POPULAR WIRELESS WEEKLY, JULY 5th, 1924. REGISTERED AT THE G.P.O AS A NEWSPAPER.

CONVERTING A SET TO THE "UNIDYNE" PRINCIPLE.

Popular Wireless

and Wireless Review

PRICE 3d. EVERY FRIDAY.

No. 110. Vol. V. July 5th, 1924.

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

Captain Eckersley, his wife and a favourite dog. (See special article inside, "Secrets of the B.B.C.," by "Ariel.")

SPECIAL FEATURES.

SECRETS OF THE B.B.C.

First of a New Series of Articles by "Ariel."

A Compact Crystal Receiver.
An Easily Made Variometer.

Mr. Marconi and Dr. Fleming.
Wireless in Australia.

OUR VISIT TO MANCHESTER.

FULL CONTINENTAL TELEPHONY TRANSMISSIONS.

POPULAR WIRELESS

AND WIRELESS REVIEW.

July 5th, 1924.] THE RADIO WEEKLY WITH THE LARGEST CIRCULATION. [Every Friday, Price 3d.

Technical Editor: G. V. DOWDING, Grad. I.E.E. | Editor: NORMAN EDWARDS, A.M.I.R.E., F.R.G.S. | Scientific Adviser: Sir OLIVER LODGE, F.R.S.

RADIO NOTES AND NEWS OF THE WEEK.

Ether Patrols.

ETHER patrols are being arranged by the Radio Society of Great Britain for the coming autumn session. 2 T O (Ipswich) and 5 Q V (Clacton) will be on point duty in the Eastern Counties, carefully "watching" the wave-bands. Both stations have already polished up their buttons ready for duty, and small boys who oscillate in their neighbourhood will do so entirely at their own risk.

* * *

A New Terror.

AMERICAN listeners are being asked to choose the most popular announcer "on the air," and thousands of votes are rolling in for the different candidates. A gold cup is the prize, and to assist voters in their choice the radio journals are publishing portraits of the announcers—not only as they appear now, but as they were as babies, and in every stage of their youth. British "Uncles" fear the craze will spread to this country, and one popular announcer is already trying to "corner" copies of the family portrait showing him as a baby sucking a big ring.

* * *

Chimes of the Times.

THE Malines carillon is at present the foremost in the world, but a still larger one is under construction in New York, which will comprise 53 bells. Perhaps we shall have the pleasure of hearing them one day, and in exchange let New York listen in to Big Ben · but just at present the X's are doing all the ringing.

* * *

Progress and Argentine.

ARGENTINE amateurs are going strong nowadays, and I see that signals from that country have been received by Mr. B. L. Stephenson, of Withington. It was a Buenos Aires amateur who recently helped to set up a world's record by talking for two hours with a New Zealand enthusiast across the 7,000 intervening miles.

* * *

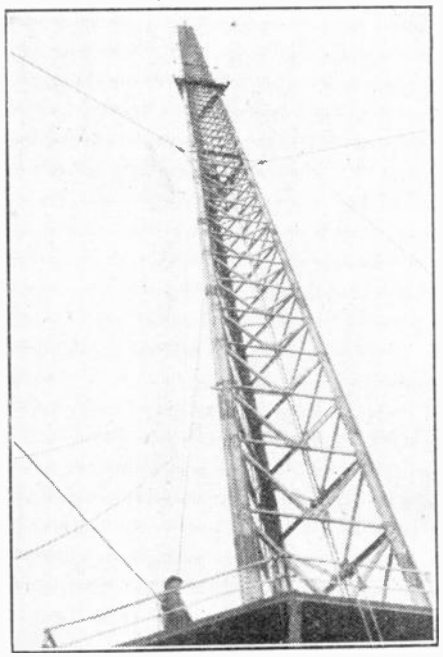
Mr. Arthur Burrows.

MR. ARTHUR BURROWS tells me that the famous Malines carilloneur, M. le Chevalier Jef. Denyn, will give a recital at the British Empire Exhibition on July 5th. This will be broadcast, via 2 L O, from the Vickers Research Hall Tower, where the bells are at present installed prior to shipment to their home in Canada.

* * *

Marrying by Radio.

IN Chicago a few days ago Mr. Wendall Hall, the popular radio star, was married before the microphone. He said he was so fond of the "Mike" that he'd like him to come to the wedding, so thousands who had heard his song, "The Little Girl in Chi," listened-in whilst the young lady in question became Mrs. Hall. Her husband's greatest radio hit was a song with the cheery title, "It ain't gonna rain no mo'," so everybody hopes that it keeps fine for the young couple.



One of the huge masts at the new Rugby Station.

The Innocent Offender.

I HEAR that one radio club in London has just solved a strange mystery. For several weeks reception on the club's aerial has been almost impossible, owing to a peculiar wiping-out by strong oscillation, so the committee had a hunt round for the offender. They eventually tracked him with frame aerials, and found it was one of their own unsuspecting members using a "Unidyne." He thought that without H.T. it could not cause interference, but after hearing it radiate he is wondering why he shouldn't try transmitting on it.

* * *

The New Licence.

WHEN your present licence expires—whether Interim, Constructor's, or ordinary Broadcast type—it will be replaced by one of the new type, costing 10/-. Applicants for new licences also will be supplied with this kind, and the doubts and difficulties surrounding the use of a home-made set are thus finally abolished.

A Sporting Offer.

IT was decidedly "sporty" of the B.B.C. to forgo the five shillings to which they were entitled upon 15/- licences up till the end of December next. They have shown both imagination and an appreciation of listeners' difficulties. I think it is up to us to admit that we are pleased, and to prove it by never, *never* oscillating.

* * *

Mr. Marconi's Discovery.

ONE of the Sunday papers says "Mr. Marconi has discovered a short-wave system. This seems to be just the thing to suit shingled hair." Nothing is known of what Mr. Marconi thought when this joke "bobbed" up.

* * *

The Theatre and King Canute.

THAT famous actress, Miss Sybil Thorndike, says that the theatrical boycott of broadcasting is foolish, and is doomed to failure, and everybody endorses this view except a few stalwarts. These worthies appear to be direct descendants of King Canute, whose attitude was very similar, until he carried out his famous investigations upon the damping properties of a wave-trap.

* * *

Wireless Bugle Calls.

A DUBLIN correspondent informs me that the bugle-calls referred to by "T. P. A." (Belfast) in our Radiotorial columns of June 21st, were sent out by 5 D C. This station belongs to Mr. Aked, "Kasauli," Devonshire Road, St. Anne's-on-Sea, and is regularly received every Sunday on a loud speaker in Dublin.

* * *

Brussels Wave-length.

A SLIGHT change has been made in the wave-length of the Brussels station, in order to reduce interference. Formerly 265 metres, it is now lowered to 262 metres, which will probably be permanently adopted as the Brussels wave-length.

* * *

Flats and Sharps.

THE fact that indoor aerials are invisible from outside has been taken advantage of in a certain city where flat-dwellers are very numerous. I hear that dealers there have sold about 5,000 more wireless sets than there are licences. Clearly a case of flats and sharps!

* * *

Amateur Transmissions.

THE new regulations regarding transmitting licences seem decidedly harsh upon the genuine experimenter, but they may help to remedy the unauthorised

(*Continued on next page.*)

NOTES AND NEWS.

(*Continued from page 669.*)

transmitting which is now going on. The whole situation emphasises the need for strong local Radio societies, to defend the movement from its foes, without and within.

* * *

Wireless Advice.

HOLIDAY-MAKERS at Weymouth saw an exciting rescue from an aeroplane the other day. A wireless message had informed the pilot that his undercarriage appeared to be broken, and advised him to "land" in water rather than risk a crash. He came down 200 yards from Weymouth beach, where motor-boats dashed up and rescued the crew.

* * *

A Reminder.

THE recent collision between the "Metagama" and the "Clara Camus" reminds me of the "Empress of Ireland" disaster, when over 1,000 lives were lost in the St. Lawrence. With a gaping hole in her side the vessel heeled over and sank almost immediately, but there was just time for a splendid piece of wireless work. After the collision the vessel listed so terribly that the acid poured out from the accumulators and the emergency set literally fell upon the wireless operator—but not before he had broadcast details and the ship's position, and so saved nearly 500 lives.

* * *

Lost Property.

TWO wireless sets were amongst the unclaimed property in the Southern Railway's auction sale. It is not only listeners-in who are forgetful, for amongst the other lost articles there were three artificial legs, sixty sets of artificial teeth, and one ice-cream barrow!

* * *

Another Man-Hunt.

THE B.B.C. are organising another man-hunt, which should provide a lot of fun for listeners. Admirers and followers of Sherlock Holmes will be interested to know that Sir Arthur Conan Doyle, the creator of the great detective, will probably be listening-in to the transmissions and enjoying the chase.

* * *

Oscillating Crystals.

OSCILLATING crystals have been engaging a good deal of attention lately, and the subject is certainly a fascinating one. The Editor tells me that Dr. J. H. T. Roberts is now busy writing a very interesting article about them, which will appear in an early issue of POPULAR WIRELESS.

* * *

"Beaming."

THE new wireless beam scored a great success when Poldhu exchanged messages with Buenos Aires, 5,000 miles away. "It is the first Transatlantic beam success," says Mr. Marconi, "and in a few months' time it is highly probable that a telegraphic beam service will be established between Great Britain and South America." The Marconi Co.'s shareholders are said to be beaming at the prospect.

* * *

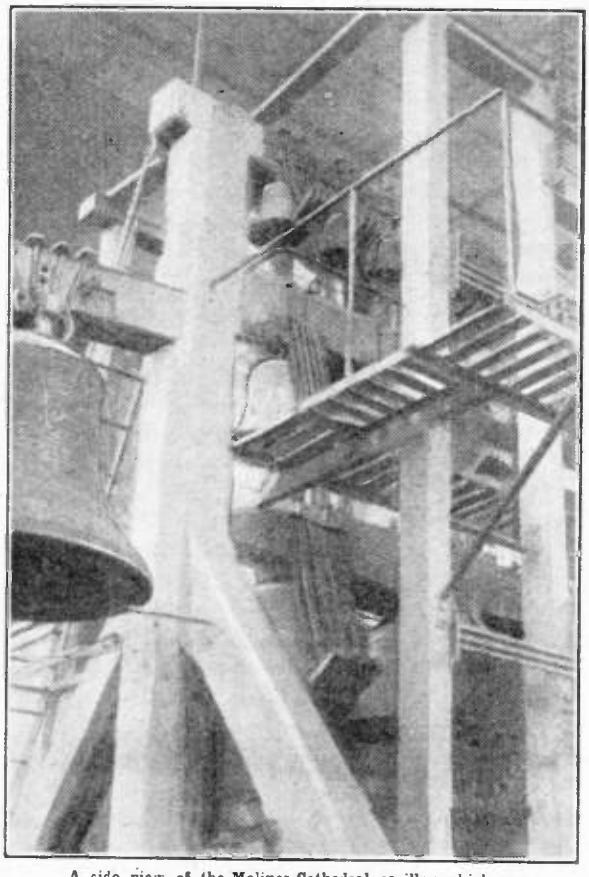
Swansea Relay.

SWANSEA has been added to the list of relay stations which the B.B.C. are to open at monthly intervals, or sooner if possible. After Leeds and Bradford the monthly programme will cover Hull, Nottingham, Stoke-on-Trent, Dundee and Swansea, in the order named.

* * *

2 L O to Move?

THE Broadcasting Board report that 2 L O must be moved from its present site, and a proposal to erect the station upon the roof of a well-known Oxford Street store has been in abeyance for some time. One objection has been that even if visitors are excluded, and the station is entirely separated from the store, its mere presence there may be considered as an advertisement, giving that store an advantage over its rivals.



A side view of the Malines Cathedral carillon which was broadcast by the B.B.C. recently.

* * *

South African Wireless.

BROADCASTING has spread to South Africa, and a new station has just been completed at Johannesburg. Its experimental test messages have been picked up in all parts of the Union, which is an uncommonly good performance considering the atmospheric conditions there.

* * *

"Double Dutch" Announcers.

THE Johannesburg broadcasting station is unique in one respect, all announcements being made in two languages. Both Dutch and English are widely spoken in South Africa, so for the benefit of all listeners the items are announced first in one language and then in the other.

* * *

A Better Word?

IN Britain we call members of the broadcasting audience "Listeners-in" or "Listeners," but in America they are known as "Hams," "Fans," or "Radio Bugs." The French have solved the problem by inventing the word "Sanfiliste," which may be freely translated as "Wirelessite."

* * *

The New Station.

LEEDS-BRADFORD twin relay station is due to open at 8 p.m. on July 8th, and, as is customary, the opening ceremony will be simultaneously broadcast to all stations. Both stations have been allotted the same call sign, 2 L B.

* * *

Independence Day.

CARDIFF station is celebrating America's Independence Day, to-day, by a special programme, which will include a speech by the American Consul, E. C. Soule, Esq. This will be followed by Mr. John Drinkwater's play "Abraham Lincoln," the condensed dramatic quality of which makes it very suitable for broadcasting.

* * *

Broadcasting at Tunis.

I HEAR that the military station in Tunis now transmits vocal and instrumental items four times weekly. These concerts are sent on a wave-length of 1,100 metres at 5 p.m. G.M.T. on Sundays, Mondays, Wednesdays, and Thursdays. The power used will vary, and if any reader should tune-in the station, the authorities would be glad of a report. Letters should be addressed to Lieut. Chaillat, Military Wireless Telegraph Station, Tunis.

* * *

Next Winter's Boom.

AFTER December 31st the restrictions against the use of foreign wireless apparatus will be withdrawn. This fact, coupled with the abolition of B.B.C. tariffs and the reduction in the cost of licences, should stimulate the whole industry. Given a reduction in the cost of components, there should be an unprecedented boom next winter.

* * *

The Growth of Wireless.

OF the twenty-four million homes in the United States, more than half (12,800,000) have a motor-car, and only one-eighth (3,000,000) have a wireless receiving set. But radio sales are increasing at a phenomenal speed, as can be gained from the following amazing figures.

* * *

Money Talks.

IN 1920 American radio sales amounted to 2,000,000 dollars, and in 1921 this figure became 5,000,000. The next year sales showed a *twelve-fold* increase, and this colossal figure was doubled in 1923, when sales amounted to 120,000,000 dollars. The estimated figures for 1924 are now to hand, and it is generally agreed that they will total approximately 350,000,000 dollars!

ARIEL.

SECRETS OF THE B.B.C.

By "ARIEL."

This is the first of a new series of articles by "Ariel," who has spent many arduous hours unearthing facts and fancies about the B.B.C ménage, and they will appear exclusively in this journal. Let it be said, however, that these articles are appearing with the permission of the unfortunate victims concerned.

I.—UNKNOWN FACTS ABOUT CAPTAIN ECKERSLEY.

MUCH has been published about Captain Eckersley in his official capacity, but little or nothing is known about his private life. I am not suggesting that he lives a double life, but even chief engineers are but human, and have their homes. I therefore thought that readers of POPULAR WIRELESS might be interested to hear a few private "scandals" connected with Captain P. P.—provided I could find them. With that charitable aim in view, I seized the first opportunity of calling at his house.

He met me looking flurried, for of his three children one was apparently causing interference through re-radiation.

I suggested that I should accompany him, to verify the cause. We had no difficulty in finding the nursery, owing to the disturbance which was being caused by one of its occupants, a little girl, and, having satisfied ourselves as to the "signal strength" of his family, we beat a hurried retreat from the nursery.

His Hobbies.

On the way downstairs, I asked Captain Eckersley whether he had any hobbies.

"Sure!" he replied "Come this way and I will show you."

He then introduced me to "Flick," "Sally," and "Poilu," the two former his wife's Cocker spaniels, the latter his Alsatian.

"It is my hobby," he said sadly, "to pay for the upkeep of these dogs."

Having praised the dogs, we entered Captain Eckersley's comfortable study. His desk was standing open, and, I must admit, it was snowed under with bits of paper (probably bills) and envelopes with halfpenny stamps. It would have beaten the desk of any Editor in Fleet Street. Close to his desk stood a telephone, which, he informed me, is directly connected with all the stations of the B.B.C., thus enabling him, even when officially off duty, to keep in close touch with his work. He has, of course, a wireless set in his house, which he showed me. It is always in good working order, as one would expect in the house of the chief engineer of the B.B.C. I did not think it necessary to ask for a special demonstration of Captain Eckersley's set. (Was it a "Unidyne"?—ED.)

The Eckersley Paradise.

When we had settled ourselves in his luxurious armchairs, he gave me a cigar of a brand which, I should imagine, was specially reserved for his worst enemies. I observed that he, exercising his usual discretion, preferred a pipe. Continuing with the subject of his personal recreations, he told me that I must not expect him to say he loved gardening.

"I always think," he added, "that people who say they love digging in the garden at all hours and in every kind of weather are either freaks or perverters of the truth!" (This was not the exact expression he used.—ED.) "If I had my way, and plenty of time to spare, I should have a room covered on four sides with ebonite, and containing every conceivable terminal and gadget, and about as much paper in stock as a whole week's circulation of POPULAR WIRELESS.

"Here I should spend my time on research, working out problems and devoting myself to every possible branch and aspect of wireless science. I should try every imaginable experiment, and get, probably, a lot of enjoyment, and—who knows?—perhaps a result. I might even make sure of the latter by getting someone to help me, preferably my brother.

Captain Eckersley as he really is. Our photo shows him "off duty," probably receiving "late news from the paddock," and also probably reading "Popular Wireless."

A Fine Motto.

At this point his wife came into the room, and was pained to hear that even I could not keep Captain Eckersley off the interminable topic of wireless. The conversation now became more general, and finally drifted, through long and complicated channels, to the subject of armorial bearings.

"By the way," said Captain Eckersley, "you know what my coat of arms is?" I expressed my ignorance, whereupon Captain P. P. settled down with an air of pride, and continued: "I have got four quarterings, and they are respectively three batteries rampant gules, one burnt-out valve argent on a field of grid leaks, three brass balls reversed, and a nightingale sable on a microphone couchant."

Upon my asking him the inner significance of this fourth quartering, he explained that, in his opinion, the ideal of reproduction was to achieve a tone as pure as that of the nightingale. "My motto is *De Osculatoribus Actum Est*, which, freely translated, means that the nefarious practices of interfering persons do not receive my sanction."

Serious Matters.

Turning to serious matters, Captain Eckersley then told me that, on the whole, he was very satisfied with life in general, and that even with reference to his work he felt that everything was going very well. In illustration of this, he informed me that the twelve stations of the B.B.C. operated each for five hours a day, making a total of sixty hours a day for the twelve, and that break-downs throughout the organisation averaged only $\frac{1}{8}$ per cent. This speaks very well for the efficiency of the silent staff. This high standard was, he understood, the despair of his rival, Mr. Harry Tate, another well-known wireless expert.

"With things going as well as they are at the B.B.C.," said Captain Eckersley, "and peace restored in the nursery, can you wonder that I find life so satisfactory?" I agreed with him that he was indeed a fortunate man.

He is fortunate in many ways. His job in life is also his hobby. I mean, he earns his living by working at a subject which is in his blood. Like Captain Pound, he was born with a variable grid leak in his mouth instead of the proverbial silver spoon.

Diagnosing the internal complaints of a wireless set is unspeakably joyous work to Captain Eckersley.

My cigar was now finished. This was not due to any hard work on my part, but to instantaneous combustion, which nothing less than a death-ray could have stopped. Rather than lay myself open to the risk of being offered a second, I bade my hosts "good-night." (I had a long way to go, since I thought it better to walk home, in order to recover from the effects of the cigar.)

As he led me to the door, Captain Eckersley's last words were: "You will always be sure of a hearty welcome, whenever you care to call."

But I sincerely hope that, before I again take advantage of his hospitality, somebody else will have finished his cigars.

WHAT THEY SAY ABOUT THE "UNIDYNE."

Some interesting extracts from published reports on H.T-less receivers.

"IN my opinion there is no novelty in the proposal to dispense with the separate plate battery in thermionic valve receiving sets. That results can be obtained with a minimum plate potential has long been known to wireless engineers; but since the valve, working under such conditions, is a comparatively inefficient instrument, these circuits do not call for serious consideration."—Mr. Marconi.

* * *

"I CONSIDER that I may congratulate the inventors on having produced a set for amateur receivers of remarkable simplicity and effectiveness. I was surprised to find it work as well as it does without the magnification usually obtained by an H.T. battery and the customary high-resistance valve."—Sir Oliver Lodge.

* * *

"APART from this relay action the three-electrode valve is no better than a simple two-electrode or rectifying valve and there can be no real magnification of signal making power."—Dr. J. A. Fleming.

* * *

"IT cannot be too strongly emphasised that large H.T. voltages and large H.T. currents are in themselves totally unnecessary for the production of powerful signals. A signal power of one-fiftieth part of a watt is quite as much as the largest of ordinary loud speakers can possibly stand up to, and is sufficient to make itself heard half a mile away."—B. S. T. Wallace. (P.W., June 21st.)

* * *

"THE cost of the H.T. battery with the ordinary receiving set can be put down as at the outside 10s. for six months, in exchange for which you get weaker signals and inability to operate a loud speaker, apart altogether from considerations of distortion which will occur due to operating the valve on an unsuitable portion of its characteristic curve."—The Editor "Wireless World."

* * *

"THIS is to report that on the evening of June 2nd, at my laboratory at Egham, I tested the Two-Valve P.W. "Unidyne" receiver. The only source of power was a four-volt accumulator. Very good loud-speaker signals were received from the Newcastle and London broadcasting stations, and since then, experimenting with a similar set loaned to me by the inventors, I have had Birmingham station at loud-speaker strength equal to a similar two-valve H.T. set. I have never heard Birmingham so well before on a two-valve set."—Edward Robinson, Technical Assistant to Sir Oliver Lodge.

* * *

"ANY attempt to focus attention upon the disadvantages of the large H.T. battery is of value."—"Wireless Weekly," May 14th, 1924.

"WE have no desire whatever to try to minimise the credit claimed by our friends in being the first journal in the world definitely to announce the fact that there was an amazing invention about to be disclosed which would result in the complete abolition of the H.T. battery."—"Wireless Weekly," May 28th, 1924.

* * *

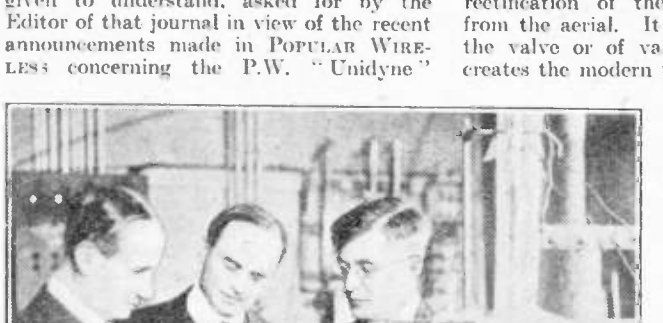
"THIS certainly is an epoch-making discovery in wireless. The results are astounding. When I first heard of the invention I was rather dubious of its possibilities, but now I am absolutely convinced that the two inventors have accomplished what appeared to be the impossible."—Mr. C. H. Mummery, of the Ever-Ready Company.

MR. MARCONI AND DR. FLEMING.

Another Invitation.

THE Editor has addressed the following letter to Mr. Marconi, in connection with the P.W. "Unidyne."

DEAR SIR,—In the "Wireless World" for June 4th, you published your opinion of H.T.-less circuits—an opinion, I am given to understand, asked for by the Editor of that journal in view of the recent announcements made in POPULAR WIRELESS concerning the P.W. "Unidyne"



Mr. Marconi examining an invention of Dr. Irving Langmuir's.

H.T.-less circuits. With regard to the latter I have twice given myself the pleasure of inviting you to investigate the claims made for the "Unidyne," once at the official test given for the benefit of wireless experts, and once when I invited you to be present at a private demonstration. This latter invitation was, I believe, conveyed to you by a member of my staff. Unfortunately, you did not see your way to accept these invitations and so appreciate for yourself the capabilities of the "Unidyne."

It is, therefore, with much surprise that I note your remarks in connection with H.T.-less circuits, viz. "These circuits do not call for serious consideration," which conclude your published opinion in the "Wireless World."

Although these remarks may possibly apply to other systems of H.T.-less reception, I must beg to point out that they have been proved erroneous in connection with the "Unidyne" circuits.

Various gentlemen who have been kind enough to investigate the claims made for the "Unidyne" before expressing a published opinion of H.T.-less circuits in general, have made very favourable comment on the capabilities of the "Unidyne." Sir Oliver Lodge has also investigated the circuit, and has reported very favourably upon it.

I feel certain you do not wish to detract from the success achieved by Mr. Dowding and Mr. Rogers, the inventors of the "Unidyne," and therefore I have pleasure in once more inviting you to attend a demonstration of the "Unidyne" at your own convenience, or to withdraw the remarks I have quoted above from your opinion as published in the "Wireless World."

I am,

Yours faithfully,

(Signed) NORMAN EDWARDS.

The following letter has also been addressed to Dr. J. A. Fleming.

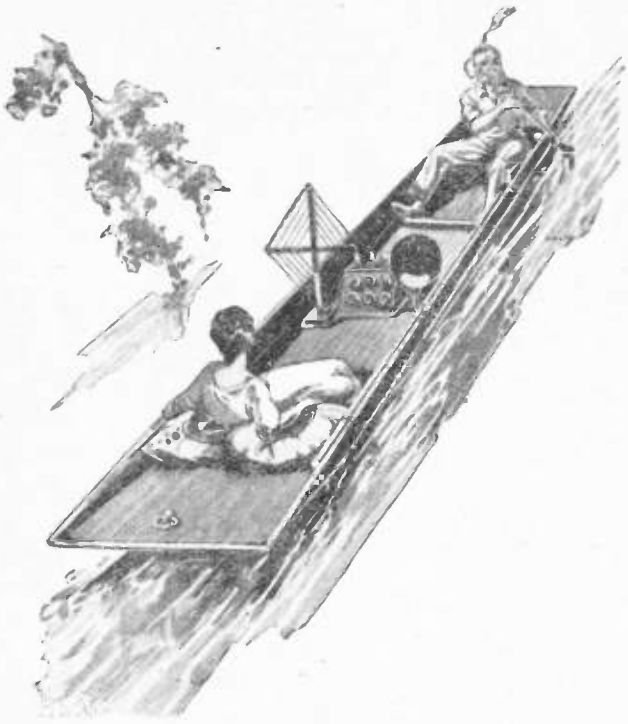
DEAR DR. FLEMING.—In the "Wireless World," for June 4th, you publish an opinion concerning the H.T.-less receivers, in which you say: "It is essential, however, to bear in mind that the function of the H.T. or plate battery is to supply the power which the valve controls, and that without this source of power there could be no amplification or relay action but merely rectification of the small power drawn from the aerial. It is this relay action of the valve or of valves in cascade which creates the modern ultra-sensitive receiver. Hence, if it proposed to get rid of the H.T. battery and to employ some type of transformer or other device to keep the valve anode at a high positive potential we should at once ask, whence comes the power for amplification? Is it drawn from the filament battery and, if not, where from? Apart from this relay action the three-electrode valve is no better than a simple two-electrode or rectifying valve and there can be no real magnification of signal-making power."

I should like to once more extend to you an invitation to investigate the P.W. "Unidyne" circuits, which will, I feel sure, convince you that very good amplification can be obtained without H.T.

I am prepared to arrange for a demonstration at your own convenience.

Yours faithfully,

(Signed) NORMAN EDWARDS.



Take Your Music with You

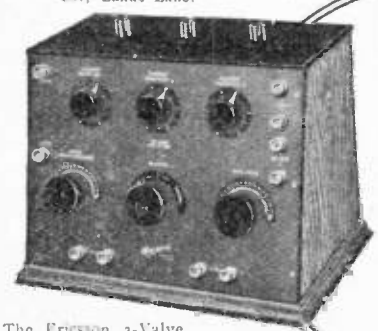
TAKE an Ericsson Valve Set with you on your picnic trips, boating, yachting, down on the farm, at the sea—anywhere. No matter where you wander through Britain an Ericsson Valve Set will put you in touch with one at least of the B.B.C. Stations.

Excellent "light" programmes are promised for the open-air months. Dancing in the open to the strains of the Savoy Havana Bands will be the order of the day—or the afternoon, rather. The incorporation of the utmost reception allowed by the P.M.G. in these sets gives a tremendous receiving range and excellent loud speaker strength on reasonable distances.

Write us to-day for further details also information re our crystal sets, famous Telephones and "Super-Tone" Loud Speaker.

The British L. M. Ericsson Mfg. Co., Ltd.,
International Buildings, 67-73, Kingsway,
London, W.C.2

LEEDS: North British Engineering Equipment Co., Lands Lane.



The Ericsson 3-Valve Set. Range 250-300 miles. Splendid for loud speaker work. With coils, less accessories—**£18 15 0.**

Selling Agents:
MANCHESTER: 19, Bridge Street.
NOTTINGHAM: W. J. Furse & Co., Traffic St.
COLCHESTER: 121, High Street.
SCOTLAND: Malcolm Breingan, 57, Robertson Street, Glasgow.
BIRMINGHAM: 14-15, Snow Hill.
N.E. ENGLAND: Milbourn Ho. Newcastle-on-Tyne.
IRISH FREE STATE: Stocks carried by A. W. Doyle, Kelly & Co., 174, Great Brunswick Street, Dublin.
BELFAST: J. Robertson, Ltd., 79, May Street.

Ericsson VALVE SETS

BBC

Buy British Goods Only

EVER-READY

BRITISH MADE

DRY BATTERIES AND ACCUMULATORS FOR EVERY WIRELESS PURPOSE.

RELIABILITY in dry Battery equipment is essential to efficient wireless reception. The fine quality raw materials, combined with the long and specialised experience in the production of "EVER-READY" Batteries, make them peculiarly suited to the exacting requirements of wireless.

The battery illustrated has been designed by us for Grid Bias purposes. It has intermediate tappings at each cell, so that any voltage may be obtained up to the maximum E.M.F. of the Battery (15 volts).

We are exhibiting at
The **BRITISH EMPIRE EXHIBITION**

WEMBLEY LONDON APRIL TO OCTOBER 1924

THE PALACE OF ENGINEERING,
AVENUE 14, BAYS 7—8

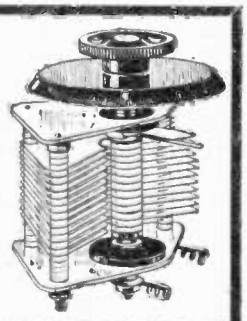
A full range of "EVER-READY" products, together with specimens of raw materials, form an interesting exhibit at Wembley, and our representative will be pleased to be at your service.

Illustrated catalogues and leaflets of standard sizes and voltages sent on application to:—

SERVICE P.W. Dept.,

THE EVER-READY CO. (Gt. Britain), Ltd.
Hercules Place, Holloway, London, N.7

That signal strength during the summer seems disappointing to that of winter is probably caused by inefficient tuning. For tuning to be efficient, it is essential to use "J.B." Condensers—time has proved them to give the best results. Fit them to your tuners—no other condenser gives sharper tuning or greater signal strength.

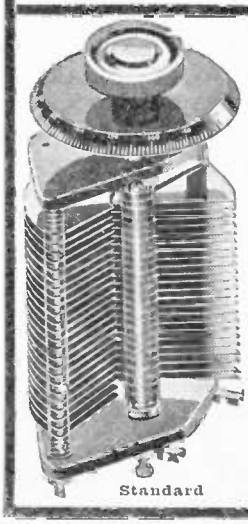


SUPER ALL-METAL

This model sets the standard of modern condenser efficiency. **Brass End Plates** combined with the proven **"J.B."** mechanical features and **generously guaranteed against manufacturing fault for six months.** One hole fixing, precision centre spindle ensuring permanent adjustment and silent movement. A distinctive **"J.B."** Condenser. British made throughout.

·001	9/6
·00075	9/-
·0005	8/-
·0003	6/9
·00025	6/9
·0002	5/6
·0001	5/3
Vernier	4/6

It is insufficient to judge a condenser purely as a mechanical device. It performs an electrical duty. Successful reception requires low electrical losses. Here, as well as mechanically, the "J.B." is universally adjudged of outstanding merit. The electrical losses of the "J.B." are negligible!



Standard

The crucial test of condenser efficiency is the "tuning-in" of Distant Telephony. Where initial signals are weak, "J.B." Condensers prove their efficiency.

MICRODENSER (Prov. Pat.)

Unquestionably the most successful condenser for very fine tuning. Recommended for long-distance work where extremely accurate tuning is indispensable. **This vernier is not an attachment; but is built in.**

·001	11/6
·00075	11/-
·0005	10/-
·0003	8/9
·00025	8/9
·0002	8/-
·0001	7/9

STANDARD

End plates made by special process, ensuring low dielectric losses; close accurate spacing (dielectric ·026), silent, metal bearings on precision centre spindle, and high electrical efficiency, **are a few of the distinctions obtainable only in the "J.B." one hole fixing.**

·001	8/6
·00075	8/-
·0005	7/-
·0003	5/9
·00025	5/9
·0002	5/-
·0001	4/9
Vernier	4/-

You may use "J.B." Condensers in any circuit confident of maximum signal strength. Get them from your dealer, or direct:

POST: One, 6d.; two, 9d.; three, 1/-.

JACKSON BROS.
THE Condenser Experts, (First Floor),
8, POLAND ST., OXFORD ST.,
LONDON, W.1. 'Phone: Gerrard 7414

HOW TO CONVERT YOUR SET TO THE P.W. "UNIDYNE" PRINCIPLE.

SIMPLE ALTERATIONS FOR THE AMATEUR.

By G. V. DOWDING and K. D. ROGERS.

(*Technical and Assistant Technical Editors, "Popular Wireless."*)

This is the first of several articles which will comprehensively outline for the benefit of the amateur the best procedure to be adopted when converting an existing valve set employing H.T. to a "Unidyne" receiver. In a future issue Mr. Dowding and Mr. Rogers will deal with the conversion of the famous P.W. Combination Set.

THE conversion of a single-valve set—providing, of course, that it is not a "stunt" circuit—presents but very little difficulties. It is necessary to purchase a four-electrode valve and a five-pin valve-holder, but the cost of these items is not much more than the cost of a H.T. battery, and, apart from the more obvious advantages, such as freedom from H.T. troubles and risks of burning out valves, clearer reception, etc., the "Unidyne" receiver owner will discover that there is even more in the set than even the greatest optimist would be inclined to admit.

Surprising Range.

We ask all readers who decide to modify their present H.T. sets to carefully make comparisons of results. On single-circuit tuning they will note "wave-trap" selectivity, allowing near stations to be cut out; a background of silence that will permit them to bring in distant stations that they, perhaps, never heard before; a really usefully sharp reaction control, and a general range efficiency that will surprise them.

Before detailing the necessary alterations to existing valve sets of various types, we should like to make the patent rights question perfectly clear. Any reader of POPULAR WIRELESS can make P.W. "Unidyne" receivers or convert existing sets to the "Unidyne" principle for his own use without incurring any legal responsibility in respect of the various "Unidyne" patents, but such sets must not be made to sell, or sets must not be modified to the "Unidyne" principle for payment unless permission is granted for this by the owners of the patents.

Changing the Connections.

We will first of all deal with, as indicated above, a straightforward single-valve detecting circuit. The use of reaction is, as with ordinary receivers, quite optional; but, of course, a P.W. "Unidyne" single-valve set without reaction will be similar to an H.T. single-valve set without reaction, little better than a good crystal set. For this reason, reaction will be included in all the diagrams.

Readers should carefully examine the wiring of their sets, and endeavour to draw a correct theoretical diagram of the circuit. In most cases it will resemble Fig. 1, where A is the variable tuning condenser, B and C the aerial tuning inductance and reaction coil respectively, D and E the grid leak and condenser, F the filament battery with its negative terminal going to earth, J the filament resistance which is connected to the positive terminal of the filament battery, G the by-pass condenser, which will be of ·001 mfd. capacity or so, I the telephone receivers, and, lastly, H the H.T. battery.

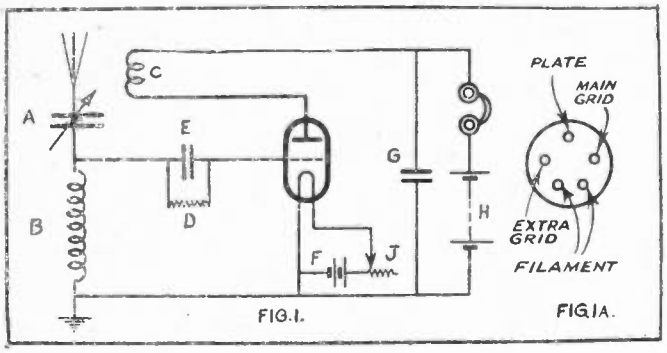


FIG. 1.

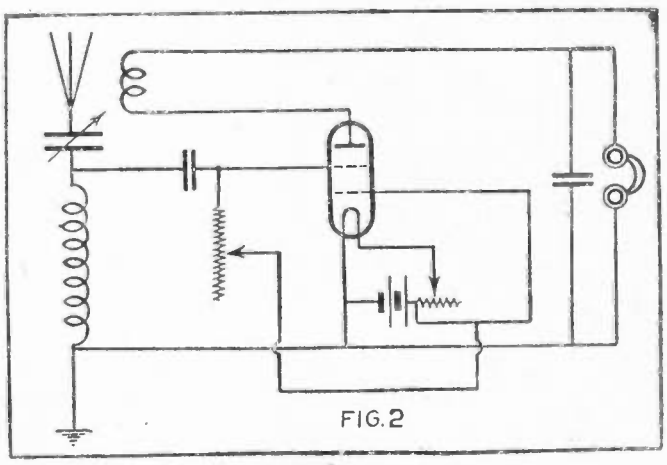


FIG. 2

All the connections to the valve sockets should be disconnected, and these latter removed from the panel and a five-pin valve-holder substituted. Constructors can, of course, mount five valve sockets themselves, in which case it will be unnecessary to remove the filament and grid sockets, as the position of these is similar to the positions of the plate and grid sockets of the five-pin layout. It is necessary to remove the grid socket, drilling the two filament socket holes each side of this in accordance with the dimensions of the spacing of the legs on the five-pin valve. This operation requires care, as the holes will be found to run almost into the existing grid socket hole.

Fig. 1A shows the disposition of the valve sockets, looking down on a five-pin valve-holder. The two filament connections are taken to the two bottom sockets, the plate connection being as usual. A connection is made between the positive L.T. battery terminal direct to the additional grid socket. The main grid is connected to one side of the grid condenser. The ordinary grid leak can be employed as a grid resistance for taking direct from the main grid to the positive terminal of the battery, although it is advisable, more especially if it is desired to obtain efficient range of reception, to employ a variable resistance in this position.

FIG. 1A.

The Variable Resistance.

In this case a variable grid leak can be employed for the purpose, although it is urged that readers should obtain first-class guaranteed instruments of this nature. As has been mentioned in previous articles

(*Continued on page* 676).

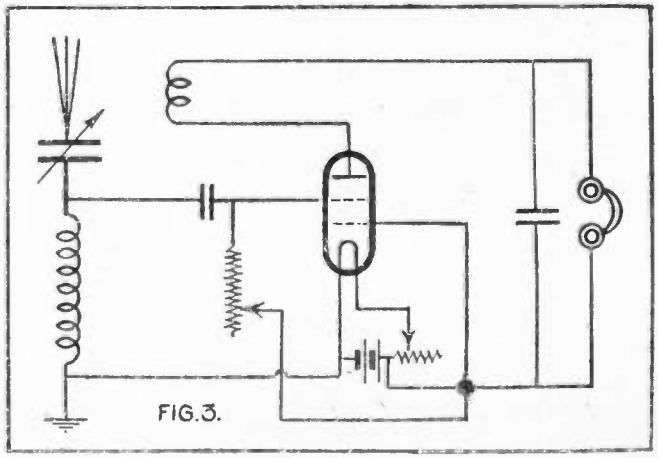


FIG. 3.

Technical Notes

CONDUCTED BY J.H.T.ROBERTS,D.Sc.,F.Inst.,P.

A Peculiar Aerial.

A SPECIAL form of outdoor aerial which has proved useful in very inconvenient situations is the T-aerial, placed on its side, so to speak, that is, with the top of the T vertical. This part is actually the mast, and from the centre a horizontal spar projects. The aerial wire, which may, of course, be single or multiple, is strung from the top of the mast, over a spreader placed at right angles to the end of the horizontal spar, and down to the foot of the mast.

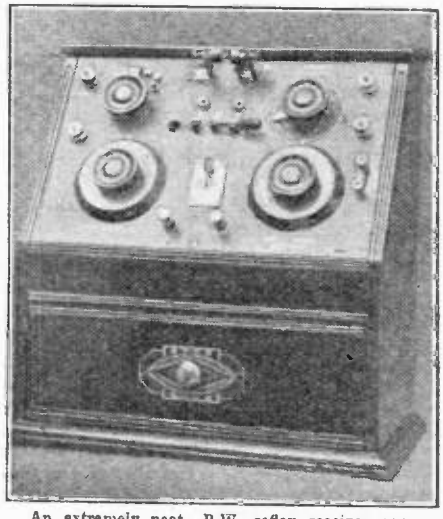
This aerial has sometimes been referred to as an "elbow" aerial. It has three spreaders, two at the ends and one in the middle. It gives greater length than an aerial simply strung from the top of the mast to the bottom and, as already mentioned, is often very useful in restricted spaces. The mast, of course, can be placed above the roof, when the aerial has every chance of being very efficient.

Improving Loud-Speaker Horns.

I have been doing a good deal of work lately with loud-speaker horns, and perhaps that is the reason why I was specially interested to read a recipe sent to me by a reader of these notes, for the purpose of overcoming the "tinny" sound which is so often associated with the trumpet. I ought to say that I have not tried this recipe myself, and it seems somewhat elaborate, but it may be interesting to some of my readers.

A quantity of paraffin wax is taken, say half a pound, and this is melted in a pan or other suitable vessel. Ordinary common salt is added to the wax when the latter is very hot. This has the effect of forming a pasty mixture. The mixture is then applied all over the inside of the horn until it is about an eighth of an inch thick, when it will be like crystal, rough and white.

The horn is laid aside for a day or two, and is afterwards given several coats of dead-black paint over the wax. According to the author, the wax lining produces non-resonant qualities which greatly improve the tone of the horn. It should be stated that the wax is easily removable at any subsequent time if desired, and if necessary the inside of the horn can always be re-varnished so as to put it back into its original condition.



An extremely neat P.W. reflex receiver constructed by Mr. A. W. Perrett, 59, Victoria Road, Bedminster, Bristol.

Some Causes of Interference.

When interference in reception is particularly bad, it is sometimes wise to ascertain that some of it, at any rate, is not due to local causes which can be removed. A toy electrical train may be a miniature wireless transmitter; a defect in a neighbouring arc light, or in an electric power transformer, passing electric cars, vacuum cleaners, and, in fact, almost any electrical machinery, however small, is liable to give interference if sufficiently close. Of course, some interference cannot be helped.

For example, I happen to have the misfortune to have my laboratory very near to the instrument-making workshop, in which a 15 h.p. electric motor is continually running during the daytime. If you put the 'phones on your ears, you don't have to ask anybody whether the motor is running. You hear it!

The result is that I have to reserve all my testing work until after 5 p.m., when the motor normally shuts down, unless I have anything very important in the day, when I shut the motor down temporarily. There are several other local sources of disturbance which I have succeeded in cutting out, by means of various devices. But this main motor I have never succeeded in cutting out, and I extend an open and mo- hearty invitation to the inventors of wave traps, interference eliminators, and any other devices, to make any better job of it than my assistants and I have been able to do.

(*Continued on page 698*).

HOW TO CONVERT YOUR SET TO THE P.W. "UNIDYNE" PRINCIPLE.

(*Continued from page 675*).

of this series, the writers have tested such devices which, even when manufactured by well-known firms, have shown great reluctance either to "vary" or to "leak," and sometimes both.

The H.T. terminals can either be entirely removed from the panel or can be employed as extra telephone terminals. The above modifications carried out, the circuit of the set diagrammatically should resemble Fig. 2. There is, however, a further alteration in the wiring which is essential to the proper functioning of the circuit, and, in view of its importance, a separate diagram has been devoted to indicate clearly its nature.

The telephones and the by-pass condenser must be taken to the positive terminal of the filament battery. Having made this connection, the circuit will now be as shown in Fig. 3. Whatever the circuit of a simple single-valve set, it should not be difficult to modify it in accordance with this last diagram.

Should any reader be unable to follow out the connections of his set with accuracy, the best course to adopt is to remove all the wiring and re-wire entirely. This, as a matter of fact, is always the most advisable method, and, although it may take longer, it makes for accuracy.

These are the essential connections. Additional grid (which is that grid on a four-electrode valve which is situated between the filament and the main grid) direct to positive terminal of battery, main grid through variable resistance of the order of 250,000 to 5,000,000 ohms to positive terminal of battery, telephone receivers connected one side through reaction to plate and other side direct to positive terminal of the battery.

Tuning-in.

A few words in respect of the operation of the circuit will not be out of place, because readers will find that to obtain such results as make "Unidyne" circuits stand out above even H.T. circuits requires a little attention paid to certain details. The set will doubtless function, and that very well, as soon as the filament of the valve is lighted, but there is a possibility that it will not be up to "Unidyne" standard.

The largest possible A.T.I. that will tune in the desired stations should be employed. The series variable condenser should be operating as close to its "zero" position as possible. When working on distant stations, control the reaction by means of the variable grid resistance; this should be working towards its maximum of resistance. The filament control will not be found to be at all critical.

Reaction Control.

If the set will not oscillate, and all connections appear to be correct, try the effect of reversing the reaction coil connections. "Reverse reaction" can generally be detected by noting whether signals grow stronger as the reaction coupling is opened, reaching their maximum when the coils are as far apart as is possible. A larger reaction coil may be necessary. Generally speaking, for broadcast reception a 100 or even 125-turn reaction coil is necessary. Basket coils are recommended, although Lissenagon and other makes of multi-layer coils have been found to give very good results.

Should the receiver still refuse to oscillate, try removing the by-pass condenser and straightening wiring. It is improbable, however, that any difficulty will be met in respect of the reaction, as in most "Unidyne" circuits this is found to be fierce enough for any purposes, whether for the reception of C.W. or distant broadcasting stations.

WIRELESS IN LIVERPOOL.

THE NEW RELAY STATION.

By G. V. DOWDING.

(*Technical Editor, "Popular Wireless."*)

Mr. Dowding recently visited Liverpool to deliver a lecture on the "Unidyne" at the Royal Institution and during his stay was able to gather many interesting facts and impressions about the new relay station

THE main reason for my visit to Liverpool was to address a meeting of the Liverpool Wireless Society which was held at the Royal Institution on Thursday, the 12th ult. The principal subject of my lecture was, of course, the POPULAR WIRELESS "Unidyne," and I shall be unable to forget for a very long time the wonderful reception given me.

Had I ever had any doubts concerning the manner in which news of our invention has been received in amateur wireless circles, they would have been entirely banished by the excellent sentiments expressed by all the members present.

Although they had for some weeks been treated to an intensive bombardment of criticism by our various contemporaries, such has been the fair-minded attitude adopted that hardly a trace of scepticism concerning the claims made for the P.W. "Unidyne" circuits was aroused.

As a matter of fact, I was told by one of the officials of the society that a great number of permanent subscribers had, to his knowledge, been gained by POPULAR WIRELESS as a direct result of the attitude taken by other wireless journals.

It was during a demonstration of a two-valve "Unidyne" at the above meeting, when, under adverse conditions, I was able to operate a small loud speaker sufficiently well to render music plainly audible throughout the hall, that I made my first acquaintance with wireless reception in Liverpool. Jamming from Seaforth and ship stations was very bad on the ordinary broadcast wave-lengths, but the new relay station, which was working on 312 metres, came through excellently, and with but the faintest background of "spark." Happily enough, the occasion was marked by 6 L V's first relayed concert from 2 L O, and its first evening transmission subsequent to the day of opening.

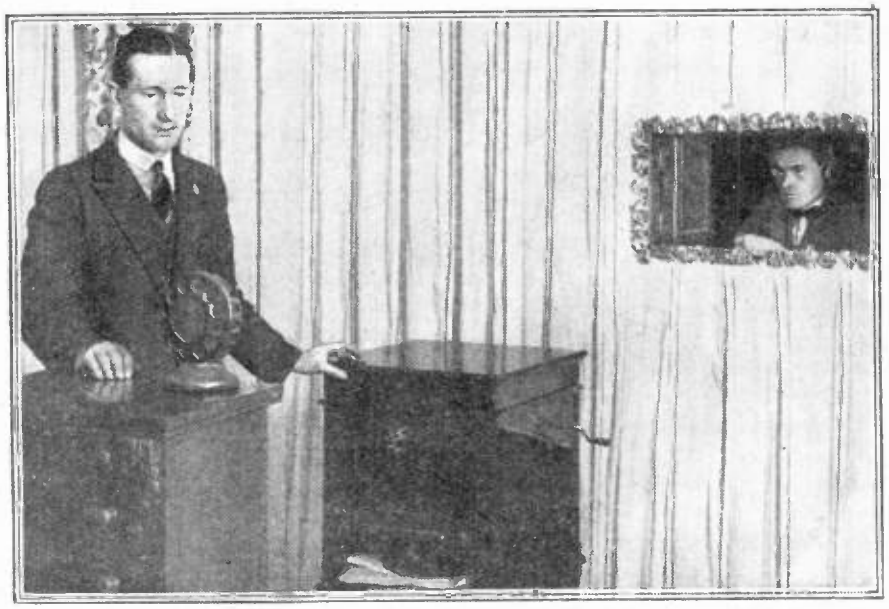
Excellent Transmission.

The transmission, technically, was really good, and the modulation all that could be desired. One could almost imagine that one was tuning-in 2 L O direct, and not 2 L O relayed by a "baby" relay station. From the listener's point of view (and that is the point of view I could take at the time) 6 L V is a credit to all concerned.

6 L V's Studio.

Inquiries proved that wireless broadcasting has been given a great impetus in Liverpool by the introduction of 6 L V; trade is brisk, and everywhere new aerials are springing up. It is only natural that this should be the case, because Liverpool is a large city with over a million inhabitants, and formerly it has been outside the normal crystal range of a broadcasting station. Manchester, which, of course, is the nearest main B.B.C. centre, is 36 miles away, and, even using valves, Morse jamming has rendered the service from 2 Z Y inadequate.

I was due to leave Liverpool the morning following the meeting of the wireless society, but on my way out of the city my attention was directed to a large "sausage" aerial which is suspended from a high chimney standing out from amidst a huge group of warehouses. Of course, I had to alter my direction to examine it more closely, and, needless to say, it proved to be 6 L V's aerial. I could not obtain admittance to the transmitting station: it was all locked up, and vigorous knocking obtained no reply. I was reminded, however, that I could not possibly leave Liverpool without visiting either 6 L V's transmitting station or the studio, so therefore retraced my way back to the centre of the town.



Mr. H. C. Pearson, the Liverpool relay station director, and Mr. B. Honri, assistant development engineer of the B.B.C., who is looking through the window of the control room at 6 L V.

Here, in that wonderful thoroughfare, Church Street, in a large suite of rooms above the Edinburgh Café, I discovered 6 L V's offices and studio. I introduced myself to Mr. Pearson, the station director (late Uncle "Pip" of 5 I T), who very kindly offered to show me round personally. Work was still in progress, but there was every indication that when it is finally completed the Liverpool relay station will set a standard that several of the main stations will find it hard to follow.

I found it difficult, in fact, to realise that it *was* a relay station that I was being shown over. The studio is as large as the smaller studio at 2 L O, and there was even a "2 L O microphone" being installed, although at the time of writing a Western Electric microphone is being used.

Lighter draperies than usual have been employed, and this, in my opinion, is a distinct advance over the former heavy "blanketing." We passed from the studio into the control room, where behind two small windows the engineers regulate the impulses passing from the microphone before they are carried over the two miles or so of "land line" to the transmitting station.

An Interesting Map.

I paused awhile before a small map of Great Britain which is covered with pins. Each pin, Mr. Pearson proudly informed me, represents localities from which reports had been received from listeners who have heard 6 L V. As some of these pins are scattered over Scotland, and others over the South of England, Mr. Pearson has every reason to be proud of the capabilities of his station.

Mention must be made here also of Mr. B. H. Vernon, the chief engineer, who is, as Mr. Pearson remarked, young and enthusiastic, two very great assets indeed in this age of progress. After being introduced to one of 6 L V's future "Aunties," and hurriedly looking around the large, airy offices, I was obliged to leave, although I had seen quite enough to convince me that Liverpool listeners can expect great things of their new station.

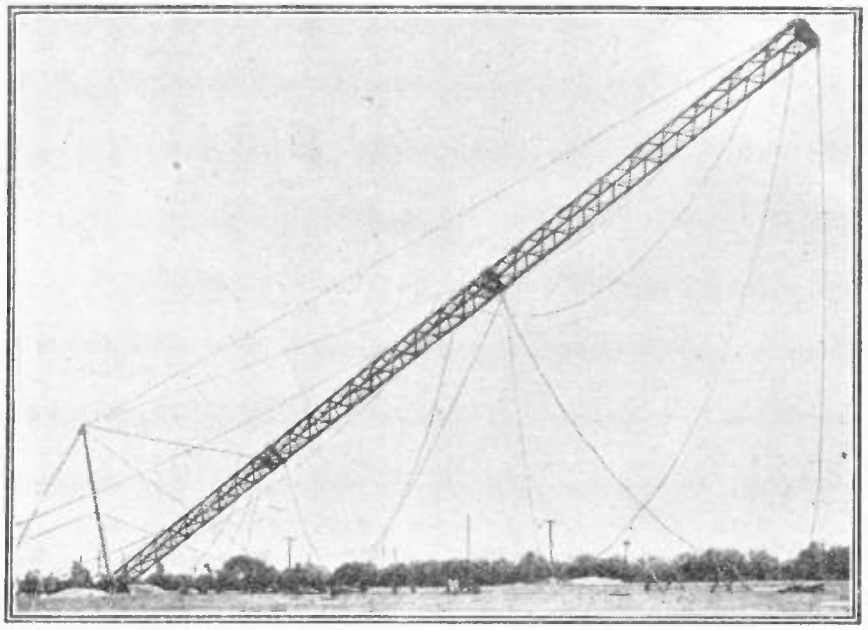
WIRELESS IN AUSTRALIA.

AMATEUR PROGRESS IN THE ANTIPODES.

By D. CONNELLY.
(Our Correspondent in Australia).

IN the following brief notes I will try and give you some idea of what we Australian amateurs do on low power. I might mention that the Australian issued licence power is only 10 watts for transmitting. One of our best attempts was carried out in Sydney last year when Mr. Charles McCluram (2 C M) transmitted to New Zealand and Victoria on ·037 of a watt and 4 A A of New Zealand logged everything, including the code words. Before the test was made the metres were tested at the University, and everything was carefully checked. The distance from 2 C M (Sydney) to 4 A A (N.Z.) is 1,250 miles.

Our next attempt was the trans-Pacific tests. About two months before the tests started quite a number of Australians constructed sets to try and log the American stations.



Erecting the 200 ft. mast for the new broadcasting station in Melbourne, Australia.

The Trans-Pacific Tests.

The first three weeks were fruitless, owing to static, and on the first night that conditions were better five were logged. From then until now American "D X" stations are not considered hard to get, as some amateurs try out their new sets on them. Quite a number of Melbourne amateurs have logged them on a loop aerial. It is also very easy to get some of the louder experimenters on a single valve.

A rather funny thing happened this year. A two-way trans-Pacific test was arranged, and as usual we logged "thousands of them," but they could not get us. They as much as said we were no good on the "key." We tried again, but still they could not get us, so two enterprising young "Aussies" rigged an aerial on the Canadian Royal Mail Steamer "Tahiti," and installed a transmitter and a receiver.

Low Power Work.

After the ship left port all the "Aussies" kept on the key and waited for the log to be made public. When these amateurs arrived in 'Frisco Bay they could still hear their own home stations calling at strength 4, so one man went and collected as many "Heads" as possible and showed the Americans that the Australians *could* be heard. The power of the loudest Australian station heard was only 100 watts. Each Australian capital is about 500 miles apart, and the amateurs must construct good receivers to hear each other as the input to each transmitter is only 10 watts.

I might mention that nearly every American who has "got over" to England has been picked up by the Australians, and the distance is much farther. The distance from England to New York is about 3,200 miles, and the distance from Australia to America is about 6,000 miles.

One of our amateurs, using less than 20 watts, has been heard in Honolulu.

A Comparison.

All the above performances are quite true, and proof of some can be produced.

In No. 92 of POPULAR WIRELESS I see that a terrible fuss has been made of Mr. C. W. Goyder, of Mill Hill School. The power he uses is very large, and his distance is small in comparison to ours.

I think the American stations must have had some power in his aerial if Mr. Goyder only used a detector and one L.F. to receive him.

Another case I forgot to mention. While I was transmitting on a 5-watt tube with 12·5 watts input, an amateur in Queensland heard my music on a single valve.

3 B A (Melbourne) claims to have heard a portable Canadian station who was only using two 5-watt radiotrons.

FREE "P.W." COMBINATION SETS FOR READERS

OUR VISIT TO MANCHESTER.

By the Editor.

TO-MORROW, Saturday, July 5th, the inventors of the POPULAR WIRELESS "Unidyne" principle, Mr. George Dowding and Mr. K. D. Rogers, and possibly myself will visit Manchester by motor-car, arriving early in the afternoon, and wireless prizes may be won by readers in that city.

The first prize will be a two-valve "Unidyne" set (supplied by Messrs. the Bower Electric), with two Thorpe 4-electrode valves; the second prize a simplified POPULAR WIRELESS Combination Receiver (supplied by Messrs. Peto-Scott, valves by Cossors); and the third prize, a pair of H. R. Brown's feather-weight phones.

The conditions are as follow:

We shall arrive in Manchester, Saturday afternoon, July 5th, and will drive slowly through the town. Readers of POPULAR WIRELESS in that town are invited to keep a look-out for our car, and the first reader *who identifies Mr. Dowding and Mr. Rogers, and who hands one of us a copy of* POPULAR WIRELESS *with his name and address written on the cover, will be entitled to a Two-Valve "Unidyne" Receiver.*

2. The fact that one reader, in approaching the car and identifying Mr. Dowding and Mr. Rogers may attract the attention of other readers, and so give them a clue, necessitates my ruling that readers "hunting" in pairs will be disqualified.

3. Should two or more readers simultaneously hand in copies of POPULAR WIRELESS and identify the inventors of the "Unidyne," my ruling as to the winner must be accepted as final.

4. The winners will be relieved of their signed copies, and given in exchange a receipt, which will entitle them to a prize. The prizes will be forwarded by post on our return to London.

6. The above rules and conditions will apply to every other B.B.C. centre we visit.

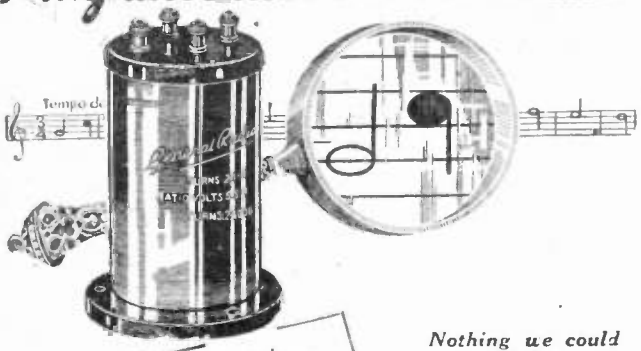
6. Prizes can only be claimed by identification of Mr. Rogers and Mr. Dowding, with myself (or assistant) as witness, in the motor-car in which we shall travel during our tour to Manchester. We may travel in two cars.

Our visits to the other B.B.C. centres will probably take place in August, and full details will be made in due course.

WIRELESS PHOTOS.

Amateur Photographs of wireless interest, if accepted for publication in POPULAR WIRELESS, are paid for at the rate of 10s. 6d. each. A stamped and addressed envelope must accompany every contribution.

Magnification over 5 times!



Pembroke Dock,
17th June, 1924.

"On testing various transformers I placed yours in an all concert set and was astounded at the marvellous result. It was quite equal to a much boomed submarine transformer."

WM. BOWLING, M.P.S.

Nothing we could say as to the merits of the G.R.C. 83 AUDIOFORMER would be so convincing as this unsolicited evidence of test. Profit by this user's experience.

YOU can safely place your trust in the G.R.C. AUDIOFORMER; an instrument which in spite of its remarkably low price is unrivalled by the most expensive transformers purchasable.

It is a "hedgehog" type transformer with best grade silicon steel wire core, and has a turn ratio of secondary 2·1 to primary 1; the correct ratio for strong and clear note magnification. It achieves a full and distortionless amplification of 5·5.

It is mounted in a plated case (which may be earthed for shielding), with ebonite base and top, and is insulated in the most complete manner.

Every G.R.C. AUDIOFORMER is carefully manufactured and severely tested before leaving the factory—you may therefore buy the G.R.C. AUDIOFORMER with every confidence.

G.R.C. 83

AUDIOFORMER

15/-

Your local dealer can supply you with a G.R.C. 83. If you have any difficulty in obtaining G.R.C. goods send direct to us stating local dealer's name and address. Write for descriptive leaflets to Dept. P

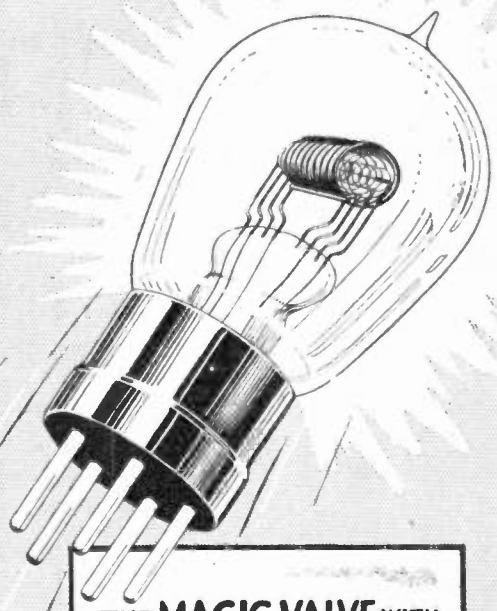
GENERAL RADIO COMPANY
LIMITED

RADIO HOUSE, 235, REGENT STREET, LONDON, W.1.

Telephone: Mayfair 7152. Telegrams: "Algenrad, London."

Branches in all principal towns in Great Britain and in principal countries overseas.

A NEW WIRELESS EPOCH!



THE MAGIC VALVE WITH THE FIVE LEGS AND THE ONLY VALVE FOR THE 'Unidyne' CIRCUIT

The THORPE K.4 (four Electrode) VALVE was used by the inventors of the famous **Unidyne Circuit** during their experiments, and is specially designed to give maximum results with this Circuit.

The THORPE K.4 is the **only guaranteed Valve on the market.**

The THORPE K.4 when used in connection with the Unidyne Circuit means—

Less Running Cost.
Great Reduction in Distortion.
Less Risk of Burnt-Out Valves.
Purer Tone.

A special five-pin holder to suit the THORPE K.4 can be obtained and is provisionally protected.

Ask your dealer for full particulars.

Filament Volt 4.0.

THORPE K4 VALVE

THE 4 ELECTRODE VALVE

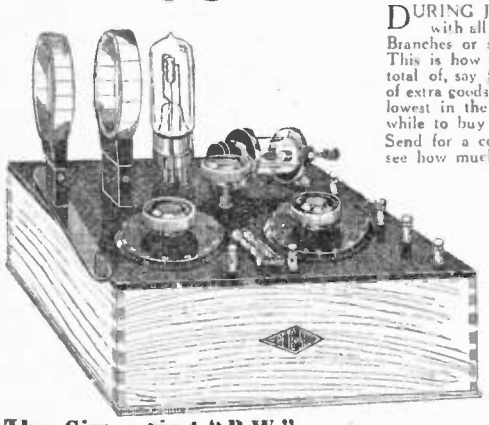
Amp. ·42 average.

Sole Agents for Lancashire and Cheshire— **THE PALATINE WIRELESS EQUIPMENT Co., 19, Bridge St., Deansgate, Manchester.**

BOWER ELECTRIC Ltd.
15, GRAPE STREET, SHAFTESBURY AVENUE, LONDON, W.C.

Sole Agents for Scotland— **ROBB BROS. (Glasgow), Ltd., Radio House, 69, West Nile St., Glasgow.**

10% Summer Discount off all Goods



DURING July and August we are offering a special bonus of 10% extra Goods with all orders. There are no restrictions—whether you buy at one of our Branches or send your order by post you will obtain this valuable concession. This is how it operates: if you send us an order for any radio apparatus to the total of, say £5, you are entitled to select *free of charge* an additional 10/- worth of extra goods from our Catalogue. Peto-Scott's prices are already recognised as the lowest in the country and this important concession will make it well worth your while to buy your components now and build your set after the Holidays.

Send for a copy of our 48-page Catalogue, fully illustrated 3d. post free, and see how much you can save by buying *now*.

PETO-SCOTT Co., Ltd.,

Registered Offices: 77, City Road, E.C. *(For all Mail Orders).*

Branches: London: 64 & 99, High Holborn, W.C.1, and 230, Wood Street, Walthamstow. Cardiff: 94, Queen Street. Liverpool: 4, Manchester Street. Plymouth: Near Derry's Clock.

Bargain Column

Aerial Wire:
7/22 stranded copper, 100 ft. 2 6
16 S.W.G Enamelled copper, 150 ft. .. .. 2 -
(Postage 1/- per coil extra).

Insulators:
Reel, 1½d. each. Small shell, 3d. each. Large shell, 10d. each. Egg, 3d. each.
Simplex lead-in, saves drilling the woodwork .. ..each 1 6

Panel Switches:
Pull-push .. .. 2 -
Tumbler, flush type .. .. 2 -
Rotary switch .. .. .. 10 -
Knife pattern, double-pole double-throw 2 6

Lightning Arresters .. each 1 9

Series Parallel Switches, best quality 2 6

Opal Valve Windows for panel use .. .. 9d.

Valve Sockets .. .. .. 1 -

Grid Leaks, 1 megohm to 5 megohms .. ..each 1 6

Resistances, 50,000 and 100,000 ohms .. .. .. each. 2 -

Two-Coil Holder .. .. each 7 6

Max-Amp L.F. Transformer 18 6

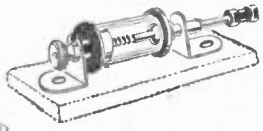
Peto Concert Coils:
Wave-length—
290– 390 metres .. .. 2 -
340– 470 " 2 6
420– 650 " .. .. 3 -
570– 900 " 3 6
780–1140 " .. .. 4 -

Ebonite Condenser Dials, 0-100 1 6

Petocite, the wonder Crystal per box 1 6

Send 3d. for our large 48-page Catalogue to-day. It is the largest Catalogue in the trade.

Crystal Detectors



Well-made set of parts for panel use, solid brass, with glass-enclosed crystal **1/6**

The Simplified "P.W."

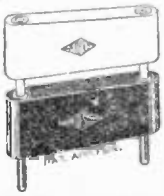
A wonderful one-Valve Reflex, using exactly the same circuit devised by the Technical Editor of "Popular Wireless," but with reaction added and switches eliminated. Full set of parts, including ebonite panel drilled, tapped and engraved, and detailed instructions for assembling, using only screwdriver and pliers (Cabinet 4 6 extra). **67/6**

(Marconi Royalty 12 6 extra.)

Finished Instrument, aerial tested .. .. **£5 : 5 : 0**

(Marconi Royalty 12 6 extra.)

10% *Bonus Scheme applies to all Instruments and sets of Parts, but does not apply to Marconi Royalty.*



Plug-in Condensers

A new system—merely plug in and build up to capacity required. Every condenser calibrated and guaranteed. Price ·0001 to ·0009 mfds., 2 6 each. Larger values to ·0004 mfds., 3 - each. Sockets 2d per pair

Long-distance H.F. Transformers

Highest grade Transformer of new design. Very selective and most efficient—a great improvement on the old flat type. As used by all experts Range 300-600 metres **6/6**

Safety Valve Holders

Beautifully finished in solid ebonite. Brass legs do not extend to top of Holder, therefore impossible to damage Valve by inserting incorrectly **1/6**

Remember our Slogan "Buy now and build later."

G.A. 1619

SixSixty

Explorer of the Ether.

Filament Volts, 1·8 to 2.
Filament Current, ·25 amps.

20/- *Post Free. Cash with order.*

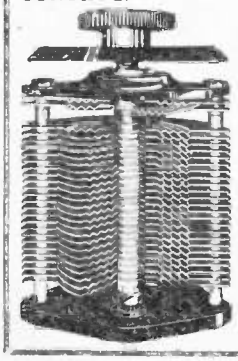
The Electron Company Ltd.,
Triumph House,
189, Regent Street, London, W.1.

A Dull Emitter Valve without dull emitter faults.

Economise in power without loss of signal strength with the scientific "Six-Sixty." Its amplifying powers are exceptional and its purity of tone unequalled by any "bright emitter." The "Six-Sixty" is the product of two year's research and embodies features possessed by no other dull emitter. It is robustly constructed with welded grid that entirely eliminates valve noises, and a special anti-capacity base, the importance of which it would be difficult to over estimate. Test a "Six-Sixty" on your set. *Look for the red and black marbled base.*

THE NEW FORMO-DENSOR WITH INTEGRAL VERNIER.

ONE KNOB CONTROL.



This wonderful Condenser has advantages over every other, and no other is equal to it in price, quality, or efficiency.

THE VANES are grooved, which increases the area, imparts great rigidity, and reduces the bulk of the instrument.

There are **NO SPACING WASHERS** between the stationary vanes, caps of special design being formed on the vanes, which interlock, making the spacing absolutely accurate.

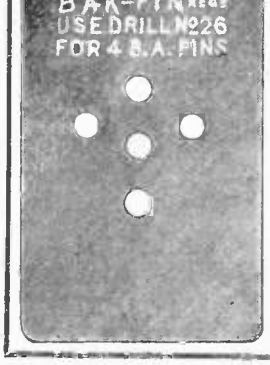
THE INTEGRAL VERNIER is the most original yet produced, and is simple and effective. **ONE KNOB** controlling main vanes and Vernier.

We do **not** fit cheap metal end plates.

Lowest minimum capacity.

THE FORMO COMPANY,
(Arthur Preen & Co., Ltd.),
22, Cricklewood Lane, N.W.2.
BRITISH EMPIRE EXHIBITION
Palace of Engineering. Av. 11. Bay 8.

·001 mfd	10 6
·00075 mfd.	10 -
·0005 mfd.	9 6
·0003 mfd.	8 6
·0002 mfd.	7 6
Dual with Vernier ..	12 6
Dual Plain ..	10 6
Vernier ..	5 6



WHY GET HOT AND BOTHERED DRILLING FOR VALVES?

USE THE BAK-FIN (Regd.) VALVE DRILLING JIG. YOU NEED ONLY MARK ONE HOLE. DRILL THE OTHERS THROUGH THE JIG.

SPEEDY & ACCURATE. MADE OF HARDENED STEEL AT BAK-FIN WORKS, BIRMINGHAM.

FROM YOUR LOCAL DEALER **1/3.**

CONTINENTAL TELEPHONY TRANSMISSIONS.

Compiled by L. W. CORBETT
(Technical Staff, "Popular Wireless").

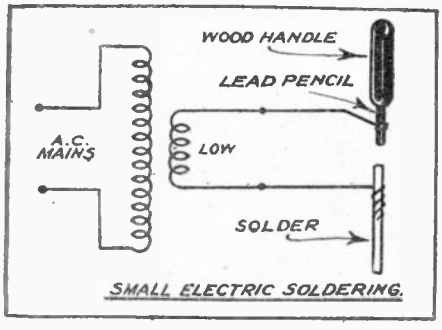
Time B.S.T.	Station.	Wave-length. Metres.	Days.	Nature of Transmissions and Remarks.
7.40	Eiffel Tower ..	2,600	Weekdays	General News, etc.
7.50	Amsterdam P C F F	2,000	Weekdays	News
8·00	Prague	1,800	Daily ..	Financial News.
9.00	Hamburg	392	Weekday	Morning Review. 1½ kw.
9.00	School of Posts, Paris	450	Sundays ..	Concert. Not regular.
10.40	Eiffel Tower ..	2,600	Weekdays	Cotton Market.
11.00	Hamburg	392	Sundays ..	Morning Review.
11.00	Berlin	415	Daily ..	Market Prices. 1 kw.
11.15	Berlin	415	Daily ..	Intelligence Service.
11.50	Lausanne	1,100	Daily ..	Meteorological Reports.
12.00	"Radio—Paris"	1.780	Daily ..	Market Prices.
12.00	Eiffel Tower ..	2,600	Mondays excepted	Fish Market Prices.
12.15	Eiffel Tower ..	2,600	Sundays excepted	General News and Time.
12.45	"Radio—Paris"	1.780	Daily ..	Tzigane Orchestra.
12.50	Königswusterhausen	2,800	Daily ..	Concert.
12.55	Frankfurt ..	467	Sundays excepted	Intelligence Service. 1½ kw.
13.15	Berlin	415	Daily ..	News.
13.45	"Radio—Paris"	1,780	Daily ..	Exchange Rates, etc.
13.55	Berlin	415	Daily ..	Time signal.
14.00	Lausanne	1,100	Daily ..	Weather Forecast.
14.00	Leipzig	450	Weekdays	Market Prices, etc. 1 kw.
14.00	School of Posts, Paris	450	Irregular	Concert.
14.00	Hamburg	392	Sundays ..	Concert.
14.30	School of Posts, Paris	450	Irregular	Concert.
15.15	Berlin	415	Weekdays	Market Prices.
15.30	Frankfurt ..	467	Sundays ..	Concert.
15.45	Eiffel Tower ..	2.600	Daily ..	Market Prices.
16.00	Hague P C G G ..	1.070	Sundays ..	Concert.
16.00	School of Posts, Paris	450	Irregular	Concert.
16.30	"Radio—Paris"	1.780	Daily ..	Market Prices and Concert.
17.00	Frankfurt ..	467	Daily ..	Light Music.
17.00	Berlin	415	Sundays & Weds.	Children's Concert.
17.00	Hamburg	392	Weekdays	Shipping Intelligence.
17.00	Lausanne	1.100	Tuesdays, Thurs., Sats.	Concert.
17.30	Stuttgart ..	437	Daily ..	Light Music.
17.30	Berlin	415	Daily ..	Light Music.
17.30	Leipzig	450	Weekdays	Station Orchestra.
17.30	Brussels, Radio Electric	265	Daily ..	Concert.
17.30	Eiffel Tower ..	2,600	Weekdays	Market Prices.
17.45	"Radio—Paris"	1,780	Daily ..	Racing Results.
17.50	Haren, O P O ..	1,100	Weekdays	General News, etc.
18.00	Munchen	486	Sundays ..	Concert.
18.00	Hamburg	392	Daily ..	Concert.
18.15	Eiffel Tower ..	2,600	Daily ..	Concert.
19.00	Madrid	392	Thurs. & Sun. Ex.	Concert, etc.
19.00	Königswusterhausen	680	Daily ..	Concert.
19.50	Berlin	415	Daily (if run)	Racing Results.
20.00	Lausanne	1,100	Mon., Wed., Fri., Sat.	Concert.
20.00	Eiffel Tower ..	2,600	Daily ..	General News.
20.00	Berlin	415	Daily ..	Instructive Talk.
20.15	School of Posts, Paris	450	Irregular	Lectures.
20.30	Brussels	265	Daily ..	Concert.
20.30	Königswusterhausen	680	Daily ..	Concert.
20.30	"Radio—Paris"	1,780	Daily ..	Final Racing Results & Exchange.
20.30	Frankfurt ..	467	Not regular	Short Lecture.
20.30	Leipzig	450	Not regular	Short Lecture.
20.30	School of Posts, Paris	450	Fairly Regular	Concert, Lectures, etc.
20.40	Hilversum N S F	1,050	Sundays ..	Concert.
20.40	Amsterdam P A 5	1,050	Weds. ..	Concert.
20.45	"Radio—Paris"	1,780	Daily ..	Concert.
21.00	Eiffel Tower ..	2,600	Usually Weds.	Concert.
21.00	Hamburg	392	Daily ..	Concert.
21.10	Ymuiden P C M M	1,050	Sats. ..	Gramophone Records.
21.10	Hague P C G G ..	1,050	Thurs. ..	Concert.
21.15	Leipzig	450	Daily ..	Concert.
21.15	Munchen	486	Daily ..	Concert.
21.30	Frankfurt ..	467	Daily ..	Concert.
21.30	Stuttgart ..	437	Daily ..	Concert.
21.30	Berlin	415	Daily ..	Concert.
21.30	Hamburg	392	Daily ..	Concert.
21.40	Hilversum N S F	1,050	Fridays ..	Concert.
21.40	Hague P C G G ..	1.050	Mondays	Concert.
22.00	Madrid	392	Thurs. & Sun	Concert.
22.40	Frankfurt ..	467	Irregular	Dance Music.
22.40	Königswusterhausen	2,800	Daily ..	Concert.
22.45	Stuttgart ..	437	Several Times Weekly	Dance Music.
22.45	Leipzig	450	Irregular	Dance Music.
22.50	Berlin	415	Irregular	Dance Music, etc.
23.00	Eiffel Tower ..	2,600	Sundays Excepted	General News, etc.
—	Petit Parisien, Paris	340	Several Times Weekly	Concerts. 300 watts.
—	Croydon and other air stations	900	Throughout day	To Aeroplanes, etc.
—	Breslau	430	Daily ..	Concerts, etc. 1 kw.
—	Königsberg ..	460	Daily ..	Concerts, etc. 1 kw.
—	Munster	407	Daily ..	Concerts, etc. 1 kw.
—	Moscow	3,200	—	—
—	Kbley	1,150	—	—
—	Scheveningerhaven	1,800 approx.	Irregular	Speech, Concerts, etc.

Constructional Notes

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

Small Electric Soldering.

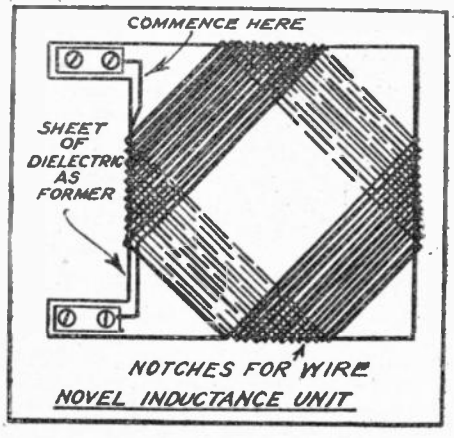
ONE of my readers sends me the following interesting account of his experiments in electric soldering for small jobs. His "soldering-iron" was the stick of lead from a lead-pencil, and the electric supply was obtained by means of a step-down transformer working on the 200 volt A.C. mains and giving 10 to 20 volts on the low side.



The lead pencil was fitted in a handle, and a lead brought to it from the transformer. The other lead from the transformer was attached to a stick of solder. Flux was applied to the part to be soldered, and then the solder was touched by the tip of the lead pencil, which was kept in contact until the solder flowed freely. The leading wire to the solder was then held against the work, and the soldering completed by means of the lead-pencil.

A Novel Inductance Unit.

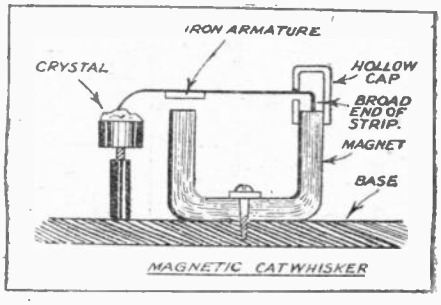
Here is a type of inductance coil which, if it is satisfactory in practice (I have not tried it yet) seems very easy to make. It is the invention of A. Taylor, of Flushing, N.Y. A comparatively thin sheet of any suitable



dielectric material such as celluloid is used as a former, and in each of the four edges a series of small notches may be made, in order to prevent the wires from slipping from their proper places. Starting at the top left-hand corner, and going behind the former, across the bottom left-hand corner, coming out in front of the former and across the bottom right-hand corner, then behind the former and across the top right-hand corner, and so on, the windings are easily laid on. There is thus no crossing of the conductor on any face and the portion of the winding upon one face will be transverse to that upon the other face. By this arrangement the crossing occurs when the conductor portions are separated by the thickness of the dielectric.

Magnetic Cat-Whisker.

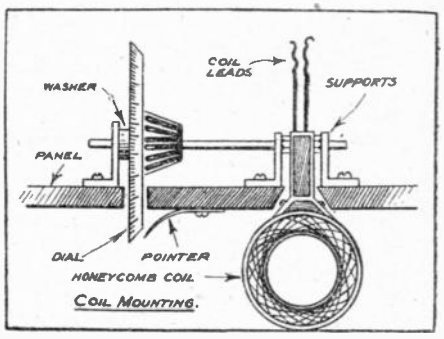
Magnetic holders for cat-whiskers are not, of course, new, but the one shown in the figure is very simply constructed, and it has the important advantage over most others that the end of the whisker which makes contact with the crystal does not make actual contact with the magnet. When there are two actual mechanical contacts, even though the part of the whisker between the contacts is springy, it is difficult to get a proper adjustment of the crystal contact. The design of the arrangement will be clear from the drawing. A small horseshoe magnet is mounted upon the base-board, with the prongs vertical. A small cap is placed upon one of the poles of the



magnet, and the whisker projects loosely through a hole in this cap. The end of the cat-whisker which rests upon the magnet pole must be a portion of strip of, say, ⅛ in. width at least. The magnetic force due to the other pole of the magnet keeps the pointed tip of the whisker against the crystal, and the whisker may be shifted about as required. It is claimed that this device is less sensitive to mechanical jars than ordinary crystal holders. It is hardly necessary to say that the strip which forms the cat-whisker must be of magnetic material, or must have a small iron armature attached to it. The actual contact may be a small tip of gold or other wire affixed at the end.

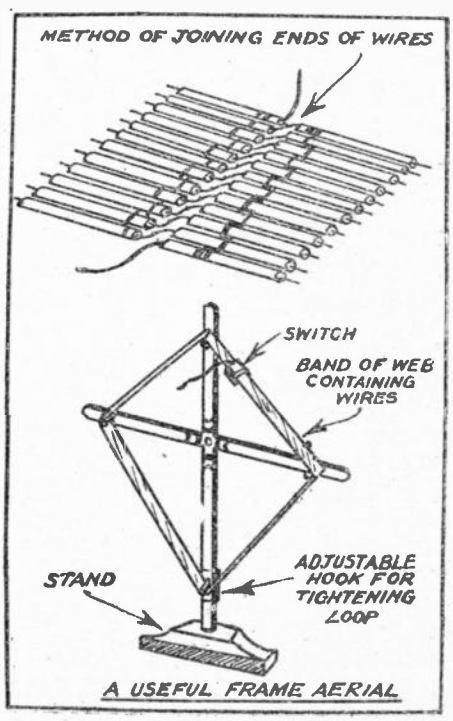
Coil Mounting.

Here is a coil mounting which, although perhaps a little elaborate mechanically, is to a large extent free from capacity effects and, if well carried out, gives a professional appearance to the panel. It will be seen from the figure that the shaft of the movable coil is placed behind and parallel to the panel. Two holes are cut in the panel, the coil mount projecting through one of these holes, and the edge of the dial through the other. The shaft is held by means of three bent brass supports, and friction is provided by means of nuts and washers. A special coil mount will probably have to be made, as the ordinary commercial variety may be found somewhat short for this method of mounting.



A Useful Frame Aerial.

A frame aerial is very useful for a portable valve set, and the aerial illustrated herewith has several advantages, including collapsibility. A number of wires are laid upon a strip of cloth or webbing, and are then bound together, and secured in position by means of weft threads of cotton impregnated with rubber solution. The two sets of ends of wire are then brought to face one another, and are first placed in register, that is, each wire forming a separate closed loop. The two sets of ends are then shifted one place to the side, and the ends then in register are soldered together. Thus the whole set of wires becomes a continuous coil. Tappings may be taken off at intermediate points as required. The tappings and the ends of the coil are brought to the switch shown. The arms of the frame are hinged to a central boss. In the centre of the frame is a four-armed plate, and by rotating this, the arms may be collapsed for transport or storage. At the lower part of the vertical arm the hook is adjustable, and can be lowered until the band is taut.



Mainly About Broadcasting

by The Editor

THE first annual general meeting of the British Broadcasting Company, held at the Hotel Cecil on June 19th, was an auspicious one for more than one reason.

To the listener it was auspicious because Lord Gainford announced the new licence regulations and the birth of the "all-round" ten shilling permit.

To the members of the B.B.C. the meeting was auspicious because the directors recommended the payment of a 7½ per cent. dividend—a recommendation both pleasing to the pocket and to the thoughts of those whose labours have not been spent in vain, and because the general indication thus emphasised that the wireless trade is, all things considered, in a very healthy condition.

To the directors of the B.B.C. the meeting was doubtless auspicious because it marked a milestone on the progressive road of a phenomenal company, and because the general policy adopted has proved—despite slight exceptions—exceedingly sound. And last, but not least, the prospect of a £2,000 bonus must provide a pleasing sensation, even to directors!

Financially, the B.B.C.'s position is remarkably good.

Lord Gainford announced an excess of revenue over expenditure up to March 31st this year, amounting to £3,811 19s. 10d.

The amount received from the Postmaster General on account of licence fees up to March 31st, 1924, was £105,483 12s. 11d., while the actual number of licences in force at the end of May amounted to 804,000.

Broadcasting Progress.

The anticipated revenue from licence fees for the following year is £400,000; but enormous as this sum is, Lord Gainford believes that the B.B.C.'s expenses will be pretty much the same in proportion to the new revenue.

This is due to the opening of new stations and the policy of the company to give the public the best they can afford.

Other points of interest to the amateur in Lord Gainford's speech dealt with the efforts made, and being made, by the B.B.C to secure some measure of protection for the broadcast band of wave-lengths against interference from other transmissions. Lord Gainford said he had been given to understand that "something definite may result in a short time."

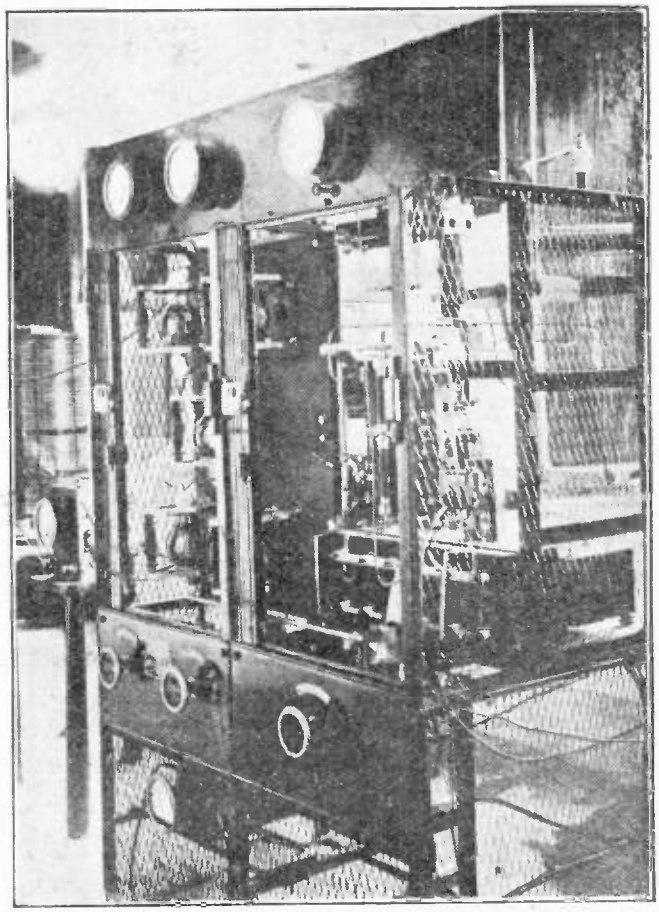
To-day there are approximately 1,400 members in the B.B.C., whereas on Sept. 30th last there were only 550 members on the register. This increase is a remarkable example of the progress a new industry can make when adequate foundations are carefully laid for its growth and development.

One piece of especially good news given by Lord Gainford was in respect of the News Bulletins.

Lord Gainford said that as a result of recent negotiations it was hoped to secure certain additional privileges in respect of broadcasting news and it is to be sincerely hoped that something concrete will transpire which will allow the B.B.C. to give a better news' service. At the moment it is certainly very inadequate, although everyone realises that is through no fault of the B.B.C.'s

J. C. W. Reith.

Lord Gainford's concluding remarks were as follows: "I feel I cannot sit down without making a special reference to your managing director, Mr. Reith, whose ability, assiduity and tact has done more than anything else to enable us to reach the satisfactory position which has been the subject of my report."



A view of the 3 kw. valve panel at the Coli station (Columbia).

And everyone who knows anything about the inner workings of the B.B.C. will say "Hear, Hear" to that.

Mr. Reith does not work in the limelight, nor are his activities apparent to the listener-in; but from personal knowledge I know how much the success of the B.B.C. is due to him and how different Lord Gainford's speech might have been had it not been for Mr. Reith's brilliant organising ability and his tactful understanding of the "other man's point of view."

Too little is known about J. C. W. Reith, but his work is a living monument to his fitness for the important position he holds.

Mr. Reith and his extraordinarily able band of helpers must have felt well satisfied on June 19th, when Lord Gainford delivered that report. I am not prone to gush about things for the sheer pleasure of handing out gratuitous bouquets, but I do sincerely congratulate Mr. Reith and his staff on their achievements, and wish them every possible success for the future.

Amateurs and listeners owe them all a hearty vote of thanks, and I hope readers will join with me in expressing their keen appreciation of "services rendered."

The postal department at 2 Savoy Hill will probably say unkind things about me, but I suggest that a postcard from readers, bearing a message of congratulatory goodwill would not be amiss, and would, at any rate, let the B.B.C. know what we think of them.

Radio Plays.

The three plays recently broadcast from 2 L O proved once more the interesting future awaiting radio plays. But the development of radio drama will be sadly hindered unless those responsible for its production realise that it is not advisable to give three plays in one evening, covering a period of nearly two hours. It was not until ten o'clock on the evening of June 25th that 2 L O's listeners had the chance of hearing "Aida," and by that time most people were a little tired of listening to the plays, despite their excellence.

Further, the position of the talk on the "Chemistry of the Stars" was surely a little out of place. Such a talk is not exactly a suitable one for 9.45 on a hot June evening.

These are little points, but during the summer it is the little points that will count, and which will decide whether broadcasting can retain a larger summer audience.

Variety and a careful choice of subjects seem to me to be two points of paramount importance, and the necessity for carefully avoiding "over-doses" of one particular brand of entertainment. This latter point seems to me to be well within the province of the B.B.C.'s artistic director.

Artistes of the Aether

SOME OF THE ARTISTES WHO HAVE GIVEN YOU PLEASURE WHEN LISTENING IN

by ARIEL

SLOWLY but none the less surely the mists of bad management are rising from the programmes of the B.B.C. and with the addition of opera at His Majesty's Theatre from the British National Opera Company, still more well-known artistes, and less amplification of the time intervals, a very pleasant summer wireless season should be assured.

2 L O has been particularly well suited with its vocalists lately. One that caused much enjoyment was the well-known soprano, Miss Dorothy Silk. Born in Birmingham, she showed early promise for music and finished her studies with Professor Ross at Vienna.

Miss Dorothy Silk.

After making her first appearance in London at Queen's Hall, Miss Silk was heard at many classical concerts at Albert, Aeolian, and Wigmore Halls, appearing also with the Birmingham Philharmonic Society. She has established herself high in public favour in London as well as in the provinces, which she toured also with the Clara Butt and Kennerly Rumford tours. Over the aether her voice carries well, for not only is it of good range, but possesses a clarity of enunciation, particularly well suited to the purpose.

A Well-known Artiste

A popular singer heard at 2 L O was Miss Gladys Haysack. A talented mezzo-soprano, there are few halls in the Metropolis and the provinces in which she has not sung. Apart from the sheer purity of tone and technical finish, Miss Haysack has proved herself capable of holding a music-hall audience by the value of her interpretations, and thoughout the country she is assured of a hearty welcome. Now over the aether her audience will be still larger. Perhaps the chief charm in Miss Haysack's singing is the freshness of her voice, due partly to her youth, partly also to the real artistry of her training.

Miss Gladys Haysack.

Classical Music.

Upon the work of the B.N.O.C. there is little need to dilate, sufficient to say that they are once more back with us at His Majesty's Theatre, and having in the intervals between their seasons borne with both German and Italian opera, we vote for "The Home-Made Supply."

"Carmen," however, with the new singer in the title-rôle, Fedora Roselli, proved disappointing from the listeners' standpoint. Histrionically, Miss Roselli probably made one of the best interpreters of the rôle, as she undoubtedly possesses great powers of acting, but "over the aether" her voice lost much in richness and depth, as well as the freshness of youth. The singing of Frederic Collier was good in every way, and the work of the chorus was very distinct and well balanced. "Aida," "Tannhäuser," "Meistersingers," and "The Valkyrie" have all since been successfully broadcast.

Mr. Alec. Sherman.

Operatic Night.

The B.N.O.C. artistes also contributed to a great evening devoted to love scenes from famous operas, and the most hardened cynic amongst listeners-in must have yielded to the love music of "Romeo and Juliet" (Gounod), "Boris Godounov" (Moussorgsky) and "La Bohème" (Puccini) amongst others.

Miss Una Cheverton.

Two clever violin duettists were heard also at 2 L O recently in the persons of Mr. Alec Sherman and Miss Una Cheverton. This instrument is one, too, often shrouded by the accompanying one, usually the piano, to reveal the fact that its notes are really true to the scale, whereas the piano notes have been tempered, being slightly flat or sharp as necessitated to make the scale more pleasing to the ear. The violin notes untempered, and when the instrument is played by an artiste with an absolutely true toned ear, the result is admirable. In such a case two violinists and harpist, this instrument again being untempered, make pleasant hearing.

Bournemouth

As is well known, most of the players of 6 B M's orchestra have been recruited from Sir Dan Godfrey's army of musicians, but in one case the reverse has taken place, for amongst the first violins of the Municipal Orchestra is Miss Nellie Fulcher, an accomplished violinist who was formerly leading player in the Studio orchestra, and broadcast many solos from there. Her tone is round and warm, and, owing possibly to her previous experience before the microphone, free from the "fading out" effects so often found with players of this instrument.

She has had a very wide experience in concerto work, Chamber music, as well as solos. At a recent Symphony concert relayed from the Winter Gardens, some excellent work was heard from Arthur Marston (pianist) and W. W. Bennett, solo xylophone.

Miss Nellie Fulcher.

Cardiff.

"The Best is Good Enough," as they say, for Cardiff's station, and variety is the keynote of its existence. A "Spanish" night was a good idea, for few nations have so faithfully preserved the character and melodic value of its music. Amongst the items was "El Amor Brujo" ("The Magician Love") by Manuel de Falla.

The music is exotic, palpitating with the southern fire and passion beloved of the country, and De Falla, an adept at translating colour and movement into music, is heard at his best.

Manchester.

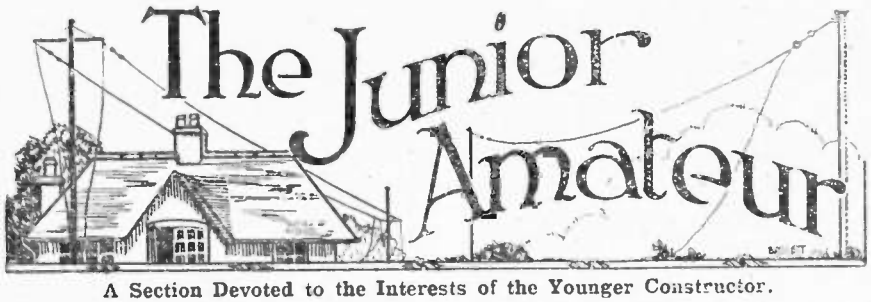
Lighter fare also prevailed at Manchester when Dan Godfrey, junr., returned just to conduct a popular Symphony Concert. Sterndale Bennett's familiar "Naiads," and the less hackneyed Ballet Music of "Ascanio" (Saint Saëns), and Jarnefelt's "Berceuse," with the classical element represented by the "Jena Symphony" attributed to Beethoven, made a thoroughly representative selection.

Birmingham.

Directed by Joseph Lewis, less familiar works made up a recent programme. Weber's Overture to "Preciosa," and Haydn's Symphony No. 15 in B flat "La Reine de France," are both works rarely heard even in the concert hall, and gave fresh lights on the powers of these composers.

Miss Wish Wynne, one of 2 L O's popular artistes.

Birmingham also had its "Mystery Night," on which artistes and composers figured, like modest violets, untamed and unknown till revealed by the next morning's correspondence.



A Section Devoted to the Interests of the Younger Constructor.

A COMPACT CRYSTAL RECEIVER.

By E. M. KNIGHT.

THE crystal receiving set shown in the accompanying photographs was designed in response to a request for a receiver that should be simple to operate and occupy but little space when not in use. The writer has made three sets as here to be described, and nothing better or louder could be desired than the results obtained with them.

On one at 4½ miles from 2 L O, under favourable circumstances in a quiet room, the Uncles of 2 L O have been heard and their words clearly understood with a pair of Western Electric 'phones of 4,000 ohms total resistance at least a yard from the listener's head. Another similar receiver at 4 miles gives perfectly loud results with three pairs of 'phones, and this on an aerial which is only ten feet high at one end. Some readers of POPULAR WIRELESS will welcome the following description.

Constructing the Case.

For the benefit of those readers who are capable of making the complete case as shown in the photograph (Fig. 1), dimensions are given in Fig. 2. Some readers may prefer to omit the lid and construct the bottom half only, or, as a third alternative, the panel which holds the components may be mounted by itself on a cross-piece at each end, about one and a half inches high. A well-seasoned hardwood, such as mahogany or walnut, can be used for the case, and the appearance is greatly improved if it is nicely varnished or polished.

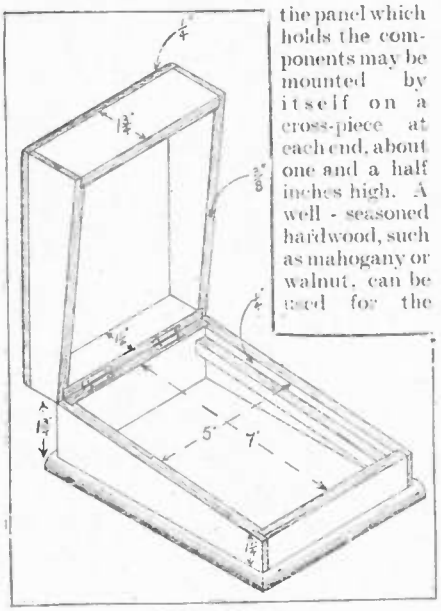


Fig. 2. The case.

To hold the components a panel 7 in. by 5 in. by ¼ in. is required. If desired, this may be entirely of ebonite, but it is not really necessary, and expense can be saved by making the panel of wood ¼ in. thick, and using a smaller piece of ebonite to mount the detector and terminals—clearance in the wood panel for the nuts being made by boring out below them with a ⅜ in. centre bit. Reference to Figs. 3 and 7 will show arrangement of the component parts. If a small ebonite panel is to be used, it may be 4½ in. by 3½ in. by ⅛ in., its position being shown in Fig. 3 with dotted lines. The back terminals are respectively for aerial and earth leads, and the four seen in the front permit two pairs of telephones to be used (Fig. 3).

The crystal detector shown is of the horizontal glass enclosed type. This was chosen in order that the lid of the case might be made compact, and can be purchased ready for panel mounting for one shilling and sixpence. Some other type, if preferred, may be substituted.

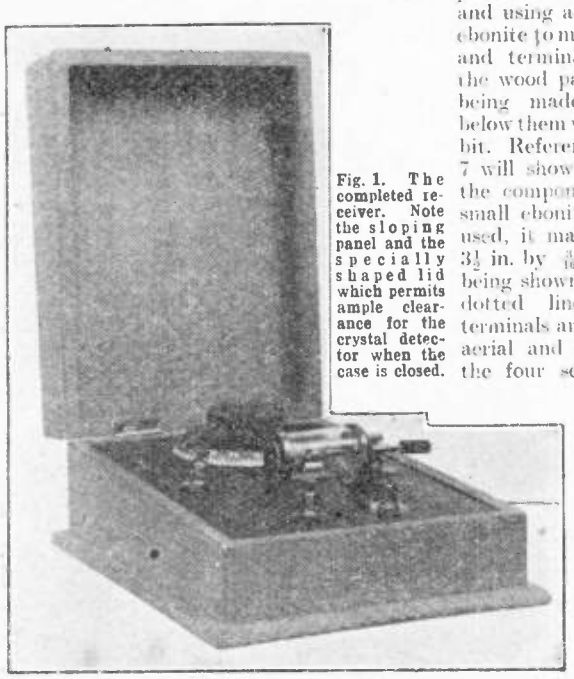


Fig. 1. The completed receiver. Note the sloping panel and the specially shaped lid which permits ample clearance for the crystal detector when the case is closed.

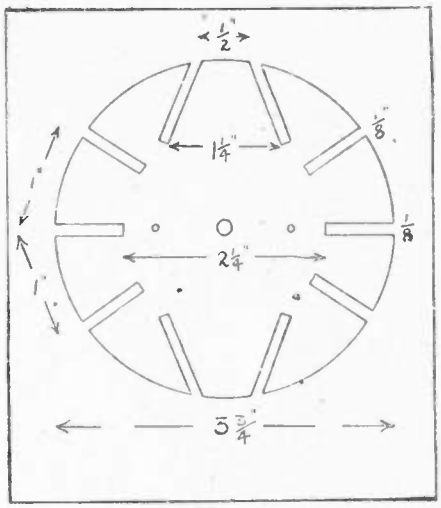


Fig. 4. The coil former.

The Variometer.

The receiver is tuned by a flat variometer of special type (Fig. 8), the control knob and dial being fixed in the back part of the panel (Fig. 3 and photograph Fig. 7). This variometer may be constructed in accordance with the following details.

Two formers are required of thin cardboard which has been well dried. Each is 3¾ in. in diameter, and has ten slots ¼ in. wide, cut according to the dimensions given in Fig. 4. They are then given a thin coat of shellac varnish. There are two D-shaped windings on each cardboard former, and each D consists of 28 complete

(*Continued on page* 690).

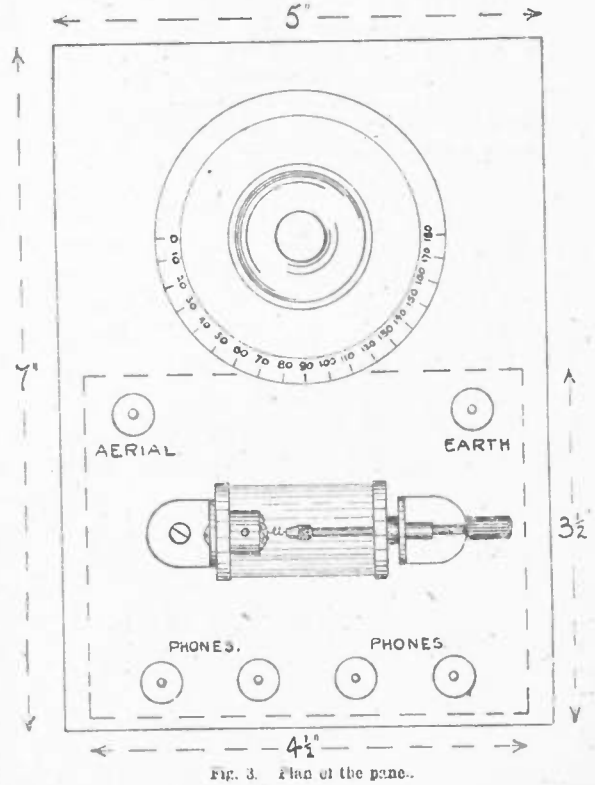


Fig. 3. Plan of the panel.

A COMPACT CRYSTAL RECEIVER.

(Continued from page 689).

turns of No. 26 S.W.G. D.C.C. wire, wound on in the same manner as a basket coil winding.

The direction of the winding for each D is clearly shown in Figs. 5 and 8. It is important that this should be adhered to. For the two complete coils about 20 yards of wire are required, and six inches should be left at each end for making connections. To well secure the winding, the end of the wire should be passed twice through pin-holes in the cardboard near the end of the winding. To exclude moisture both coils may be given a thin coat of shellac varnish and well dried.

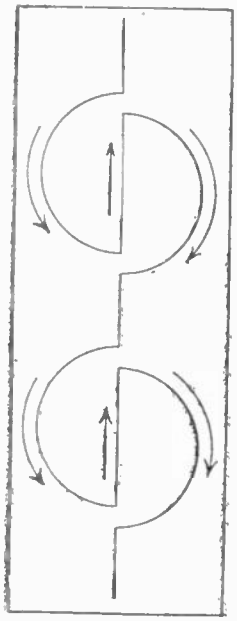


Fig. 5. Direction of windings.

The top coil is fixed to the underside of the panel, while the bottom one is made to revolve for tuning purposes by means of the control knob. Details for mounting are given in Fig. 6. An ebonite knob and dial has a piece of 2 B.A. screwed rod, 2 in. long, tightly screwed into it to form a spindle, and a nut screwed up to the underside of the dial. This spindle passes through a condenser bush fitted through the underside of the panel; on the top is an ordinary flat 2 B.A. washer and spring washer.

Mounting the Coils.

A small condenser spacing washer is placed in the centre of one coil, and this is then placed on the spindle, and a nut screwed down, so that the control knob moves smoothly, but not too easily. The nut is then carefully and securely soldered to the spindle. The top coil can now be

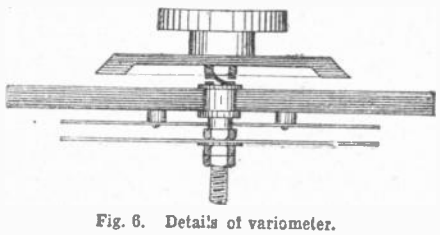


Fig. 6. Details of variometer.

fixed to the underside of the ebonite panel, with $\frac{3}{8}$ in. screws, through the centres of the two D's (Figs. 4 and 6), a spacing washer forming the necessary packing between coil and panel.

Connection between fixing and moving coils is made with thin rubber-covered flex. They are joined in series as shown in Fig. 5, the loose ends of the winding being cut off fairly close and at least six inches of flex, to allow ample movement, carefully soldered on. This may lay in the air space between top and bottom coils. A washer and two nuts, the second to act as a lock nut, will then fix the moving coil in position on the spindle.

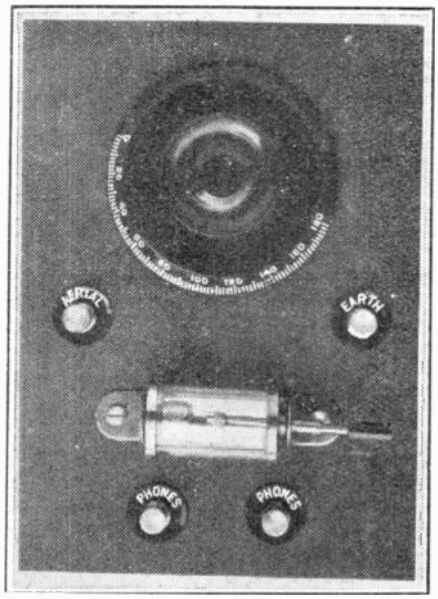


Fig. 7. The panel lay-out.

Setting the Adjustments.

The other connections necessary are as follows. The aerial terminal is joined to the loose end of the fixed coil and the crystal cup; the detector arm to the left-hand telephone terminal; the two centre telephone terminals together; the loose end of the moving coil (with six inches of flex) and the right hand telephone terminal to the earth terminal (Fig. 8). The respective terminals may be indicated by ivorine tabs if desired. After fixing a suitable crystal (left to the reader's choice) in the detector, the complete panel may be screwed to the bearers shown in Fig. 2.

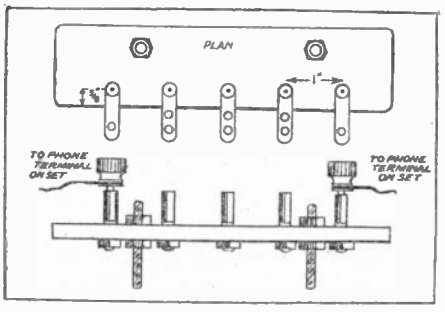
A receiver of this type makes a pleasing gift to the "Old Folks," as it can be adapted so that no adjustments are necessary when it is desired to listen to broadcast music, etc. By using a detector of the perikon type, and obtaining two good specimens of crystal, results equal to any with "cat's-whisker" and one of the "—ites" can be obtained. The writer has obtained excellent results with zincite and copper pyrites. If the receiver is tuned and the perikon detector adjusted during construction, it will always remain ready for use, connection to aerial and earth only being necessary.

If only one pair of telephones is used, the leads should be fixed to the two outside terminals, but if two are required in use at one time, the right pair of terminals should be used for the leads of one and the left pair for the others, the 'phones being then in series.

A SIMPLE MULTIPHONE BOARD.

THE base is a piece of ebonite $\frac{1}{4}$ in. thick, measuring 6 ins. by $1\frac{1}{2}$ ins. This was squared up and matted, and five holes were drilled along one side $\frac{3}{8}$ in. from the edge and 1 in. apart. Into these holes are fixed five valve sockets. With each of these valve sockets is fixed on a small brass lug 1 in. long by $\frac{1}{4}$ in. wide, and $\frac{1}{16}$ in. thick.

These are shown in sketch projecting over front of base, and are drilled with clearance holes for the threaded part of the valve socket, and also with smaller holes to take the 'phone tags; the end ones with one hole each, and the three centre ones with two holes each, and are so linked up by the 'phone tags. On the other side of the base two holes are drilled $\frac{1}{4}$ in. from the edge and 3 ins. apart.



These are to take the pegs that are made to fit into corresponding holes drilled into side of cabinet or into the panel itself. The pegs shown are two short pieces of screwed rod with two nuts on each for fixing to base.

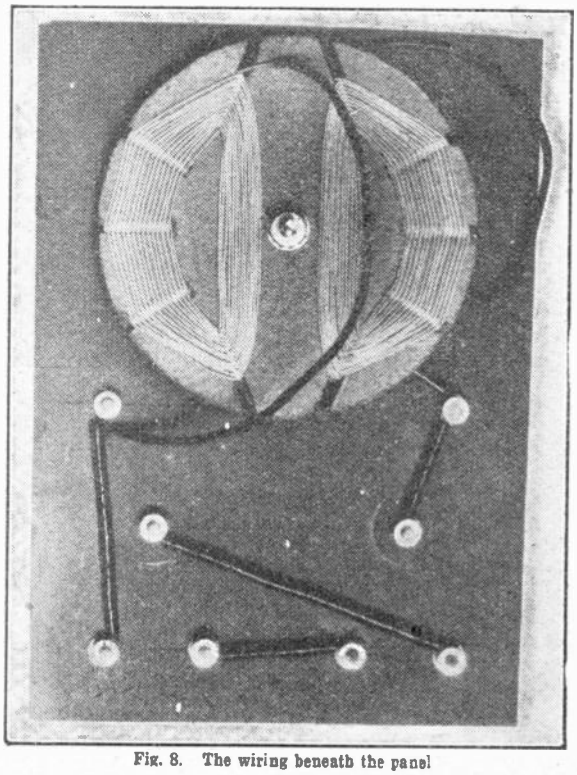


Fig. 8. The wiring beneath the panel

AN EASILY MADE VARIOMETER.

By W. HORSFELL.

This instrument covers the range of broadcast wave-lengths, and constitutes a very efficient tuning element.

THE variometer is, indeed, a useful article to have on one's experimental bench, and the writer, finding that the usual wound on cardboard things were not substantial enough, constructed the one shown in Fig. 1.

The insulation is of ebonite, and should not cost above half-a-crown, less dial; so that it is as cheap as the common cardboard tube type, besides being a better job both mechanically and electrically.

Forming the Stator.

Considering first the rotor or moving coil (Fig. 2), the two end pieces are of ebonite, $\frac{3}{16}$ in. thick and $2\frac{3}{4}$ in. diameter. These may be cut out with a fretsaw and finished off with a file, or may be cut octagonal with a hacksaw and then filed circular. A circle $2\frac{3}{8}$ in. in diameter is scribed with dividers, and four 4 B.A. clearance holes drilled as Fig. 3. In the centre of each is a $\frac{3}{16}$ in. hole to take the 2 B.A. shafts.

The parts shown shaded in Fig. 3 are bevelled at 45° with a small square file; these bevels stop the windings from slipping

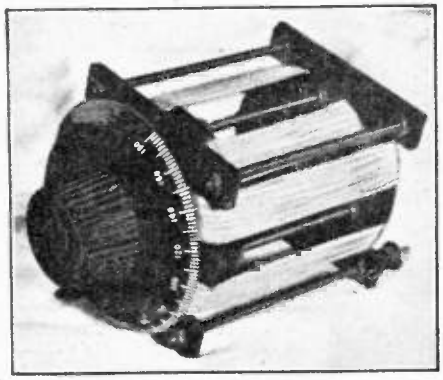


Fig. 1. The complete variometer.

off the rotor. Four lengths of 4 B.A. rod are now cut $2\frac{3}{4}$ in. long, and the end pieces are fixed up with the bevelled parts outside and opposite each other. A thin 4 B.A. nut is on each side of the ebonite; that is, sixteen nuts in all.

The Rotor Windings.

The end pieces of the rotor must be adjusted by means of the nuts until they are perfectly parallel, or it will run out of truth. Two pieces of 2 B.A. rod, $1\frac{1}{2}$ in. long, serve as shafts, and are locked in each end with a thin nut on each side of the ebonite.

Using 22 gauge double cotton-covered wire, wind fifteen turns on each side of the rotor. Each side must be wound separate and joined together in the centre. Make sure that the winding runs in the same direction. The extreme opposite ends

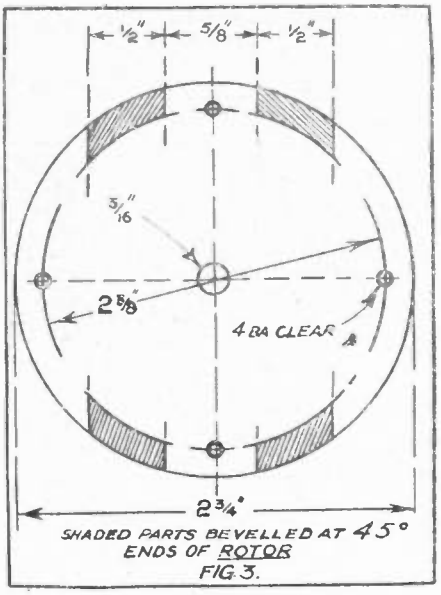


FIG. 3.

are run through small holes in the end pieces, and locked under the 2 B.A. nuts inside. The windings may then be well dried and given an extremely thin coat of shellac to stiffen them.

Assembling the Variometer.

For the stator, two pieces of $\frac{3}{16}$ in. ebonite are required, 3 in. square. These are filed out at $1\frac{1}{2}$ in. radius, and bevelled as the end piece of the rotor. Four 4 B.A. clearance holes are drilled at the corners (see Fig. 4). One end is drilled in the centre to take tightly a top condenser bush, and the other end tapped in the centre to take an adjustable bottom bush.

Connection is made from these bushes by means of a strip of copper or brass foil to the corner hole, so that the nut on the stay rod will screw down on to the strip.

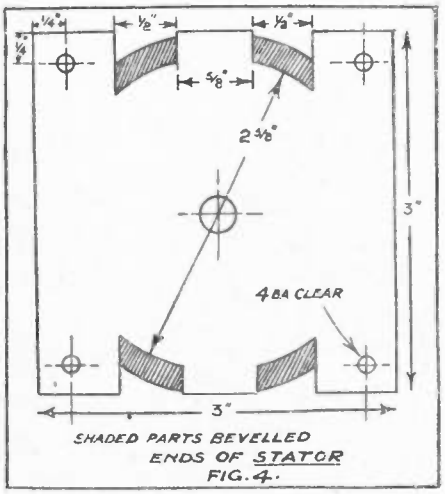


FIG. 4.

These connections must not run to the same rod, as they are the running connections from the inside winding to the outside winding.

The rotor may now be built in with the stator. Four corner stays will be required, 4 in. long, these being 4 B.A. rod. A nut on each side of the ebonite ends locks it up rigid, and here, again, care must be taken to get the ends parallel, or the rotor will bind tight. The method of assembling will be made quite clear by looking at the finished product in Fig. 1.

The Complete Instrument.

Now that it is built up, the bottom bearing may be adjusted to the proper tightness. Here is a little tip which is useful for any wireless parts with running joints, such as variometers and condensers: rub a little blacklead (grate polish will do) on the bearing parts—that is, the shaft and bush holes and faces. This will cure a lot of noises in the receiver, as the bearings may be adjusted with a greater pressure, and still be easy to turn.

Now for winding the stator. Using the same size of wire as on the rotor, wind

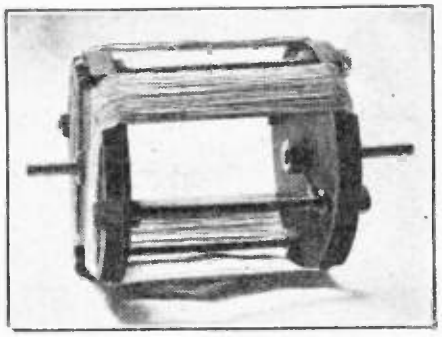


Fig. 2. The complete rotor.

fifteen turns on each side, running in the same direction, and join in the centre. One free end of the winding is screwed under the same nut that clamps the top brass strip, thus connecting the outer winding in series with the inside winding. The other free end is screwed under one of the bottom nuts on either of the rods which have no brass strip connections.

A terminal head may be screwed on the bottom end of this rod, and one also on the rod which makes the connection to the bottom side of the rotor. Thus we have connection right through from the last-mentioned terminal, along the strip to inside winding, from the other end of this winding through the top strip to the outer coil, and through the outer winding to the terminal on the idle rod. The stator winding may then be given a thin coat of shellac, the same as the rotor.

An Efficient Tuner.

This variometer will do for aerial tuning on broadcast wave-lengths. Should one desire one for tuning the plate circuit of a valve, it may be bridged by a fixed condenser, or the windings may have 50 turns inside and 50 outside, using 26 gauge D.C.C. wire.

The making of this variometer is not as difficult as one would imagine from this description. The one illustrated was made by the writer in about two hours.

THE OPENING OF LEEDS RELAY STATION.

The twin Leeds-Bradford station is something unique in British Broadcasting, two transmitters being worked permanently from one studio. The station is due to open on July 8th.

By OUR SPECIAL CORRESPONDENT.

THE Leeds-Bradford station will probably be opened on July 8th with a concert in the Leeds Town Hall. His Majesty's Grenadier Guards Band, Miss Elsie Suddaby, and Mr. Walter Widdop have been engaged to provide the musical portion of the programme, and the opening speeches will be given by Mr. J. C. W. Reith, managing director of the B.B.C., and the Lord Mayors of Leeds and Bradford. It is hoped that a speech will be given by a representative of the University of Leeds, but as there is at present no Vice-Chancellor of the University it is not known who will fill his place.

Power and Wave-length.

The speeches will be simultaneously broadcast to other stations and minute greetings from other stations will be sent to Leeds, as at the Liverpool inauguration.

The erection of the two transmitters and the single studio is going forward rapidly. The aerials are in place, the earths put in, the Post Office have constructed the land lines from London to Leeds and from the Leeds studio to the Leeds and Bradford transmitters. The apparatus, of the now standardised relay type, is being installed. Two hundred watts will be used by each, and the Bradford transmitter will work on 309 metres. Test transmissions will take place during the first week in July. The microphone at the Leeds studio will be the familiar "Sykes-Round" type, as used at 2 L O.

Mr. Lionel Harvey, the engineer-in-charge, and his four assistants, Messrs. Garth, Bottle, O'Dell, and Humphries, are all at Leeds with Mr. B. Honri, the assistant development engineer of the B.B.C., making the engineering arrangements, while Mr. Philip Fox is hard at work as station director. He is already inundated with applications for broadcasting by local artistes.

Artistes Engaged.

The two vocalists for the opening ceremony are a happy choice, as both are singers of national repute and at the same time are local artistes. Miss Elsie Suddaby is one of the select band of local musicians who have achieved Festival honours, as she sang in the Leeds Musical Festival of 1922. She began her musical career as a pianist and she possesses pianistic qualities and qualifications of a very high order. Discovering that she had an excellent vocal organ she decided to adopt a vocal career and was trained by Dr. E. C. Bairstow. As an artiste who gives more thought to the music she is interpreting than to her own glorification she is an ideal broadcaster.

Mr. Walter Widdop has shown musical tendencies from his childhood, but it was not until recently that he forsook his duties as an employee of the Bradford Dyers Association and devoted his time to training. In twelve competitions he secured eight first prizes, two seconds, and two specials, and was adjudged the most promising vocalist at the Glasgow Musical Festival. An interview with Mr. Percy Pitt, of the British National Opera Company (now musical director of the B.B.C.) resulted in Mr. Widdop taking up opera training. He had the satisfaction of taking his first part in opera in his native county when in October, 1923, he sang in "Aida" for the B.N.O.C. at the Theatre Royal, Leeds.

SIR OLIVER LODGE ON "BROADCASTING THE NIGHTINGALE."

THE following interesting letter by Sir Oliver Lodge appeared in "Light," for June 21st, a copy of which has been sent to POPULAR WIRELESS by Sir Oliver Lodge. We reproduce it here with full acknowledgments to our contemporary.

SIR,—The experiment has been made of arranging an instrument in the haunts of the nightingale, stimulating the bird to song by the notes of a 'cello, and broadcasting the result by wireless. Some invalids and town dwellers have thus rejoiced at the opportunity of at last gaining some impression of a song which otherwise they could never hear. Others have objected that it was unnatural and futile to take the sound away from the glamour of its proper surroundings and distribute it amid alien conditions. We may sympathise with both points of view: but the objection would have more force if the process interfered with or coerced the bird in any way, whereas it merely utilises some of the sound waves spontaneously produced, which would otherwise be wasted on the trees and ground.

All that is done is to hold a séance in the woods, to play some music, and wait results. No compulsion is exercised, no surety can be given; and the result may be a failure on one occasion and a success on another. A sympathetic and quiet attitude will conduce to success, while noisy turbulence would be adverse. All we can do is to furnish the opportunity, by providing a suitable medium for transmission and a receptive instrument. Then, if the conditions are favourable, the spirit of the wood can be apprehended even by those whose day-work lies in Wigan or Wolverhampton or Whitechapel.

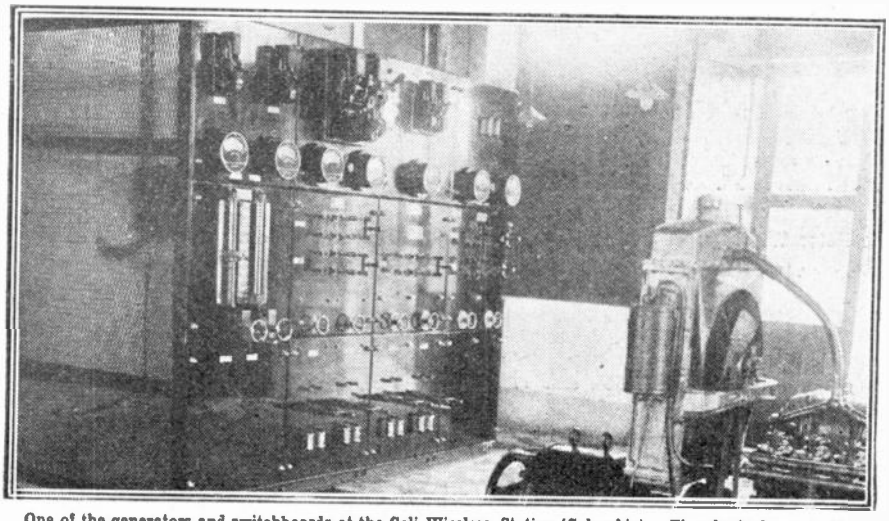
Nor are our domestic woods only thus accessible. The sounds of an African jungle could—and probably will—be transmitted in the same way. Not only the song of the bird, but the croak of the frog, the roar of the lion, the shriek of a macaw, the hiss of the snake, might all be made accessible; and the wealth of concurrent existence, with its multifarious grades, might thereby be demonstrated.

A sceptic on another planet who, after much effort and ingenuity, began to receive sounds from the earth, might be greeted by some which he would stigmatise as diabolic, or by some which he would call ugly or alarming. The still small voice might be long in attracting his attention. Yet all these things co-exist; and it is among them that our lot is cast.

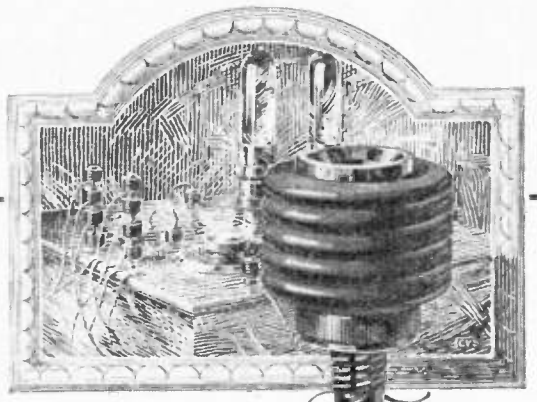
The analogy of all this with the experience of the readers of "Light" is obvious. But to avoid misapprehension, I would add a caution. To broadcast utterances from one human soul to another, and thereby distribute refinements to scoffers, would be unwise. Broadcasting is suited to impersonal utterances and public intelligence; it is not suited to private and personal affairs. The spirit of the beloved should not, without good and sufficient reason, be degraded and cast to the dogs. Trance utterances in public may be made more public; but the personal séance is not for broadcast distribution.

Yours faithfully,

OLIVER LODGE.



One of the generators and switchboards at the Coli Wireless Station (Columbia). The plant shown in the photo is part of a 3 kw. set.



CLIX

The Electro-link with 159 uses

The introduction of this ingenious **combination** Plug and Socket marks the advent of a **standardised system of instantaneous wiring.**

These inexpensive universal contacts embrace every utility of terminals, plugs and switches, which they entirely supersede.

Obtainable from all high-class wireless dealers or direct from the Patentees and Manufacturers:

AUTOVEYORS LTD.
Radio Engineers and Contractors
84, VICTORIA STREET, LONDON, S.W.1.

REVISED RETAIL PRICES
CLIX (with locknut) 3d. each
CLIX insulators (6 colours) 1d. each
CLIX Bushes (6 colours) 1d. pair
CLIX is patented all over the world.

Manufacture of Broadcasting Apparatus

USE OF PATENTS

The pioneer work of the Marconi Company in connection with wireless telegraphy and telephony is well known, and as the result of many years of research work and considerable expenditure. the Company controls numerous patents relating to the manufacture or use of wireless telegraph and telephone apparatus.

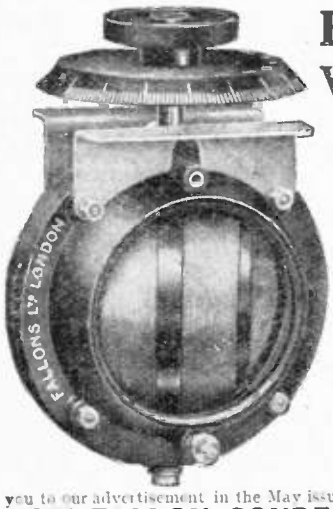
The Company is prepared to grant a licence for the use of its patents in connection with the manufacture of broadcasting apparatus to any member of the British Broadcasting Company, Limited.

A large number of firms (including the principal manufacturers) are already so licensed and pay royalty for the use of these patents, and all apparatus manufactured under licence is so marked

Any persons or firms manufacturing or offering for sale valve apparatus embodying patents controlled by Marconi's Wireless Telegraph Company, Ltd., without its permission, render themselves liable to legal proceedings for infringement.

Whilst hoping that it will not be forced to take legal proceedings, the Marconi Company wishes to give notice of its intention to protect its own interests and those of its licensees, and in cases of infringement the Company will be reluctantly compelled to take such steps as may be necessary to defend its patent rights.

Marconi's Wireless Telegraph Co., Ltd.,
Marconi House, Strand, London, W.C.2.



FALLON'S VARIOMETER

ONLY **10/-** Originally sold at 15 -. Now sold at only 10 -. *Postage 6d.*

You benefit by the Enormous Demand for Fallon Products.
On this line alone you are saved 33⅓%

Quality exactly as fine as before.

The finest Variometer on the market at ANY price. Inside winding. Suitable for broadcast reception on any P.M.G. Aerial, extraordinary close coupling, ensuring large tuning range. On a 30 ft. indoor aerial the max. wavelength exceeds 420 metres and the min. on a 100 ft. aerial is below 350 metres. The max. on a full size outdoor aerial is 700 metres and the min. on a 30 ft. is 200 metres. Inductance, the highest possible—0.5 to 1. Metal feet can be adjusted to four different positions. **Reduced Price Now 10 -.** Post 6d. For particulars of our Condensers we refer you to our advertisement in the May issue of *Modern Wireless*.

NEW FALLON CONDENSER with combined Vernier

This condenser can be had in both styles of our A II. model, with either moulded or Aluminium ends. Prices: ·001, **10 6**, ·00075, **9 6**, ·0005, **8 6**, ·0003, **8 -**, ·00025, **7 6**, ·0002, **7 -**.

Foreign and Colonial Agencies.
Australia: The Westralian Farmers, Ltd., PERTH, W.A.
South Africa: G. D. Henderson & Co., 15, Timber Street, MARITZBURG, Natal; Stuttaford & Co., Ltd., JOHANNESBURG and CAPE TOWN.
Sweden: Graham Bros., Stockholm.
Holland: De Witt Sadee & Co., 182, De Carpentier St., The Hague.
Portugal: M. E. Mussche, Rua Newton 22, 2° Lisbon.
SCOTTISH DEPOT.
120, WELLINGTON STREET, GLASGOW.

Important Notice.
Insist upon FALLON Specialities and refuse firmly to accept substitutes. If your local dealer will not supply, send to us direct. You run no risk in sending to us direct; we guarantee prompt and safe delivery **and pay the postage.** *Delivery by return of post, as we carry large stocks.*

Write direct for trade terms.
FALLON CONDENSER CO., LTD.
"The Condenser People."
'Phone: Tottenham 1932.
WHITE RIBBON WORKS, BROAD LANE, N.15.
and 143, FARRINGDON RD., E.C.1.

TRADE **Grelco** MARK

WE INTRODUCE OUR NEW PATTERN VALVE WINDOW

Face Rounded. Inside Dia. ¾" Outside 1¼"

Knowing that it will prove to be very popular.

Looks very smart on panel and is highly recommended.

Polished brass **3d**, Post 1½d
„ nickel **4d** „
Black nickel **5d** „

TRANSFORMER BOBBIN
High Insulation.
6d, Post 2d

WANDER PLUGS — PANEL BUSHES

DISPENSE WITH TERMINALS
and use above.
Very neat.
Wander plug, red or black, **3d** Post 1d
Panel bush and nut, brass, **2d** Post 1d
Ditto, nickel, **3d** „

TRANSFERS
for lettering panels.
Just apply hot pad.
6d sheet, Post 1½d

OUR NOTED PANEL MOUNTING SWITCHES
S.P.D.T. brass or **N.P. 1/-** Post 1½d
D.P.D.T. brass or **N.P. 1/6** Post 1½d

For Complete **124** page Illustrated Catalogue (1,500 illustrations) full of *guaranteed* goods, send **3d.** Post free.

Telephone: MUSEUM 241 Works: SLOUGH.

ELECTRIC GRAFTON COMPANY

64, GRAFTON STREET TOTTENHAM COURT ROAD
LONDON, W.C.1.

The Editor will be pleased to publish concise reports of meetings of Wireless clubs and associations, reserving the right to curtail the report if necessary. Hon. Secretaries are reminded that reports should be sent in as soon after a meeting as possible. Reports sent in cannot appear in this paper in less than ten days after receipt of same. An asterisk denotes affiliation to the Radio Society of Great Britain.

Lewisham and Catford Radio Society.

On June 12th the society gave a very successful demonstration at a garden fête held by the East Lewisham Conservative Association.

On June 19th, Harrison N. Orme, Esq., of the "Hightensite Co." gave an admirable talk on Ebonite.

Hon. sec., Chas. E. Tynan, 62, Ringstead Road, Catford, S.E.6.

Radio Association Midlothian Branch.

A lecture was delivered recently by Mr J. Pickard on the theory of valves.

Hon. sec., R. T. Daniel, 77, Sixth Street, Newtonquay.

Croydon Wireless and Physical Society.

"The Application of High Frequency Valves to Receiving Circuits and the Screening of Aerials," was the title of Mr. C. Creswick Atkinson's recent lecture.

At the next meeting Capt. A. G St. Clair Finlay will deliver a lecture on "The Operation of Thermionic Valves in Radio Circuits."

Hon. sec., H. T. P. Gee, 51-52 Chancery Lane, London, W.C.2.

The Leicestershire Radio and Scientific Society.*

An interesting lecture was given on the 17th ult., the subject being "Plugs, Jacks, Etc.," by Dr. F. S. Pool.

Hon. sec., Jos. W. Pallett, Esq., 111, Ruby Street, Leicester.

Hackney and District Radio Society.

Recent and forthcoming events: June 19th, Film Show and Public Demonstration; June 26th, Various Valve Circuits, by Mr. Bell on Society's Experimental Panel; July 3rd, Demonstration of Portable Sets; July 10th, Surprise Night; July 17th, "Crystal Set Construction," by Mr. Toye; July 24th, "Calibration of Condensers," by Mr. C. C. Phillips.

Hon. sec., G. E. Sandy, 70, Chisenhale Road, E. 3.

The Clapham Park Wireless and Scientific Society.

The second session of this society ended on Wednesday, June 18th. The society will not be holding meetings during July, August, and September, but these recommence on the first Wednesday in October next.

Hon. sec., 41, Cautley Avenue, S.W. 4.

The Radio Society of Great Britain.

An informal meeting of the Radio Society of Great Britain will be held on Wednesday, July 9th, at which Mr. P. R. Coursey, B.Sc., F.Inst.P., will give a talk on the manufacture of condensers.

Hon. sec., Philip R. Coursey, B.Sc., A.M.I.E.E., F.Inst., P., 53, Victoria Street, Westminster, London, S.W. 1.

North Middlesex Wireless Club.

The last meeting of the club was held on the 25th ult. when Mr. F. C. March read a paper on "Receiving Circuits Without High-Tension Batteries."

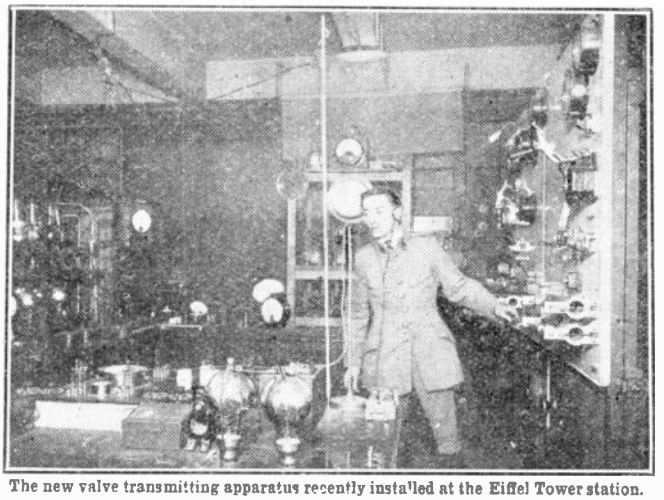
Hon. sec., H. A. Green, 100, Pellatt Grove, Wood Green, N. 22.

Radio Association (Rugby and District Branch.)

On Saturday, June 21st, a number of members visited the Birmingham Broadcasting Station under the leadership of Mr. C. F. Clough, M.Inst.C.E. (vice-president).

On Wednesday, June 25th, the members visited the Rugby Radio Station, in course of erection at Hillmorton. Mr. F. Pritchard, A.M.I.E.E., A.M.I.Mech.E. (president), led the party.

Hon. sec., H. W. Cambrell, A.Rad.A., 36, Manor Road, Rugby.



The new valve transmitting apparatus recently installed at the Eiffel Tower station.

Catalogues Book Reviews Etc.

WE are informed that the Watmel Wireless Co. have removed to larger premises at 332a, Goswell Road, London, E.C.1, and all communications should now be sent to this new address.

* * *

The Woodhill Wireless Manufacturing Co., 55, Cardington Street, Euston, N.W.1., have sent us a copy of their June price list of radio components. Their No. 1 variometer embodies exclusive features, and we understand is particularly efficient. POPULAR WIRELESS readers may obtain a copy of this price list by writing to the above address.

* * *

Copies of the new Igranic catalogue of radio accessories are now ready for distribution to the trade and public. Igranic coils, various types of coil-holders, rheostats, potentiometers, vario-couplers, variometers, L.F. transformers, etc., etc., are illustrated and fully described.

* * *

"Hogarth Super-Selective Radio Receivers" is the title of a leaflet received from the Radiare Electrical Co., Ltd., 1, Warwick Street, London, W. 1. These receivers are made in one, two, three, or four valve sizes. The prices for the receivers (less B.B.C. tax and accessories) vary between £7 12s. 6d. and £22 10s. The best English and American practice has been followed in the wiring and general design of these receivers, and the makers claim that they are unsurpassed for selectivity. Readers may obtain copies of this leaflet by application to the above address.

* * *

An up-to-date and thoroughly comprehensive list, giving full particulars of the standard sizes and voltages of dry batteries and accumulators manufactured by the Ever-Ready Co., Ltd., Holloway, has come to hand. The catalogue is attractively arranged and profusely illustrated, batteries for every purpose being described. The Ever-Ready Co. will be pleased to forward copies to anyone interested.

* * *

"Via Marconi," a booklet published by Marconi's Wireless Telegraph Co., Ltd., aims at satisfying the interest of the public in general and of business men in particular, in the increasing importance of wireless communications. It has therefore been written in popular language and illustrated in an attractive manner.

APPARATUS TESTED

ERNEST BASTOCK, the inventor of the "Spearpoint Cat's-whisker," has forwarded for our inspection a sample of the "Aerio" insulated detector whisker. It is a simple gadget costing only a shilling, and consists of a tiny brass nose in which the cat's-whisker is soldered to the aerial lead, in perfect metallic contact. The nose is held firmly in an ebonite tip which fits securely on the end of the detector arm. Thus all the movable adjustability of the detector arm is retained, while the aerial wire is carried in perfect contact and perfect insulation right to the cat's-whisker. The "Aerio" may be obtained from 135, Showell Green Lane, Sparkhill, Birmingham.

* * *

The price of the Challenge Super-Power crystal set, as supplied by Radiax, Ltd., which was omitted from this firm's advertisement in a recent number of POPULAR WIRELESS, should read £2 2s. inclusive of B.B.C. tax.

THE P.W. "UNIDYNE."

The Editor, POPULAR WIRELESS.

Dear Sir,—I have partly built the 2-valve "Unidyne," the 1-valve circuit being completed, and find it works in every respect as well as an H.T. set at its best. Your diagram shows a ·0002 grid condenser, but I found this (and also a ·0003) almost useless, the signals being as good (or, I should say, as bad) without. The substitution of a ·001 (point, two noughts and one) Edison-Bell condenser worked wonders, and the music from 5 S C came in in great style. A ·006 Dubilier condenser across the 'phones improved the tone wonderfully. With the 1-valve music is audible twenty or so feet from the loud speaker. The Lissen variable gridleak is set at its very highest resistance to give best results, which is exactly contrary to my old H.T. receiver. Reaction effects (with the characteristic whistle) are very similar. Thorpe valves are unobtainable here, so I bought Electron 4-0-4, which I have arranged to plug in horizontally, thus the filaments are vertical. Filament control is very critical, and I intend to fit carbon compression rheostats later and discard the wire type. I would impress on all building any type of "Unidyne" to use only the best makes of condensers and rheostats, etc. Then they will do as I have done and transfer the useless H.T. battery to the ashpit. If I can get the amplifying valve to work as well as the first my ambition will be realised fully. In conclusion, I must congratulate the inventors on what is undoubtedly a great discovery. If Mr. Marconi wishes to be converted, let him hear mine.

Yours faithfully,
WILLIAM CLARE.

163, Gourlay Street, Springburn, Glasgow.

COLUMBUS AND THE EGG.

The Editor, POPULAR WIRELESS.

Dear Sir,—No doubt Messrs. Dowding and Rogers have brought to light a great invention, useful in both commercial and experimenting circles, and for which I shall ask your permission to allow me to tender them my heartiest congratulations.

In the Editorial of an English wireless paper I read: "We are sure that the gentlemen concerned will forgive us if we point out that the elimination of the H.T. battery is not new in itself."

A good reply could easily be given to these remarks by reminding them of Columbus concerning the egg!

The people to-day are interested to know who succeeded in eliminating the H.T. battery, and not who or how many suggested that it ought to have been eliminated.

The elimination of it has been done by your technical staff, and their names will always remain with this great invention.

Very faithfully yours,
L. P. SCLAVOUNOS.

Alexandria.

LOUD SPEAKERS IN SUBURBAN GARDENS.

The Editor, POPULAR WIRELESS.

Dear Sir,—Reading a wide variety of "Wireless Notes" in the daily Press, as well as many wireless periodicals, I have noticed a strong tendency among writers on the joys of broadcast reception in summertime to dwell on the delights of loud-speaker concerts in the garden on summer evenings.

As a dweller in a London suburb, I wish respectfully, but nevertheless most strongly, to protest against any such misuse of the loud speaker. If its use in this way were to become common, the peace and amenities of suburban gardens, and houses, too, for that matter, will be annihilated. Two of my neighbours have already adopted the idea of "earting" the loud speaker into the garden, with the result that, almost every night, the nerves of all the rest of us are tortured with the raucous braying of these instruments. It is bad enough when they are tuned into the same station, but when one is on London, and the other is braying a different programme altogether, the noise is dreadful.

It cannot be denied that no man has a right to inflict upon his neighbours a nuisance of this kind. The same thing, of course, applies to playing gramophones out of doors. I have a wireless loud speaker, but I would no more dream of intruding its noise on my neighbours willy-nilly, whether they liked it or not, than I would of disturbing their peace by continual shouting and yelling, or any other breach of ordinary decent manners.

I must earnestly hope that you will reconsider your attitude in regard to this matter of the use of loud speakers, whether in suburban gardens, on the river, or anywhere else where they can cause annoyance to other people who may not wish to hear them, and have the right to the quiet that they prefer. Encouragement of outdoor loud speakers can only do broadcasting generally the most serious harm.

In order to avoid causing embarrassment to my loud-speaking neighbours, who may be unconscious of the discomfort they are inflicting, I will ask you not to publish my address.

Yours very truly,
FRANK HILLIER.

RADIOTORIAL.

All Editorial Communications to be addressed The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

Editor:
NORMAN EDWARDS, A.M.I.R.E., F.R.S.A., F.R.G.S.

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

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

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

Staff Consultant:
Dr. J. H. T. ROBERTS, F.Inst.P.

Foreign Correspondents:
L. S. LEES, Paris; Dr. ALFRED GRADENWITZ, Berlin; R. YATES, New York; P. F. MARTIN, Italy; W. PEETERS, Holland.

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

The Editor desires to direct the attention of his readers to the fact that, as much of the information given in the columns of this paper is of a technical nature and concerns the most recent developments in the Radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.

PATENT ADVICE FOR READERS.

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

Questions and Answers

R. I. T. (Henley-on-Thames).—What are the various values of plug-in coils used for different wave-lengths, and how should they be varied when the coil is placed in the different circuits? When searching for a long wave station on a two or three circuit tuner I find great difficulty in arriving at the correct combination of coils for aerial and anode circuits, or for aerial, secondary, and anode circuits. Is there any definite ratio between coils used for the respective circuits, or any list published which will act as a guide for the correct coils to use over a wide range of wave-lengths? If possible, please include gauge of wire used, and give the best size for the reaction coil's applicable to the different wave-lengths.

PLUG-IN COILS.

Wire for Primary	Wave-length with average aerial	Primary Turns	Secondary Turns	Anode Turns	Reaction Turns (approx.)
24	260–375	25	35	35–50	35–50
24	310–515	35	50	50–75	50–75
26	370–730	50	75	75–100	50–75
26	460–1030	75	100	100–120	75
26	580–1460	100	150	150–200	75
26	790–2200	150	200	200–250	75
26	1060–2850	200	250	250–300	75
26	1430–4000	250	300	300–400	75–100
28	1680–4800	300	400	400–500	75–100
28	2180–6300	400	500	500–600	100
30	3130–8500	500	600	600–700	100
30	4100–12000	600	700	700–800	100
32	5100–15000	750	850	800–900	100
32	6300–19000	1000	1100	1100–1200	100–150
34	7100–21000	1250	1350	1350–1450	100–150
36	8300–25000	1500	1600	1600–1700	100–150
		·001 mfd. in parallel	·0005 mfd. in parallel	·0002–·0003 mfd. in parallel	

For basket coils allow about 20 per cent off the maximum wave-length. Wind on a former of 11 slots, with centre diameter of 1½ inches. For a ·0005 mfd. condenser instead of ·001 mfd. allow 35 per cent off. Many well-known coils are subject to Letters Patent, and the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.

The list printed herewith embodies all the required information, and also shows the necessary variations to make with different sizes of variable condensers, which are in common use for aerial tuning. It should be noted that owing to local conditions, etc., the figures vary slightly under different circumstances, and therefore no list of this kind can be absolutely accurate. The values given, however, will be found approximately correct for all cases, and may be used with confidence owing to the wide overlap between the different ranges.

* * *

L. F. R. (Richmond, Yorkshire).—Where can I obtain the Booklet "300 Wireless Queries Answered," which was distributed by P.W. some months ago, and what is the cost of same?

The booklet named was given free of charge with P.W. No. 94 (March 15th, 1924), and a strictly limited number of copies of that issue are still available. They can be obtained from The Amalgamated Press, Back Number Dept., Bear Alley, Farringdon Street, E.C.4, price 4d. post free.

* * *

R. K. (Forest Hill).—In P.W., June 7th issue, the writer of "A Practical Selective Circuit" explains that three variable condensers are required, but only shows two in the diagram. Which is correct?

Three variable condensers are required. The ·0005 mfd. condenser is connected across (in parallel with) the inductance L2.

* * *

W. B. (No address given).—What type of coil do you advise for loading inductance coil for use with a crystal set 20 miles from the broadcasting station? Would it be advisable to take tappings from same, or to use a variable condenser? If the latter, what is the best capacity to use?

Any type of inductance coil is suitable, but generally speaking best results are obtainable with basket coils, which are capable of close coupling and sharp tuning. Either tappings or a variable condenser may be used for tuning, the latter being rather better on account of better contacts and finer variations. The value of the condenser can be anything between ·001 and ·0005, but if connected in parallel this value should be kept low, and should not be more than ·0005 to give best results.

* * *

T. K. W. (Linthorpe, Middlesbrough).—Having obtained excellent results with "An Interesting One-Valve Circuit" described in P.W. 94 (March 15th), I wish to know if I can add an amplifier in the usual way?

Circuits of this description are very liable to be upset by the addition of L.F. amplification, becoming extremely unstable and difficult to handle. The only possibility of successful inagnification lies in the use of separate batteries (both L.T. and H.T.) for the additional stage, and even this is not infrequently found to give disappointing results. Where considerable volume is desired it is better to use a "straight" circuit, or one that has consistently proved itself capable of providing a stable input to the amplifier.

* * *

C. A. (Ipswich).—I am desirous of constructing one of the "Unidyne" sets, but am not sure which will be best suited to my locality and requirements. Do you advise the detector and L.F., or would the H.F. and detector be better at Ipswich? I wish to receive all the B.B.C. stations, and have not had previous experience in handling wireless sets.

The H.F. and detector would be advisable in your circumstances, and would normally bring in all B.B.C. stations if an average aerial is employed.

As you have never handled a valve set before you may not find it easy to do so at first, but you have the satisfaction of knowing that you cannot accidentally burn out the filaments, and you will rapidly become accustomed to the different controls. When your tuning and coupling is good you will find the other controls very critical in obtaining the best signal strength from distant stations.

* * *

O. A. C. (Ealing, W.5).—I am looking forward to the advent of the Chelmsford station, but my set is variometer tuned (200 to 700 metres), and I fear that with it I shall hear both programmes at once.

IMPORTANT NOTICE.

Readers are please requested to note that not more than three queries can be answered in one letter addressed to the Technical Queries Department. Owing to the extraordinarily heavy pressure on this department, readers are requested only to send in questions which they find they cannot possibly solve for themselves. On no account will more than three questions be answered in one letter, and telephone calls and personal calls at this office cannot be dealt with, owing to pressure of work on the technical staff.

A stamped and addressed envelope must accompany all queries. A copy of the questions asked should be kept by the sender, as it is not possible to reproduce the original query when replying. Number your queries 1, 2 and 3, and answers will be given to each item.

I find that with a loading coil which tunes up to 1,600 metres I can still hear 2 L O quite well, and this is the case with a larger coil tuning up to 3,000 metres. Should I be wise in scrapping the variometer and employing loose-coupled tuning with coils and condenser?

Unless the variometer is well constructed the tuning would be sharper with coil and condenser, and of course loose coupling would be of still further assistance in separating two different stations. Possibly in loading the aerial you have not loaded the secondary circuit at the same time, which, is of course, necessary for tuning purposes. To do this arrange the loading coil so that when plugged in it is not only in series with the ordinary aerial coil, but 'phones and crystal are connected across both coils.

* * *

G. F. (near Basingstoke, Hants).—I have made up the P.W. Ultra Crystal Set, but kept snapping the wire whilst soldering. Finally I had to twist the tappings and make contact with snap fasteners, using no solder whatever in the whole set, and twisting neat joints where the wire had broken. I put a ·0005 variable condenser in series with the aerial, but up to the time of writing I can get no signals. My aerial is 100 ft. long and I have connected a frame aerial in series with it (on

(*Continued on page* 697.)

RADIOTORIAL QUESTIONS & ANSWERS.

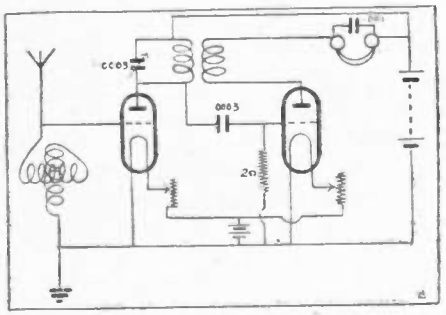
(*Continued from page 695.*)

the top of a 25-ft. pole), as we are about 50 miles from a broadcasting station.

Crystal set signals over a distance of fifty miles can only be hoped for when the circuit is as efficient as possible. Your snap fasteners are decidedly inefficient, and may be making sufficiently bad contact to lose the signals altogether. Another obstacle to efficient reception is your aerial system, which with unsoldered connections is hopelessly inefficient compared to the single straight wire alone. Furthermore, it is contrary to P.M.G. regulations to include a frame aerial in the outdoor system, and it certainly offers no advantages from your point of view. Your best chance is to make the set exactly as described, making aerial and earth as efficient as possible and paying the most careful attention to soldering all connections.

* * *

R. F. L. J. (Petersfield).—What are the connections for an H.F. and detector circuit, employing a variometer and plug-in basket coils? I have a ·001 fixed condenser, which I should like to use if possible. Is reaction on the variometer as satisfactory as upon the tuned anode?



The circuit shown herewith is the most satisfactory one, reaction being employed upon the tuned anode, which is preferable to reaction upon the variometer. It should, however, be understood that strong reaction upon the anode circuit causes interference, owing to the fact that the aerial is coupled through the capacity of the valve. A 2-megohm grid leak is shown, and this value will generally be perfectly satisfactory, although a variable leak gives best results for long-distance work. For B.B.C. wave-lengths an ordinary variometer is O.K. if the aerial is of average length. The anode basket coil should be of about 70 turns upon a former of 4 in. centre diameter. The reaction coil is smaller, and generally about 50 turns will be found to give best results.

H.T. and L.T. voltage will, of course, depend upon the valves used.

* * *

T. M. B. (Liverpool).—In order to protect a set against lightning, is it sufficient to connect the aerial to a water pipe in a cellar?

This depends upon exact situation of set, etc., the only rule covering all cases being the one which says that to be really efficient the earth should be directly under the aerial with the lead-in going straight down to it.

* * *

L. A. M. (Hammersmith, W.6).—Shall I be able to receive other stations apart from 2 L O on a coil 5 in. in diameter, wound with 360 turns of 22 S.W.G.? I am using a crystal set, and my aerial is 25 ft. high and 30 ft. in length, of the inverted L type.

You would be able to tune up to about 2,000 metres, but of course the reception of long-distance long-wave stations will depend upon the efficiency of the receiver, good connections and insulation, and upon whether the aerial is screened.

* * *

T. M. B. (Liverpool).—Is an indoor aerial sufficient for use with a crystal set at a distance of barely 1½ miles from the new Liverpool relay station?

Probably the indoor aerial will give good results, but you will find it advisable to vary its shape and direction until maximum signals are obtained.

TECHNICAL NOTES.

(*Continued from page 676*).

A Mercury Condenser.

For those who are inclined to the making of novel forms of condenser, the following will be interesting. It is a simple form of mercury condenser, consisting of two test-tubes, one of which slides loosely inside the other. The outer one is coated on its outer surface with tinfoil, and a little mercury is placed inside.

When the smaller test-tube is inserted, it depresses the mercury, and causes it to be squeezed up the narrow space between the two tubes. A little mercury thus "goes a long way" when squeezed. The tubes must, of course, be mounted vertically, and a cam or other eccentric device is arranged upon a shaft with dial, to permit of the depression of the smaller tube into the mercury.

Protecting Your Filaments.

Various devices are brought out from time to time for protecting the filament from being burnt out, and when you consider how frequently this accident really happens (probably there is hardly an experimenter who has not at least one burnt-out valve to his credit—or discredit) any such device would seem to be a good investment in the long run. Most, if not all, of these devices consist of fuses in some form or other, which, of course, require replacement after functioning.

The neatest little accessory I have seen in this direction, however, is a wander-plug which contains a tiny coil of resistance wire of about 1,000 ohms resistance. This is used for the negative connection to the H.T. battery, and, of course, will only allow as many milliamps. to pass as there are H.T. volts in circuit, that is, for example, with 60 volts H.T. the maximum current which the H.T. battery can put out is 60 milliamps., which is much too small to burn out any valve on the market. But it is nevertheless many times more than is ever required in the H.T. circuit, for the total current required is only a very few milliamps., even with several valves and a loud speaker.

Capacity Without Inductance.

The inventor has sent me a sample of the invention, which I understand is patented, and I must say it worked perfectly. The coil is wound "double," so as to have some capacity but not inductance, and in tests there was not the least difference detectable in the set when the safety plug was in series and when it was not. On connecting a dull-emitter valve (rated for 0.2 amp.) direct across a 60-volt H.T. battery, using this plug, the filament was not even rendered dull red. Moreover, the H.T. battery was similarly protected from being run down, and as nothing was burnt out, there was nothing to replace.

Safety Battery.

I understand that the inventor is bringing out these tiny coils in a form suitable for attaching in the set in the negative H.T. side, and also that he has a method of combining the necessary resistance with an H.T. battery, so giving the same effect as though the battery had a suitably high internal resistance. This strikes me as a very useful invention in this form, since the H.T. battery has its "claws cut," as one observer remarked.

A capacity consisting of two or three sheets of tinfoil and waxed paper may be shunted across the H.T. battery, this condenser and the resistance being manufactured as part and parcel with the battery itself and inserted inside the case. Probably before long some enterprising firm will bring out on these lines "the battery that cannot burn out your valves or hurt itself with short circuits." I forgot to say that we short-circuited a 60-volt battery with this arrangement for 60 seconds, and during that time there was not the least drop in the current through a milliammeter which was in circuit.

Safety Rheostat.

Talking about the ever-important subject of valve filaments and taking care of them, I have been experimenting with a new patent rheostat which is fitted with an arrangement for limiting the minimum position of the contact-arm, by means of an adjustable stop, so that all you have to do is to fix a safe degree of brightness of your filament when you put in a fresh battery, set your stop, and thereafter forget all about it.

I had a talk with the inventor of this arrangement, and he tells me he has a number of different ways of accomplishing the same result. I must admit it gave me a feeling of comfortable security when I knew that however pre-occupied I might be with listening in the 'phones, and however much I might twiddle the rheostat around, I couldn't possibly do any damage. It is to be hoped that this safety rheostat will soon be on the market.

Local Interference.

Some of my readers may recollect that I recently described in these notes how I had experienced considerable interference, of a very persistent kind, due to a local electric motor. Of course, all sorts of expedients have been tried to minimise the effect, including all known methods and a good many unheard-of ones. But I have now found, or rather my assistant, Mr. F. J. Welch, has found for me, a simple method which seems, in certain cases at any rate, to work excellently.

In case this may be of help to others who are similarly troubled, I am giving here a brief account of it, but hope to give fuller details later on.

The Remedy.

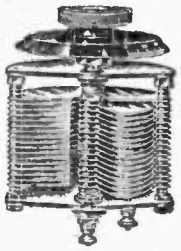
It consists essentially in the use of a counterpoise earth. The use of a counterpoise for this same purpose is, of course,

(*Continued on page 700*).

HULLO EVERYBODY!!

RAYMOND'S VARIABLE CONDENSERS

NEW MODEL. National Laboratory Certificate for Guaranteed Capacities.



NEW MODEL.

Accurate Constant Capacity.	Rigid Construction Throughout.	Electrically and Mechanically Perfect.	Narrowest possible spacing Aluminium end plates.

BEAUTIFULLY FINISHED. Cap.	No. of Plates.	ALL PARTS NICKELLED. Price.	Height without connections.
·001	49	6/11	3¼ in.
·00075	37	5/11	2⅞ in.
·0005	25	4/11	2 in.
·0003	15	4/6	1⅜ in.
·0002	11	4/-	1⅛ in.
·0001	5	3/6	1 in.

·00005 3-plate vernier, 2/6 (no dial)

A handsome dial with scale 0-180 given free.

EBONITE DIAL and scale 8d. extra. POST 3d. SET.

Special terms to Trade, Radio Clubs, etc.

NEW MODEL with 3 Plate Vernier at bottom "It" for very fine tuning, complete with 2 knobs. Ebonite Dial 6d. extra (not sold separately).

Height without connection.

4-in. ...	·001	8/11
2¾-in....	·0005	6/11
2¼-in....	·0003	6/6

Post 6d Set.

POST FREE COLUMN

Valve Windows (Gauze) Nickel	8d.
Empire Tape ½in., doz. yds.	9d.
'Phone Cords (double) 72 in.	1/11
Ebonite Coil Plugs 2 for	1/10
Shaped (Edison Bell) 2 for	2/4
Terminals with Nut—	
Large Pillar, W.O. 12 for	1/4
Telephone, 4 B.A. 12 for	1/3
Telephone, 2 B.A. 6 for	1/-
Small Pillar .. 12 for	1/1
Valve Sockets, complete 12 for	1/1
Ditto with Shoulder (Best) 12 for	1/3
Brass Plugs and Sockets 6 prs.	1/-
Screw Spade Terminals doz.	1/2
Pin Screw Terminals doz.	1/-
Brass Spade Tags.. doz.	5d.
Wander Plugs (Red, Black) pair	6d.
Lightning Switches—	
S.P.D.T. on Porcelain ..	2/-
D.P.D.T. " " ..	2/6
S.P.D.T. on Ebonite ..	1/8
D.P.D.T. " " ..	2/8
Basket Coil Holders with Plug	1/6
Ditto. 2nd quality ..	1/2
Battery Clips .. doz.	11d.
Ebonite Valve Holders ..	1/-
Ditto cut from Solid Rod	1/4
Enclosed Perikon Detector	2/6
Ditto, Smaller Size .. (With two crystals.)	2/-
2-Way Coil Holder for Basket Coils	5/11
2-Way Ditto for Igranic	3/11, 4/6
For Extra Specials see other Columns.	
Nugraving (Titles) ..	8d.
Nugraving (Scales, etc.)..	8d.
Tungstalite Crystal ..	1/-
Midite " ..	9d.
Shaw's Genuine Hertzite ..	1/-
Gecosite	1/3
4 Electrode Valve for Unidyne Circuit	12/6
10 to 1 Telephone Transformer	15/-
R.F. Plug-in Transformer 250/700..	3/9
Raymond Intervalve Transformer	11/9
Accumulator, 4 v. 40 amp.	17/6
Burndept Crystal Detector	5/2
Mic-met Micro Patent ..	6/3
Choke Coils "R.I." ..	10/-
Skinderwiken Buttons ..	5/-
Brunet 4,000 ohm Single 'Phone	8/6
Skinderwiken Transformer	15/-
Watmel gd. lk.	2/6
Watmel anode	3/6

HEADPHONES.

N. and K. 4,000 ohms. Original Pattern. Leather Headbands.

Lightweight ..	9/11
Standard..	11/6
Non-rust diaphragms ..	12/9

Post 6d. pair.

French Thomson-Houston. Genuine original, 4,000 ohms 13/11

Ericsson E.V. (Continental) ebonite earcaps (small) . 4,000 ohms .. 12/-

Post 6d. pair.

4,000 ohms

B.B.C. Sterling ..	25/-
B.B.C. B.T.H. ..	25/-
B.B.C. Premier ..	16/6
Brunet Type D ..	14/6
Brunet Le Luxe ..	18/11
Brunet Single 4,000	7/9
8,000 Brunet. Double for Crystal Sets ..	19/11

Post 6d. pair.

ACCUMULATORS. SUMMER TIME PRICES.

4 v. 40	16/6
4 v. 60	18/6
4 v. 80	22/6
6 v. 60	27/6
6 v. 80	33/-
6 v. 100	34/6

Post 1/- each.

RHEOSTATS.

Ormond	2/-
Raymond ..	1/6
Do. with dial ..	2/-
Extra value do.	2/6
Igranic	4/6
T.C.B. 6 ohms ..	4/-
Ditto, 15, 30 ohms	4/-
Potentiometer T.C.B. ..	5/-
Ajax 25·5 ..	4/-
Ajax Potentiometer 464 ohms ..	6/6
Filostat	2/-

(For D.E. or R. Valves.)

WHEN VISITING WEMBLEY CALL HERE. WE

PAY YOUR FARE

up to 2/6 in £ on Ordinary Prices. (N.A.R.M. and fixed excluded.

EBONITE COIL STANDS FOR IGRANIC, ETC.

2 way ex-handles nickel fittings .	4/6
3 way ditto ..	5/11
2 way .. 3 9,	3/11
3 way .. 4 9,	5/11
FRANCO (micro)	
2 way	12/6
3 way	17/6
Cam. vernier	
2 way .. 8/6	10/6
3 way .. 12/6	15/-
Igranic Patent	
2 way	10/-
3 way	15/-

CRYSTAL DETECTORS, GLASS ENCLOSED

Post 6d. each.

Small	1/-, 1/2, 1/4
Large	1/4, 1/6, 2/-

Very handsome designs, splendid quality.

Mic. Met. ..	6/-
Burndept ..	5/-
Micro movement	2/6

All on ebonite base.

VARIOMETERS.

Ebonite 200/650..	3/11
Ebonite Ball Rotar	5/11
Impregnated Board	2/9
Inside Winding..	9/11

(Edison Bell type.)

EBONITE STOCK 3/16 in. SIZES.

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

Also cut TO SIZE while you wait.

BASKET COILS.

200/3600 waxed (6)	1/8
200/2000 waxless (5)	1/11
2 waxless ST 100	1/-
1750 metres (1) .	10d.

Post 5d. set extra.

POLAR VAR. CONDENSERS.

·001, ·0005 .. 10/6

FIXED CONDENSERS. DUBILIER.

·001 up to ·006	3/-
·0001 up to ·0005	2/6
Grid Leak ..	2/6
80,000 anode ..	5/6
Minicap switch .	8/-

EDISON BELL.

·002 to ·006 ..	2/-
·001 to ·0005 ..	1/3
Grid leak ..	1/3

RAYMOND.

·001 to ·0003 ..	10d.
·002 to ·004 ..	1/-
·006	1/3
·01, ·02 ..	1/6
·05	3/6
TCC. 1 M.F.D. .	4/-
TCC. 2 MFD. ..	4/6

L.F. TRANSFORMERS.

Radio Instruments	25/-
Igranic. Shrouded	21/-
Powquip "	18/-
Formo "	16/6
General Radio .	14/11
Brunet. Shrouded	11/9
Powquip. Open 2-1 or 4-1 ..	14/6
Formo. Open ..	11/9
Raymond ..	10/-
Eureka Concert Grand ..	30/-
Ditto (2nd stage)	22/6

LISSEN PARTS.

Var. grid leak ..	2/6
Anode Res. ..	2/6
Lissen Minor ..	3/6
Lissenstat ..	7/6
Ditto (Universal)	10/6
2-way Switch ..	2/9
Series Parallel .	3/9
Lissen T.1. L.F.	30/-
T.2., 25/- T.3	16/6

Coils and all parts always stocked.

LOUD SPEAKERS.

"Baby" Models.	
Sterling . ..	55/-
Brown	48/-
Raymond ..	30/-
Sidpe	25/-

Post 6d. each.

VALVES.

PHILLIPS ·04

FV. 1·6 to 1·8 AN.V. 30-75. ..	18/6

FRENCH "METAL."

FV. 3-3·5. F.C. ·06 AN. V. 20-80 ..	17/6

Post 1/- each.

Fil. v. 3. 3.5.	
Cossor P.1., P.2.	12/6
Mullard Ora .	12/6
Ediswan ..	12/6
Marconi R. and R.5	12/6
A.R.D.E. Ediswan	21/-
D.E.R.	21/-
D.E.3	30/-

All valves stocked.

D.C.C. WIRE.

S.W.G.	¼lb.
18 "	9d.
20 "	10d.
22 "	10d.
24 "	1/-
26 "	1/1
28 "	1/3
30 "	1/6

Post 6d. reel.

McMICHAEL H.F. SPECIAL TRANSFORMERS.

50-150 ..	8/-
150-300 ..	7/-
300-600 ..	7/-
500-1200 ..	7/-
1100-3000 ..	7/-

Post 6d. each.

This first-class Switch Arm, with 12 studs, 12 nuts, 12 washers. To callers, 10½d. By Post, 1/6 set.

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

These Prices for

CALLERS ONLY

Spade Tags ..	4 a 1d.
Empire Tape, ½ in. ..	2 yds. 1d.
D.P.D.T. Panel Switches	1/3
S.P.D.T. Panel Switches ..	10½d.
D.P.D.T., on Porcelain ..	1/11
S.P.D.T., on Porcelain ..	1/5
Filament Dials, 0-10 ..	4½d.
Ditto, with Knob, 0-10 ..	5½d.
Easi-Fix Cups	each 1d. & 1½d.
Valve Holders, Ebonite ..	8d.
Ditto, cut from Solid Rod	1/3
Valve Sockets, Nut & W.	2 for 1½d.
Ditto, with Shoulder ..	each 1d.
1-16th in. sq. Tin Copper	4 ft. 2½d.
Best Sleeving (large) ..	yd. 4d.
Large Pillar Terminals ..	1d.
W.O. and Telephone	each 1d.
Small Pillar ..	4 for 3d.
2 B.A. 'Phone ..	2 for 2½d.
'Phone Wood Screw	2 for 2d.
Adhesive Tape ..	roll 3d.
Copper Foil ..	foot 2½d.
Washers, 2 & 4 B.A.	doz. 1d.
Nuts, 4, 5, 6 B.A.	3 doz. 4½d.
Nuts, 2 B.A. ..	3 doz. 5d.
Brass Plug and Socket pair	1d.
Ebonite Coil Plugs ..	4d.
Ditto, Very Superior 7d., 8d.,	9d.
Aerial Wire 7/22 ..	100 ft. 1/11
Ditto, Extra Heavy	100 ft. 2/3
Spade Screw Terminals ..	1d.
Pin Screw Terminals 2 for	1½d.
72 in. 'Phone Cords ..	1/5
English 4·5 Batteries ..	4d.
Battery Clips ..	2 a 1d.
Shaped Coil Plugs ..	8d.
Ditto, Edison Bell ..	1/-
Electron Aerial ..	100 ft. 1/4
Filostat (D.E. or R. Valve)	1/9
Spearpoint Whisker ..	2d.
Gold or Silver Ditto ..	2d.
5 in Packet (one gold) ..	3d.
Crystal Tungstalite ..	9d.
Crystal, Midite	8d.
Crystal, Gecosite	1/3
Shaw's Genuine Hertzite	8d.
Large, Ditto	1/-
Rubber Lead in ..	yd. 1½d.
Extra Heavy ..	yd. 2d.
Wander Plugs ..	pair 2½d.
30 v. H.T. Battery ..	4/6
60 v. H.T. Battery ..	7/6
Variometers, 250/600 ..	1/6.
Switch Arms	6½d.
Contact Studs complete 2 a	1d.
Nickel Gauze Valve Wind	5d.
Twin Flex .. 4 yds.	6d.
Ditto, Red and Black 4 yds.	7d.
Bell Wire, D.C.C., I.R.C.	10 yds. 5d.
Dutch Valves, Tubular ..	4/3
Dutch Valves "R" Type	5/9
Phillips "R" Valves ..	7/3
French "R" Valves ..	6/6
Microphone Button ..	4/6

RIGHT OPPOSITE **DALY'S** GALLERY DOOR

K. RAYMOND

27, LISLE STREET, W.C.2

'PHONE: GERRARD 4637.

No responsibility accepted on post orders unless cheques and postal orders are crossed and made payable to the firm. Moneys sent must be registered.

HOURS OF BUSINESS:

Daily - 9 to 7.45

Sundays 10 to 1

TECHNICAL NOTES.

(Continued from page 698).

well known, but I have tried many such systems before and have never known one to be so effective as this. The building (the University Physics Laboratories) is a large steel-girder framework, and the laboratory in which this particular work is being carried out is on the ground floor. We have several aerials, but the one most used is a single-wire aerial about 10 feet above the roof, 30 feet long and with a down lead of about 50 feet.

The counterpoise consists of five lengths of "electron" wire stretched below the ceiling of the laboratory, each length being about 20 feet, and the height of the aerial above the ground being about 10 feet. I have already mentioned that the building is on a fairly close steel framework, and no doubt this has a good deal of influence upon the effects obtained. This counterpoise earth is more effective when receiving on certain wave-lengths than on others. I am at present unable to say exactly why the particular combination now in use cuts out the interference so well (without reducing signals to any appreciable extent), but it has been of very great benefit in our experimental work, and the matter is being further investigated.

Absorption.

Talking about peculiar interference effects, a most remarkable case has just been reported to me which seems well worth investigating. I am not able to give very much information about it, as I have not yet examined the sets concerned, but by the time I have had a chance of hearing them, possibly some of my readers may be able to throw some light on the matter.

The case is simply this. Two experimenters live in adjacent houses, and one operates a three-valve set, whilst the other has simply a one-valve detector set. There is apparently no connection between their aerials, and no obvious circumstance which would seem to account for anything unusual. But whenever the one-valver is working, the three-valve set is almost completely cut out. Is it a case of interference or absorption? If any readers know of similar cases, perhaps they will write and let me have details.

An Interesting Experiment.

The use of a gas flame for amplifying purposes is not new, and, in fact, articles on the subject have appeared in this journal. But the following experiment will prove interesting to those who are able to obtain a few inches of fairly fine platinum wire and a Bunsen burner. The Bunsen flame takes the place of the valve in the conventional circuit. A short, straight piece of platinum wire is mounted vertically in the centre of the flame, and corresponds to the filament.

A vertical spiral of the wire surrounds this, without touching, and corresponds to the grid, whilst a tip of wire just projects into the flame at the base and forms the "plate." This amplifier may, for example, be used in the secondary circuit of the audio-frequency transformer. The adjustment of the flame is not critical, but the flame should be large enough to envelop the electrodes. The action of the device depends upon the fact that intense ionisation is produced in burning gases, and there is, therefore, a plentiful supply of ions and electrons to carry the current through the flame.

R/R

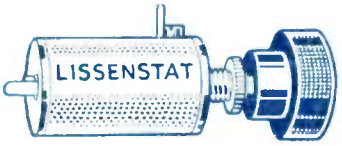
Stepping in with LISSENSTAT Control

Oftentimes physical alteration of the tuning inductance or condenser fails to give just that acute control which means so much in long distance telephony. It is when this critical condition is reached that one realises how important LISSENSTAT control is to fine detection. Where further physical adjustment of the reaction control is ineffective then it is that you step in with that final touch of LISSENSTAT control. Immediately tuning becomes transformed—at once it is so acute that the distant station which previously was so elusive comes in clearly.

It is now generally known that LISSENSTAT control improves fine detection of long distance telephony in a truly remarkable manner.

LISSENSTAT (prov. pat.)

Critical electron emission is absolutely dependent upon the exact control of filament temperature. LISSENSTAT control gives that indescribable sensitivity to detection which has to be experienced to be understood 7/6



LISSENSTAT MINOR (prov. pat.)

Such a high degree of LISSENSTAT control is provided by the LISSENSTAT MINOR and at a popular price that no inefficient rheostat need longer be tolerated. The LISSENSTAT MINOR makes it worth while discarding any existing device. For dull emitter and all valves 3/6

LISSENSTAT Control is an indispensable part in the building of any efficient receiver.

Why Transformers Break Down—

It is commonly assumed that transformers always break down because of overload. Oftentimes, however, the cause is far different. The windings of an audio-frequency transformer are called upon to carry comparatively heavy low-frequency impulses of varying audio-frequencies. The louder the signals the stronger are these audio-frequency impulses.

If the windings of a transformer were microscopically examined whilst audio-frequency impulses of varying frequencies were flowing through them, it would be seen that they were vibrating in sympathy with the frequencies they were passing.

If the windings had not been designed bearing in mind the conditions of service, although the effect of the vibrations might not be immediately obvious, the ultimate effect would be to alter the molecular formation of the copper in the windings and render the wire crystalline. Once the windings have reached this condition, it is only a question of time before the user will one day be surprised to find his transformer no longer amplifying. Unfortunately, even expensive transformers are not immune from this fault. That is why these break down even though in the factory testing room they may have withstood thousands of volts.

Apart from perfect mechanical constructions, LISSEN AUDIO-FREQUENCY TRANSFORMERS have certain technical attributes which place them above every other. For amplification of radio telephony they are unsurpassed.

The Low Tones of an Orchestra—

(1) **THE LISSEN T1 TRANSFORMER** is the only transformer which has a sufficiently high impedance value that it forms the ideal transformer for immediately behind the detector valve. THE COIL WOULD AMPLIFY BY ITSELF WITHOUT ANY IRON CORE AT ALL. The secret of its beautiful amplification is in the expensive coil. Even the low tones of an orchestra are faithfully reproduced, perfect in every note **30/-**

(2) **AUDIO FREQUENCY IN REFLEX CIRCUITS.** Besides being exceptionally pure and powerful in all reflex circuits, the LISSEN T2 Transformer can be used for all stages. Recommended also to follow the LISSEN T1 where the latter is not used throughout **25/-**

(3) **SKILFULLY BALANCED DESIGN.** The LISSEN T3 Transformer actually compares with many expensive transformers of other make. It is certainly the best light transformer made. For all stages **16/6**

Fit a LISSEN Transformer—and make sure.

Altering Leak Resistance

Once a fixed leak is put into a circuit it offers no opportunity to the operator to alter its resistance either way. Although some circuits do not immediately respond to variation of grid potential others are decidedly susceptible to it. Valves also vary and variable grid control is, therefore, highly necessary in many cases, and it is always reassuring to know that one has the means of controlling grid potential, so that the correct value is obtained for each circuit or valve, or the particular conditions under which a valve may be working on any given signal. With the LISSEN Variable Grid Leak fitted a receiver is equipped to yield the utmost sensitivity which correct grid potential under all conditions implies.

LISSEN ONE HOLE FIXING, OF COURSE—POSITIVE STOPS BOTH WAYS **2/6**

LISSEN Variable Anode Resistance—20,000 to 250,000 ohms same outward appearance as the LISSEN Variable Grid Leak **2/6**

You just gently pull or push

LISSEN two-way switch, **2/9**

—and you hear those little switches "make" with a reassuring click. The contacts do not short when changing over—they are self-cleaning. There are no neater or handier switches. LISSEN ONE HOLE FIXING, OF COURSE. Take up hardly any room.

LISSEN Series-parallel switch, **3/9**

Is this your nightly problem?

Puzzling how to cut out your interference, so that distant stations may come in uninterrupted? How easy it is with LISSENCEPTOR, broadcasting and Morse, although there is some type of Morse which is more difficult to eliminate. Even this, however, can be so subdued that it ceases to be troublesome.

A separate tuning condenser should be used with the LISSENCEPTOR—diagram with each shows easy connections.

LISSENCEPTOR Mark 1 type for 600 metres **7/6**

" 1 " " broadcasting **7/6**

LISSENCEPTOR Mark 2 type for broadcasting and 600 metres (combined with switch for more selective tuning) **15/6**

The LISSENCEPTOR acts as a sentinel beside your Receiver.

Why Use Mixed Parts?

There is a LISSEN part for every vital place of a receiver. If you build with all LISSEN parts your finished receiver will be far above the average.

The Text Book of LISSEN parts contains a lot of useful information. Post Free 8d. Free to the Trade.

LISSEN LIMITED

8-16, WOODGER ROAD, GOLDHAWK ROAD, SHEPHERD'S BUSH, LONDON, W.12.

Telephones: Hammersmith 1072, 3380, 3381 and 3382.
Telegrams: (Inland) "Lissenium, Shepherds, London."
(Foreign) "Lissenium, London."

All Applications for Advertisement Space in POPULAR WIRELESS to be made to JOHN H. LILE, LTD. (Sole Agents), 4, Ludgate Circus, London, E.C.4. 'Phone: 1080 Central.

Printed and published every Friday by the proprietors, The Amalgamated Press (1922), Ltd., The Fleetway House, Farringdon Street, London, E.C.4. Advertisement Offices: Messrs. J. H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4. Registered as a newspaper and for transmission by Canadian Magazine Post. Subscription rates: Inland and Abroad, 17/4 per annum, 8/8 for six months. Sole agents for South Africa: The Central News Agency, Ltd. Sole agents for Australia and New Zealand: Messrs Gordon & Gotch, Ltd.; and for Canada: The Imperial News Co. (Canada), Ltd. Saturday, July 5th, 1924.
R/R