozens of others, of which I do not know the calls. I can get Daventry and London on a loud speaker, loud enough for an ordinary size room, and lots of other B.B.C. stations on 'phones. Hoping this will interest you,

Yours faithfully,

W. A. DEVONSHIRE.

54, Cambridge Road, Strood, Kent.

RE CRYSTAL SETS ON LOW WAVES.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to P. R. T.'s letter in this week's issue of "P.W." as to getting below 200 metres on a crystal set, I should like to say that about a year or two ago I was able to get down to 90 metres quite easily.

The circuit used was simply a 25-turn coil tuned by a series condenser. No attempt to get below this wave length was made although no doubt this could have been done with a little trouble.

Transmissions from 2 O O (Hendon) on 100 metres were often received with this set.

It is interesting to note that this station could be tuned in on an ordinary broadcast set, variometer tuned, by simply disconnecting the earth wire. 2 O O (Two, Oh, Oh) was admittedly a fairly powerful station, but amateurs working on about 150-180 metres could also be heard quite easily on either of these sets. I do not think that 90 metres is by any means the limit for a crystal set, and probably some of your readers have got down considerable lower than this.

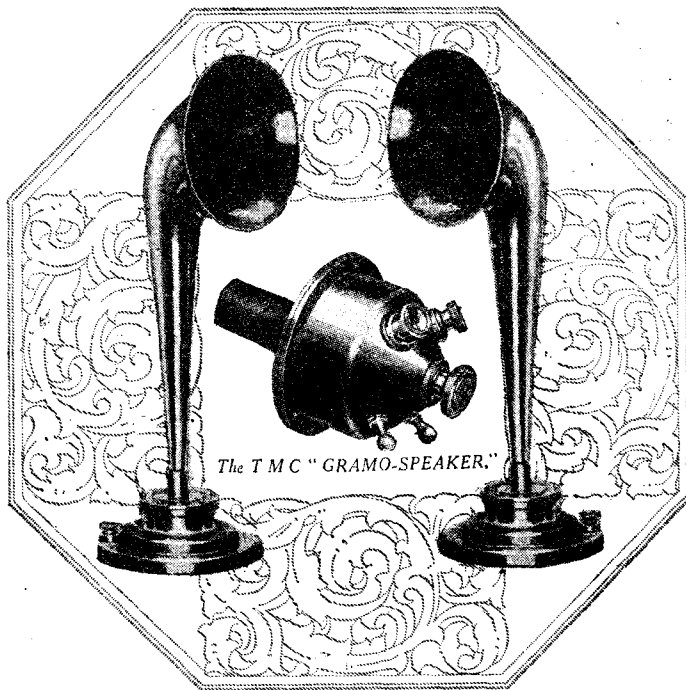
If "P. R. T." or any other readers desire further information, I shall be very pleased to hear from them.

Yours faithfully,

F. K. BRITAIN.

16, Puller Road, Barnet, Herts.

JUST LISTEN!



The T.M.C. "GRAMO-SPEAKER."

THE most critical test of any Loud-Speaker is to listen—not look.

The tone of the T.M.C. Junior will surprise you. Mellow, round, silver-toned music—full-bodied, clear, natural speech is what the T.M.C. Junior gives. The softest whisper is clear and audible—the full volume of a symphony Orchestra comes through without any blast or throatiness. So reasonably priced, too. Now only 30/-.

Another popular member of the T.M.C. Loud-Speaker family is the Minor. A fine little fellow with a rich, melodious voice. The T.M.C. Minor is inexpensive. Price 17/6.

Now comes the baby of the T.M.C. family—the Gramo-Speaker. This splendid unit will instantly transform your gramophone into a Loud-Speaker of highest merits. The Gramo-Speaker is mechanically sound—not an adapted earpiece, and it costs but 13/6.



The T.M.C. "MINOR."

Go to your dealer—ask to hear them, then take your choice.

We invite comparison.

TMC

Telephone Manufacturing Co. Ltd.
HOLLINGSWORTH WORKS WEST DULWICH, S.E. 21

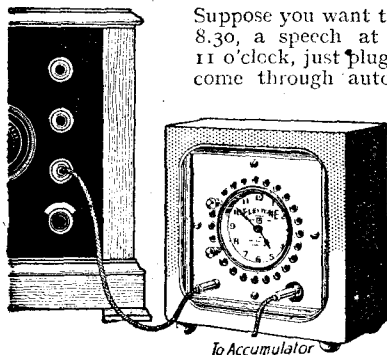
An Ideal Xmas Gift

What more acceptable than ELECTONE? Beautifully finished in polished mahogany or oak, it is a handsome reliable timepiece and, of course, so much more.

ELECTONE

AUTOMATIC PROGRAMME SELECTOR

AUTOMATICALLY SWITCHES ON YOUR SET FOR THE ITEMS YOU WISH TO HEAR AND SWITCHES OFF WHEN OVER. It consumes no current as it operates by clockwork. Saves battery consumption and valves.



Suppose you want to hear a concert from 7.30 to 8.30, a speech at 9.30, and dance music at 11 o'clock, just plug in at those times and they come through automatically. When the final item is over, ELECTONE automatically switches off the set for the night.

PRICE 27/6

Stocked by:
CATESBYS
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HARRODS
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If any difficulty in obtaining, write direct to:

FREDK. J. GORDON & Co., Ltd., 92, CHARLOTTE ST., LONDON, W.1.
Phone: Museum 5189.

THIS IS THE VERNI-NOB!

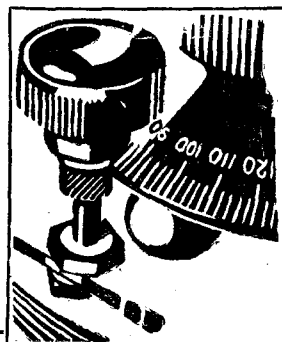
PRICE

6d.

From all dealers.
By post 7½d.

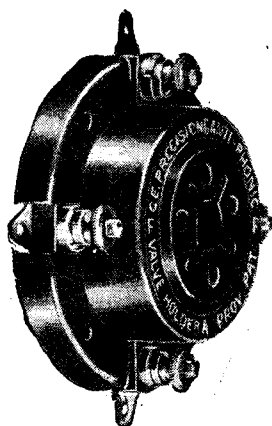
Fitted in a
few moments.

The
M.A.P.
Company,
246, Great Lister Street,
BIRMINGHAM.



The Verni-Nob does all the work of a Vernier attachment or Vernier dial and increases the selectivity of your set.

Positive drive—No back-lash.
10 to 1 reduction with 3" dial.
16 to 1 reduction with 4" dial.
Over 8,000 were sold during the Wireless Exhibition at Olympia!



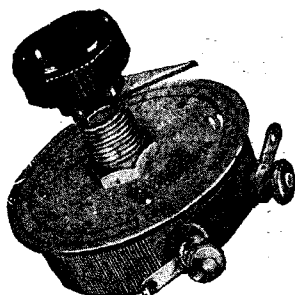
OUR latest production, the C.E. PRECISION FLOATING VALVE HOLDER, shows great improvements upon others. By its use, the distortion due to vibrations transmitted to valve filaments is entirely eliminated and a receiver fitted with it acquires a perfectly clear background which facilitates the reception of distant stations. Of very low capacity and entirely non-microphonic, the C.E. PRECISION FLOATING VALVE HOLDER is ideal for its purpose. Made from Bakelite and fitted with soldering tags and terminals.

2/3 each.

C.E. PRECISION RHEOSTATS AND POTENTIOMETERS have so frequently been specified by the Wireless Press that they need little description. The special care taken in their production ensures a perfectly smooth and silent action. Bakelite formers; silvered dials; fitted with soldering tags and terminals.

7 and 15 ohms - 2/9 each
30 and 50 ohms - 3/- each
Dual Rheostats & Potentiometers - 3/9 each

FOR UTMOST
C.E. PRECISION
EFFICIENCY



C. EDE & CO., LTD., BYFLEET, SURREY

Telephone: Byfleet 226.

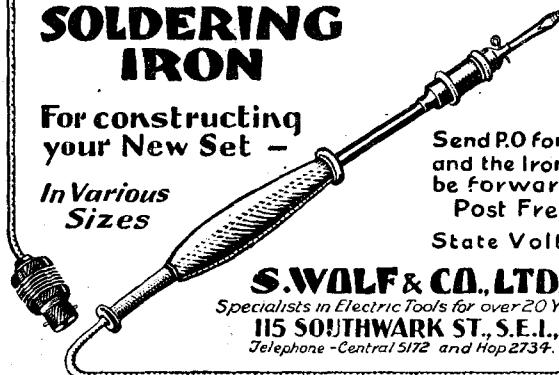
Telegrams: "Ceprecise, Byfleet."

ELECTRIC SOLDERING IRON

For constructing
your New Set -

In Various
Sizes

Send P.O. for 10/-
and the Iron will
be forwarded
Post Free
State Voltage



S. WOLF & CO., LTD.

Specialists in Electric Tools for over 20 Years
115 SOUTHWARK ST., S.E.1.
Telephone - Central 5172 and Hop 2734.

BECOL

Registered Trade Mark.

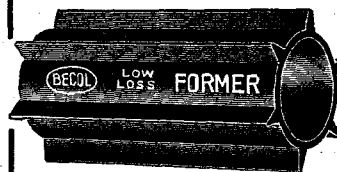
Makers of the
ORIGINAL world-famous
BECOL LOW LOSS FORMER

As used in sets that took the first four prizes at the 1926 "Manchester Evening Chronicle" Wireless Exhibition and the set that won the Gold Medal at the 1926 Amsterdam Exhibition.

Notice:—Do not be put off with an imitation. Ask for BECOL and use the Former with a reputation.

Size: 3 inches diameter to outside of wings. Prices:
6 inch lengths 3/- (Postage 9d.)
4 inch lengths 2/- (Postage 6d.)
3 inch lengths 1 6 (Postage 6d.)
Up to 36 in. lengths.

Write for List "C."



Ebonite Rods, Tubes and Sheets. Panels guaranteed free from surface leakage.
THE BRITISH EBONITE Co., Ltd., Hanwell, London, W.7.

AN IMPROVISED LOUD SPEAKER

AT Christmas-time you are sure to want to "Let Your Friends Listen" (to quote the familiar Wireless Week slogan), and unless you possess a loud speaker they will have to take it in turns to listen with the headphones, which is apt to be rather annoying.

The simplest way out of the difficulty is to improvise a loud speaker, provided, of course, that your set is capable of giving signals of sufficient strength or that you can borrow an amplifier to enable it to do so.

You can make an improvised loud speaker quite easily out of three very simple components at a cost not exceeding sixpence. In addition to the ordinary headphones, the only parts required are a large sheet of thick, stiff paper and a cardboard tube about six inches long.

Artistic as well as Useful!

The paper may be what is known as "poster paper," which you can buy at most shops which sell artists' materials, at about fourpence per large sheet. As this is made in a wide range of colours, you can choose a shade that will harmonise pleasantly with the wallpaper, etc., and so make the loud speaker quite artistic and ornamental as well as useful.

The diameter of the cardboard tube should be just a shade larger than that of the ebonite ear-caps on your 'phones, so that the latter will fit inside the ends of the tube. In all probability you will be able to find an old carton of some description which will meet these requirements.

Cut a strip of the coloured paper measuring six inches in width and the length of the sheet, and roll this round the tube until the latter is completely covered, finishing it off by gumming down the edge of the paper. When the gum is dry, cut a hole in the side of the tube, measuring exactly one inch in diameter.

How to Use it.

The horn is formed out of the remainder of the sheet of coloured paper by rolling it into a sugar-bag shape. The mouth of the horn may be almost any convenient size, but it must taper down to a diameter of exactly one inch at the narrow end. The paper must be held in place by gumming it along the edges. The top of the horn should afterwards be trimmed carefully with a sharp pair of scissors so that the edge is neat and even.

The narrow end of the horn should then be pressed firmly into the one-inch hole in the side of the tube. If you find it has a tendency to wobble, you can make it more secure by running a little sealing-wax round the joint. The improvised "L. S." is then complete and ready for use.

Connect a pair of headphones to your set, and tune the signals up to maximum strength in the usual way. In order to

(Continued on next page.)

High Recommendation by "Popular Wireless."

TUNGSTONE

Pure Lead Grid

Accumulator

Entirely of British Origin and Workmanship.

Editor writes in issue of June 12th, 1926:—

AMATEURS who are fortunate enough to own motor-cars need not worry about accumulator charging during the summer. Current can be tapped off from the dashboard to supply portable sets, while, if a "Tungstone" accumulator is used, a cell or two can be removed for running a "household" receiver when the car is in the garage. Better still, extra cells can be purchased and interchanged with those on the "auto." During summer months the car accumulator is not called upon to do much work, so the foregoing is an economical proposition. The "Tungstone" is eminently suitable for the purpose, as its cells can be detached with the greatest of ease. As a matter of fact, the plates themselves can be removed from an individual cell in a few minutes. And this is but one of the many unique features of the Tungstone Accumulator. Its design throughout, from the construction and composition of its plates to its patent "Vislok" terminal locknuts, is a triumph of thoughtful attention to both details as well as essentials.

We have had a 6-volt "Tungstone" in use on a car for a period of about six-months, and six months, moreover, of mainly hard winter work. The self-starter must have been used thousands of times, frequently on very cold mornings, and on one occasion the car was driven a distance of over 100 yards on the starter motor. Additionally, the accumulator has been used for wireless work as well, and yet, when recently we examined its plates, no signs of deterioration were in evidence. Our previous accumulator accumulated a deposit of "mud" half an inch in thickness after a similar period of not quite such hard usage, but the "Tungstone" did not need washing out. It is still in commission and no doubt will remain at work for many years.

We have not sufficient space at our disposal to describe these products in the detail they deserve.

TUNGSTONE High Tension 60 Volt Battery 3 a.h. is sold in the United Kingdom on monthly payments over extended period. Apply for particulars. Further interesting information on points of this advertisement are to be found on pages 58, 59, and 67 to 73 of the Illustrated Booklet "Photography tells the Story" which will be sent free on application to the—

T.A.55

TUNGSTONE ACCUMULATOR CO., LTD.,

St. Bride's House, Salisbury Square, Fleet Street, London E.C.4.

PATENTS, TRADE MARKS.

Inventions Advice Handbook & Consultations FREE.—B. T. KING, C.I.M.B., Regd. Patent Agent (G.B., U.S. & Canada), 146a, Queen Victoria Street, London, E.C.4.

40 years' references. Phone: Cent 682

Real UKULELES



REDUCED PRICE 10/-

Guaranteed 12 mths. Complete with and Lightning Tutor.

POST FREE. SEND TO-DAY.

Prepare for Xmas and learn this melodious Jazz instrument in one day. Entertain your friends and make your song and dance parties go with a swing. Outfit includes handsome silver-toned instrument, case, plectrum and speedy self-tutor. No musical knowledge necessary. Vaudvill Theatre, London, W.C. "Real Ukuleles and Jazz S.T. I think they are wonderful value."—ROBERT HALE.

Hand & J. Melly, 43, Highgate Hill, London, N.19.

"GREEN DRAGON" DIAPHRAGM PAPER

40" x 6", 1/6 per roll.

As reviewed in "Popular Wireless," 23rd Oct., 1926, p. 442. F. J. EASTOE, 29, Prince's Parade, LONDON, N.3

REPAIRS

Headphones, Loudspeakers, and Transformers re-wound & reconditioned equal to new.

AN UNSOLICITED TESTIMONIAL

"Thanks to the excellent manner in which it was reconditioned, the results achieved have been astounding. It is very gratifying to find a firm that really turns out a first-class job, as I have had very disappointing experiences with firms who have advertised as experts, and whose workmanship has been far from good."

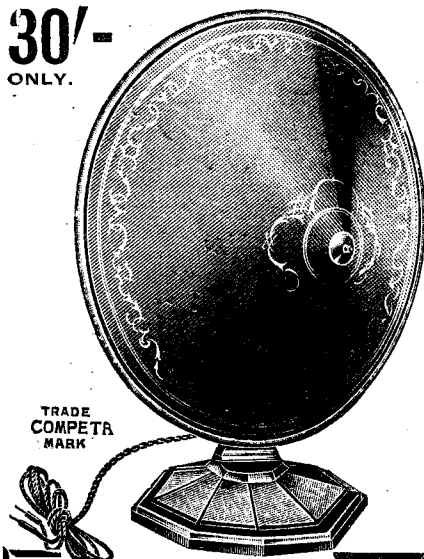
Varley Magnet Co.,
Repairs Dept.,
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S.E.18.

Proprietors,
Oliver Fell
Control,
Ltd.



The Gift for Xmas!!!

30/-
ONLY.



Ahead of all Competitors TRUE REPRODUCTION

12 in. Cone. Adjustable diaphragm. Handsome appearance. Crystalline brown and fine gold border design.

A remarkable instrument in every way.
SPLENDID VALUE for 30/- only.
Including extension cord. Post 1/- extra.

**A. F. BULGIN & CO., 9-10-11, Cursitor St.,
Chancery Lane, LONDON, E.C.4.**

Pure Ad.

WET H.T. BATTERIES

BUY BRITISH. Complete Units 3/6 per doz. All goods BRITISH MADE BY BRITISH LABOUR. Jars 1/3, Zincs 1/6, Sacs 1/6 per doz. Carriage and Packing extra. Trade inquiries invited. — **Demon Battery Co., 59, Badlis Rd., Walthamstow, E.17**

RADIO

Inches

7 x 5.1/2

7 x 6.1/8

8 x 6.1/4

10 x 8.2/1

10 x 9.2/4

12 x 10.3/4

14 x 12.4/-

REGISTERED

TRADE MARK

PANELS

Inches

6 x 6.1/4

8 x 5.1/2

9 x 6.1/7

11 x 8.2/8

12 x 8.2/8

12 x 9.2/10

14 x 10.3/5

2 in. thick

Post Free.

Money back guarantee that each and all Panels are free from surface leakage. Megger test Infinitely.

Callers cut any size. Quotations by post, or 'phone Clerkenwell 7853. Samples and prices post free to the Trade.

CROXSONIA CO., 10, South St., MOORGATE, E.C.2

EASY PAYMENTS

**LOUD-SPEAKERS, HEADPHONES,
H.T. ACCUMULATORS.** Anything Wireless.

Send a list of the parts you are requiring, and we will send you a quotation on monthly payments.

**H. W. HOLMES, 29, FOLEY STREET,
Phone Museum 1414. Gt. Portland St., W.1**

JARS, Waxed, ZINCS, SACS

1/6 DOZ. 1/- DOZ. 1/6 DOZ.
For making Wet H.T. Batteries, post free on 3 doz. or over. Packed in special carton with division for each cell. This can be used as a container for the battery when made up. Send 6d. for sample complete unit, particulars and instructions.

**SPENCER'S STORES, LTD.,
4-5, Masons Avenue, Coleman Street, London, E.C.2.
'Phone: London Wall 2292. (Nr. Bank).**

AN IMPROVED LOUD SPEAKER.

(Continued from previous page.)

change over to the loud speaker, simply push the cap of one earpiece into each end of the tube. In this way, of course, both earpieces are utilised, while at the same time the 'phones can be instantly removed and used in the ordinary way any time you wish to do so.

The simplest way to support the loud speaker is to place the whole arrangement on the table and allow the horn to rest on the head-bands of the 'phones. The horn can then be tilted at almost any angle by merely adjusting the head-bands, provided, of course, that these are adjustable on the usual "scissors" principle.

If it is used in conjunction with a good pair of 'phones and a suitable receiving set, this improvised loud speaker will generally be found to give surprisingly good results, considering its extremely low cost and ease of construction.

Give Books This Year!

There is nothing that will give the children greater pleasure at Christmas or Birthday than a copy of their favourite picture and story Annual. Such gifts are of lasting popularity—they will be read again and again. Among the many excellent gift-books available this winter, none are more attractive than those which are issued in connection with the popular coloured papers which delight boys and girls every week. Those famous characters, Tiger Tim and the Bruin Boys, who play the leading part in "Rainbow" and "Tiger Tim's Weekly," appear in **PLAYBOX ANNUAL** and **TIGER TIM'S ANNUAL**, both of which are published at 6/-.

Children who read "Playtime" will find all their favourites in the new **PLAYTIME ANNUAL** (6/-), and all the little people from "Puck," appear in the **PUCK ANNUAL** (6/-).

All these annuals are profusely illustrated, contain many pages and plates in colour, and are packed with entertaining stories, jokes, riddles, poems, etc. They can be obtained from booksellers and newsagents everywhere.

SPUN COPPER SCREENS—

With six-pin ebonite base with terminals, standard fitting, accurate workmanship, for ALL screened coil circuits. Complete, 9/-. Copper screen, drilled, 5/-. Six-pin ebonite base with terminals, 4/6. Special ebonite base, with six pins and terms, for monodial, etc., 2/6. Immediate delivery. Post free. Cross P.O.'s Barclays. Trade enquiries invited.

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SPECIAL NOTE

All communications concerning advertising in "Popular Wireless," "Modern Wireless," and "The Wireless Constructor," must be sent to

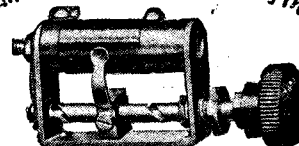
JOHN H. LILE Ltd.

4, LUDGATE CIRCUS, London, E.C.4.
(Phone: CITY 7261)

and NOT to the Editorial or Publishing Offices.

THE FINEST VALVE CONTROL

Can be assured by using only the



NEW T.C.B. GUARANTEED RESISTANCE

(PATENT No. 225,132)

Perfect contact; smooth and dead silent in operation; perfect insulation; positive stops for "Off" and "Full On" positions; a travel from "Off" to "On" in two turns of the knob; easy to fit; occupies minimum panel space (illustration is three-fifths actual size).

Every one carries our written guarantee to replace it free if the slightest defect be found within three months from date of purchase.

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| Resistance 6, 13, or 30 ohms | 2s. 6d. |
| Resistance 50 ohms | 3s. 0d. |
| Potentiometer 300 ohms | 3s. 6d. |

BRITISH THROUGHOUT

Of all dealers or direct, post free, from the sole manufacturers. If ordering direct, state whether one or two hole fixing is desired.

Descriptive folder on request.

Wavio Ltd

DEPT. P., QUEEN STREET, HITCHIN.

JUST THE THING!!

What better present could you buy yourself or your friends than our **AUTOMATIC CONTROL APPARATUS?**

It consists of an Alarm Clock fitted with our famous Attachment, with which you may start or stop your Wireless Set automatically at any time you like to set the alarm to operate. **COMPLETE APPARATUS** - 7/9 post free. **ATTACHMENT ONLY** (will fit any ordinary alarm clock), 2/9 post free, with full instructions. Further particulars free. Order early from—

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For every Constructor.

Estimates to your OWN sizes and **LISTS FREE.**
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WHY WASTE MONEY?

Let us RE-MAKE your old ones as good or **BETTER** than NEW D.E. 4/6 ea. Power 8 - ea. All work thoroughly **TESTED, GUARANTEED** and promptly dispatched by Post C.O.D.
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Headphones and loudspeakers rewound and remagnetized H.F. and L.F. Transformers rewound and repaired **EQUAL TO NEW** by skilled mechanics on the latest automatic coil winding machines.

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TRADE ENQUIRIES SOLICITED.**

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Transformers, Phones, Loudspeakers, Rewound and Repaired to **Maximum Efficiency.** All One Price 4/- each. Don't discard if burnt out. All work guaranteed for 12 months. Write for trade terms. **TRANSFORM CO., 115, LINKS RD., TOTTING, LONDON, S.W.17**

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Resin-Cored Radio Solder.

Guaranteed Non-Corrosive

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Used exclusively by all Telephone Manufacturers, Government Departments, etc. No Flux required. Makes a perfect joint. Low melting point. Eliminates messy Flux.



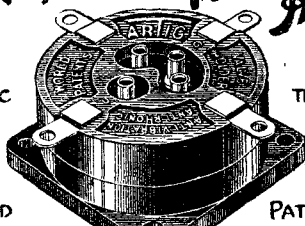
The Safe Solder for Radio and Electrical Work.

1/- Per Carton. Obtainable from Leading Stores, Electricians, Radio Dealers, Ironmongers, or Post Free direct from.

W. H. AGAR, 19, Whitecross Place, Wilson Street, LONDON, E.C.2

The Master Non-Vibratory Valve Holder

ANTI-
-MICROPHONIC
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SPRUNG - YET
THERE ARE NO
SPRINGS OR
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SUSPENSION
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The Artic Valve Holder represents a real step forward in valve-holder design at a small extra cost, a De Luxe Holder giving results obtainable in no other type.

Used in De Luxe 2 and Spider 3, and recommended by "Popular Wireless" to all its readers.

The Artic suspension is used by the Admiralty and all large Industrial Concerns for preventing the destruction of metallic filaments through vibration and shock. What better recommendation can be had than that of experts who have tested all devices?

ORDER NOW—DON'T DELAY!

THE ULTRA
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HOLDER



FROM YOUR DEALER
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Use one of these to get them—

ELSTREE SOLODYNE with LEWCOS COILS
ALL BRITISH SIX with LEWCOS COILS
EVERY MAN FOUR
THE MONODIAL
IGRANIC SUPERHETRODYNE

Complete finished Receiver in Mahogany, Oak or Walnut Cabinets or parts only for home construction.

Cut out the WORRY

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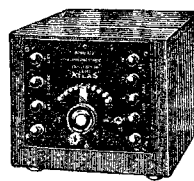
Install one of

"ATLAS"

"B" BATTERY ELIMINATORS

and lead the way to Brighter Radio

Models for A.C.
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Variable Vol-
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Upkeep negligi-
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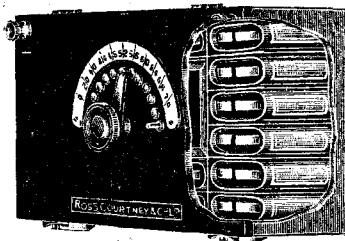
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every instrument.

We make them good—Good judges make them famous

Manufacturers of the famous "Atlas" Plug-in Coils and Fixed and Variable Condensers; also sole manufacturers of the Super Selective Reactor Formers.

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DRY BATTERY BOX WITH GRADUATED SWITCH.



USE ORDINARY DRY
FLASH LAMP CELLS
AND MAINTAIN YOUR
H.T. AT EFFICIENT
STRENGTH AT LOW
COST.

NO WANDER PLUGS.
FIND THE REQUIRED
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TURNING THE KNOB.

"HIGHTENSWITCH" Battery Box.

Price 25/- each. Post Free.

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"TROMBA" H.T. UNITS

are not the CHEAPEST on the market, they are the BEST! Constructed of finest quality components, "Creeping" of salts entirely eliminated. The Sacs for these units are specially made to give a constant current, and last indefinitely. Very thick zines are used, ensuring long life. Made in small and large capacities, suitable for power valves. Large, 6/10 doz.; small, 5/5 doz. Sample unit and large capacity Sac, post free, 1/-. Foreign Orders, 1/6. Also in 60 v., 80 v., & 100 v. batteries in mahogany cases with glass covers. Send to-day for free descriptive folders, etc.



TROMBA ELECTRICAL
COMPANY,

17, WHITE HART LANE, TOTTENHAM, N.17



Christmas—

*How will you
spend it?*

JUST sitting in front of the fire, listening in, snug and happy. It's something to look forward to as long as you know the Radio will be in perfect order. Here's a suggestion—invest in a TANGENT H.T. Battery Eliminator and your Radio will not let you down. Give yourself one for a Christmas present. Absolutely silent in operation. Ample output for the largest receiving set.

Price complete in metal case with connecting plate - - **£7-15-0**



LONDON: 25 Victoria Street, S.W.1.
NEWCASTLE/TYNE: TANGENT House, Blackett Street.

**GENT & CO. Ltd., Faraday Works,
LEICESTER.**

HEARING THROUGH THE HANDS.

By J. F. C.

A MOST noteworthy series of experiments has recently been conducted in one of the foremost American colleges. Essentially this series of experiments has comprised the practical part of an investigation which was started with the object of ascertaining to what extent radio signals can be received by deaf persons.

Peculiar Effects.

One or two of these experiments are interesting enough to be repeated by the average listener. It is stated that a person wearing an ordinary pair of headphones was able to convey the received radio signals to a non-listener merely by lightly shaking hands with the latter individual, and, furthermore, that this individual was able to pass on the signals to still another person by making a similar light hand contact with him. Thus the signals received by one individual wearing a pair of 'phones were passed on to two more individuals.

Working on this apparently chance discovery, the investigators have been able to show that this effect, while being comparatively rare in the case of normal persons, is fairly common in deaf or partially deaf individuals, and, therefore, that an almost totally deaf person may have radio signals conveyed to him in this novel and strange manner.

It is very possible that this effect may be able to occur with some peculiarly sensitive individuals, and, in view of this fact, the reader may be encouraged to carry out a few similar experiments for himself.

Probable Explanation.

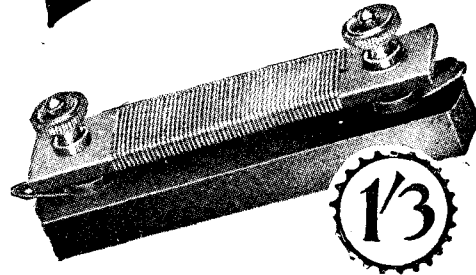
An explanation of the phenomenon has been based on the supposed presence of a number of unreal factors of inductance and capacity present in the human body. It seems more likely, however, that the effect is merely due to microphonic sound transference through the human body, particularly through the bones. That such a feat is possible is very easily proved by the following experiment.

Grip the stem or chain ring of a watch between the front teeth, at the same time tightly stopping up the ears with the fingers. The ticking of the watch will be very distinctly audible, thus proving that the sound has been transmitted to the ears not through the medium of the external air, but along the upper jaw and facial bones.

Further Experiments.

Another experiment in bodily sound transmission which will be of still more interest to the radio listener is the following:

Get another person to hold a single earpiece from a pair of headphones tightly



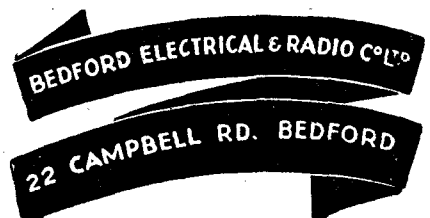
Efficient, Neat and Cheap

YOU can see from the illustration what a neat job this "Peerless" Fixed Resistor is. The base is solid insulation and the former a strong impregnated material that atmospheric conditions will not affect. The wire is wound evenly and firmly and terminals and soldering tags are fitted. One hole fixing. A very thoroughly assembled and finely finished unit in all.

OTHER BEDFORD PRODUCTS:

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| "Peerless" Dual Rheostat .. | 3/9 |
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| (already over half a million sold) | |
| "Peerless" Resicon Variable Condenser, from .. | 15/- to 18/- |
| (Dial and Vernier 2/6 extra) | |
| "Peerless" Master Switch .. | 2/9 |
| "Peerless" Valve Switch .. | 3/- |

From all good dealers or direct.



(Continued on page 960.)

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EDISWAN R.C. THREESOME R.C.R.

SET OF PARTS 2 Ediswan R.C. Units, 3 Valve Holders, 2 R.C.2 Valves, 1 P.V. 2 do., 3 Fil. Rheostats, 9v. Grid Bias, 67/6 '0005 Tuning Condenser. All Accumulators, Panels, L.T. Batteries stocked.

VOLTMETERS.

First-class meters for testing high and low tension. Double reading, dead beat, 10 6 and 7 11. Cheaper line, excellent value, 5 11. Post 6d.

Experimenter's 6-way Terminal Block... 1 3
Baseboard Valve Holders... 8d. 3 for 1 6
High-class Phone Boards... 1 6
Splendid Indoor Aerials D.C.C. 1/9, 1/11 Phos. BR. 4d.
Flydine Choke... 3 11
Centre Tapped Coil on ebonite former, B.B.C. 3 6
Post Extra.

"Tunewell"

LOW LOSS COILS (Tandco Patent)

Accurately calibrated. Standardised Polarity. 25, 35, 50, 75, 1 6 each. 30, 40, 60, 100, 1 8 each. 150, 2 3. (5XN 175, 2 6.) 200, 2 9. 250, 3 3. 300, 3 9. Post extra (5/- worth free).

CRYSTAL and ONE VALVE AMPLIFIER (L.F.)

In handsome polished cabinet, tested for use. 22/6. Post 1/6. (with D.E. valve 30/-) OR COMPLETE SET, valve, H.T., L.T. units, aerial equipment, 5XX coil, 45/11. Post 2/-.

"SUPER ONE" ONE VALVE RECEIVER. (will also work Loud Speaker) A WONDERFUL INSTRUMENT

In American Type Cabinet, all parts enclosed complete with Dullemitter Valve, 1 Pair 4000 ohms Headphones, Tuning Coils, H.T. and L.T. Batteries, Aerial Equipment. Tax Paid. £3 - 3 - 0 Post 2/6.

EDISWAN VALVES

R.C.2 14/- ea. P.V.2 18/6. R.C. Units 7/- ea. Post 6d. OTHER PARTS AVAILABLE. See top of column.

VERNIER DIALS.

Formo 6-, Indigraph (Igranic) 7/6, Detex 5/9, Detex Vermo 4/6, Ormond 10/-, etc., etc. Igranic 4 in. Dial and Knob 2/6, KAY RAY 2/-, Triolite 2 3, Standard Ebonite Dials 10d. and 1/-.

If you want a REAL CRYSTAL Try "WYRAY" 1/6 The Crystal with the power of a valve.

Sets of Parts for

A TWO-VALVE D. & L.F. CIRCUIT.

L.F. Transformer, 2 Valve Holders, Fil. Rheostat, 2-way Coil Holder, square wire, Variable Condenser and Dial, '0003 Fixed and Grid Leak, Terminals and WIRING DIAGRAM. Post free 21/-.

PANELS, BOXES, ETC., STOCKED.

H.F. TRANSFORMERS

Magnum 7/-, B. Lowe 9/-, McML 10/-.

Buy IGRANIC Parts

If you want the best.

Be sure you are at RAYMOND'S!

IGRANIC'S

BIG PRICE REDUCTIONS.

COMB INDUCTANCE COILS. 30, 2 9; 40, 2 9; 50, 2 9; 60, 3 1; 75, 3 3; 100, 3 6; 150, 3 9; 200, 4 4; 250, 4 6; 300, 4 9; 400, 5 6; 500, 7 7; 750, 9 0; 1,250, 14 4; 1,500, 16 1.

Indigraph Vernier Knob and Dial, 7/6. Microvern, 8/6. "E" Type L.F. Transformer, latest shrouded model 3 1, 15/-; 5 1, 16 1.

FRANCO - Midget Bal. Cond., 3 9. Panel Brackets, pair 1/-.

LISSEN - Lissensia 13/6. L.F. Transformer, 8/6. 35 ohms Rheostat, 2 6. H.F. or L.F. Choke, 10/-.

ARLEY - Andros, 7/6; 250, 10/-; 500, 12/6. H.P. Choke, 9/6, 12/6.

BEARD & FITCH (Successors). H.F. and L.F. Chokes, each 10/6. Midget Neut. Condenser 7/6. "Black" L.F. Transformer, 21/-.

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BENJAMIN - Battery Switch, 1/3. Valve Holder, 2 9. Grid Leak, 5/3. With Condenser and Leak, 7/-.

PEARLESS - 6 or 30 ohm Rheostat, 2 6. Fixed Resistors (State Valves), 1/3.

JACKSON BROS. (J.B.) S.L.F. '0005, 11/6; '0003, 10/6. 5/3. Vanos, 1 in. dial, Geared, Sq. Law, Twin Gang stocked.

ALL CIRCUITS, PARTS, COILS & SETS STOCKED.

FORMO Low Loss S.L.F. Condenser, '0003 or '0005, 9/-.

Formo L.F. shrouded, 10/6. Micro Dial, 6/-.

HEADPHONES, all 4,000 ohms N. & K. Standard Pattern, 7/11 pair. N. & K. Genuine, new light weight, 11/6, 13/6.

DR. NEPPER, 10/6 and 12/11. Telefunken, adjustable, genuine (20/- model), 14/11.

Brunet, 11/9, 12/11, 14/6. 3 models.

ERICSSON (Continental) E.V., 7/11 pr. (Post 6d.).

British Headphones: Brown's Featherweight, 20/-; Brown's A Type (Reed), 30/-; B.T.H. 15/-; Ebonite 20/-.

THORPE K4 VALVES, 5-pin... 9/6

D.E. -06, 5-pin... 14/6

WEST END DEPOT FOR "MAGNUM" (Burne-Jones) FINEST SCREENED COILS.

B.B.C. Aerial Coil, 5/6. Split Primary H.F. Transformer, with reaction, 7/6.

SS. H.F.T., 7/6. Reinartz 7/6. 5XX, above, 5/6. 7/6. 11/- Screen and 6-pin Base, 9/-.

FIXED CONDENSERS. Dabiller, '0001, 2, 3, 4, 5, each 2/6. '001, 2, 3, 4, 5, 6 each 3/-.

Grid Leak, 2/6. Edison Bell, '001, '0001, 2, 3, 4, 5, 1/-; '002, 3, 4, 5, 6, 1/6. '0003 and grid leak, 2/-.

McMichael with clips, '0001 (2), '0005 2/6 each. '001 to '006, 3/- each.

MONODIAL RECEIVER COMPONENTS £7 7 6. All as specified.

BURNE-JONES, LEWCOYS, PETO-SCOTT, POWYER LOWE COLVERN SCREENED COILS, BASES & SCREENS.

OUR NOTED 1-VALVE and CRYSTAL SET, in solid polished cabinet, complete with valves, phones, H.T. and L.T. Units, Aerial Equipment, Daventry Coil. Extraordinary Value, 45/11. Carriage 2/-.

ASTOUNDING 2 Valve AMPLIFIER in L.F. plates 25/11. Amplifiers in or complete handsome with valves, polished box, H.T. and L.T. 1 valve, 16/11. Units, 44/6. Carriage 1/6. Carriage 2/-.

ALL PREVIOUS LISTS CANCELLED. PRICES SUBJECT TO ALTERATION WITHOUT NOTICE

LOW LOSS SQUARE LAW

This variable Condenser is simply marvellous value. It cannot be equalled in price or quality.

'0003 .. 4/11 each
'0005 .. 4/11 each

By Post 5 11. With VERNIER 1/- extra.

L.F. TRANSFORMERS. Ferranti A.F.3, 25/-; A.F.4, 17/6; Eureka Concert, 25/-; 2nd Stage, 21/-; Baby 1st or 2nd, 15/-; Reflex, 15/-; Formo shrouded, 10/6; Success (Black), 21/-; Royal 20/-; Ormond newest model, 15/6; Waters' Supra, 10/6. Croix 5-1, 5-1, 4/6. Marconi '0001, all stages, 25/- each. C.A.V. 15/-; Pye, 22/6. Gambrell, 2 stages, 25/6. Ideal Junior, 18/6. R.L., 25/-.

Multi-Ratio, 25/-.

KAY RAY S.L.F. CONDENSERS

LATEST MODEL NOW READY. 6/11

Post 6d. set

'0003 .. 6/11 each
'0005 .. 6/11 each

With 4 in. dial 7/11

LOTS. - V. Holders, 2/3; with Terminals, 2 6. 2-way Coil Stand, 7/-, 8/-; 3-way, 10/6, 12/-.

VALVES. - Cosmos S.P.18, Red or Green, 14/-.

New Blue Spot, 14/-.

All Mullard, Ediswan, Osram, Marconi, Gossor, Bright, D.E. and Power, 8/-, 14/-, 18/6, 22/6, 24/6, 30/-, £2.

Mullard P.M. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

CHOKES. - Cosmos H.F., 6/6; Lissen H.F., 1 8. 10/- each; Success L.F. or H.F., 10/- each; Bowyer-Lowe H.F., with base, 9/-.

ORMOND SQUARE LAW LOW-LOSS. '0005, 9/6; '0003, 8/6 (1/6 each less no vernier).

Friction Geared, '0005, 15/-; '0003, 14/6; '00025, 13/6. Straight Line Frequency Friction Geared, '0005, 20/-; '00035, 19/6. S.L.F., '0005, 12/-; '00025, 11/-.

SQUAD, '0005, for Elstree Six, 16/11 each.

Ormond Friction Dial, 10/-.

Filament Rheostats Dual, 2/6; 6 ohms or 30 ohms 2, 4. Potentiometer, 400 ohms, 2/6.

L.F. Shrouded, latest model, 15/-.

RADIO MICRO VALVES. '06, 3-v., 6/11; 25, 2-v., 6/11; Power, 3, 8/6; Power, 1, 9/11. Power are 3-4 volts. Phillips 4 Electrode, 4-pin for Undyne, 8/11. Post 6d. each.

ACCUMULATORS. 2-v. 40, 7/11; 2-v. 60, 9/6; 2-v. 80, 12/6; 2-v. 100, 14/6; 4-v. 40, 13/11; 4-v. 60, 17/11; 4-v. 80, 26/6; 6-v. 60, 26/6; 6-v. 80, 35/6. ALSO another good make, 1/6 extra on each of above. Post 1/- each.

HART'S & OLDFHAM STOCKED GANG CONDENSERS, Dual '0005.

ORMOND, with dial, 32/-; CYLOND, no dial, 50/-.

Triple '0005. ORMOND, with dial, 40/-; CYLOND, no dial, 70/-.

IGRANIC, no dial, 75/-.

Grand Value in NON-MICROPHONIC VALVE HOLDERS. Board Mounting, 1/6.

COIL STANDS.

Lotus 2-way, 7/-; 3-way, 10/6 (extension handles extra). Polar 2-way, 6/-; 3-way, 9/6. Sterling Triple, 21/-.

KAY RAY, geared 2-way, 3/11; 3-way, geared, 6/11.

Penton 2-way, geared 6/-.

Imperial 2-way vernier knob, 6/-.

THIS MAGNIFICENT 2-VALVE SET (D. & L.F.) AS SHOWN, IN HANDSOME POLISHED AMERICAN TYPE CABINET, WITH 2 DULL Emitter Valves and COILS (MARCONI TAX PAID)

£3.5.0

Carr. and packing 3/6 extra. OR WITH VALVES, IGRANIC COILS, 103/6. H.T. L.T., AERIAL EQUIPMENTS, LEADS, AND 25/- LOUD SPEAKER, TAX PAID.

THE LOT £5.5.0

Carr. and packing 5/-.

PARTS IN STOCK FOR THE ELSTREE SIX, SOLODYNE, MEWLEW, ALSTREEFLX, 1927 FIVE AND ALL THE CHIEF CIRCUITS.

EXIDE H.T. ACCUMULATORS. 20-v. Unit, 15/- (Not sent by post).

VARIABLE CONDENSERS. - Polar Standard, 10/6.

Junior, 5/6 each. Bowyer-Lowe Popular, 10/6.

Igranic, 24/-; 21/-; Collinson's Low-Loss, 21/-; 20/-.

Utility, 8/6, 10/9. Vernier, 2/6 extra. Utility Low Loss, stocked. '0003 and '0005, J.B. (Jackson Bros.), Square Law, '001, 9/6; '0005, 8/-; '0003, 7/- (with vernier), each extra. Geared, '0005, 15/-; '0003, 13/-.

Low Loss, 10/6, 9/-.

ASHLEY JACKS & PLUGS. Fit panels 1 to 3 thick, one hole fixing. S.C.O., 1/3. S.C.C., 1/6. D.C., 1/9. F.S.C., 1/9. F.D.C., 2/3.

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Newey 2-way geared coil, standard, 6/-.

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Gambrell Neutrovernia, 5/6.

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BROWNIE No. 2. Latest model, 10/6. Complete with pair of high-class phones, 4,000 ohms, value 9/11.

Aerial wire, lead-in, Daventry Coil, the lot, 18/11.

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STAR COILS MOUNTED 35-1/3 50-1/6 75-1/9 100-2/ 150-2/3 200-2/6 250-2/6

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Scraw, 4d. doz. Plugs, 2d.

3d., 4d. pair 1d. 2 ft. D.C.C. Wire, 1 lb. reel, 20g. 9d., 22g. 10d., 24g. 11d., 26g. 1/-, 28g. 1/1.

Battery Boxes, with clips, covered, 1/6 each. 2/1; Metal, 3/9. Ebonite, 1/6; "A", cut while you wait.

3/16th is 1/4 sq. inch; 1/4 in. is 1/4 sq. inch. Stock sizes cheaper: 7 x 5, 1/3; 6 x 6, 1/3; 5 x 5, 1/3; 9 x 6, 1/11; 10 x 8, 3/-; 12 x 9, 4/-.

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3/11. Penton, Lotus, Polar, Newey stocked. Back or panel, W.L.L., 4/11.

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sections, 15 ft., 7/6; 20 ft. 10/-; and 30 ft., 14/-;
4 ft. 3 in. sections, 2 1/2 in. dia., 5/- each.
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range on 6 volts, any wave-length, 12/6 each.
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TRANSFORMERS, 5/- each; smaller size, 4/6 each.
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formers, for power 5 to 1 or 3 to 1, 7/8 each;
Polar Intervalve, 10/-; G.R.C. and Maxtone, 8/-.
CONDENSERS.—025 Mansbridge, 6d. each; '001
Mica, unmounted, 6d.; also '002, 7d. each;
Marconi Variable, 6/-; '002 High Tension, 1,000
volts, 5/- each; '001, '002, '003, '005, 6d. each;
Ex W.D. '03, 6d.; 2 mfd., 2/6. New, 25 mfd. and
50 mfd., 2/6; 1 mfd., 3/3; 2 mfd., 4/3; 4 mfd., 1/6;
10 mfd., 15/-; 1000 v. 1 mfd., 17/6; 2000 v. 2 mfd., 27/6.
NEUTRODYNE CONDENSERS, variable, '000,025,
minimum cap. '000002 U.F., max. cap. '0025
U.F., 3/6. **MICRO-CONDENSER**, '00004, 5/6.
LOW LOSS INDUCTANCE, 10 taps to plugs, 5/-.
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10/-; 3-gang Polarencio, 12/-, Polarencio, '0003, 4/6.
WAVEMETERS of all types and ranges, Townsend
Broadcast, reduced to 35/-. All guaranteed.
CORDS.—Twin for single 'phone or battery, 1/-.
Brown cords, double, with 2-pin plug, 1/6. With jack
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CHOKES.—1,000 ohms ironclad, 40 s.w.g. silk, 1/6,
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Chokes for H.T. transmitting, Smoother, &c.,
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For your H.T. supply from d.c. mains. Perfect
control, 40 to 120 volts for Plate, 3 taps, 35/-.
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Cost 48. Sale, 25. Six only.
Get the best out of your set. The Multi-Range **DIXON**
ULTRA ONE-METER enables you to correct faults
in wireless. For real efficiency One Meters are
practically indispensable, 50/-. Multipliers 6/6.
MINIATURE PANEL METERS.—Voltmeters, 0-3,
0-6 and 0-10 volts. Price 7/6 each. Ammeters—
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meters, 0-20, 0-30 and 0-40 M.A. Price 10/3 each.
Combined Voltmeters, 0-6 and 0-120 volts. 11/6.
VALVES.—Microsax D.E. '06 9/-, Transmitting
A.T. 40 new Osram and Cossor, 12/6; 250-watt do.
40/-; Cunningham Power, 17/6. Rectifying, 8/6.
"STAR" MOUNTED COILS, centre tapped, 25,
1/6; 35, 1/6; 50, 1/9; 75, 2/-; 100, 2/3; 150,
2/9; 175, 3/-; 200, 3/-.
MOUNTED COILS.—No. 25, 35, 50, each 2/-; 75,
2/6; 100, 3/-; 150, 3/6; 200, 250, 300, each 4/-.
MOUNTED LOCOSS,—25, 1/2; 35, 1/4; 50, 1/3;
75, 1/11; 100, 2/-; 150, 2/6; 200, 2/10; 250, 3/-;
300, 3/3; 400, 3/6.
WESTERN ELECTRIC LOUD SPEAKER, 17/6.
EBONITE STANDS, 2-way, 2/11, 3/3, 3/6.
Ebonite plugs, extra quality, 7d. Plated, 3 pair.
COIL HOLDERS, 2-WAY—Lotus, 7/-; Dixon,
geared, 6/-; Polar 2-coil, 4/6; Newey, 6/6;
Woodall, 10/6; Reliability, geared, 3/6; good
quality, 2/6; 'ernier Friction Drive Type, 3/6;
Single Moving Holder, 1/9. For inside baseboard
mounting, with 6-in. handle, two-way, 7/-; 3-
way, 8/-.
BATTERY BOXES, 63-v.—Metal, take 14 batteries,
3/6. Fitted Clips, Battery Testers, 4d. Bull's-
eye Bulbs, 3d.; 6 for 1/3. Torches all sizes.
H.T. BATTERIES.—Ever-ready, 66-v., 12/6; 103-v.,
21/-, L.T. for D.E. Valves, 7/6 and 9/-, Siemens
H.T., 60-v., 12/6. Hellensen's 60-v., 14/6. Various
1 1/2 D.E. Batteries, 1/6 to 3/6.
BATTERY CHARGERS, 100 or 200 volts D.C. or
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BUZZERS, 2/6, 3/-, and 3/6. With key and 'phone,
7/6. Signal sets, 22/6. **BOXES**. 1 1/4 in. by 10 in.
by 2 in., for storing coils, 2-hinge tops, 2/- Boxes
with plugs for H.T. Batteries, 5/-, 12 by 8 by 6 1/4
in., covered boxes, hinged lid and ebonite panel for
portables, 10/6. Brown's 2-relay cabinets, with fit-
tings, 5/-, Three-cell valve boxes, padded, 1/6 each.
CRYSTAL REFLEX CIRCUITS.—Marconi pattern for
panels, 2/6 set. Polar Semi-fixed, 2/-, Card Sets, 9d.
DETECTOR CATWHISKERS.—2 in box, 4d. pair.
700 G.P.O. 2-RANGE DETECTORS.—Ediswan,
G.E.C., etc. Brand new, 5/6 each. Siemens Cell
Testers, M.C., 15/-.
**1,000 VOLT GEARED DRIVE MEGGER DYNA-
MOS** for H.T. testing. Cost 430. Sale, 43 10s.
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DYNAMOS.—Charging 12 volt Lucas 8 amp., 50/-;
Crompton 30 volt 15 amps., 25. M.C. 220 volt
A.C. to 8 volt 1 1/2 amp. D.C., 70/-; 1,000 volt,
23 10s. All sizes in stock.
PRECISION INSTRUMENTS — ONE-METERS.
—ONE-VALVE TO SIX-VALVE RECEIVERS—
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HEARING THROUGH THE HANDS.

(Continued from page 958.)

up against the jaw or cheek bone, and at the same time place the two index fingers tightly in the ears. The signals from the 'phone will be distinctly audible under these conditions, particularly if they are of good strength in the 'phone itself. Here again we are faced with the phenomenon of sound transmission through the human body.

It is thus, working on these basic principles, that certain investigators have shown that radio signals can be transmitted not only for considerable distances through one individual's body, but also from person to person by light bodily contact only. Whether any important application of this fact will be forthcoming, particularly in the matter of helping the deaf to hear radio signals, remains to be seen. Nevertheless the whole subject is of interest, as a few experiments conducted on the lines mentioned above will prove.

A MARGIN OF SAFETY.

Do you remember Scrooge of "Christmas Carol" fame? If you do you will recollect that one night he went home fully anticipating that he would find his front door had a knocker, only to discover, subsequently, that the excrescence was merely somebody's face.

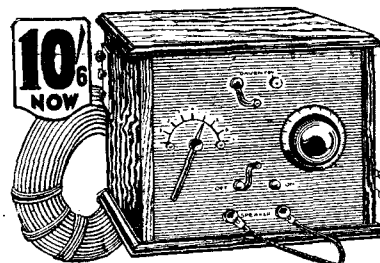
The moral is, obviously, that things are not always what they seem. Therefore, we must always be prepared for the worst and not the best. If your set gives nice loud-speaker results from the local station when everything is "just so," what will happen when something is not "quite so"? Naturally, the receiver must not be expected to give better results, although it would not be the first time if the effect of doing something supposed to be wrong did improve matters.

Capable of More.

However, at Christmas-time if at no other time, a really nice margin of safety is really essential. A motor-car engine is never kept running year in and year out at its maximum speed—it couldn't do it, anyway—so why should we expect our set to give of its best over long periods running "all out" all the time.

For many reasons your own set, the set you give somebody as a present, in fact, all sets, should be capable of doing just a little more than it is probable they will ever be asked to do. In that way lies reliability, purity and peace in the ether of space.

GRAVES

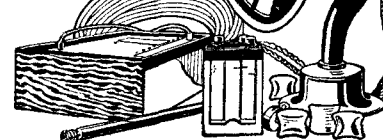
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LOUD SPEAKER BARGAIN.

This highly efficient 2-Valve Loud Speaker Set is the finest wireless value ever offered.

It gives a volume and quality of tone unattained by any instrument of a similar price and is the essence of simplicity. Fitted with coils covering all the British wave-lengths, including Daventry.

THE CABINET is of beautifully polished Oak, & all components are of the highest quality. Dull Emitter Valves with patent valve holders, &c.; H.T. Battery, 2-volt accumulator and complete Aerial Outfit. **LOUD SPEAKER** of exclusive design with unique magnetic system and improved mica diaphragm. Price £7:17:6

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Give a man something that he wants, something that he would otherwise buy himself, and he will value your token and your discrimination the more highly.

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All these are precision instruments designed and manufactured to the highest standards and as Christmas gifts show a clear expression of personal judgment and good taste. Their merits are well known to your wireless friends, to whom they will have a far greater appeal than the superfluous oddments so frequently regarded as tokens of remembrance.

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