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Popular Wireless

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

August 18th, 1923.

Miss Corinne Griffith — listening-in — "between scenes."

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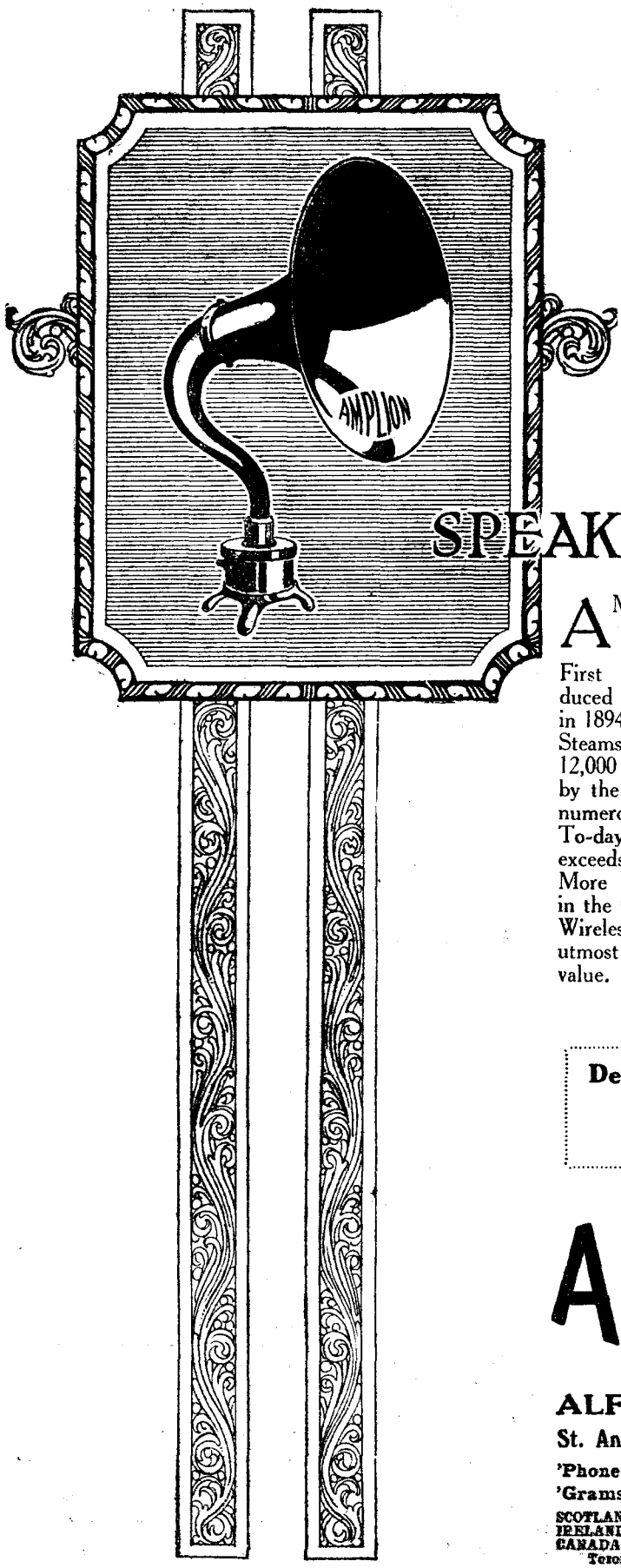
New Form of Crystal Detector.
An Efficient One-Valve Receiver.
The New Manchester Station.
Single Panel Unit Valve Set.
The B.B.C.'s £200 Holiday Competition.



SPEAKS FOR ITSELF

AMPLION RECEIVERS are designed and produced by the world's original and largest manufacturers of Loud-speaking Telephones.

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CANADA—Messrs. Burndept of Canada Ltd., 172, King Street West, Toronto.

POPULAR WIRELESS

August 18th, 1923. SCIENTIFIC ADVISER, SIR OLIVER LODGE, F.R.S., D.Sc. [Every Friday.

TOPICAL NOTES AND NEWS.

A Few Notes from 5 I T.

MR. JOSEPH LEWIS, a well-known Midland conductor, has been appointed musical director, and a station choir and a repertory of soloists have been formed. These will be responsible for all the vocal music of 5 I T, and besides songs, duets, etc., selections from opera and oratorios will be leading features.

* * *

ON Friday, August 17th, an augmented orchestra will give an Elgar programme, and Saturday will see the first appearance of Appleby Matthews' military band.

* * *

ON Wednesday, August 15th, there was a land-line transmission of the orchestra of the Lozells picture-house, this is an innovation which is increasing in popularity each week.

* * *

Thunder and Cold Salmon.

IT is to be hoped that a more select repertoire will be given in the children's hour from 2 L O in the future. On Thursday, August 2nd, in particular, it was rather distressing to hear pessimistic references to the approach of thunderstorms, and not particularly amusing to hear that one of the announcers had eaten too much cold salmon.

A little knowledge of child psychology would show that thunderstorms are not the most suitable subjects for children just going to bed. As for the salmon, some people never know when they have had enough!

* * *

A Farewell Ceremony.

ON Friday, July 27th, a particularly happy little affair took place in Manchester, when the members of the staff and orchestra of 2 Z Y gave a luncheon to their departing director, and presented him with a handsome gold watch. This, I believe, is the first social function in the history of the British Broadcasting Company, and therefore deserves special mention. Mr. Burrows, the director of programmes to the company, and Mr. Godfrey, who will succeed Mr. Wright at the Manchester station, were both present at this function. Accepting their tribute of goodly fellowship and esteem with obvious emotion, Mr. Wright replied, nevertheless, with characteristic whimsicality: "I hope that it keeps better time than the studio clock."

Mr. Wright takes with him to London the sincere good wishes of all listeners-in in the station area. The ideal feeling existing between Mr. Wright and all who come in contact with him is admirably set out in the inscription engraved on the back of his watch:

"To Kenneth Anthony Wright
(Uncle Humpty-Dumpty),
From the Staff and Orchestra of 2 Z Y.
An appreciation of a man."

* * *

The New Broom.

MR. WRIGHT is succeeded by the eldest son of a man whose name is associated with British music all over the world—Sir Dan Godfrey—whose name he bears. Mr. Dan Godfrey is already a very distinguished musician. He will be assisted by Sidney G. Honey, who is well-known for his charitable work among young men, and who has recently been acting as announcer at 2 L O.

* * *

Lady Baden-Powell.

MANY people enjoyed listening-in to Lady Baden-Powell talking to her Guides last week. Lady Baden Powell told me she felt quite happy before the microphone, and was quite pleased to speak to her Guides in this way.

* * *

Future Events from 2 L O.

AUGUST 17TH.—G. A. Atkinson—Cinema Criticism; F. G. Bristow, F.C.I.S., Gen. Sec. of the Commercial Motors Association, on "The Relation of Broadcasting to the Motor Industry"; Irish Guards' band; Mr. Allen S. Walker, Mansion House.

AUGUST 20TH.—Dr. V. E. Pallin on "The Wonders of X-rays."

AUGUST 21ST.—An appeal on behalf of the Royal Infant Orphanage; Major G. C. Home on "Roman Britain."

AUGUST 22ND.—Topical Empire chat; Edward Salmon; Mr. Archibald Haddon on "Dramatic Criticism"; Mr. W. H. Shipway on "Industrial Dentistry."

AUGUST 23RD.—Percy Scholes on "Music Criticism."

AUGUST 24TH.—Ernest Esdaile on "Elocution"; G. H. Atkinson on "Cinema Criticism"; F. H. Bather on the Natural History Museum.

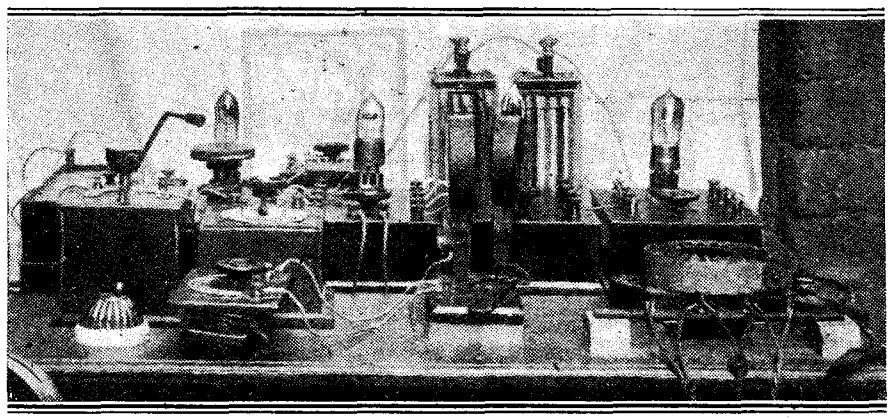
AUGUST 25TH.—Major Harry Barnes' second talk on "London Buildings."

* * *

A Cardiff Station Item.

A SPECIAL Mozart programme will be given on Sunday, the 19th inst. when Miss Doris Lemon (soprano) and Mr. William Michael (bass) will perform.

* * *



A receiving station almost entirely home constructed by Mr. A. T. Billingsley, 103, Manor Rd., Leyton, E.10

The New Southern Station.

THE B.B.C. have acquired the whole second floor above Messrs. Vernals' pram depot, 68, Holdenhurst Road, for the Bournemouth station. The studio being about 33 ft. by 20 ft., it will be the largest provincial studio, and will not be so heavily draped as is the studio at 2 L O.

The transmitting site is situated in Bushey Road, backing on the North Cemetery. This station will be the only one on the B.B.C.'s own land, and consequently they will have considerable opportunities of experimenting and improving transmissions. The Marconi wireless installation of 1,500 watts will be used, and broadcasting will begin about the middle of September.

* * *

French Wireless Club.

THOUGH France took up broadcasting some time after this country, wireless societies are being formed all over the country. It is interesting to note that the English phrase Radio Club has been borrowed in its entirety, and is now incorporated in the wireless —— of France. A new club has recently been formed at Anvers, called the Radio Club d'Anvers, and has met with a great welcome in that district.

* * *

After Three Months.

AT the time of writing the Broadcasting Committee are still "considering," and there appears to be no sign of their cogitations ever coming to an end. Mean-

(*Continued on page* 910.)

NOTES AND NEWS.

(*Continued from page* 909.)

while, the wireless slump is becoming more acute, and the general public are fast losing interest in broadcasting.

* * *

And So It Goes On.

THE report that was to have been issued last week has been postponed indefinitely, and we are still in the dark. Why the committee cannot tackle one thing at a time it is difficult to understand. The most important consideration is the licence problem, and until that is settled broadcasting can never be firmly established. If this is too much for the committee they should say so, and leave it to a more competent body.

* * *

A Wireless Obstruction.

A CHEMIST and agent for wireless sets was summoned for causing an obstruction.

It was said that a crowd of more than three hundred people assembled outside his shop whilst wireless demonstrations were given inside.

It was argued that his licence entitled him to give concerts, which were advertised for him.

The Bench dismissed the case on payment of costs, as it was the first summons of its kind.

* * *

Tracking Criminals by Wireless.

SCOTLAND YARD is to have ~~two~~ new transmitters of 500 watts power each. Major T. H. Vitty, engineer, and Mr. G. A. H. Wootton, wireless expert of Scotland Yard, were chiefly concerned in the recent experiments which led to the purchase of the new sets.

* * *

Journeys Saved.

THE adoption of wireless by the police force will assist in cases of intricate and baffling natures, which necessitate inquiries in several directions. Many local constabularies are watching with interest this innovation at Scotland Yard.

* * *

5 W A's New Control Room.

THE Cardiff Station has been fitted with a new control room, and there is no doubt that this innovation will greatly add to the efficiency of 5 W A. The control will naturally be easier, and it will enable the station to broadcast weather reports received from Fishguard during the afternoon.

* * *

Damage by Lightning.

A READER writes that his set was damaged in the recent thunderstorm, although his aerial and earth wires were connected together. The lightning flash struck the ventilator in the glass roof, and smashing a gas bracket, set light to the gas which in turn lighted the wooden rafters in the glass roof, and jumped a gap of one foot, six inches. The lead-in tube was bent to a curve, and the curtains and wooden curtain rings set on fire. It also blew a three-inch hole in the glass of the window, just under the lead-in tube.

* * *

A Special Wireless Telephone.

A DEMONSTRATION of the use of wireless telephony on aircraft was given to Sir Samuel Hoare, Secretary of State for Air, and Lady Hoare, when they recently flew to Gothenburg, Sweden. The aeroplane in which they travelled was fitted with a Marconi A.D.2 Wireless Telephone Set, and extra 'phones were provided to enable Sir Samuel and Lady Hoare to listen to the conversation with the wireless stations during the voyage.

Some blind boys of a New York Institution constructing a valve receiving-set.

Further Extortions.

I HAVE received a letter from one of our readers stating that the L.C.C. charge £1 deposit to erect an aerial on their land, and a further sum of £1 1s. if their own workmen erect it, in the Rotherhithe district. I suppose the L.C.C. require payment to think these things out.

* * *

A £1 1s Prize.

READERS in Bournemouth should look out for a 4-seater car, possibly an "Albert," with a representative of POPULAR WIRELESS and others who are visiting this town on Saturday, August 18th, to test a 6-valve Marconi portable set. A prize of £1 1s. is offered to the first reader who presents a copy of this number to one of the occupants. They will be in the town for the morning transmission, and again for the 5.30 women's talk.

* * *

How You Can Tell.

IF you see the car drawn up on the front with someone listening in, just walk up and hand in your copy of POPULAR WIRELESS with your name and address. The first reader to do so will win the £1 1s.

* * *

Saved by Wireless.

A LADY travelling on the Carmania was taken seriously ill, rendering an immediate operation necessary. The ship's doctor made arrangements by wireless for an ambulance to be waiting at Queenstown to convey her to Cork.

* * *

The Wireless Craze.

WIRELESS is responsible for a new trouble that has arisen in an electrical engineering works as a consequence of broadcasting developments. The apprentices have developed a habit of making wireless parts in their spare time with their employer's material.

* * *

The Glasgow Station.

"ROB ROY," by Sir Walter Scott, is to be broadcast from the Glasgow station. This is the first time in the history of broadcasting that this famous author's work has been transmitted by wireless.

* * *

Glasgow's Future Items.

MONDAY, AUGUST 20TH. Dance night. Mr. Chas. Wreford, Entertainer.

TUESDAY, AUGUST 21ST. Mr. Eric Niven, Elocutionist, Miss Amy Murdoch.

WEDNESDAY, AUGUST 22ND. Classical Night of the Wireless Orchestra, Miss Annie Hobson, Contralto, and Mr. Chas. Brown, Tenor.

THURSDAY, AUGUST 23RD. Miss Doris Lemon, Soprano and Mr. Wm. Michael, Bass.

FRIDAY, AUGUST 24TH.—By kind permission of Brevet Col. O. H. Delano-Osborne, C.M.G., Royal Scots Fusiliers, now stationed in Glasgow, will render the musical items during this evening's performance.

SATURDAY, AUGUST 25TH.—Mr. George Hutchison, Humorous reader, with his delightful stories of "Mrs. Duff's Experiences in Glasgow," is guaranteed to make you laugh and weep. Miss Jessie Crombie, Soprano. **ARIEL.**

BROADCASTING TRANSMISSIONS.

Regular transmissions of news and concerts take place daily from the following stations. Full details appear in the daily press.

London	**2 L O**	369 metres.
Birmingham	**5 I T**	420 „
Manchester	**2 Z Y**	385 „
Newcastle	**5 N O**	400 „
Glasgow	**5 S C**	415 „
Cardiff	**5 W A**	353 „

Other stations of interest to listeners-in in Great Britain are :—

Eiffel Tower	**F L**	2,600 metres	Throughout the day.
Radio-Electrique, Paris	**S F R**	1,780 „	5.5 to 6 p.m. 8.45 to 10 p.m.
School of Posts and Telegraphs	—	450 „	7.45 to 10 p.m. (Tuesdays and Thursdays.) 4.30 to 7.30 p.m. Saturdays.
The Hague	**P C G G**	1,050 „	3 to 5.40 p.m. (Sundays.) 8.40 to 9.40 p.m. (Mondays and Thursdays.)

Note.—A revised and more comprehensive list of the Continential Broadcasting stations is in the course of preparation and will appear shortly.

HOW TO BUILD A CRYSTAL SET FROM MECCANO PARTS.

By ELLISON HAWKS.

THE constructional toy Meccano is now so well known as to be in almost every home. Those who possess Meccano outfits, or whose younger brothers are Meccano enthusiasts, can make an efficient crystal receiving-set from the standard Meccano parts without difficulty. One or two extra parts such as inductance discs, telephone ear-piece, and crystal, may be obtained separately from the Meccano Company.

Meccano strips and plates are now made from specially prepared fibre, which gives perfect insulation. Some of the parts may also be obtained in brass, and are useful in this form because of their non-magnetic properties. As both varieties of these plates and strips are perforated with the well-known equidistant holes, at distances of half an inch, they are very useful for constructing home-made apparatus. These fibre strips, together with other standard Meccano parts, are especially adaptable to trying-out any new ideas, for standardisation of the parts enables alterations in design or circuit to be made very rapidly.

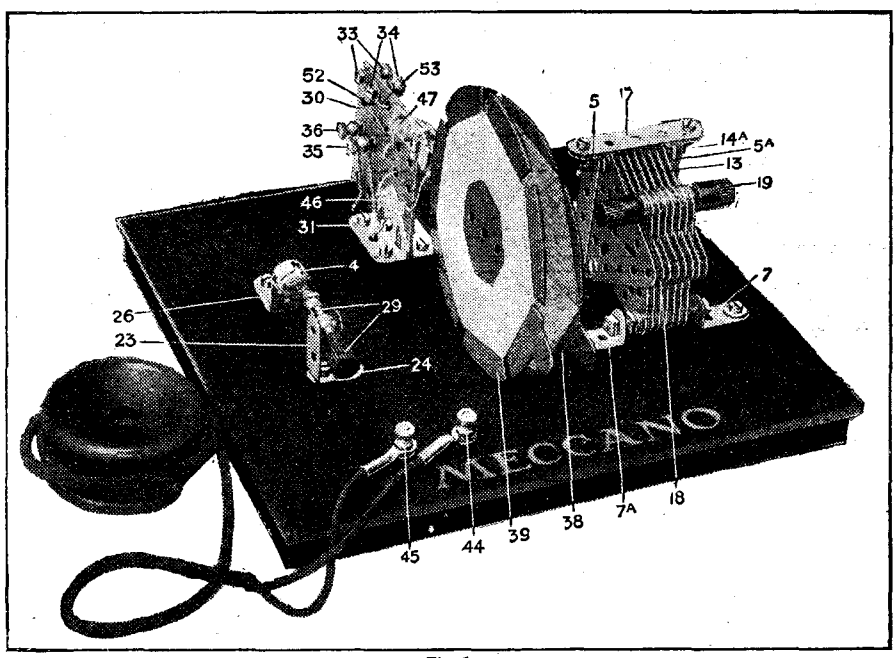


Fig. 1.

An Inexpensive Condenser.

Those of our readers who do not wish to make up the complete crystal receiver-set will no doubt be interested in having brought to their notice particulars for making a very efficient variable condenser at the cost of a few shillings. This condenser will be found to function equally as well as a condenser costing five or six times as much.

It is made by connecting together eight 2½-in. Meccano triangular plates at the lower end by a 2-in. threaded rod (14, Fig. 2), and at the same time spacing them by two nickel washers between each plate, afterwards clamping them at each end by a washer and nut. At the upper end a 2-in. threaded rod (14a) is used.

Before threading the rod through the plates, two triangular fibre plates (one of the Meccano Company's special radio parts) should be placed between each pair. In order to make the upper spacing uniform with the lower, these are spaced apart by nickel and brass washers, and are clamped together in the same manner as the lower end.

It will be noticed that in these triangular fibre plates one of the corner holes is cut out; this is intended to clear the washers on the rod (14) in order to make a better electrical contact.

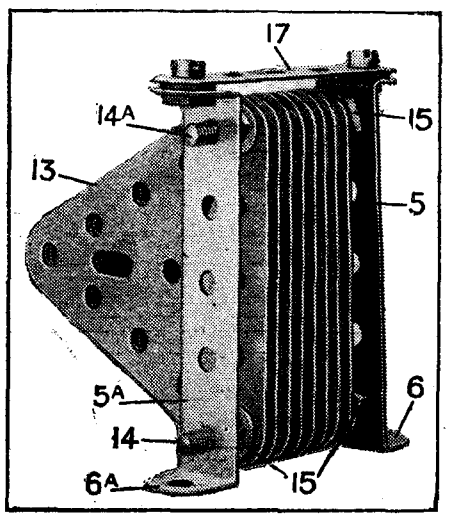


Fig. 2.

Assembling the Fixed Portion.

The fixed portion of the condenser (Fig. 2) may now be fastened in position between 2½-in. and 1½-in. angle strips (5 and 5a). A 2½-in. strip (17) is bolted at the top with a spacing washer at each end, and extra nuts (15) are threaded to both ends of the rods (14 and 14a) to centralise them. The strips 5 and 5a are then secured to the plate at 6 and 6a by two No. 6 B.A. bolts, with an insulating fibre brush between each angle strip and the plate.

The movable portion (Fig. 3) is composed of seven triangular plates threaded in a similar manner to those in the fixed portion, with two nickel spacing washers at the top and bottom, but without triangular fibre plates. This movable portion is passed between the apertures of the fixed portion and connected to the 1-in. and ½-in. brackets (7 and 7a) with a lock-nut on the outside of the same brackets. The special fibre plate (30), itself held in place by two trunnions (31) one on each side of the plate. The inductance discs (38 and 39) are attached at the upper corresponding corner of the same plate by hinges.

Tuning is effected by moving the discs towards or from each other, and the hinges are so arranged as to enable them to be brought together as closely as possible. Two terminals (33 and 34) are connected in the two top holes of the outer corner of the plate (30), and a further two terminals (35 and 36) are connected lower down.

An underneath view of the set is shown in Fig. 4, and the wiring diagram (Fig. 5) will make the connections clear. The circuit may, of course, be varied by placing the condenser in the primary circuit.

(*Continued on page* 912.)

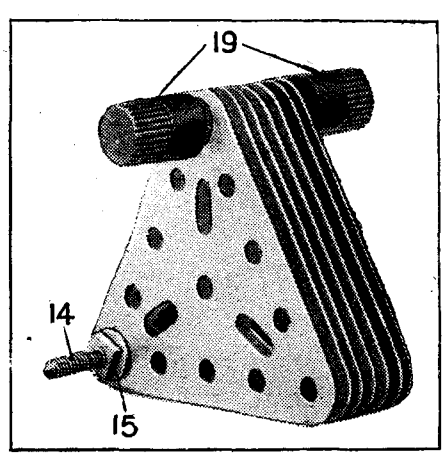


Fig. 3.

HOW TO BUILD A CRYSTAL SET FROM MECCANO PARTS.

(*Continued from page* 911.)

The primary inductance disc, as supplied by the Meccano Company, is wound with approximately 47 ft. of No. 23 S.W.G. D.C.C. wire, and the secondary disc with 50 ft. No. 26 S.W.G. D.C.C. wire. This gives an approximate range of wave-lengths of about 300–500 metres. Broadcast from Manchester has been clearly and loudly received on this set at distances of up to 26 miles.

The wave-length may, of course, be increased by adding holes in the fibre plate. With four such discs, time signals from the Eiffel Tower have been satisfactorily received.

This constructional set cannot be used under a broadcast licence, an experimental licence being necessary.

The following is a list of parts necessary to make the set:

15 2½-in. triangular plates.
2 double angle strips, 2½-in. by ½-in.
2 1-in. by ½-in. angle brackets.
1 1-in. angle bracket.
2 trunnions.
1 flat bracket.
1 single bent strip.
1 perforated strip, 2½-in.
4 screwed rods, 2-in.
7 5/16-in. bolts.
23 ½-in. bolts.
4 ¾-in. bolts.
53 nuts.
87 washers.
15 brass washers.
8 terminals.
1 connecting pin.
1 2½-in. by 2½-in. fibre plate.
14 2½-in. insulated triangular plates.
2 insulated handles.
2 bushes for handles.
1 detector arm.
1 each inductance discs, primary and secondary.
2 hinges.
4 rivets.

Crystal, telephone receiver, and mounting board.

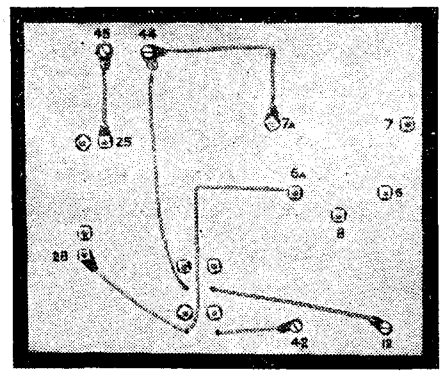


Fig. 4.

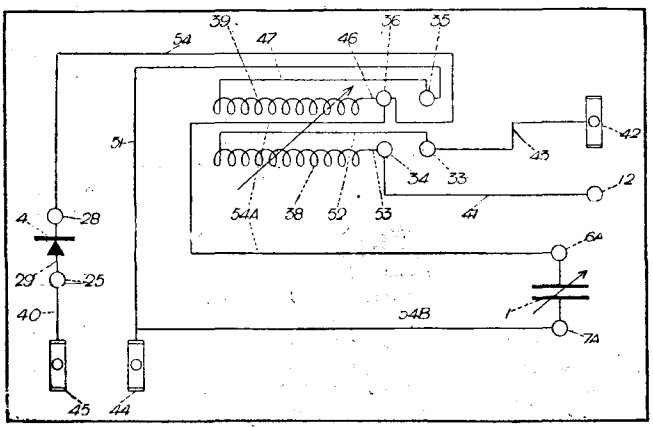


Fig. 5.

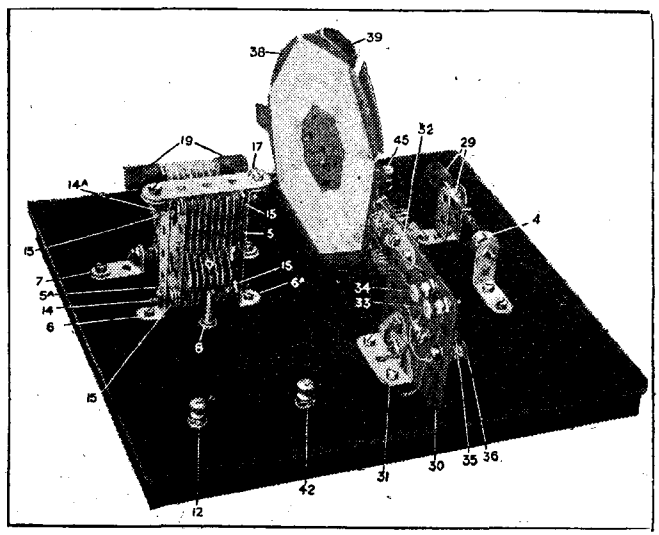


Fig. 6.

B.B.C. HOLIDAY COMPETITION.

THE British Broadcasting Company is offering prizes of wireless equipment to the value of £200 for interesting photographs, sketches, or descriptions of listening-in during the summer holidays. These will be awarded according to merit amongst the various groups.

The competition will be divided into five sections:

1. For the most artistic photograph showing the enjoyment of listeners-in.
2. For the most amusing photograph of listening-in.
3. For the most original photograph of listening-in.
4. For the most interesting, original, or amusing sketch of listening-in.
5. For the most interesting, original, or amusing description of listening-in.

Whether you may be at the sea, up the river, in the garden at home, send pictures of yourselves listening-in during some part of the day.

Fuller details of prizes will be announced shortly. The judges will be well-known men who will come and announce their decisions and give criticisms of the results personally from the London station, but their reports, as delivered at London, will be read out from other stations also.

The B.B.C. is prepared to receive entries from the 1st August, and the closing date will be the 30th of September, and the company hope to announce and publish the results early in October.

There will be no entrance fee.

The following are the preliminary rules for the competition.

Rules for the Holiday Competition.

1. The above prizes will be awarded for photographs, sketches, or descriptions which, in the opinion of the judges, are the best from the technical and from the interest point of view.

2. All entries must be submitted on the understanding that the decision of the judges is final, and no correspondence can be entered into on the subject.

3. Competitors may submit as many attempts as they choose. Each must have the name and address of the sender attached.

4. The copyright of all entries shall be the absolute property of the B.B.C., and cannot be returned under any circumstances.

5. The competition will be judged by the General Manager of the B.B.C., assisted by any technical experts he may decide to consult.

6. The competition will be open from the 1st of August until the 30th of September, 1923. Entries received after this date will be disqualified.

7. Entries to this competition must be addressed to the GENERAL MANAGER, B.B.C., 2, Savoy Hill, London, W.C., and the envelopes or packages containing contributions marked "Brighter Britain Competition."

8. Competitors agree to, and by submitting their entries, accept all the conditions.

The Editor of "Popular Wireless" welcomes photographs of amateur sets from readers, or anything else of particular wireless interest. 10s. 6d. will be paid for each photograph used.

SOME SIMPLE WIRELESS CALCULATIONS.

By C. E. FIELD, B.Sc.

Simple instructions for computing coil values, or discovering the dimensions required to cover certain ranges.

III. CALCULATIONS OF WAVE-LENGTH.

THE wave-length to which the aerial circuit of a receiving set will tune depends upon the inductance and capacity of the aerial, the inductance of the tuning coil, and the capacity of the tuning condenser. The second is the most important of these factors, and so we will consider first how to ascertain the inductance of a single-layer tuning coil.

It is beyond the scope of this article to give a full explanation of the meaning of inductance and its effect upon wave-length, but it may be stated briefly that the inductance of a coil is a measure of the product of the number of turns of wire, and the magnetic flux produced by a given current flowing in the coil. The flux produced by a coil depends, in turn, upon the diameter and length of the coil, and upon the number of turns with which it is wound, as well as upon the distribution of the flux outside the coil.

Formula for Inductance.

The simplest formula for calculating the inductance of a single-layer cylindrical coil is as follows:

$$L = \frac{0{\cdot}00986 \times d^2 \times n^2}{l} \times k,$$

where L stands for the inductance of the coil in mhys. (these being the most convenient units for this purpose), in the number of turns of wire, and d and l the diameter and length of the coil in cms.

k is a number which depends upon the value of the expression $\frac{d}{l}$, the following being a range of values sufficient for most purposes.

d/l	k	d/l	k
0·2	0·92	1·25	0·64
0·4	0·85	1·5	0·6
0·6	0·79	2·0	0·53
0·8	0·74	3·0	0·43
1·0	0·69	5·0	0·32

As an example, we will calculate the inductance of a coil consisting of 150 turns of No. 22 S.W.G. enamelled wire, wound upon a former 4 ins. in diameter.

By reference to a wire table, we find that about 13·3 turns of wire occupy 1 cm. length of winding; 150 turns will therefore occupy $\frac{150}{13{\cdot}3} = 11{\cdot}5$ cms. Hence the length of our coil is 11·5 cms, and the diameter is 4 ins. = 10·16 cms. This gives for $\frac{d}{l}$ the value $\frac{10{\cdot}16}{11{\cdot}5} = 0{\cdot}9$, for which we find the value of k to be 0·71. We can now apply the formula given above, and say that

$$L = \frac{0{\cdot}00986 \times 10{\cdot}16 \times 10{\cdot}16 \times 150 \times 150}{11{\cdot}5} \times 0{\cdot}71 = 1410 \text{ mhys.}$$

Before we can calculate the wave-length to which a particular coil will tune, we must know the inductance and capacity of our aerial. There are no very simple formulæ for this purpose, but for single or parallel-wire aerials which comply with the P.M.G.'s regulations, the values of the capacity and inductance do not vary much, and in general these may be taken as ·0002 mfd and 15 mhys. respectively.

The capacity of the aerial tuning condenser also affects the wave-length of a receiving set, but we shall not consider this in our calculations, for the A.T.C. should be used only for fine adjustments, and its value kept at a minimum for efficient working.

6 O X, the amateur station controlled by Mr. B. Quentin of L'islet Lodge, St. Sampson, Guernsey.

Determining the Wave-length.

The greater the capacity and inductance of a receiving circuit, the greater is the wave-length to which it will tune. The wave-length, however, does not depend directly upon either one of these two factors, but upon the square root of their product, the formula being as follows:

$$\text{Wave-length} = 1885 \sqrt{L \times C} \text{ metres.}$$

L and C being the inductance and capacity of the circuit, measured in mhys. and mfds. Excluding the added capacity of a tuning condenser, C stands for the capacity of the aerial, and L for the sum of the inductances of the aerial and the tuning coil.

If the coil we have just been considering were connected in series with a normal P.M.G. aerial, the total inductance would be 1410 + 15 = 1425 mhys., and the capacity would be that of the aerial = ·0002 mfd.

The wave-length of the circuit would then be given by $1885 \sqrt{1425 \times ·0002} = 1885 \sqrt{0{\cdot}285} = 1885 \times 0{\cdot}53 = 1000$ m. Those who find difficulty in obtaining the square root of a decimal quantity, such as 0·285, should move the decimal point *two* places to the right, and then proceed by a process of trial and error. Having obtained the correct value, the decimal point must be moved back *one* place to the left.

Construction of Coils.

For instance, to find the square root of 0·285, moving the decimal point to the right gives us 28·5. We can see at a glance that the square root of this lies between 5 and 6, and a few trials will give us the value 5·3. Moving the decimal point back one place gives us 0·53. Had the original number been 0·028, moving the point to the right would give 2·8, of which the square root is evidently somewhere between $1\frac{1}{2}$ and 2, finally giving 0·17.

We will now imagine that we possess a quantity of No. 20 S.W.G. enamelled wire, and a cardboard tube $2\frac{1}{2}$ ins. in diameter, and we desire to construct a coil which, in conjunction with a P.M.G. aerial, will tune up to a wave-length of 600 m.

First of all we must calculate the required inductance of the coil, and for this purpose we can rewrite our wave-length formula thus:

$$L = \left(\frac{\text{wave-length}}{1885}\right)^2 \div C.$$

Assuming an aerial capacity of ·0002 mfd., we then have

$$L = \left(\frac{600}{1885}\right)^2 \div ·0002 = (0{\cdot}318)^2 \div ·002 = 505 \text{ mhys.}$$

The aerial inductance is about 15 mhys., so that the inductance of the coil must be 490 mhys. Rearranging the formula for the inductance of a coil, the number of turns is given by the following expression:

$$n = \sqrt{\frac{L + 1}{·00986 \times k \times d^2}}$$

Here a difficulty arises, for we do not know the value of l or k until we have decided upon the length of our winding, which, in its turn, is dependent upon the value of k. Consequently a certain amount of guess work is necessary. As the coil is of small diameter and wound with thick wire, the ratio $\frac{d}{l}$ will be fairly small, and we might assume, for a start, that $\frac{d}{l} = 0{\cdot}7$—*i.e.*, that the diameter of the coil is not quite three-quarters of the length. The corresponding value of k in this case is 0·76. The

(*Continued on page* 914.)

DIFFICULTIES OF EXPERIMENTAL VALVE MAKING.

By H. P. WARAN, M.A. Ph.D. (Cantab), F.Inst.P.

A further article by Mr. Waran, in which he describes minutely the construction of an amateur valve, will appear in a future issue of "P.W."

THE valve is probably the only component of one's wireless set which still defies all the attempts of even the most enthusiastic of experimenters anxious to improvise it in some cheap and simple form. This difficulty arises from the fact that the valve is a very specialised product requiring not only a good scientific knowledge of the processes involved in its manufacture, but a high degree of skill in such unusual arts as glass blowing as well if one is to have any measure of success in making thermionic valves.

The whole difficulty arises from the principal fact that a thermionic valve is a high vacuum device, and even for the so-called soft valve the vacuum in the valve chamber has to be quite a good one. The gas pressure has to be less than about ·001 m.m. of mercury, which corresponds to what is commonly described as an X-ray vacuum. Such a good vacuum is essential for the following two reasons. Firstly, any appreciable quantity of air left in the valve will immediately burn out the very thin tungsten filament as soon as the valve is lighted up for the first time. Secondly, such excess of residual air will seriously interfere with the function of the valve by setting up space charge effects and other undesirable complications.

Preliminary Difficulties.

This necessity to keep a high vacuum in the valve precludes the efficient use of such materials as corks, rubber, wax, and other stuff of a similar nature in the construction of experimental valves. These materials are not stable compounds like glass, and thus they undergo rapid decomposition when exposed to a high vacuum or high temperature, and the large quantities of gases and vapours liberated by them would foul the vacuum of the valve and render it useless for our purposes.

This necessity for the permanency of the high vacuum in the valve necessitates the use of only such stable materials as glass and metal in the construction of the valve. The valve must have an air-tight outer envelope of one of these materials, and there lies the difficulty for the experimenter. Since the metal (being a conductor) would short circuit the leads if used for the outer envelope the only solution is to use glass (fortunately a very good insulator) for the outer envelope and metal for the inner components. From this glass envelope the four current leads have to be taken out through air-tight seals, and to do that without using waxes and cements is rather difficult for the average experimenter. But there is still another difficulty.

Occluded Gases.

Even such apparently stable materials as glass and metal have the very undesirable property of holding large volumes of gases occluded or dissolved in them, and if these are not to foul the vacuum gradually they must be got rid of during the operation of exhausting the valve. To liberate these gases the glass envelope and the metal electrodes in it have to be heated as high as possible during the exhaust. The absolute necessity for this treatment makes it impossible to use any materials like waxes and cements in any part of the valve having access to the high vacuum inside.

Thus the only practical design for an experimental valve is that embodying an all-glass envelope without wax or rubber joints that can be safely heated up during the exhaust to about 300 degrees C. This would mean that the experimenter ambitious to make valves must understand glass blowing, and those anxious to make their own valves would do well to start studying this very useful and fascinating art.

Obtaining the Vacuum.

The problem of exhaust even for soft valves is by no means easy. Ordinary single stage oil pumps are useless for the purpose. Some form of mercury pump is absolutely essential, and with patience and using a Sprengel or Töpler pump one can reach their limit of exhaustion which is about that required for a soft valve. For a hard valve the vacuum has to be much higher, and it can be reached only with the aid of a mercury vapour pump. Every trace of the gas occluded in the glass and metal must be got rid of by heating the valve exposed to the high vacuum. During use the plate of the valve would be subjected to a bombardment of electrons from the filament attracted to it by its positive potential. This would result in the heating of the plate which may liberate any gases left in it. Hence, hard valves are given this bombardment before they are sealed off.

Between the lighted filament and plate a high potential of the order of 1,000 volts or more is applied and the plate becomes red hot and liberates any gases contained in it, and these are immediately removed by the pump. When no more gas is coming from such sources the valve may be sealed off from the pump, and on cooling the valve would have improved in vacuum by the hot metal and glass absorbing any traces of gas still left in the valve.

Notwithstanding these difficulties in the making of a good valve that will work, experimenters will probably spend much time in trying simple arrangements with tubes, corks, and wax. In such attempts they would do well to use a thick platinum wire for a filament in preference to tungsten. Then they would be able to bring their valves up to, at least, the lighting stage even in an imperfect vacuum since the platinum wire would not get burnt out so readily as tungsten in the presence of residual air in the valve.

SOME SIMPLE WIRELESS CALCULATIONS.

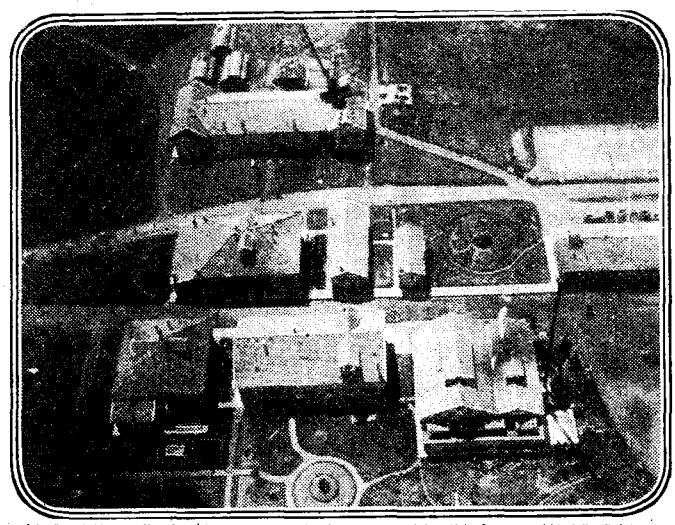
(*Continued from page* 913.)

length of winding is 3·6 ins, or 9·1 cms., the diameter being 6·35 cms.

$$\text{Hence } n = \sqrt{\frac{490 \times 9{\cdot}1}{{\cdot}00986 \times 0{\cdot}76 \times 6{\cdot}35 \times 6{\cdot}35}} = \sqrt{14800} = 122 \text{ turns.}$$

We can now tell what sort of a guess we made as to the length of the coil; 26 turns of No. 20 enamelled wire occupy one inch of winding length, so that 122 turns would occupy $\frac{122}{26} = 4{\cdot}7$ ins. Our guess of 3·6 ins. was therefore too small. If we now calculate exactly the inductance of this coil, we find that it is 405 mhys, and so our coil is too small. The required value of 490 mhys. is about 21 per cent greater than this, and so we will increase the number of turns on the winding by 21 per cent, giving 148 turns. Although the inductance of a coil does not vary exactly with the number of turns of wire, we shall find that we are now well on the safe side, the inductance of the coil being now 500 mhys., giving a wave-length of just over 600 m.

If we propose connecting the A.T.C. in series with the A.T.I., an extra twenty turns should be added to the coil, while if the tuning condenser is in parallel with the coil, wave-lengths of considerably over 600 m. can be received.

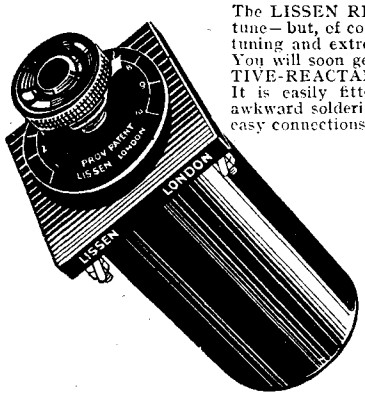


An interesting photograph of the Osmanlia Station taken from a point half way up the central mast.

STRIKING SENSITIVITY— ACCURATE SELECTIVITY!

Another Glasgow user writes that he is able to cut out his local station from two miles away and select Birmingham, which is separated in wave-length by only 5 metres! He uses 1 H.F., 1 Det., 1 L.F.

A Manchester user of the LISSEN REGENERATIVE-REACTANCE writes that he is able to cut out his local station and select other B.B.C. stations on two valves, and cut out any station he does not need, a result which many of his friends are unable to obtain with 3, 4, and even 5-valve sets.



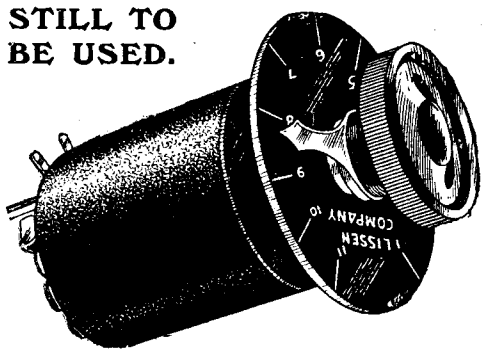
The LISSEN REGENERATIVE-REACTANCE is critical to tune—but, of course, you understand you cannot have broad tuning and extremely accurate selectivity at the same time. You will soon get the "feel" of the LISSEN REGENERATIVE-REACTANCE for *one knob controls tuning and reaction.* It is easily fitted—no switch to connect—no drilling—no awkward soldering—everything complete Blue print shows easy connections.

150–4,000 metres—UNBROKEN REGENERATION POSSIBLE OVER THE WHOLE RANGE .. .. **£2 12 6.**

Always tune with a Vernier condenser (preferably the LISSEN VERNIER, 1 in. diameter, designed for fine tuning in H.F. circuits, price **12/6**).

This LISSEN REACTANCE gives high efficiency for one or two stages radio frequency Amplifies loud and faint signals, adds range and power. Can be used alone or with the LISSEN REGENERATIVE-REACTANCE. Self-tuned, but where reaction of any kind is used tune with a Vernier for best results (preferably the LISSEN Vernier). Rapid tuning, no lengthy searching. No switch to connect etc.

STILL TO BE USED.



150–600 metres .. .. .. **27/6** 150–10,000 metres **32/6**

Blue print shows easy connections.

HOW AN ORDINARY VARIABLE CONDENSER AFFECTS SIGNAL STRENGTH.

If the condenser you use has a high resistance it damps signal strength. Most variable condensers have much too high a resistance—this may arise from indifference, faulty construction, bad workmanship, or from the choice of unsuitable materials. The LISSEN MICA VARIABLE CONDENSER has no ebonite or fibre in its construction—it is of metal—and its high dielectric strength is obtained by the use of the best Ruby Mica it is possible to procure. Add to this the LISSEN fine instrument construction and you have a condenser with almost a negligible resistance. Signals remain strong, therefore.

Capacities: ·001, ·00025, and ·0005 .. .. **17/6**

Table or panel mounting without alteration—LISSEN ONE HOLE FIXING, OF COURSE.

NOISE!

Of course you don't want noise, but if you use a wire rheostat you *must* have it—for the WIRE RHEOSTAT *MAKES* NOISE.

If you want noiselessness, use the LISSENSTAT. Not only is noise eliminated, but its constant, non-fluctuating control of filament current results in clear reception and increased range.

IT IS EASY TO CHANGE OVER TO LISSENSTAT CONTROL—length under 2 ins., diameter ⅞ in.—the LISSENSTAT goes in between anything—LISSEN ONE HOLE FIXING, OF COURSE! Replace your wire rheotsats with LISSENSTAT CONTROL, as quickly as you can. **7/6**

TUNE HIGH, TUNE LOW, TUNE SHARPLY—with the LISSEN TUNER.

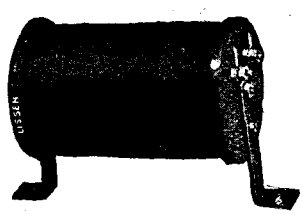
You have never seen an inductance exactly like it—LISSEN multi-wound, it combines greatest inductance per length of wire with lowest H.F. resistance and least distributed capacity—the explanation of its sharp tuning properties—with a ·0005 condenser (preferably use the LISSEN MICA VARIABLE CONDENSER **17/6**) the LISSEN TUNER covers a wave-length band of 150–4,000 metres. Yet it goes compactly into any set, length 4 in., diameter 4 in.—11-point switch already mounted and connected—panel or table mounting without alteration—turns not in use are shorted to eliminate "dead-end" loss. **22/6**

LISSEN VARIABLE GRID LEAK.

Use it to obtain clear signals—eliminate hissing—to get correct grid potential—to provide maximum signal strength—particularly in those circuits which are more susceptible to variable grid control—goes easily in between anything, no thicker than a pencil—LISSEN ONE HOLE FIXING, OF COURSE! NOTE THE PRICE! Neat and nicely finished. **2/6**

N.B.—A variable grid leak makes but little difference in some circuits—but it may be useful to fit so that the effect of variation may be tried. It is there if wanted.

WHERE TO START ELIMINATING DISTORTION — LISSEN recommendations for Audio Frequency.



The first place in L.F. amplification to start eliminating distortion is immediately behind the detector valve. Any distortion here is magnified many fold by the time the last stage of L.F. is reached. Look to your first L.F. transformer if you get distortion. The LISSEN T1 TRANSFORMER is DISTORTIONLESS for one reason, because impedance is obtained by means of the exceptional coil used, and not by the use of a heavy iron core, which always tends to distort. The LISSEN T1 has a valuable coil—NO OTHER TRANSFORMER HAS A COIL WHICH WOULD AMPILFY BY ITSELF WITHOUT ANY IRON CORE AT ALL.

All other transformers have too low a primary impedance to properly function immediately behind the detector valve. **30/-**

Any good transforemr will do for the 2nd and 3rd stage L.F. Use the LISSEN T2 for preference **25/-**

A POPULAR TRANSFORMER—LISSEN Type T3, described in recent tests as the best light transformer made—actually compares in performance with many expensive transformers, because of its skilfully balanced design. **16/6**

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A CHAT ABOUT THE "P.W." COMBINATION SET.

By THE TECHNICAL EDITOR.

Describing the results of a series of tests carried out on the original model, and detailing a few points that should receive attention in order that the 100% mark of adaptability, usefulness and efficiency of this unique receiver may be obtained.

TO the wireless man a good circuit gives as much pleasure as does a good horse to the huntsman, a good car to the motorist, or a well-tuned, speedy aeroplane to the aviator, and I can honestly say that the series of tests that I have conducted with the "P.W." Combination Set has been work of pure delight. At no point has there been trouble, and in every respect success has attended us all the way, from the first rough diagram on paper to the finishing off of the complete set. The reason for this is obvious to the more advanced amateur, to whom will be apparent the fact that the keynote of our labours has been "efficiency, adaptability, and simplicity." The very nature of the circuits involved has rendered it unnecessary to deviate from the path of the straightforward into the complicated and tortuous path of biassing batteries, high-resistance stabilisers, etc., and, apart from the fact that the component values called for rather close attention, no trouble of an obscure nature was encountered.

It must be thoroughly understood, however, that results will suffer and "howling" can arise if the instructions regarding the construction of the set are not faithfully carried out. No guarantee of the efficient operation of the set can be given if amateurs modify the "lay out" or the values of the condensers employed, either fixed or variable. Also the indiscriminate use of twisted flexible wires may cause capacity effects to arise. It is advisable to employ the shortest lengths possible of straight twin wires of the nature of telephone cords for the plugs.

Tuning-in.

In respect of the interior wiring of the units, the usual rules regarding good separation and avoidance of parallel wiring are, of course, essential. Should Unit Two not cause efficient note magnification, change over the transformer primary leads. As the L.T. + is directly connected to the H.T. − in both units, obviously only three battery connections between the two are necessary, but great care should be taken in seeing that the L.T. + and NOT L.T. − is taken to the H.T. − in either case, before connecting up.

With those few general remarks concerning the construction of the units, I will now proceed to deal with the handling of the set, and briefly detail some of the results obtained on the original model.

In the first place it will be found that the tuning on the H.F. condenser is not critical, but that the adjustment of the A.T.C. requires to be very close indeed. This is an interesting and useful point.

In the case of near-at-hand stations, however, tuning can at first be done on the crystal, which cuts down the variable factors or components requiring adjustment to two—the crystal detector and the A.T.C. This is one of the great advantages of the "P.W." Combination Set, and permits far finer tuning and the finding of a more sensitive point on the detector than is possible with any other type of reflex circuit. The change-over switches are over at "Crystal," and the telephone plug in the "C. and H.F." jack for this preliminary tuning. Having tuned in the A.T.C. and adjusted the crystal, the change-over switches are carried over and the valve turned on. The H.F. condenser can now be tuned, and the telephone plug thrust into "Dual" if loud-speaker signals are desired. Where good signals are received on the crystal alone, loud-speaker work should be possible when working "Dual." Referring to loud speakers, it will be found very convenient if the telephone plug is taken to a small terminal board; this will enable any number of 'phones or a loud speaker to be very quickly brought into circuit.

When working to distant signals it will be necessary to commence tuning with the valve in use as an H.F. amplifier, or it may be even necessary to start right away on "Dual." In these cases it should be remembered that the A.T.C. requires finer tuning than the H.F. condenser, and so, leaving the latter in approximately the correct position, close attention should be paid to the adjustment of the A.T.C. until audible signals are obtained. The crystal detector can always be adjusted to the signal of some near-at-hand station.

The Technical Editor adjusting the "P.W." Combination Set.

Some Surprising Results.

There are, with the two units, as everybody will by now know, six circuits available, and I will not anticipate the experiments of those who have constructed the set, because one of the most fascinating of all the possibilities of the receiver is that it permits a close comparison between various circuits. The difference between H.F. and L.F. amplification under varying conditions can be closely studied, and careful note can be taken of the behaviour of different valves operating in varying capacities with varying pressures of H.T. voltages. In fact, the possibilities of the set, as any amateur who handles it will quickly discover, are almost illimitable.

At the offices of POPULAR WIRELESS, Unit One was tested on a frame aerial, and comfortable loud speaker signals from 2 L O resulted. With Unit Two "plugged in," these became deafening. Such signals were also the order when Unit One alone was coupled to an outdoor aerial without using an earth. Birmingham came in comfortably on 'phones. At Sidcup, which is 15 miles from 2 L O, this station actuated a small loud speaker with sufficient intensity to fill a small room, using only Unit One on an outdoor aerial. This was also the case when the set was tried at Radlett, which is 15 miles from 2 L O in the other direction. Bringing in Unit Two in either case resulted in deafening signals. Tried at Thorpe Bay, which is near Southend, some forty or so miles from London, Manchester, Cardiff, Newcastle, and Glasgow were comfortably received, although trouble was experienced in some cases from "jamming" by ships.

At Radlett, Newcastle was brought in on a loud speaker using both Units, while Glasgow gave comfortable telephone signals. School of Posts and Telegraphs, Paris, actuated a loud speaker comfortably.

Demonstrations of the Set.

London at Thorpe Bay came in strongly on H.F. and crystal, while "Dual" nearly gave loud-speaker signals. These latter were comfortably obtainable with Unit Two plugged in. At Leyton, five miles from 2 L O in an easterly direction, the London station comfortably worked a loud speaker on the one unit. All the well-known amateurs were easily audible on 'phones, 2 O M at Brentwood, some 20 miles away, coming in with some considerable strength. Fairly hard valves, with some 60 volts on the plate, were used during these tests.

It is one's feeling, when listening-in on this remarkable receiver, that anything transmitting is within range wherever its location. I have been present during the majority of demonstrations given to readers who have visited the offices of POPULAR WIRELESS in order to examine the original model (in response to a general invitation, which is, by the way, still open), and in no single instance have those who have actually seen the set working, and have closely investigated its action, had anything but admiration and praise to offer.

Considering the fact that our callers have included not only amateurs, but professional wireless men of advanced standing, it is a fact of which the technical staff and myself are justly proud.

THE RADIO TYPEWRITER.

By G. H. DALY.

Describing a remarkable invention whereby wireless transmission and reception is effected automatically and with secrecy.

IN many telegraph offices there will be found an instrument called the Morkrum teletype. This instrument—which at first glance may easily be mistaken for an ordinary typewriter—is for automatically transmitting and receiving messages over the telegraph line, and has been in use for a number of years.

The Morkrum teletype has a keyboard containing the letters of the alphabet, numerals, and punctuation marks exactly similar to the standard typewriter keyboard, and in order to send a message to a distant station by means of this machine it is merely necessary for the operator to strike the various letters on the keyboard, just as if he were typing a letter. In this case, however, the fact of the operator striking the keys causes the message to be automatically printed on a moving slip of paper at the distant receiving station within an extremely short space of time.

It was only natural that sooner or later the idea would appeal to someone of using this ingenious teletype for wireless work, and this someone appears to have been a Mr. J. H. Brady. The perfected radio-typewriter, however, which embodies the Morkrum teletype, is the work of the U.S. Navy Department and the Morkrum Company of Chicago, and with this radio typewriter it is possible for any typist to send a wireless message in the same way as he or she would type a letter—i.e., by depressing the necessary letter keys. At the receiving station the message is automatically printed on to a moving slip of paper by means of another radio typewriter. For it should be understood that each individual radio typewriter consists of a complete transmitting and receiving apparatus in itself. A very important point about this machine is that it entails no knowledge of the Morse, or any other code, on the part of the radio typist.

Action of the Typewriter.

When a particular key of the keyboard is depressed, such as, for instance, the letter "A," the controlling circuit of the wireless transmitter—to which the radio typewriter is connected—is closed, and a series of electrical impulses are radiated into the ether. This is accomplished by the mechanical action of certain cams and levers working in conjunction with an electric motor and selecting device which are brought into action by the depression of the key, the whole being contained in a compact cabinet behind the keyboard.

Now each letter key on the keyboard is allotted a different combination of electrical impulses, and thus each key on being depressed causes the wireless transmitter to radiate one particular combination of impulses into space.

These impulses on being picked up by the aerial at the receiving station are amplified by a two-stage amplifier, and in this condition actuate an automatic relay recorder, which in turn operates the printing portion of the radio typewriter of the receiving station.

The principal unit of the receiving portion of this radio typewriter is a type wheel containing letters, numerals, and punctuation marks, exactly similar to the keyboard of the transmitting radio typewriter.

On the receipt of a certain combination of impulses by the receiving antenna this type wheel is made to rotate—by means of a delicate and selective mechanism—and print the letter which that particular combination of impulses represents upon a moving slip of paper. Therefore the letter which was depressed on the keyboard at the transmitting station is automatically printed upon this moving slip of paper at the receiving station.

As it was impossible to operate the teletype with the international Morse code the inventors found it necessary to evolve a code of their own. In this code each letter of the alphabet is allotted five units or impulses, the difference between each letter, etc., being that the five units are differently arranged in each case.

For instance, the five units allotted to the letter "A" may be said to consist of two dots and three spaces, as it were. The letter "B" consists of one dot, two spaces, and two dots. "C" is made up of one space and three dots, followed by a space—and so on with each letter of the alphabet.

One obvious advantage of this code is from the point of view of secrecy, for the actual arrangement of the code can be altered at will.

A SINGLE PANEL UNIT RECEIVING SET.

By D. STEWART, B.Sc.

THE receiving set shown in the accompanying illustration was built by the writer, as the result of experiments carried out with a view to the construction of an experimental set which, while permitting of various arrangements of tuning coils, valves, and crystals, would yet present a neat and compact appearance, and have few loose connecting wires such as characterise the majority of experimental sets built up of separately mounted parts.

All controls and terminals are mounted on a vertical ebonite panel 36 in. by 9 in., which forms the front of the case 36 in. by 10 in. by 10 in.

This panel, while being in one piece, is divided into five sub-panels, forming a tuner, a H.F., a detector, and two separate L.F. units.

The input and output of each unit is brought to terminals, so that short connecting wires can be used to connect up whatever valves are required. A crystal detector may be separately mounted, and the output of the tuner or H.F. valve unit connected to it instead of to the valve detector.

A three-coil holder is mounted above the tuner panel, on which itself are mounted primary, secondary, Vernier, and reactance variable condensers. The circuit of each of the three coils is broken and brought to six terminals at the extreme left of the panel, so that after short-circuiting the coil plugs any type of tuner may be connected up to the set by means of the six terminals.

The H.F. panel is designed to give either transformer or tuned anode coupling to the grid of the detector valve, the connections for one or the other being made by moving the four-pole two-way switch either to right or left. The anode coil is large enough to tune to 2,000 metres, but loading coil terminals are provided.

Grid Control.

Anode tuning is controlled by means of a nine-stud switch and a ·0002 mfd. variable condenser, which also tunes the primary of the plug-in H.F. transformer when it is in use.

Grid potential is varied by a potentiometer, operated by a ten-stud rotary switch. Two sets of reactance terminals are provided, so that regenerative effects can be obtained either on the aerial secondary coil or on the anode coil.

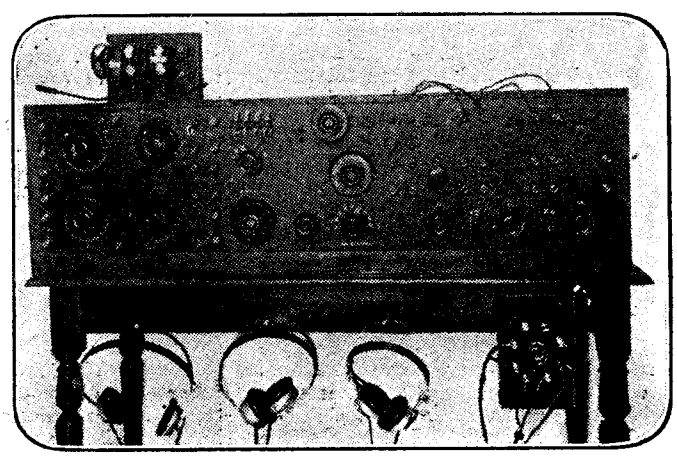
The detector panel is of the usual type, but carries a variable graphite grid leak.

The L.F. panels are also standard, and, of course, one or both may be used as desired.

One pair each of L.T. and H.T. battery terminals are provided, wires from which run to all the valves; but only those valves actually in use need have their filaments glowing, as a separate resistance is fitted to each valve.

As will be observed from the illustration, all the valves are mounted inside the cabinet, but the condition of the filaments may be readily seen through peep-holes.

Though this particular set employs four valves, a smaller or larger one on the same system is, of course, practicable, and would be as likely to prove successful as the one here described has certainly been.



The single panel unit receiving set described in the above article.

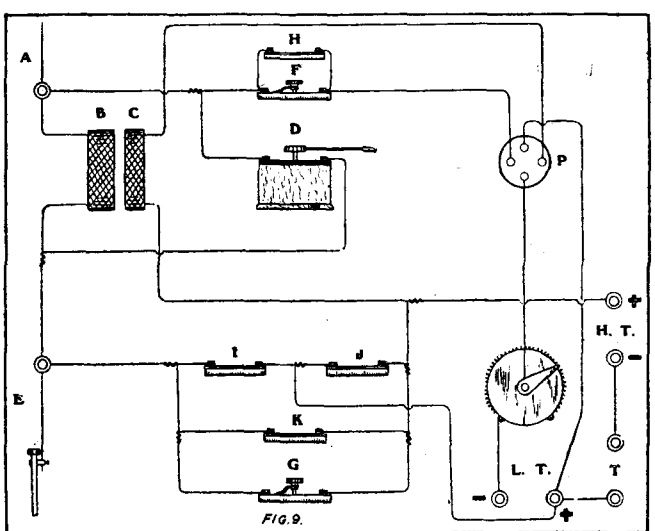
SUMMERTIME WIRELESS.

By OSWALD J. RANKIN.

Describing some useful circuits, suitable for portable work, illustrated with some of the author's well-known pictorial diagrams.

AS in the case of ordinary stationary installations, it is not possible to specify the exact range of any particular receiver. So much depends on the existing conditions, locality, the amount of care taken in constructing the apparatus, experiments, and—the individual ability to carry out experiments. With portable sets it is possible to take a train journey and erect the installation within a short distance from the broadcasting station, so that even with a fairly simple type of receiver one is enabled to "make ends meet," so to speak.

The selection of any particular type of receiver will, of course, depend on the distance between the proposed temporary receiving station and the transmitting station. For general purposes, a suitable circuit which will compare very favourably with the single-valve receiver in the ordinary way, is the Flewelling super-regenerative circuit shown in the pictorial diagram Fig. 9. This is probably the most efficient single-valve receiver yet devised, and it is extremely simple in construction and operation. It is adaptable either to the ordinary single aerial or to the frame aerial previously described. The tuning coils B and C may be of any suitable type, the secondary coil, C, giving about two-thirds of the inductance of the primary coil B. Nos. 50 and 35 Igranic coils are quite suitable, and an ordinary loose coupler or vario-coupler will also give good results.



The Flewelling super-regenerative circuit.

Important Details.

The variable condenser D, which shunts the primary coil, should have a maximum capacity of ·0005 mfd., and sharper tuning may sometimes be obtained by connecting a 5-plate Vernier across the terminals. These condensers and the filament rheostat should be well shielded in order to prevent body capacity effects. F is a variable grid resistance with a value from 1 to 1½ megohms, and G is a similar component, being continuously variable from ¼ to 1 megohm. H is an ordinary ·002 mfd. mica grid condenser connected in shunt with the variable resistance F, which, of course, is in series with the aerial lead-in and the grid of the valve. The three fixed condensers, I, J, and K, each have a capacity of ·006 mfd., the exact value being a rather critical factor. The tuning will be rather difficult until the operator has become acquainted with the various adjustments.

Efficient Reflex Circuit.

Place the variable resistance F to its maximum value, and vary the coupling of the coils until a whistling noise is heard in the headphones. The coupling and variable condenser should be continuously adjusted until the desired signals are heard, when it will then be necessary to readjust the variable resistances, which are then left at the best positions while the signals are finally tuned in by making further adjustments of the coils and condenser. A good hard valve should be used, and great care should be taken to see that all the connecting wires are well insulated and well separated from each other.

Fig. 10 represents a pictorial circuit diagram of a double amplification or "reflex" valve-crystal receiver particularly suitable for portable work. The single valve functions as a high and low-frequency amplifier simultaneously, rectification being accomplished by a crystal detector. The simple slide inductances B and C are identical in size and capacity, and to enable both coils to be tuned to the same frequency a ·0005 mfd. variable condenser D is connected in shunt with the active turns of the coil C. Both coils should be 6 in. long by 3 in. in diameter, and wound with No. 22 enamelled wire.

The secondary side of the low-frequency inter-valve transformer F, which is in series with the earth and the common negative line, is shunted with a ·001 mfd. fixed condenser G. A fixed condenser H having a capacity of about ·01 mfd., shunts the telephones and the high-tension battery; and I is the usual telephone condenser, which is not essential, but desirable. The most admirable feature of this circuit is the entire absence of distortion, and it is also extremely simple in construction and manipulation.

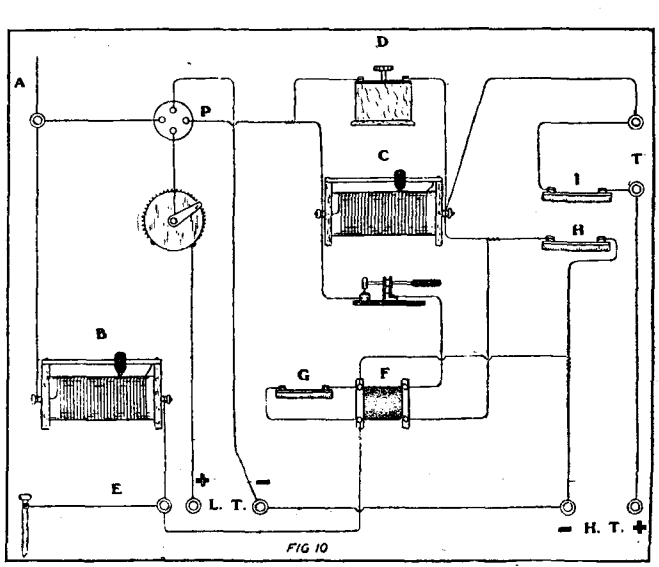
The signals are first amplified in the aerial circuit, then rectified by a well-adjusted crystal, then fed back into the valve again to be amplified at low frequency, and finally delivered to the headphones at a greatly increased strength. This is one of the very best single-valve circuits particularly suitable for portable work, since the few necessary components may be conveniently arranged in an attaché case or small box.

There are, of course, many existing two-valve receivers which, under normal conditions, would be quite suitable for portable work. The usual outfit, comprising one valve rectifying and one valve L.F., will sometimes give excellent results; but a stage of H.F. is always desirable, since we are concerned with a more or less inefficient aerial system. The two circuits to be described indicate examples of the most suitable types of two-valve receivers to use with a make-shift aerial. These are ordinary receiving circuits, the first, Fig. 11, employing one stage of H.F., tuned anode reactance coupling, and valve rectification; the second, Fig. 12, employing one stage of H.F., crystal rectification, and one stage of L.F. The latter has been adapted to the frame aerial for sake of variety.

A Two-Valve Set.

The circuit shown in Fig. 11 is selected because it is highly efficient and easily handled. Two standard coil-holders will be required, one for the primary and secondary aerial tuning coils B and C, and the other for the anode and reactance coils F and G. The secondary aerial coil C is shunted with

(*Continued on page* 922.)



A dual amplification circuit.

SUMMERTIME WIRELESS.

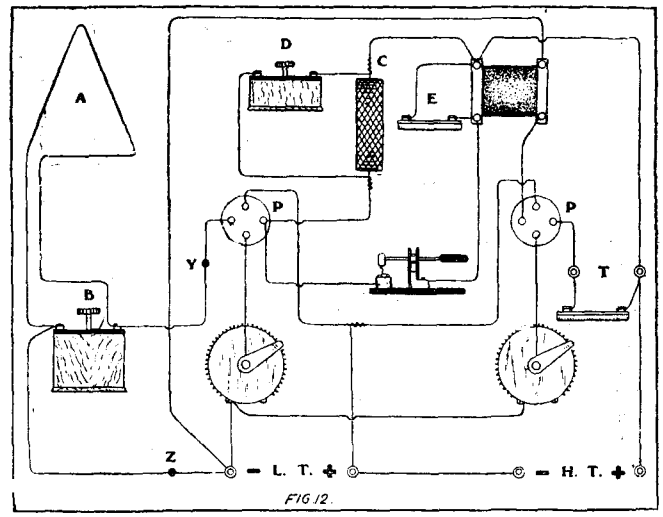
(*Continued from page* 921.)

a ·0003 mfd. variable condenser, D, and a ·0002 mfd. variable condenser is similarly connected to the anode coil, F.

An ordinary mica grid condenser, I, is placed in series with the plate of the first valve and the grid of the second valve and the grid leak, J, is in series with the grid of the second valve and the positive low-tension line. K is a 2 mfd. Mansbridge type fixed condenser connected in shunt with the telephones and high-tension battery. If desired, either or both pairs of honeycomb coils may be replaced by small loose couplers. Basket coils may also be used, the amount of winding in each instance being determined by experiments and the particular wave-length it is desired to work on.

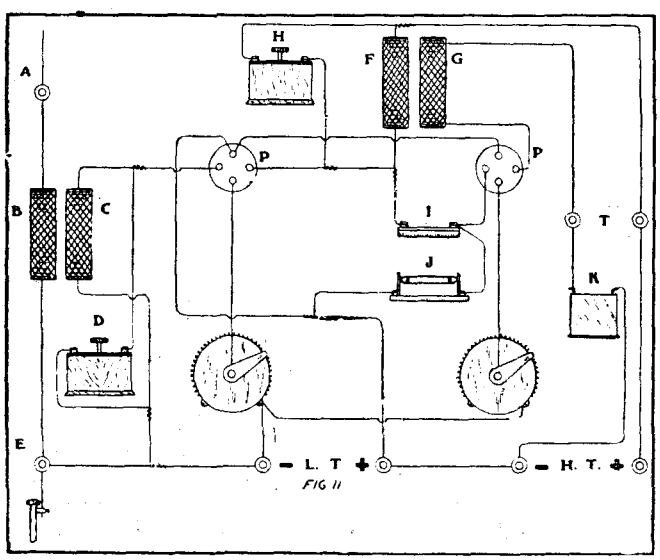
Using a Frame.

Fig. 12 represents another very efficient two-valve receiver which is a hot favourite with the author. It is here shown connected up to the outdoor frame aerial previously described, and it was this combination which gave the remarkable results mentioned in an earlier chapter. A is a diagrammatical impression of the frame aerial, and B represents the ·00075 variable condenser. A five-plate Vernier condenser connected across these terminals will sometimes facilitate sharper tuning. C is a No. 50 Igranic honeycomb coil, which is in series with the plate of the first valve and the I.P. terminal of the low-frequency inter-valve transformer, and D is a ·0003 mfd. variable condenser connected in shunt with this coil.



A circuit similar to Fig. 11, with a crystal and L.F. amplification.

E is a ·001 mfd. fixed condenser which shunts the primary winding of the transformer, and another of ·002 mfd. capacity is connected across the telephone terminals. Y and Z represent the two points where the leads from a tuning coil would be connected if it was desired to use the ordinary aerial and earth system. In this case the frame aerial and the large capacity variable condenser would be dispensed with.



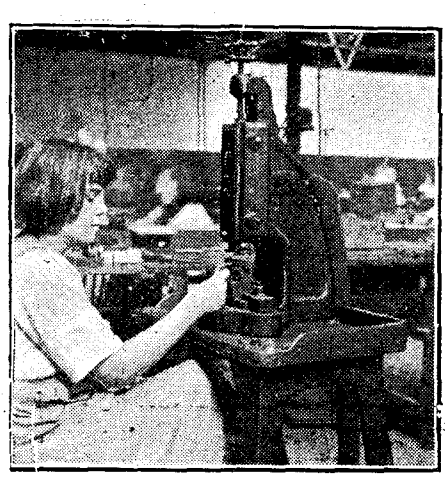
One Stage of H.F. valve amplification with a valve detector.

The one drawback with portable outfits is the accumulator. During the hot summer months one seldom feels energetic enough to carry masses of lead plates across rough country fields, and for this reason I have not described anything more ambitious than a two-valve receiver. These outfits will give several hours' enjoyment using a "respectable" size accumulator, say, 4 volts 20 ampere hours; and even this size may be modified when using certain types of valves.

My theme has been to show the average enthusiast how it is possible to extend his efforts to the open air, and receive the usual broadcast programmes throughout the summer without experiencing that "boxed-up" sort of feeling which creeps upon us with the coming of the brighter days. Those who regard the hobby as a serious pursuit rather than a novel form of amusement, and who intend experimenting on long-distance reception, will, of course, know that the receivers described in the foregoing chapters are essentially "broadcast" receivers, and that it will be necessary to modify these circuits to suit individual requirements. For long-distance reception with portable outfits I would recommend the use of not less than two stages of H.F. amplification with reaction.

Crystal Advantages.

Concerning loud speakers, I do not hesitate to advise the use of a single-valve power amplifier having a separate high and low-tension current supply. The best results will be obtained by using a good crystal detector, since a crystal will rectify all frequencies equally well without undue distortion. This is where the crystal scores over the valve, and there is no doubt that the ultimate success of the loud speaker will be attributed to the crystal.



THE CONSTRUCTION OF VALVES.

These two photographs, taken in the factory of the Cossor Valve Co., Ltd., illustrate two of the operations involved in the manufacture of thermionic valves. On the left is shown the machine that mounts the filament wires, while on the right the operator who cuts the wires to the correct length can be seen at work. The tungsten wire employed is very brittle, and extremely careful handling is required, otherwise considerable wastage would result. The factory hands are mostly girls, and it is said that they are more suitable than men for such delicate work. A high degree of efficiency is attained by these workers, who are mostly quite young, and it is a most interesting experience to walk around the factory and watch them at work.

THE NEW MANCHESTER STATION.

By Our Manchester Correspondent.

On Thursday the 2nd of August, 2 Z Y closed down at Trafford Park and re-opened again the following day at its new position in Dickenson St., Manchester. Full details of the new station and important changes in the staff are given in this article.

A FORTNIGHT ago the Manchester broadcasting station was removed with fitting ceremony from the out-of-the-way building in Trafford Park to the top floor of 57, Dickenson Street, just outside the great corporation power station.

One half of the upper floor is occupied, and the aerial suspended from the top of the power-station chimney to one of the windows of the transmission room. The studio is considerably larger than that of the old station, being about 30 feet long and 14 feet wide, compared with the former room of 24 feet by 14 feet. It is, of course, smaller than the new London studio at 2, Savoy Hill, which is 40 feet by 20 feet. On one side of the studio is a tastefully furnished green room for artistes, who enter it directly from the lift. On the other side of the studio is the transmission room, containing the new equipment specially designed and built by the Radio Communication Co., Ltd., of Barnes.

Up-to-Date Apparatus.

This set embraces all the advantages of the latest improvements, and is controllable by one operator, who can check all the necessary power and other readings by consulting all the meters in front of him, and at the same time controls the musical quality and strength of the transmission. He also has visual control of the studio through a sound-proof window by his side, so that any necessary alteration in the position of the artiste, and so on, may be carried out immediately by his instructions. The power from the corporation 400-volt D.C. mains is converted by a motor generator set supplying current at 5,000 to 6,000 volts to the transmitter. This generating set is in duplicate in a room removed from the transmitting room together with two duplicate battery-charging sets driven by five horse-power motors. The low-tension and high-tension batteries are housed in separate gas-tight compartments with controlling switchboard energy machines.

There are also directors' offices, where the many callers may be interviewed, and quite an imposing orchestral room, where the members of the orchestra or band may retire between turns and, if necessary, rehearse without disorganising the studio arrangements. The spacious general office, in which the heavy daily audition common to all provincial stations is carried out by the station staff, contains a sound-tight telephone box, in which the nightly news bulletin will be received from London by a special night operator. All rooms are easily accessible from the entrance of the lift or from the alternative staircases by a central passage.

Old Station "Closes Down"

The closure was applied at the old station on Thursday, August 2nd, when, in addition to the programme, arrangements were made for special items reminiscent of 2 Z Y. These contributions related not so much to the difficulties of the station as to the personnel aspect of it. The old familiar voice of Humpty-Dumpty, Mr. Z. Rastus, and Massa Johnson were heard again. Unfortunately, the Cloud Lady and Mr. X were at the time on a well-earned holiday.

The old impromptu talks which were given by the staff, and were quite effective, were rearranged, and made an interesting feature of the programme, while the chat on the technical equipment of the whole station, and a little demonstration of the efficiency of microphones, also provided an attractive interlude. After this the end came with the shaded ghost, who, finding everywhere deserted, buried the carrier wave with a low, dying heterodyne note.

Memorable Evening.

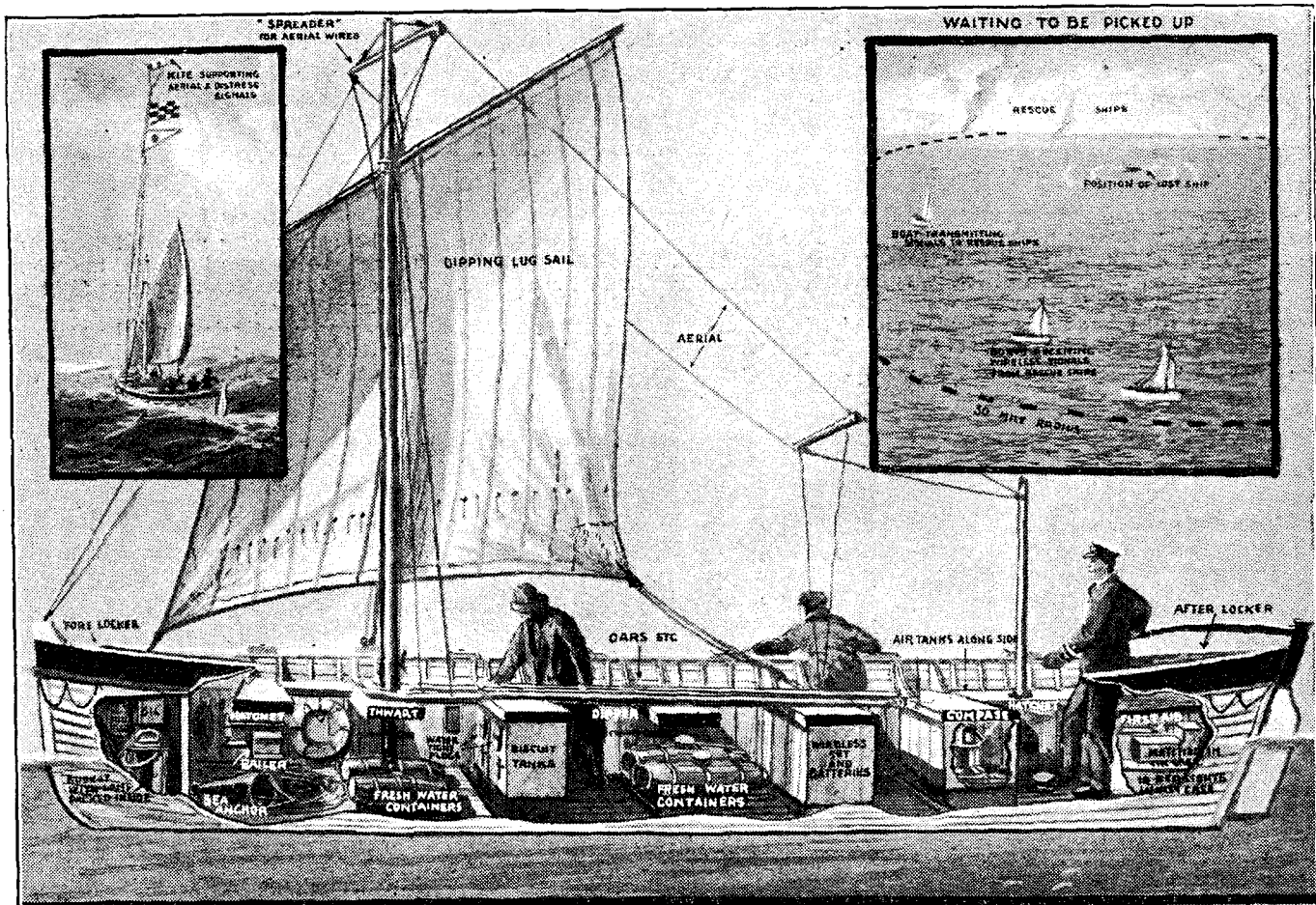
There was no break in the service to listeners-in, for the next day the new station was opened with due ceremony. Arrangements, in fact, were made for the usual afternoon concert, which was provided by the Oxford Picture House orchestra. The opening night had all the appearances of being a memorable one in the history of Manchester broadcasting. In the first place, Lord Gainford, the chairman of directors of the B.B.C., was due to speak, and Sir Wm. Noble, another director, and Mr. J. W. Reith, general manager, along with many civic notabilities, were expected to be among the distinguished gathering. Following the speeches, there was to be a musical programme by the band of H.M. Irish Guards, with Miss Florence Holding as the soprano, Mr. Lee Thistlethwaite baritone, and Mr. Victor Smythe the entertainer. It is interesting to note that ever since Mr. Smythe gave "Algy on the Golf Links" he has been frequently requested to repeat it, and he proposed giving the piece again on the auspicious opening night at Dickenson Street.

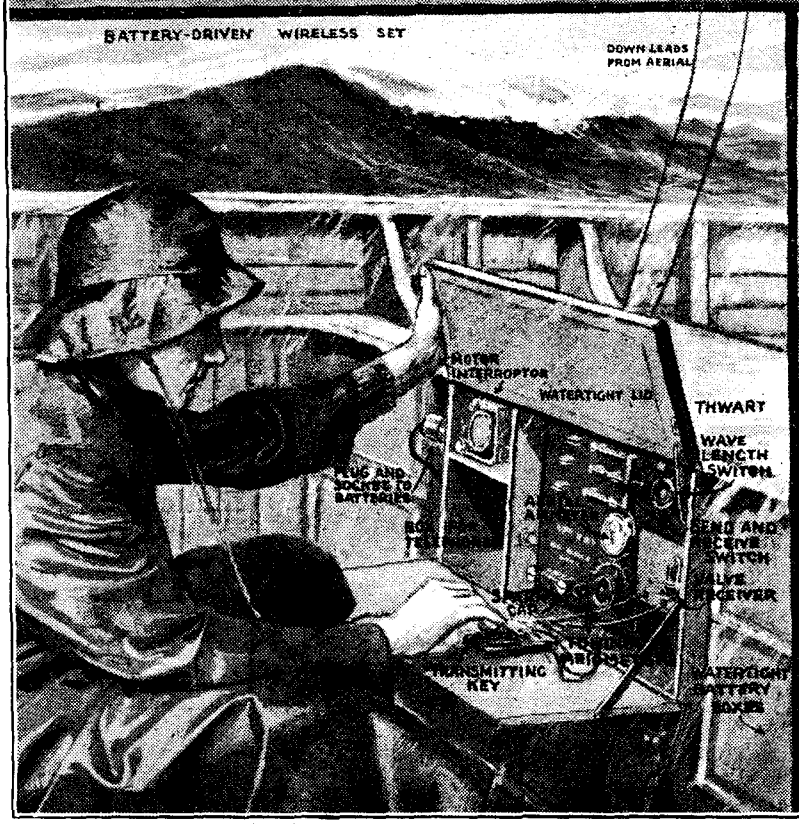
Manchester enthusiasts will be sorry to hear that with the transfer Mr. Kenneth A. Wright, who has been director of the old station since February 1st, before which he was in control of the programme for the Metropolitan-Vickers, will relinquish his duties to take up a post at the London headquarters. Mr. Wright has been a real live wire. His charming manner has endeared him to everybody, and he has made troops of friends. Speaking to me, Mr. Wright said one of the chief advantages of the removal of the transmitting station from Trafford Park to the centre of the city was that the programmes could be extended. Trafford Park was rather remote, and artistes and speakers had often to curtail their contributions in order to get back to town in time for their trains. Again, a more adequate transmitting set was installed at the new station. The set at Trafford Park was originally designed to take seven-tenths of one kilowatt, but for some months latterly it had to take something like 1½ kilowatts.

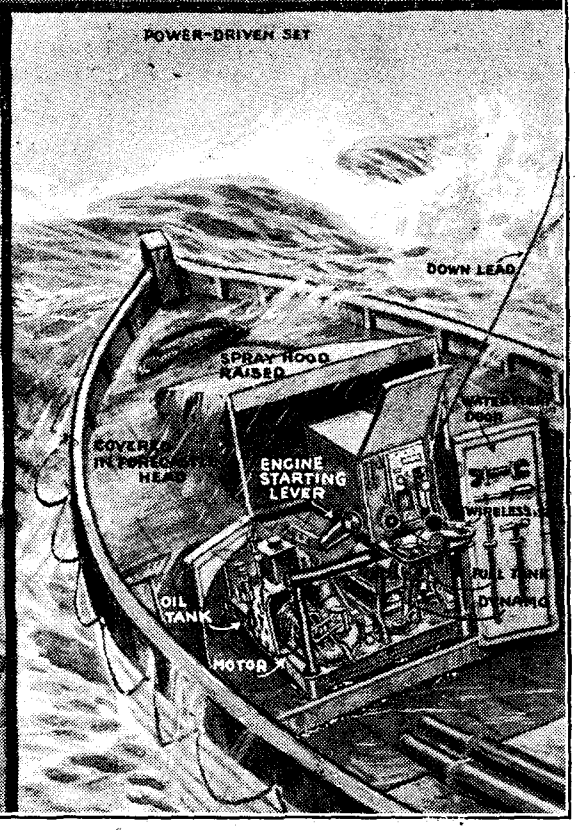
Mr. Dan Godfrey, jun., son of Sir Dan Godfrey, will succeed Mr. Wright at the new station, while Mr. F. G. Honey is to look after the educational side.

A demonstration was held at the Bronx Zoological Park, New York, recently, in order to study the effect broadcast music had on the animals. The bears enjoyed it immensely and danced to the music, but the lions roared with rage.

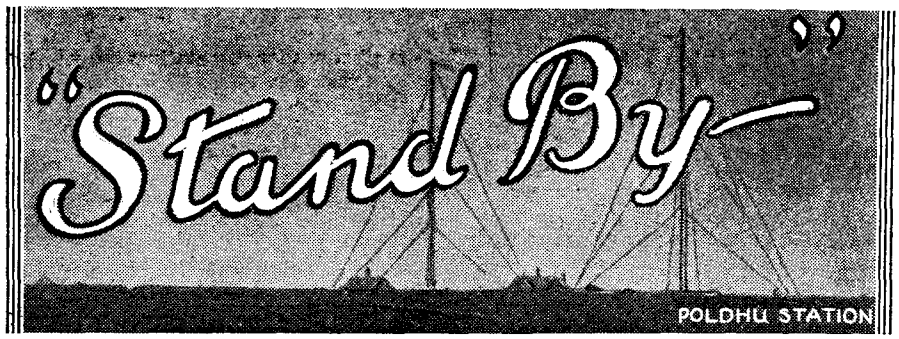
WIRELESS FOR SHIPS' BOATS







The above illustrations depict a proposed system of adapting wireless to ship's boats in order to enable survivors of vessels in distress to continue transmitting S O S signals. Each apparatus thus installed would have a range of 50 to 100 miles.



At Sea—Wigan Pier—Local Colouring—Buzz-z-z—The Honeyed Phrase—Parasitic Noises—Animals as Inventors.

At Sea.

AN American scientist suggests that experienced meteorologists should be distributed on ocean-going vessels, so that one or two would be always at sea. The meteorologist at sea, he suggests, would receive weather reports by wireless and issue weather forecasts to the land stations, also by wireless.

The only difference between the newly-proposed system and the present system is that in the latter *all* the weather prophets are usually at sea.

Wigan Pier.

The broadcasting programmes radiated from Manchester have been heard in the Wigan coal-mines. This item of news has been received with great calmness by Wiganites temporarily domiciled away from their native city. Every man jack of them stood their ground while the inevitable question was fired at them. "Ah, but have you heard of the dancing to wireless music at the end of Wigan Pier?"

Local Colouring.

The conversation turned on noteworthy achievements in the reception of wireless signals from far-distant stations. Over in the corner sat a little man with a white, pointed beard. Breaking into the talk for the first time, he remarked:

"I have enjoyed the story of your achievements, gentlemen, but I think I can go one better than most of you. On my valve set I can get Manchester so well that you can hear the cotton spinning."

That started it.

"Nothing funny about that," said Nettleton. "Speaking seriously, when I get Cologne about midnight the reception is so good that you can fairly smell the scent."

"Don't be such a confounded ass!" said Jimmy Gallipot. "Talking of Continental stations, I know a schoolboy who gets Ostend so clearly that he can hear the rabbits running about the quay."

"Silly idiot!" broke in Heaviside. "I don't believe a word any of you have said. You can believe me if you like, but when I pick up Teneriffe on my super-seven, I can hear the Canary Islands whistle."

Buzz-z-z.

The chairman of the Newcastle and District Beekeepers' Association recently gave an address on beekeeping from the Newcastle station. After the address a bee was placed on the microphone and the buzz of the insect was broadcast to listeners-in.

Which reminds me very forcibly of a schoolboy friend of years ago who had the wonderful faculty of being able to imitate a buzzing bee in true ventriloquial style. It was a pleasure to sit next to him in church.

There was a good old gentleman who used to sit in front of us. I have seen him descend suddenly from the lofty heights of an eloquent sermon to the sordid reality of a bee buzzing about his ears. That same boy used to try it on at school occasionally, but the effect was not quite so good there, and the chances of capture (of the buzzer, not the bee) were much greater. There was the possible penalty at school of so many "lines" or so many hours of "extra drill," or worse than those forms of mild punishment—the whizzing stick, which stings over a greater area than a buzzing bee.

The Honeyed Phrase.

One little incident has remained fresh in my memory of this ventriloquial schoolboy chum of years ago. It was a history lesson, and we were putting up with it as best we could. Our history master was a curious mixture. Sometimes he was funny, sometimes he was boring. His stock phrases included William the Corncurer (date of phrase 1100 circ.), Edward the Confectioner (date of phrase 1840), and Inky Stephen, a potty joke. We had read a chapter together more or less, and we were learning its contents with a view to questions. Everything was deadly quiet and dull, when gradually there arose the sound of a buzzing bee. Louder it came, and still louder, just as if the bee had come in at the window and was hovering over the heads in the front row. You can imagine how thoroughly we enjoyed it and how much we admired the courage and effrontery of my ventriloquial friend Woodhead. The bee appeared to settle and the buzzing ceased. Then there arose the high-pitched, sarcastic voice of David, our date merchant:

"Woodhead, I should advise you very strongly not to make a business of that sort of thing. There is a cure for it—the bees whacks cure."

Parasitic Noises.

If the buzzing bee performance as performed at Newcastle catches on well, no doubt we shall hear many strange noises in our telephones. The trouble will be to determine whether those noises come from the transmitting station or from the receiving set itself.

A famous Indian scientist has photographed, by means of a wonderfully sensitive piece of apparatus, the sounds emitted by a dying carrot. Perhaps there will be developments of this kind of thing so that our broadcasting programmes will include items such as these in the future:

(1) The howls of a skinned banana.

(2) The high-pitched whistle of a boiling cabbage.

(3) The peals of laughter of an orange being prepared for the fruit salad.

(4) The chromatic scales of a prima donna mackerel. And

(5) Mixed melodies of an uncooked sausage.

Animals as Inventors.

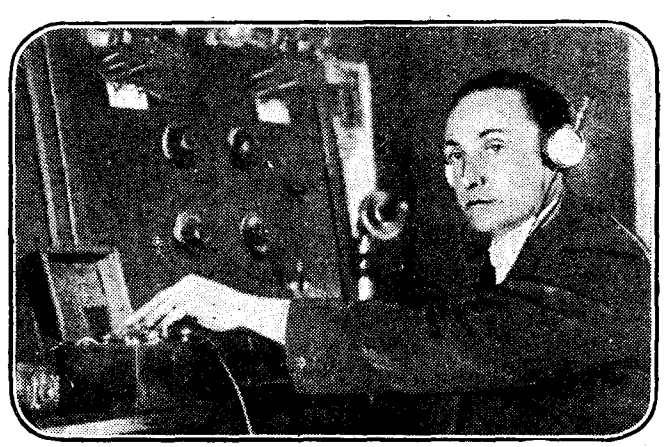
According to the "Wireless Review and Science Weekly," special observations of the intelligence of chimpanzees have been made recently, and the results of the observations have proved that the chimpanzee has a certain amount of inventive genius. The chimpanzee is not alone amongst the animals in this respect.

Many years ago the domestic cat perfected a system of face washing which for ease of manipulation has never been equalled by man with his soap and water methods. The fox terrier long ago thought out a wonderful game of hide-and-seek (played with ripe bones) which is streets ahead of any hide-and-seek game that children play.

In the distant past the honey bee invented a system of geometrical configuration which has been the surprise and envy of the geometrician ever since. The trapdoor spider invented the hidden pit method of capturing flies centuries before the method was used to win some of the world's most famous battles.

Last, but not least by a long chalk, the beaver must be given the credit for being the inventor of the dam water system.

Readers are invited to submit the results of their experiments in the form of short constructional articles. If accepted for publication they will be paid for at our usual rates.



The wireless set installed at Brooklands by Mr. Pullen, the well-known racer, to assist in the tuning-up of motor-cycles for racing purposes.

CARDIFF STATION NOTES.

By "KYM-RADIO."

A few interesting items concerning 5 W A and its staff.

"COMRADIOS" had a warm welcome for "Mr. Everyman" upon his return to us last Monday. The evening edition of the "Western Mail" voiced the popular feeling in a happy cartoon, "Mr. Everyman Speaking." This depicted a burly "Comradio" standing before a loud speaker, shaking hands with fantastic wireless waves that poured out, and exclaiming: "Glad to hear you again, sir." Very appropriately, "Mr. Everyman" devoted his return chat to "New Friends and Old," and charmed everyone. His other topics this week have been "The World Unrest and the British Commonwealth" (a speech of rare statesmanship), "Australia and Her Boy Scouts," and "The Burney Air-Ship."

Miss Haidee Gunn, the distinguished Shakespearean actress.

What an extraordinary power for good or ill "Mr. Everyman" must wield! We speak of the pen being mightier than the sword, and the value of the written word diffused by a great journal amongst a million readers. But here is a man who, nearly every night, is affectionately welcomed in thousands of homes as an intimate personal friend of the family, and actually speaks to young and old sitting by their firesides. How can he fail to exercise a strong influence upon thought and action? And especially so since he possesses in marked degree that most valuable attribute of a public speaker—sincerity. Even in so trifling a topic as "The Passing of Door Knockers" he exerts influence. For I heard of two cases at least where a daughter and a nephew went out next day and purchased sets of tiny brass knockers for presents.

Listening-in, Popular.

One is often tempted to speculate upon the effect of "broadcasting" generally down here in the West Country. Here are folk listening to the great masterpieces of music and literature for the first time in their lives. What are their feelings? The station director showed me a letter the other day from a farmer's wife in Somerset. She wrote that friends walked twelve or fourteen miles to her house three or four evenings a week to "listen in." This music and poetry and drama must mean something to them. "We haven't been able to get to a theatre or hear any music for twelve years," wrote another "Comradio," "so to us your entertainments are too wonderful." It is well that folk like these are in such safe guiding hands. By the way, what curiously warped ideas some persons possess. A man wrote to the director complaining about the inclusion in a programme of that very popular song, "We'm coom up from Somerset." He said that it was an incitement to militarism!

For obvious reasons a station director gets any praise or blame that may be going; his second-in-command is little heard of. But Cardiff is very fortunate in having such a deputy chief as Mr. W. N. Settle ("Uncle Norman" to the little folk), and the "appreciation" of Mr. Settle published last week in the leading West Country journal was well deserved. A sound and courteous business man, a hard worker, and a loyal chief-of-staff, Mr. Settle is certainly a distinct asset to the station and to the Broadcasting Company. We like him down here.

Classical Items.

A very fine Wagner night last Sunday included the Preludes to "Parsifal" and "The Mastersingers," and the "Siegfried Idyll." We have one Wagner and one Beethoven night every month. The complete series of Beethoven Symphonies (except No. 9) is being presented. The Sunday programme is certainly the most popular of the week.

LATIN—AMERICAN RADIOGRAPHIC NEWS.

Progress in Argentina and Venezuela—Success Attends Colombian Installation—Central American Enterprise.

By P. F. MARTIN, F.R.G.S.

RADIO-TELEGRAPHY is making sensible progress in Argentina. The latest arrangements include the establishment of apparatus and a club at Mendoza, the capital of the province of the same name. By means of the apparatus, concert programmes are broadcast from the Radio Club of Buenos Aires.

The Argentine Government has decided upon the purchase of two radio-plants for the use of the army, consisting of a portable set to cost $42,000 (gold), and equipment for a 6-kw. radio station to cost $40,000 (gold). It is understood that both plants will be furnished by the Marconi Wireless Telegraphy Company, Ltd. The existing laws in Argentina provide that privately owned radio stations are permitted only for inter-continental communication. these being under the jurisdiction of the Ministry of Marine or the Ministry of War.

Many New Stations.

The former Department controls all stations located within 100 miles of the sea or the River Plate, and within fifty miles of either bank of navigable rivers; while the Ministry of War controls all other stations in the republic. Of the forty-one existing stations of the army and navy, thirty-five are now being used for commercial traffic. Authorisations for new stations are granted for commercial reasons, as well as on military or naval grounds.

The Compañia Transradio Internaciónal is about to erect a wireless station at Monte Grande, located on the Buenos Aires Great Southern Railway. This construction will prove one of the most powerful stations in the world.

In Brazil, a concession to instal and operate for forty-five years radio-telegraph and radio-telephone stations for international communication has been granted to the Sociedád Anónyma Agencia Americána. The agency, which has been established with Brazilian capital, is now successfully operating radio-telephone stations for communication within the national territory, but its concession strictly excludes radio-telegraphy in that field.

Notable Progress.

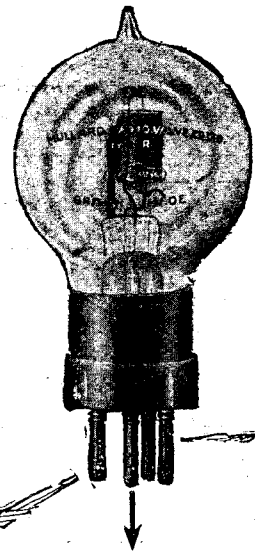
The receiving station of the Sociedád Anónyma Agencia Havas, one of the first radio-telegraph enterprises to be established in Brazil, has recently secured an extension of its concession granted as far back as August 2nd, 1920. The receiving station at Praia Vermelha has lately been opened for international service.

The past year has proved notable for the progress of radio communication in Venezuela, which was one of the first of the South American republics to institute a chain of radio stations throughout the state. The service is under the control of the Minister of Promotion (Ministero de Fomento), and the present occupant of that office, Dr. Gumersindo Torrés, a man of far vision with great faith in the value of radiography for Venezuela, seeks to encourage foreign contractors and manufacturers of electrical installations to assist in developing radio communication in the country. Another official, who is likewise broadminded enough to admit of free competition, is General Tobias Uribe, Chief of Communications, under whose guidance very considerable and knotty problems, dealing with the establishment and conduct of the service, have been solved. A third official, Señor H. Eichwald, who, although bearing a Teutonic name, is a Venezuelan by birth, has in his hands the technical control of the stations, their installation and maintenance, also charge of the national school for training operators for the wireless service of the country.

Loud-Speakers Introduced.

An influential radio association is being formed in San Salvador by a group of citizens, whose object is to equip the parks and other public places of that city with loud-speaker radio-receiving stations. These will be used to disseminate market quotations for coffee, grain exchange rates, official time, concerts and late Press reports. Permission has been granted to the group to sell receiving apparatus and to instruct purchasers in the use of the instruments. Authorisation has also been given for the purchase of amplifiers and improvements for the Government wireless station. Radio-telegraphy has become extremely popular throughout the Central American states, but more particularly in El Salvador, which offers an excellent market for radio apparatus.

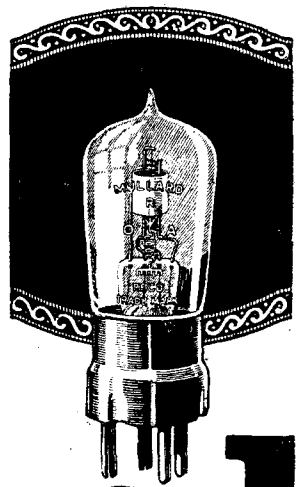
After Rodin



REDUCED PRICE OF "R" VALVES

15/-

PROBLEMS arise in every phase of life, and the power of concentration does not always solve them, but when the problem is one of valves you can see The Thinker straightening his heavy back and smiling because there is only one solution—



Mullard

Obtainable from the Leading Electricians, Wireless Dealers, etc.

Advt. of the Mullard Radio Valve Co., Ltd., Balham, S.W.12.

INEXPENSIVE TOOL KITS FOR WIRELESS AMATEURS.

By RADIOGRAPH.

II. STOCKS AND DYES.

Some hints on the purchasing of suitable tools for amateur wireless work and how to preserve and handle them.

WHEN component parts used in wireless construction are purchased from dealers there is always a possibility that large stocks may include certain parts which are not accurately machined in some respect, and this is especially the case with regard to components having threaded portions. With constant use the taps and dies used by the makers become worn; and if for any accidental reason such tools are kept in service after the point of wear limit has been reached, inaccurate production ensues.

Constructing a Die-Plate.

Such considerations, apart from any desire to produce threaded components in the home workshop, make it necessary for us to investigate the best forms of screwing tackle to use in wireless construction. The form of thread used for scientific instruments, which category includes wireless apparatus, is known as the British Association Standard Thread, recognised by the initials B.A. It is preferred to standard Whitworth on account of its suitability for small screwed parts, and is identified by numerals from 0 to 25. For our particular purpose, however, the complete range of sizes is unnecessary, and the amateur who makes use of bought components which may require easing on the threaded portions, will find a simple screw plate and set of taps such as those illustrated in Fig. 1 adequate for his needs.

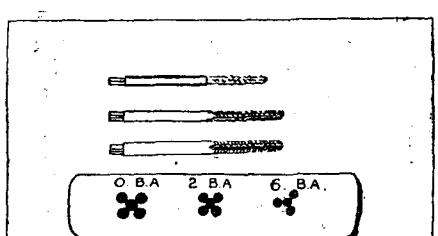


Fig. 1. B.A. Die Plate & Taps.

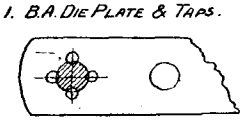


Fig. 2.

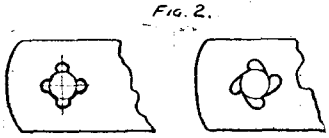


Fig. 2A. Fig 2B.

D

In the interests of economy it becomes desirable to standardise the sizes of screwed parts as much as possible, and in purchasing components care should be exercised in choosing those which have threads corresponding with the sizes of threads on the screw plates and taps.

Readers who desire to make their own screw plates can do so by using a worn file of suitable size from which to form the plate. The file should be annealed by raising it to a cherry red heat and allowing it to cool slowly in a coke fire. Whilst the file is red hot it should be examined for cracks, which, invisible when cold, would render the steel useless for the intended purpose. When cold the teeth can be filed off and the file can be marked out as shown in Fig. 2. After the central holes have been drilled and tapped they should be plugged up with pieces of screwed steel and filed off flush on either side. The next step is to mark off and drill the clearing holes, A, which must be spaced so as to just break into the central holes, after which the plugs can be removed, leaving the plate in the condition shown at Fig. 2A.

In order to allow the metal removed from a tight thread to clear whilst the plate is in use, the edges of the holes, A, should be eased away at one side in the manner indicated in Fig. 2B, this being done with the aid of a small half round file. If a taper tap is used for making the thread in the central hole it should not be put right through the plate, for by leaving the threaded hole slightly on the small side, allowance is made for any distortion during the tempering process, and also for wear on the threads themselves.

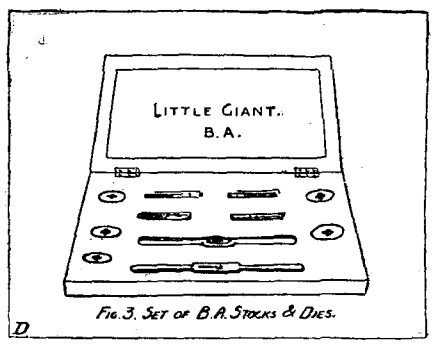


Fig. 3. Set of B.A. Stocks & Dies.

D

How to "Temper."

After having completed the plate it must be tempered so as to preserve the cutting edges. This is done by raising the plate again to cherry red heat and plunging it into clean cold water. To avoid chances of buckling the plate by sudden contraction it should be dipped into the water edge on, which minimises distortion.

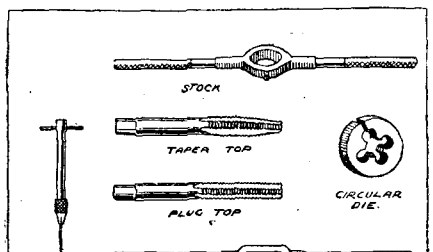
The plate is now dead hard, and if so used would soon become broken or chipped, therefore to retain the cutting edge without risking fractures the plate must be tempered or "let down." After polishing the surfaces with emery cloth the plate is held over a gas flame until the polished surface begins to assume a straw colour, a few seconds later the straw colour will darken and before it merges into the darkest shade, the plate must be dipped quickly into cold water.

Unless readers are accustomed to tempering tools it will be well to practice on a piece of cast steel or silver steel before attempting the process on a finished tool, for the changes of colour follow each other so rapidly that before one is aware of it the steel turns blue, which gives too soft a finish for any class of cutting tool. The following table shows how temperatures may be judged by colours, and the colours at which various tools should be tempered:

TABLE OF TEMPERATURES AND TEMPERING OF TOOLS.

Degrees Fahr.	Colour for Tempering.	Class of Tool.
430	Very pale yellow	Scribers and small scrapers.
440	Light yellow	Larger scrapers, centre punch points.
480	Dark yellow	Points of dividers, edges of shears.
500	Brown yellow	Small chisels, die plates and taps.
520	Brown purple	Large chisels and small flat punches.
550	Dark purple	Ends of screwdrivers.
560–570	Dark blue	Springs.

A set of die plates and taps such as those shown in Fig. 1 will cost about 4s. 9d., but amateurs who desire a rather more elaborate equipment can purchase a very useful screwing set for about 15s. which will last for years with ordinary use.



D Fig. 4.

A very neat set known as the "Little Giant" can be obtained from tool dealers (Fig. 3) and consists of a wooden case, five dies, five taps, a die holder and a tap wrench, the set being capable of cutting threads of 0, 1, 2, 3, and 4 B.A.

The parts are shown individually in Fig. 4, the types selected being suggested as the most convenient for amateur use. When purchasing separate taps, they should be

(*Continued on page* 930.)

MINOR VALVE-SET REPAIRS.

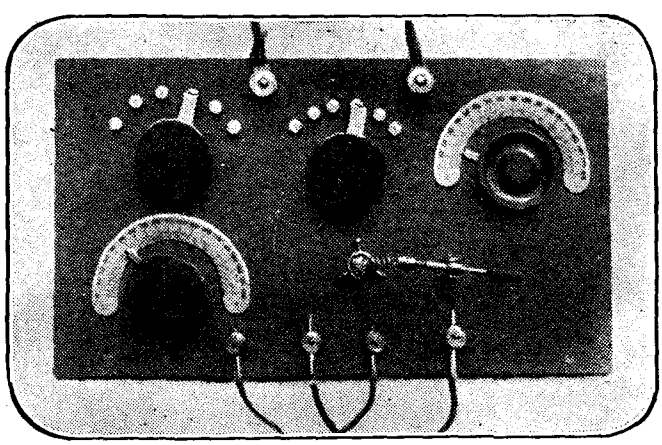
A few remarks concerning the interior of valve sets intended for the guidance of those readers not thoroughly conversant with the "innards" of their receivers.

COMMONSENSE is the most important asset an "amateur mechanic" can possess, and most people have quite a lot if they will only use it. For instance, supposing it is decided that it is necessary to remove the top of a valve panel; don't seize hold of a screwdriver and commence to remove all the screws that can be seen, or the whole set will disseminate into small pieces. Only those screws situated evenly around the edge of the panel will be employed in holding down the ebonite top.

Removing the Panel.

Having removed these screws carefully, don't jerk up the "lid" hastily, because it is ten chances to one if you do that you will find you are tearing apart soldered joints and leads. Although most sets come away in their entirety when the panel is raised, it is just possible that in the particular set that you are dealing with some of the gear is mounted in the interior of the case itself. However, having carefully removed the panel, the next thing is to carefully stand it so that no weight is brought to bear upon such delicate parts as the vanes of a variable condenser, grid leak, etc.; in fact, it is generally the best plan to lay back the panel in its correct position whilst not referring to its underside. It need hardly be added that during these operations all valves and external connecting leads should be removed.

Quite a common occurrence, and one that can be very easily dealt with, is for the locking nuts of a terminal to work loose and cause a loose or broken connection in the circuit. The more continually used terminals, such as the L.T., and A, and E, are, naturally, the chief offenders. Having worked loose, a turn of the terminal inadvertently performed while connecting the set up will generally break the soldered connection internally made to it, and apart from the fact that this will prevent reception, it is always liable to cause an internal short-circuit, with all sorts of resulting damage, buckled accumulator plates, burnt-out valves, etc.



The super crystal receiver described in "P.W." No. 38 as built by Mr. H. Hitchen, 5, Block 20, Garden Village, Highley, near. Kidderminster. 5 I T, 20 miles away, is comfortably audible.

The Filament Rheostat.

When replacing the panel of a valve set always carefully run over the interior "lay-out," removing dust and arranging the wiring so that each lead is as far from all the other leads as possible. See also that no lead is in such a position that it will be bent back on to another or dangerously near to anything else when the panel is pressed down. Have a look at the filament resistance, and if the wire along the point of contact appears to be rather dirty, carefully clean it. Should the resistance wire along this same point of contact appear to be burnt or blackened, then the chances are that the current is "arcing" along that point, or sparking as the filament knob is twisted. This will cause horrible grating noises in the 'phones. As filament resistances vary so vastly in point of construction it is hardly possible to venture even a general remark on the adjustment of the moving contact, but it can clearly be seen whether a firmer contact is necessary, and doubtless "commonsense" will guide the amateur mechanic along the path of safe and correct procedure.

Try the effect of varying the value of the grid leak by running a pencil line along the grid leak. The thicker the line the less will be the resistance of the leak. Start with a very, very thin line, and if it does not improve results don't carry on, but if it does, then thicken it slightly, no more. After that, leave it, otherwise you will do more harm than good.

INEXPENSIVE TOOL KITS FOR WIRELESS AMATEURS.

(*Continued from page* 929.)

bought in pairs—i.e., taper and plug. Taper taps are very useful for threading holes in ebonite, for by leaving the threads shallow, the screws fitting into panels, etc., finish cutting the thread whilst being forced home, thus securing a better fit than when the same thread is finished with the plug tap.

The circular adjustable dies are made from well tempered steel and consist of one piece, a small set screw being provided to regulate the die to cut full or shallow threads as required (Fig. 4). They are all made of a uniform external diameter and depth, thus enabling them to be used in the kind of the die holder illustrated. For the larger sized taps a double ended adjustable tap wrench is useful, but as even the smallest of these will be heavy for small taps, it is advisable to procure a watchmaker's tap wrench on fragile taps so as to lessen risks of breakages.

Even with the best screwing tackle obtainable the results will be very disappointing unless due precautions are observed in using the appliances. A good many amateurs, and professionals, too, go wrong because insufficient care is taken in squaring things up before a start is made.

The great thing is to start with a truly vertical hole,—I shall give a few hints on drilling in another article—but for the moment it may be assumed that this condition is already fulfilled. The natural tendency of a tap is to start its downward path in an oblique direction, and unless this tendency is corrected from the start the tapped hole becomes more and more crooked.

Use of Square.

One may be blessed with a fairly "straight" eye, and yet manage to start a tap or die crooked, therefore it is best not to trust the eye too much, but make quite sure the natural perversity of the tap is overcome by introducing it to a square. The application of the square in the manner shown in Fig. 5 by itself is not enough, for if the tap is made to be against the square in this one direction, it will "have its own back" so to speak, by dodging the square the other way. So it is necessary to try the vertical accuracy in two directions—i.e., from the side and the front—and once it is started in these conditions it will give up the unequal combat and be obedient to orders.

Dies can be started so as to cut true threads if the round stock to be threaded is provided with a slight chamfer, but care must be taken to ensure that the chamfer is concentric with the diameter of the stock, otherwise the die will run down out of truth.

When tapping holes no downward pressure on the tap is needed as the tap feeds itself into the material being cut. Jambing or clogging of the taps, which is often a preliminary to breakage, can be avoided if the direction of the motion of the wrench is reversed occasionally. This movement relieves the cutting edges and allows particles of metal to collect in the flutes of the tap, thus preventing tendencies to clog or jamb.

(*To be continued.*)

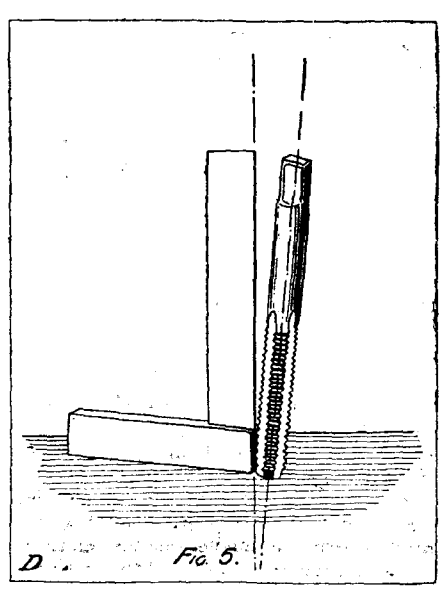
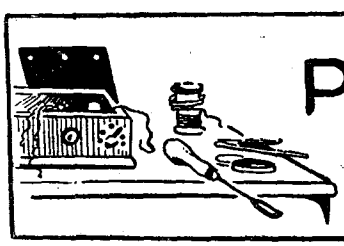
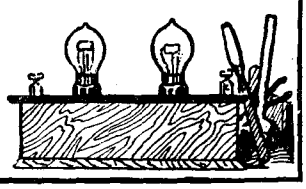


FIG. 5.



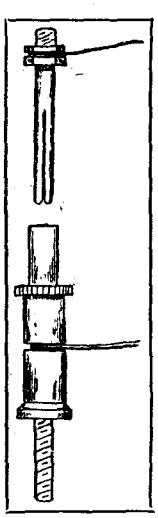
PRACTICAL IDEAS FOR THE AMATEUR



SOCKET TERMINALS.

TO the experimenter, any device which tends to facilitate the making of alterations to a circuit when "trying out" various arrangements is always welcome, and to that end several contributors have recently advocated the use of valve sockets and pins. The following method has been very successfully used by the writer for some time, is capable of considerable adaptability, and combines the flexibility of the "plug in" socket with the relative permanency of the terminal.

The sketch attached shows the whole idea, which consists in soldering a small socket on to the top nut of a terminal.



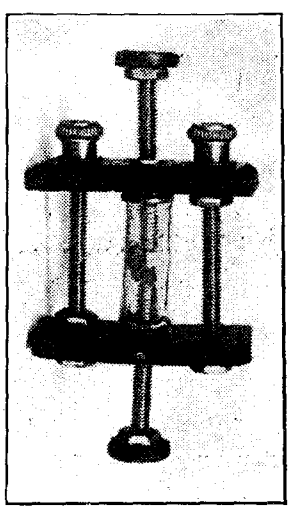
Valve sockets, with the threaded part removed, are suitable, but rather unsightly, and the writer therefore used the sockets from an old tapped H.T. battery, which proved neat in appearance and much more easily soldered.

Before soldering, the lacquer on the top of the terminal nut should be removed with emery cloth and the bottom of the socket filed flat. The nut should also be plugged with wood level with the top, to prevent the solder blocking up the inside thread. A little solder is run on to the terminal, and the socket placed on top and held in position with a pair of pliers. The hot iron is then applied to both socket and terminal for a few seconds, and a permanent joint ensues.

A SIMPLE PERIKON DETECTOR.

FIRST obtain two pieces of ebonite 2 in. by ¾ in. by ⅛ in., and drill in each three holes large enough to pass a 4 B.A. screwed rod, one at the centre, and one each side ½ in. from it. The centre hole is now enlarged until it is just a shade smaller than the thinner end of a 4 B.A. terminal head, which should be preferably slightly roughed.

Having passed a piece of copper wire round the head, it is gently tapped with a hammer until the smaller end fits tightly in the hole prepared for it. After fitting a head in like manner to the other piece of ebonite, a piece of glass tube 1 in. long with a ¼ in. bore and holding two crystals is placed between them, and the whole is kept in position by passing two short lengths of 4 B.A. screwed rod through the other four holes and tightening up by means of nuts.



Two further lengths of the same rod, the ends of which should be fitted with small ebonite knobs, are then screwed through the fixed heads until they make good contact on the crystals. The wires from the fixed heads should be joined to alternate screwed rods, which may be fitted with terminal heads and washers.

A FEW TIPS.

Before going to the expense of buying a 60-volt H.T. battery, it is advisable to borrow a battery and see what voltage the plate requires, as very often they do not need nearly as much as stated by the manufacturers. Dutch valves, for instance, will work satisfactorily on as little as 12 volts, and sometimes will not give good results on anything over about 20 volts.

* * *

Ordinary sealing wax makes a good insulator. Insulated knobs can quickly be made by dipping a screw head into molten wax, which cools instantly after being immersed, and a very neat appearance results.

* * *

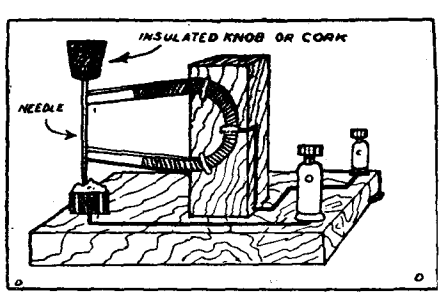
Sometimes it is very difficult to separate two stations that are both on practically the same wave-length as the Vernier condenser is not precise enough. Try the following tip with your existing Vernier, which will give very exact tuning. Take out the moving vane and on one of the radii (neglecting the round projection where the spindle goes) describe a semi-circle on the vane. Now cut out this semi-circle and the vane will then come to a point, giving extremely accurate tuning.

A NEW FORM OF CRYSTAL DETECTOR.

AN ingenious form of crystal detector is illustrated in the accompanying drawing. It possesses great advantages over the ordinary cat's-whisker type of crystal connection in that the pressure of the needle on the face of the crystal can be accurately gauged and the needle point can be moved without effort over the entire surface of the crystal. The question of pressure is an important one where certain crystals, such as galena, are employed, and the device has the additional advantage of simplicity of construction.

A wooden baseboard which can be fashioned to any design favoured by the constructor is first obtained, together with a block of wood which should not be less than half an inch in thickness and approximately two inches high. This block, after the permanent magnet has been mounted on it, is glued firmly to the baseboard as shown.

In order not to disturb the wooden block once it is in position, the two terminals indicated should be inserted into the paste-



board before gluing on the block. It is, perhaps, unnecessary to state that the magnet is tightly clamped to the block by means of the small staples, as illustrated.

Most permanent magnets of the horseshoe type are insulated at that portion of the magnet which touches the block by a coating of red paint. The block itself, however, may be treated with a little rubber solution or other insulating material at the point where contact is made if so desired.

An ordinary sewing needle is then obtained to act as a "whisker." This, of course, will be held against the two poles of the magnet by magnetic attraction. In order that a proper adjustment may be found the fingers should be insulated from the conductive metal of the needle, and this is accomplished by placing an insulated knob over the "eye" of the needle, which also enables a better grip to be obtained.

The simplest solution of this difficulty is to obtain a small cork and insert the head of the needle into the centre, as shown.

AN EFFICIENT ONE-VALVE SET.

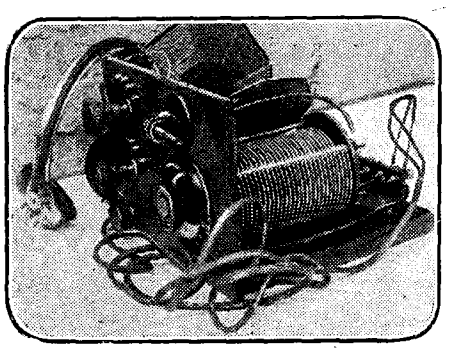
An interesting circuit claimed to give remarkable results over long ranges of reception.

A SINGLE valve set, for use with a low voltage, or dull emitter valve, that has created a great deal of interest in America, is described by P. F. Albright in a recent number of the "Radio World."

A diagram of the set will show the reader that the wiring of the instrument is carried out on almost orthodox lines, and while nothing new is claimed for the apparatus in this respect, it is stated that the circuit given is remarkably efficient for long-distance working, and that the strength of signals received will compare favourably with most other sets employing only one valve.

The Variometer.

It will be noticed that a departure from the ordinary type of single valve circuit is a lead which connects the aerial with the plate circuit of the valve. The variometer, also, is somewhat novel in design. This was made by constructing the inductance out of a cardboard tube three inches in length and three inches in diameter, the winding consisting of fifty turns of No. 22 D.C.C. wire wound on to the former in the usual honeycomb manner.



The super crystal receiver described in "P.W." No. 38 as built by Mr. H. J. Redgewell, of 35, Monson Road, Redhill, Surrey.

Mounting the Coils.

Two further coils are then wound round the other end of the tube, as shown in the diagram, each coil consisting of four turns of No. 22 D.C.C. wire. These coils, for the sake of simplicity, might be referred to as a winding of eight single turns in two separate groups of four turns each, with a distance of about three-eighths of an inch between them. This distance is allowed to permit of the mounting of the rotary coil, which is constructed from another cardboard tube of one inch in length, and of as large a diameter as will permit of its being rotated inside the stationary tube without touching the inside of the latter.

The rotating former is also wound with eight turns of No. 22 D.C.C. wire, the windings being spaced in a similar manner to the eight turns previously dealt with—i.e., in two groups of four. This coil is mounted on the supporting shaft in such a manner that the windings come directly under the stator windings, as shown in the illustration.

Variable Leak Advisable.

The three coils described are joined up in series and connected in the circuit as shown. It will be observed that the received signals from the aerial first pass through the rotor coil, then through the two groups of windings on the stationary coil, and finally through the honeycomb coil.

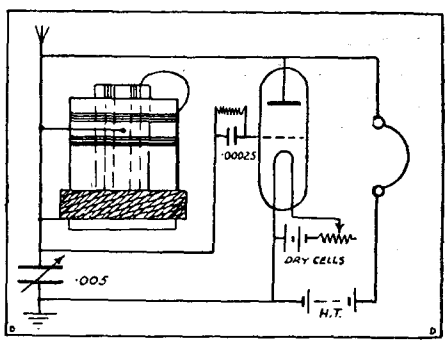
It is claimed that a variometer constructed on these lines acts as a Vernier on the inductance, and increases to an appreciable extent the selectivity of the apparatus.

The grid condenser has a value of ·00025 mfd., and as attention is called to the extremely critical ohmage value of the grid leak, it would perhaps be advisable to use a variable leak in order to obtain the best results from this instrument.

For long-distance working, a Vernier type of rheostat should be employed.

Good Earth Essential.

In addition to the variometer tuning, a variable condenser of ·005 mfd. capacity is connected between the aerial and earth and is inserted in the aerial and earth circuit between the point at which the grid connection is made to the aerial, and the lead which is taken from the earth terminal to the negative side of the high-tension battery.



The set described works admirably on the regulation 100 ft. aerial, although a good earth is essential if the best results are to be obtained.

The set referred to at the beginning of this article was wired up with No. 14 tinned copper wire, and wherever it was possible to do so, every joint was firmly soldered. The various components were mounted on a panel 6 in. by 3 in., and in addition were carefully shielded with tinfoil and earthed.

A final word of warning is given concerning the variable condenser and the inductance, which should be mounted as far as possible from each other to obviate undesirable capacity effects while tuning.

The fact that no accumulator is necessary to light the filament of the valve employed is an added attraction to this type of detector, the voltage and current being supplied by a dry battery.

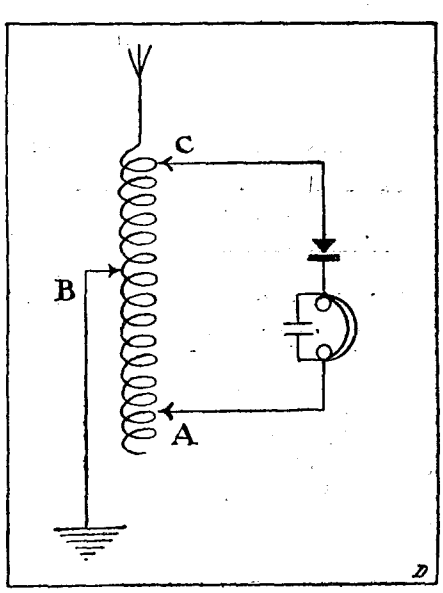
THE THREE-SLIDE TUNING COIL.

ALTHOUGH practically unheard of by the greater number of amateurs over here, the three-slider coil is quite common in America. There are very few advantages over the more common type, the double-slider, but it should be interesting from an experimental point of view.

It is constructed in the same manner as any other slider coil, with the exception of the extra sliding contact and brass rod. The aerial and earth circuit is varied by means of the one-slider, as in the case of the two-slide coil. It differs from the double-slide coil in that the detector circuit may be varied by the other two sliders. The method of tuning is as follows: The aerial and earth circuit is first tuned to the incoming signals by means of the slider B. The secondary circuit is tuned to the primary circuit by allowing the slider C to remain near the end of the coil to which the lead-in is attached and moving slider A towards or away from slider C until the signals are at maximum volume.

Having thus tuned the secondary circuit to the primary circuit, by drawing both the sliders A and C towards the lower end of the coil a slight coupling effect can be obtained. This slight coupling effect is the only real advantage obtained with this type of coil over the other types. In obtaining this effect the turns of wire used in the aerial and secondary circuits would be at the ends of the coil, thus separating, to some extent, the primary from the secondary.

A variable condenser of ·0005 mfd. can, of course, be placed in series with the aerial to decrease the wave-length, while one in parallel, say, of ·001 mfd. will increase the wave-length. The diagram shows a three-slide tuning coil used in conjunction with a crystal detector.



Wireless Club Reports

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 with the Radio Society of Great Britain.

Treharris and District Radio and Scientific Society.

The above society has, since its inception, worked hard and is building itself in the practical and theoretical phase of wireless. It has on hand the construction of a crystal and dual valve receiver, and various experiments are carried out at the meetings, which are held bi-weekly—i.e., Tuesdays and Fridays at 6.30 p.m.

The society has on its programme some interesting lectures and demonstrations. The members are keen experimenters and are not pure "broadcatchers." One of the members has been successful in receiving American broadcasting. Anyone desirous of joining can obtain any information from the hon. sec. at his residence.

Hon. sec., David D. Richards, "Mametz House," Bontnewydd Terrace, Trelewis, Glam.

The Carmarthen and District Radio Society.

A local wireless society has been formed, called the Carmarthen and District Radio Society, which is being affiliated with the Radio Society of Great Britain. At a recent meeting Col. E. C. Jennings (5 O C) was appointed president, and Mr. W. D. Williams, vice-president.

Particulars of membership can be obtained on application to the hon. sec., Mr. W. I. Thomas, 9, Hall Street, Carmarthen.

Battersea and District Radio Society.*

On Tuesday, July 10th, Mr. H. Bevan Swift, A.M.I.E.E., lectured to the above society on the "Fundamentals of Radio Work," which proved of very great interest to the members.

His methods of cutting out unwanted stations was very interesting and solved the trouble of many members.

We have great pleasure in announcing that Captain Davis (2 X L) of the Pavilion, Lavender Hill, has kindly consented to become president of the society, and has offered the vestibule and aerial of the Pavilion Cinema for any special transmission.

Hon. sec., A. E. P. Walters, 31, Holden Street, Grayshott Road, Lavender Hill, S.W. 11.

Tottenham Wireless Society.

On Wednesday, July 18th, Mr. R. G. Ellis gave a lecture on "Dual Amplification."

After introducing the theory and method of this branch of research, Mr. Ellis gave details of several dual amplification circuits he had used.

Hon. sec., S. J. Glyde, 137, Winchelsea Road, Bruce Grove, Tottenham, N. 17.

The Leeds and District Amateur Wireless Society.*

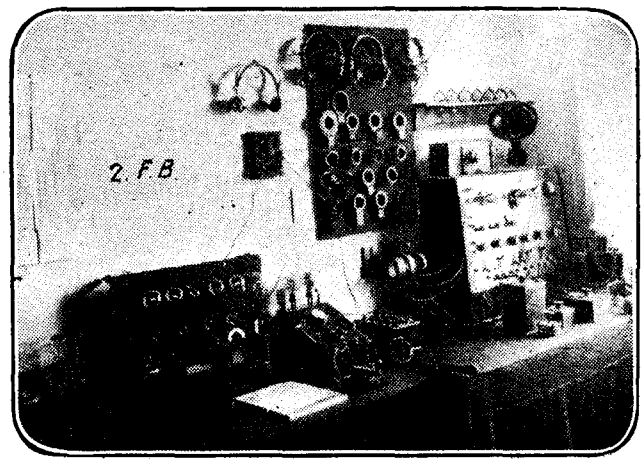
At an instructional meeting held recently the president, A. M. Bage, Esq., described "The Construction of a Two-Valve Portable Receiver." This self-contained set was on view, the first valve functioned as cumulative rectifier, magnetic retro-action being utilised for amplification, the second valve being a low-frequency magnifier, coupled to the rectifier by a transformer, normal valves and batteries being utilised. Practically every essential to maximum efficiency is included in the outfit, the more important items being the use of a micro-variometer for fine aerial tuning, separate filament control, good potential adjustments, etc. The set was very successful last winter on the reception of U.S. broadcast and amateur traffic.

Hon. sec., D. E. Pettigrew, 37, Mexborough Avenue, Chapeltown Road, Leeds.

Barnet and District Radio Society.

Mr. F. W. Watson Baker presided at the fortnightly meeting of the society which was held on Wednesday evening, July 25th. There was a good muster of members, and amongst the new members enrolled was Mr. W. R. Kent, a member of the Barnet Urban District Council and formerly Postmaster of Barnet. He is the second local councillor to become a member of the society.

Hon. sec., J. Nokes, "Sunnyside," Stapylton Road, Barnet.



The experimental transmitting and receiving station belonging to Mr. W. Ison, of 80, Barnham Road, Salisbury.

Catalogues Book Reviews Etc.

For those to whom money is an object P. J. Risdon, F.R.S.A., Research Editor of our companion paper, "Wireless Review and Science Weekly," has written a very interesting little book entitled "Wireless Really Explained." Besides explaining the theory of wireless, there are interesting chapters on "Magnetism and Electricity," "How to Erect an Aerial," "How to Make a Crystal Receiver," etc. The twelve chapters are very interesting from end to end, while the book ends up with an explanation of the Morse code and a few interesting photographs.

* * *

It is generally stated that a repaired valve is not so efficient as a new one. To prove that this is not absolutely correct, Crowther and Osborne, Manchester, have forwarded us a repaired R type valve for test. While taking only very slightly more current than an unrepaired valve, it gave really excellent results, and nearly quite equal to a new one. This shows that it is worth while having your burnt-out valves repaired instead of paying a high price for a new one.

* * *

An interesting price list has been forwarded to us by the "Griffin Wireless Supplies Co." Besides giving a list of components and accessories, the catalogue contains details of complete one to four valve sets, and also an interesting unit set. All the apparatus of this well-known firm is well made and thoroughly efficient, despite the low prices of the goods.

* * *

There are many excellent variometers on the market at present, but perhaps none quite so neat as the new "Sterling" instrument. It is unique in design, while the novel construction of the rotor and station afford very close coupling and selective tuning. It has an inductance ratio of 9 to 1. The wave-length range is 250—2,725 metres in conjunction with a ·0005 variable condenser and when used with a standard P.M.G. aerial.

* * *

The Radio and Electrical Supply Co., of 29, Paternoster Row, E.C.1., are making a very unique offer and one that should appeal to all possessors of burnt-out valves. They are prepared for a time to accept burnt-out valves in part payment for brand-new valves of any of the Ediswan types. Somewhere around 4s. or 5s. is allowed for each burnt-out valve, so that amateurs can obtain the brand-new article for but half a guinea or so, against the usual 15s.

* * *

The Mullard Radio Valve Co. have sent us one of their "dull emitter" valves for test. We have tried it and can safely say that it is one of the best valves we have tested irrespective of its merits as a small current consuming component. At 27s. 6d. it should command a very ready sale. On the "P.W." Combination Set, using a dry battery instead of the usually required accumulator, results were excellent. A single cell of an accumulator can be used, but we should think the length of time that it would supply the valve with the small required current would tend to cause amateurs to allow their accumulators to stand too long without charging.

* * *

Two leaflets have been issued by M. Hirst & Co. They give details of a very neat set on the unit system, while a crystal receiver is also described. It should be mentioned that "Radiocite" has been obtainable from this firm for some time, whilst it has often been difficult to get it elsewhere.

RADIOTORIAL.

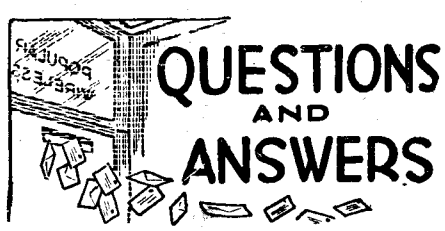
All Editorial Communications to be addressed The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

Have you seen one of those ornate ormolu clocks—a great show outside, but very few actual "works"? If you have, then I think you can safely say that you have investigated the "materialisation" of a Government committee. Surely all the problems of the ages, let alone those connected merely with the wireless of the present, could have been discussed and satisfactorily settled during the long period that the broadcasting committee has been sitting. I am inclined to believe, however, that behind the "gilt" of promises their "works" are acting in a similar manner to the "works" of the cheapest of German alarm clocks—"in fits and starts." But then we do not know, we have no actual proof that the worthy members of this committee are discussing matters wireless at all; maybe golf, fishing, and other holiday diversions are given pride of place behind the barriers of official secrecy and silence. It seems incredible that months should be required to decide the comparatively few problems connected with broadcasting when only a matter of days can settle such gigantic questions as those in days of war, which can settle the fate of nations. The old saying, "Don't put off till to-morrow——" has no doubt been adopted as a motto by our energetic broadcasting committee, but the sense of the advice inverted. Several times they appear to have been on the verge of breaking their silence and emerging into daylight, but have at the last moment decided to leave it just a little longer. I wonder how many of the original members will be alive when finally their cogitations are finished, and will they be regarded with the venerable awe accorded to surviving participators of long-past historical events? Will they come within the category of "Interesting facts," and figure as the "Government committee that sat for over fifty years"? Seriously, though, will this committee be ready with their report before the anticipated winter boom? If not, their dilatory actions will have a serious effect on trade. If when these words appear no definite news is to hand some form of serious agitation should be commenced, and readers should communicate with their M.P.'s and endeavour to force a more speedy settlement.

THE EDITOR.

Owing to the enormous number of queries received daily from readers of POPULAR WIRELESS, I have temporarily decided to limit the number of questions sent in by one reader to three. Readers are asked to keep their questions as short and as concise as possible in order that the minimum of delay can be exercised in answering queries. Until further notice three questions from one reader will be the limit for one letter. All questions should be addressed to POPULAR WIRELESS Queries Department, Room 138, Fleetway House, Farringdon Street, London, E.C.4. Readers are requested to send the necessary postage for reply.

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.



A. W. C. (Bridlington).—I intend making a basket coil to tune up to 2,600 metres to get Paris time signals. I am using 22 D.C.C., and find that a very large coil is necessary for this wave-length; in fact, too large for easy handling. Is there any method whereby I can make these coils smaller, sticking to the basket method of winding? I am using cardboard formers with nine slots.

You will find that if, instead of passing the wire through every slot you pass it through alternate slots you will save a lot of room and have two layers of windings on each side of the former. These coils are just as efficient as the single layer basket coils, and have no larger self-capacity. An article on this subject will appear shortly in POPULAR WIRELESS.

A. H. S. (Moorgate).—What are the brief details of the Wireless Telegraphy Act of 1902? Has this Act been renewed or does the original act still hold good? Is it true that this act only holds good for the coherer, etc. (that is, if it has not been renewed since it was first passed)? What are the penalties for infringing these laws?

The first Wireless Telegraphy Act was passed in August, 1904 (not in 1902, as you state), and has been extended from time to time. The first section lays down that no person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place except under and in accordance with the licence granted by the P.M.G. for that purpose. The fees, etc., are to be determined by the P.M.G. with the consent of the Treasury. Section 2 sets out that any person who can furnish satisfactory proof to the effect that his sole object in obtaining a licence is to conduct genuine experiments, shall be granted a licence subject to the special terms and restrictions, etc., but shall not be subject to rent or royalty. The fee of 10s. merely covers the various administrative charges. As regards the penalties, anyone installing a set without a licence is liable to be fined £10 if brought before a magistrate. He may also be brought before the quarter sessions or assizes on indictment, and be fined anything up to £100 or be sentenced to anything up to twelve months. In either case, the set may be confiscated. No prosecution, however, may be launched against an offender unless consent is obtained from the P.M.G., the Admiralty, the Army Council, or the Board of Trade.

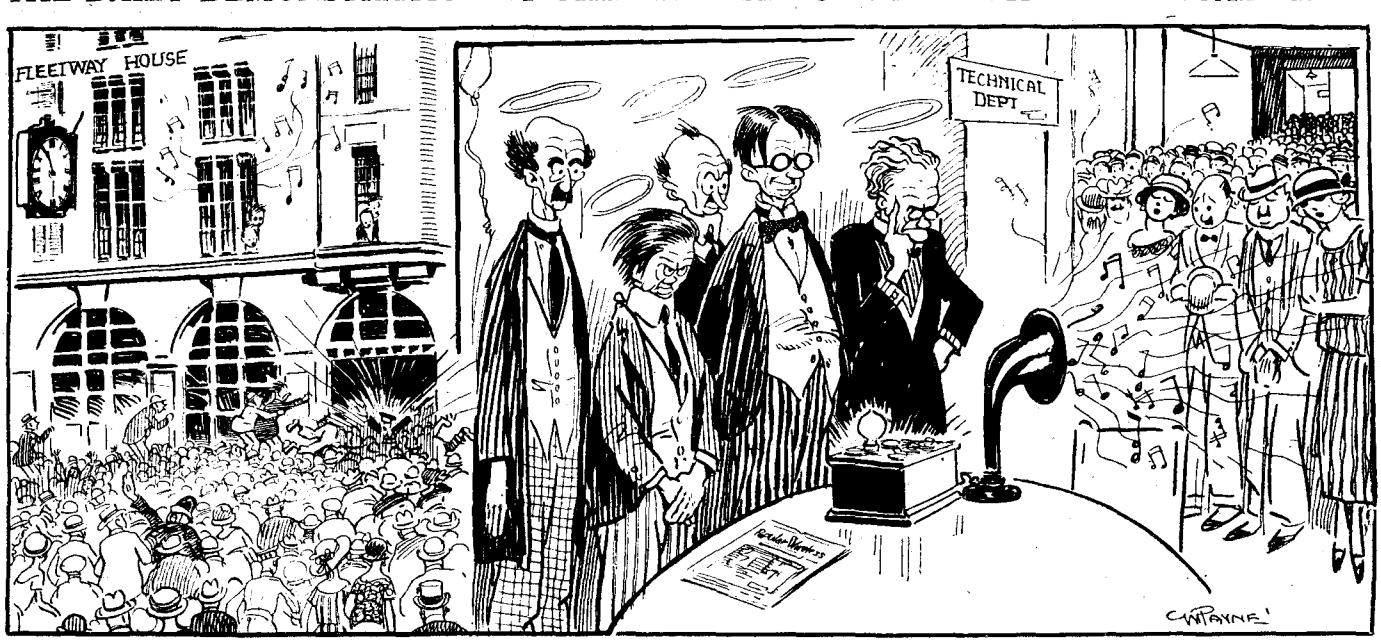
* * *

"GRID" (Liverpool).—What is the action of the grid condenser?

The grid condenser is placed in series with the aerial and the grid in order to make the valve rectify. In the normal way the grid is slightly negative or at zero potential. The incoming signals produce varying charges on the grid, so that it becomes positive and negative alternately. When the grid is made positive electrons are attacted from the filament and remain on the grid on one side of the condenser. These cause the grid to have a steady negative potential. The negative impulse from the aerial simply makes the grid more negative, so that, instead of fluctuating from positive to negative and back again, the grid becomes either more or less negatively charged. At each successive positive impulse the grid negative charge is partly overcome and more electrons collect on the grid. Finally, the grid becomes so charged with a negative potential that the incoming oscillations would have no effect on the anode current, which would have been gradually decreasing. At the end of a wave train the grid would be still at negative potential, and subsequent wave trains would produce no effect. To obviate this a grid leak is provided which enables the electrons on the grid to leak away during the intervals between the wave trains. These intervals are comparatively long, and the accumulation of electrons has ample time to leak away before the next wave arrives. This leaking away brings the valve back to about zero potential, and the process can be repeated. By this means the valve is made to pass the anode current in one way only—in a series

(*Continued on page* 937.)

THE DAILY DEMONSTRATION OF THE "P.W." SET GIVEN BY THE TECHNICAL STAFF.



RADIOTORIAL.

(*Continued from page 936.*)

of jerks, according to the wave trains, and this series causes a succession of clicks in the 'phones, which, coming very rapidly, produce a buzz or musical note, according to their frequency.

* * *

P.W.S. (Clacton).—In the details regarding the L.F. transformer for the "P.W." combination Set, are not the dimensions incorrect in one or two places?

Yes, there are two misprints in connection with the ebonite bobbin. The 1 in. should refer to radius, not diameter, while the hole should be $\frac{3}{8}$ in. instead of $\frac{1}{4}$ in.

* * *

A.E.W. (Balham)—What is the cause of "Blue Glow" in a valve?

In the first place, when constructed, a valve is evacuated, and according to its degree of evacuation so it is called either "hard" or "soft." A hard valve is one in which there is little residual gas or air, while in a soft valve there is an appreciable amount of air.

When the filament of the valve is heated and a positive charge applied to the anode, or plate, electrons stream off from the filament and rush across to the plate. Now, if the valve has been fairly completely exhausted, the electrons will fly across without encountering many molecules of gas, but if there is residual gas present the electrons will keep on colliding with the molecules.

The molecules, on the other hand, have lost electrons, so that they are left with a positive charge. They are therefore called positive ions. Being positive they will not be attracted by the anode, but repelled; they will be attracted by the filament and will rush towards it.

On arriving at the filament the ions meet more electrons flying off and will eventually unite with some of these electrons, becoming neutral molecules once more. But they are now in amongst the crowd of electrons moving round the filament, and which naturally have a somewhat screening effect, because they will tend to repel some of the electrons leaving the filament.

The effect of utilising some of these electrons by the molecules, or rather ions, will "ease" this crowd, as it were, and thus remove its screening effect to some extent. The direct result of this is that more electrons rush off the filament to the plate.

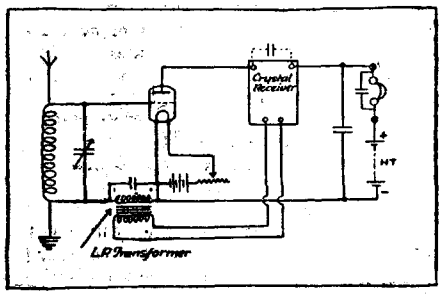
All this action and interaction between the electrons and the molecules of gas means an expenditure of energy, which in turn is largely converted into heat. It is this heat that causes the "blue glow," for the molecules are heated up and the gas becomes incandescent.

A great drawback of soft valves is the fact that they are liable to have a much shorter life than those that are harder. This is because the filament is constantly bombarded by the positive ions, and thus is weakened and burns out more quickly.

If, therefore, you find that your valve begins to "blue glow" you must cut down your H.T. voltage so that the electron bombardment is lessened.

* * *

DUAMP (Kendal).—I have made up the Super-Crystal Set from "P.W." No. 38, and get some quite good Morse, but no telephony, being about 70 miles from Manchester. I did once get him faintly during the winter, so the set is quite O.K. I now wish to add a valve. Is it possible to make it into a dual amplification circuit without any switches, as in the "Combination" set? If so, what are the connections? :



This is quite possible. As the A.T.I. of the crysta set will act as the anode coil in the dual amplification set, it will not be necessary for both the primary and the secondary coil to remain in the crystal set, so the first thing to do is to remove the secondary, taking the aerial terminal of the crystal set to the plate of the valve, and the earth terminal to the 'phones and H.T.+, while the crystal is connected across the coil as in a simple crystal set. The valve is connected as follows, the coils mentioned, of course, being for the broadcasting band of wave-lengths. The removed secondary of the super-crystal set can now act as the primary of the dual set, a new A.T.I. being constructed to form a loading coil if necessary. Take a lead from aerial to grid of valve, and connect plate to the aerial terminal of the crystal set. I.S. of

(*Continued on page 938.*)

RADIOTORIAL QUESTIONS AND ANSWERS.

(*Continued from page* 937.)

L.F. transformer should go to earth, while O.S. goes to H.T.−, filament and L.T.−. A fixed condenser of ·0003 mfd. is connected across the secondary of the transformer. The primary leads of the transformer go to the original telephone terminals of the crystal set. The filament resistance, of course, is connected in the usual manner between L.T. and filament. The earth terminal of crystal set goes to 'phones, the other side of these latter going to H.T.+. A fixed condenser of large capacity is connected across the H.T., and one of ·001 mfd. approx. across the 'phones. One of ·0003 variable mfd. may be necessary between A. and E. terminals of crystal set. The new A.T.I., that is, the old secondary will be suitable for broadcasting while both it and the anode coil (the old A.T.I.) can be loaded to reach higher wave-lengths.

* * *

L.W.C. (Manchester).—Is it possible to employ reaction on the "P.W." Combination Set? In this event, could plug-in coils be utilised?

It is certainly possible to employ reaction in the POPULAR WIRELESS Combination Set, but this will not result in very greatly increased signal strength. Up to 30 miles or so the effect of reaction is hardly noticeable if the set is used on an efficient aerial. It is useful for bringing in distant stations, but as it necessitates a form of reaction forbidden on 300-500 metres by the P.M.G., it should not be used on broadcast wave-lengths. Reaction is, of course, carried out by coupling the anode coil to the A.T.I., but this is likely to cause the set to oscillate and disturb other listeners-in if it is not carefully handled. If you decide to alter the lay-out of the set to use reaction the coil connections should be brought up to sockets on the surface of the panel so that either one or the other is movable and can be variably coupled to the remaining coil. If these alterations are carried out the purpose for which the set was designed will no longer be achieved, for the set was built in such a manner that it is perfectly stable under all conditions and will not cause interference, however carelessly it is handled. Apart from this, its case of operation makes it an ideal "household" receiver. Reaction will bring up the signal strength of weak stations to a certain extent, but it may cause difficulty in that the set may become less stable and howling be introduced. If reaction is used, we would advise you to keep the coils away from the L.F. transformer, and also to fit that type of crystal detector which employs a Vernier adjusting screw for varying the pressure of the cat's-whisker upon the crystal. This latter—the pressure—is an important factor if reaction is used, for a very light contact will cause violent oscillations and consequent howling to take place. Heavy pressure on the crystal will have an opposite effect, and will cut down the signal strength, so that it is important that the correct pressure be obtained.

THE "P.W." COMBINATION SET.

To the Editor, POPULAR WIRELESS.

Dear Sir,—In reference to your letter of the 26th ult., wherein you enclose pull of POPULAR WIRELESS Dual Amplification circuit. We have to inform you that we have tested this out and find it eminently satisfactory.

We attach herewith some notes we have made on the operation of the set, which you are free to publish if you think fit.

Yours faithfully,
Ernest A. GORDON
(for Managing Director).

L. McMichael, Ltd.,
Hastings House,
Norfolk Street, Strand, W.C.2

This would appear to be the ideal amateur combination in the form of the irreducible minimum, and perpetrating the arrangement 1 H.F., 1 R., 1 L.F., which most of us use for general purposes, for that is, in effect, what is happening here. In addition, by an arrangement of switches and telephone jacks the crystal can be used or set alone.

On the full application the valve acts first as a high-frequency amplifier with a tuned anode transference to the crystal detector, after which the low-frequency impulses pass through the primary of an intervalve transformer. The secondary transfers the stepped-up voltage to the first grid again, and the magnified result is taken through 'phones or loud speaker inserted immediately in the following anode circuit.

On test we found the combination working amazingly well, but we would warn you that results come suddenly. A crystal "rectifies," and until that is adjusted properly the excellence of the circuit cannot be judged. That is the only fault we have to find—the crystal—every day, however, brings new crystals to light, and perhaps we shall soon find a permanently sensitive specimen, or means of quick and certain adjustment.

One or two refinements suggest themselves, of course. The anode coil can be magnetically coupled with the aerial coil, giving reaction, and its consequent signal strength increase, but entering oscillation tends somewhat to upset the adjustment of any but robust crystals. Nevertheless, oscillation can be avoided.

A slight negative bias, 3-6 volts, can be given with advantage to the first grid. A small battery can be inserted on the right of the ·0002 μF condenser in series with the transformer secondary. Furthermore, a blocking condenser across No. 2 jack (a nominal ·001 μF, say) improves the tone somewhat.

We think investigation in this direction will lead to something really good, although at present the hum of nearby electric light and power mains is strangely strong in dual circuits. Experimenters should certainly try this circuit out for themselves and communicate the results for general information.

The Editor, POPULAR WIRELESS.

Dear Sir,—In reply to your letter of the 26th ultimo, regarding the POPULAR WIRELESS Combination Dual Amplification Circuit, our Technical Director, Mr. A. Chapman (who you will remember, is the inventor of the famous 3-Electrode Variable Condenser), is of the opinion that this circuit would afford a very high degree of sensivity, and enable long range reception to be effected with a minimum number of valves. Furthermore, the H.F. amplification coupling described on the diagram would effect an appreciable degree of selectivity to the A.T.I. input, despite the fact of its being direct-coupled.

We trust that the above opinion, coming as it does from one who has been identified with wireless work since the earliest days, will prove of interest to your readers.

Thanking you for giving us the opportunity of commenting on this very interesting circuit.

We are, dear sir,
Yours very truly,
AUTOVEYORS, LTD.

4, Victoria Street, Westminster, S.W. 1.

CRYSTAL RECTIFICATION.

The Editor, POPULAR WIRELESS.

Sir,—Will you kindly allow me to make a few comments on your "Notes on Crystal Rectification" appearing in the July 28th number of your journal, as this is a subject I have made a special study for the past fifteen years.

It is impossible to accept the theory of thermal action to explain the rectifying properties of the usual crystal detectors, for the three following reasons:

(1) When heat is applied to them they give no practical indication of thermo-electric action.
(2) If the most sensitive thermo-junction known—the platinum-bismuth couples used by Professor Thompson for measuring the heat of the stars, or the heat of a candle a mile away—are used in place of the usual detector, nothing can be heard in the telephones.
(3) Assuming a thermo-junction to act as a detector of feeble high-frequency oscillations, the resulting current from speech transmission would be quite inaudible in telephone receivers owing to the time lag of the heating and cooling of the junction.

The statement that the resistance of a typical wire contact detector is 10,000 ohms is only half the truth, as all these detectors have a negative and positive resistance. The positive resistance in the case of the cat's-whisker type averages 500 ohms, the current travelling from crystal to wire. On reversing the battery with negative to crystal the average resistance is 10,000 ohms.

In the case of zincite combinations the values are 750 ohms against 15,000 ohms or more.

The difference in resistance in the two directions fully explains the purely rectifying action that goes on. The greater the difference in the two resistances the more sensitive is the detector. It will be seen from the figures quoted that 95 per cent of the half wave is rectified, a figure that is not likely to be improved upon.

It is a simple matter to verify all this by measuring an adjusted detector on a Wheatstone bridge or placing it in series with a 1-volt cell and a milliammeter. The latter should register 2 milliamps. in one direction and ·1 milliamp. when the detector is reversed.

What is required for the functioning of all crystal detectors is high resistance at the point of contact.

When this high resistance is broken down by mechanical pressure, or the moving of the contacting elements to a position of no, or too low, resistance, then rectification becomes inefficient or ceases altogether.

During the past few weeks I have tested upwards of 1,000 detectors on a microammeter passing an average current of 200 microamps. from the rectified carrier wave of 2 L O, and only in one instance was there a reversal of current—a matter of only 20 microamps. in the apparently wrong direction—and on investigation this was found to be due to the imperfect contact of the crystal in its holder causing partial rectification in two directions. Crystals must always be thoroughly embedded in "wood's" metal.

Those interested in thermo-electric effects will be glad to know that a very efficient junction can be made for next to nothing by twisting together one end from each of a piece of fine euraka wire and a piece of copper or silver wire. The heat of the fingers applied to this junction will generate a current of 20 microamps., and the approach of a match will send it up to 200 microamps.

Although this is one of the most efficient thermo junctions known, it is quite useless as a detector in a wireless receiving circuit. It could be arranged to give a deflection on a visual indicator when placed in a tuned circuit near a transmitter.—Yours faithfully,

B. S. T. WALLACE.

(*Continued on page* 940.)

APOLOGY

WIRELESS CRYSTAL "TALITE"

Trade Mark

My attention having been drawn to the sale at my premises, 143-144, Fleet Street, E.C., of an article in substitution of, and represented as, the above-named Trade Mark, "Talite" Crystal, I HEREBY express my regret to HARDING, HOLLAND & FRY, LIMITED, of 27, Garlick Hill, E.C., the Sole Selling Agents for "TALITE," for any inconvenience, loss or damage they may have sustained in consequence thereof, and UNDERTAKE that no further sales of any substituted article shall be made.

DATED this 3rd day of August, 1923.

Signed R. GREEN,
143-144, Fleet Street,
London, E.C.

A.1. HEADPHONES

(4,000 OHMS)

15/6 POST FREE.

ADJUSTABLE DIAPHRAGM, LEATHER COVERED HEADBANDS, LIGHT WEIGHT (11 ozs. only.)

CRYSTAL RECEIVING SETS

READY FOR USE.

Mounted Handsome Polished Cabinet 8"×10"×5½" **21/- POST FREE.**

Coil Holders, Mounted Polished Ebonite, 2-way, each; 3-way	6/- 7/6 each
Beaver Special Basket Coil Holders	1/6 ,,
Fixed Condensers, all capacities	10d. ,,
Double-Throw Switches	1/6 ,,
Coil Plugs, 9d. each; **Variometers**	3/3 ,,
Crystal Detectors, Glass-covered	2/- ,,
Valve Holders, Highly polished	9d. ,,
Beaver Special Crystal	9d. box of 4

POST FREE.

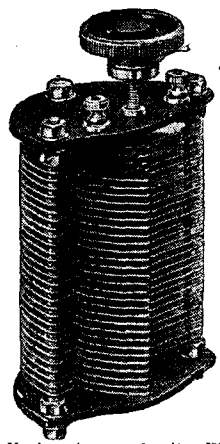
THE BEAVER ELECTRICAL SUPPLY Co.

(Under entirely New Management and Proprietorship.)

109, REGENT STREET, LONDON, W.1.

HULLO EVERYBODY

VARIABLE CONDENSERS



COMPLETELY ASSEMBLED WITH EBONITE ENDS AS SHOWN IN SKETCH.

		ASSEMBLED BUT WITHOUT EBONITE ENDS.	
·001	8/-	·001	6/6
·00075	6/9	·00075	5/6
·0005	5/11	·0005	4/6
·0003	4/11	·0003	3/6
·0002	3/11	·0002	2/6
·0001	3/8	·0001	2/3
Vernier	3/3	Vernier	1/9

Pair of ebonite drilled ends to fit yourself on above 1/- extra.

NOT A BAG OF PARTS.

NOTE. — Postal Charges 9d. per set, otherwise not executed. To callers 1d. in the 1/- discount off condensers.

Variometer on ebonite, W. 250/750 metres, internally wound. Very fine. Sell at sight, 17/11.
Fixed Condensers (from .0002 to .006), 9d., 10d., 1/-, 1/6.
Ebonite Dials (with knob 0-180), 1/4 and 1/6.
Turned Ebonite Valve Holders, 8 nuts, 1/-.
Fil. Resistance, 1/8, 1/10, 2/3.
Fil. Resistance, 7 ohms, 3/6.
French "R" Valves, 9/6.
Moulded Valve Holders, with nuts, 9d.
Perikon Crystal Detectors, glass, 2 crystals, 1/4, 1/6 and 2/8.
Glass Dustproof high-class Detector (whisker), 3/-.
Contact Studs and Nuts, doz. 4½d.
Valve Pins, doz. 7d.
2 B.A. Nuts, 3 doz. 7d., 1/10 gross.
4, 5, 6 B.A. Nuts, 3 doz. 6d., 1/6 gross.
Terminals, special offer with nut, 4 for 3½d.
Valve Legs and Nuts, 1d. each, 9d. doz.
Valve Legs with shoulder, 2 for 2½d., 1/- doz.
Switch Arms, very good, 8d., 10d., 1/3.
Twin Flex, 4 yds. 7d., 12 yds. 1/7½.
Genuine (Shaw's) Hertzite, 9d., 1/-, 1/3, 1/6, according to size.
100,000 ohm Resistance, 2/3.
T.M.C. 'Phones, 4,000 ohms, B.B.C., 22/6.
Grid Leak & Condenser, .0003, 2/-.
Coil Holders, 3-way, on ebonite, 6/- and 6/6.
2-way Coil Holders, good value, 5/-, 5/6.
15 v. H.T. Batteries, 2 plugs, 2/6.
30 v. H.T. Batteries, 2 plugs, 4/6.
36 v. H.T. Batteries, 2 plugs, 4/9.
100 feet 7/22 Aerial wire, 4 Insulators, the lot, 2/6. No post orders.
Real Ebonite Knobs, 2 B.A. Bush, 3d.

Please note that a special discount 1d. in the 1/- is given off many articles in the windows where not marked NETT. This must save you a large sum, as in any case profits are reduced to a minimum.

Marconi R Valves, latest type, 45-60 v., 14/11.
Brunet 4,000 ohm genuine 1st quality Headphones, 17/11.
N. & K. 6,000 ohm Headphones, extra loud, 15/11.
H.T. Batteries, 2 Wander plugs, 66 volt, 8/6.
H.T. Batteries, 2 Wander plugs, 60 volt, 8/-.
Aerial Wire, 7/22 per 100 feet, 2/3½ and 2/1½. No post orders.
Rotax Accumulators, 4 v. 40 amp., 15/6.
'Phone Cords, double, extra long, 10d.
5-1 Intervalve L.F. Transformers, 11/6.
Wound Coils, 6 x 3, Turns 180, W.L. 1,100, 1/6.
Wound Coils, 12 x 4, Turns 400, W.L. 3,800, 2/6.
Variometers, very good value, 250/750, 3/5.
Crystal Detectors (whisker), extra value, 1/1 and 1/3.
Large Telephone Terminals, 2 B.A., with nut and washer, 2 for 3½d.
Terminals, all kinds, with nuts and washers, 4 for 6d.
Basket Coils (6 in set), up to 3,000 metres, well made and efficient, 2/6.
1 Switch Arm, 12 Contact studs and nuts, the lot 1/-.
Sleeving, takes 18-gauge wire, 3 yards for 1/-.
Insulating Hooks, 3 for 3½d., 1/- doz.
D.P.D.T. Switch, compact, high-class article, 2/3½.
4 yards Copper 18-gauge connecting wire, 2d.
6 yards Bell Wire, 2½d.
6 yards Bell Wire, D.C.C., I.R., 3½d.
Radio Instruments, Ltd., L.F. Intervalve, 25/-.
6 v. 60 a. Accumulators, extra bargain, 30/-.

SPECIAL PRICES RADIO CLUBS AND TRADE.

IN STOCK. — Mullard Ora, Cossor, Ediswan Valves, and Crystals of every description.

Everything you want for your set.

We want your business by post, but MUST have postal charges as follows: Up to 10/- 2d. in the 1/- (or any part); Up to 20/- 1½d. in the 1/- (or any part) Over 20/- carriage paid (Condensers excluded). Foreign orders must include 3d. in every shilling, or part of a shilling, extra on list prices. Over £5, FREE.

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Open 9-8. Saturdays 9-6. Sundays 11-2. *'Phone: Gerrard* 4637.

CORRESPONDENCE.

(*Continued from page* 938.)

A HUMAN AERIAL.

The Editor, POPULAR WIRELESS.

DEAR SIR,—During the past week I have been experimenting with various types of aerials, and had been getting quite good results on a one-valve set, using quite primitive aerials. On July 19th I was listening to 2 L O on a crystal set, using a normal outside aerial, and tried to get results by using my body as an aerial. Wetting my fingers I pinched the aerial terminal, and by increasing the inductance about 75 per cent faint signals were received from 2 L O. The music was clear, and by straining my ears I could just manage to read or understand the announcing, etc.

I am seven miles from 2 L O, and my set is installed on the ground floor, thereby obtaining no height. I would be pleased if you would publish this letter in your valuable paper.

I am,
Yours sincerely,
A. N. S.

Wimbledon Park.

DAMAGED BY LIGHTNING.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to your article re lightning a few weeks ago in POPULAR WIRELESS.

A friend of mine living near here was accustomed to earth his aerial inside his house with a piece of 24 S.W.G. enamelled wire. On the morning after the storm this wire was fused and the woodwork round the earth lead slightly scorched. Considerable current must have passed to have fused wire of this size.

His aerial is mounted on two poles 12 ft. in length and mounted on the roof. The wire is about 3 ft. above the ridge, a total height from the ground of about 52 ft.

My own aerial is 30 ft. in height and 55 ft. long and is earthed by a switch, inside the window, having a separate direct lead to a buried earth plate. The ground is always damp. On the night of the storm I noticed for a short time a bluish glow around the mast head.

My aerial, etc., suffered no damage whatever.

Trusting these few particulars are what you require.—I am, yours faithfully,
W. H. CLARKE.

TRADE MARKS AND WIRELESS.

The Editor, POPULAR WIRELESS.

Dear Sir,—Re Trade Marks for Gramophones, etc., and Wireless. In view of the fact that many owners of trade marks for sound-reproducing instruments, *e.g.*, gramophones, are now dealing in wireless apparatus, it may be useful to them to learn that it is not safe for them to assume that they are justified in excusing themselves from applying for registration in respect of wireless apparatus (if they wish to be protected for such apparatus) merely because they are registered in respect of sound-reproducing instruments.

It may, however, be stated that official objection is taken to an application for registration of a trade mark for wireless apparatus if a similar mark is already on the official records for sound-reproducing instruments.—Yours faithfully,
H. T. P. GEE.
(Patent and Trade Mark Agent.)

RECENT WIRELESS INVENTIONS.

The following abstracts are specially contributed by Mr. Harold J. C. Forrester, Fellow of the Chartered Institute of Patent Agents, 88-90, Chancery Lane, W.C.2.

Grant of the following patents can be opposed and printed copies of the full specifications obtained.

198,552. — J. ROBINSON, H. L. CROWTHER, & W. H. DERRIMAN.—AERIALS. — For directional transmission only vertical portions of the antennæ are used, the idea being that radiations from horizontal portions produce errors due to reflection in the upper atmosphere. Two aerials having horizontal and vertical portions may be employed, the horizontal portions lying parallel and close together, and thus mutually neutralising, and the vertical portions being placed as far as possible apart, the aerial then being practically H-shaped.

198,589. — A. W. KNIGHT. — INDUCTANCES.—Three flat circular coils are mounted upon ebonite stands, the centre one of which is fixed, the other ones being attached to a rod passing through the fixed stand and to a concentric sleeve respectively. The stands are adjusted by means of knobs upon the ends of the rod and the sleeve, and are pressed together by a spring which presses the sleeve and rod in opposite directions.

198,636.—CAPITOL PHONOLIER CORP.—RECEIVERS.—A receiving set is incorporated in an ornamental table-lamp. The hollow base forms an inverted loud-speaker horn and capacity earth, and is fitted with a deflector. Umbrella and loop aerials are formed in the top and sides of the shade which is hinged for adjustment, and a fringe conceals the valves, etc., placed at the centre, and also the lamps which are supported in reflectors around the sides.

198,662.—DR. G. SEIBT.—CONDENSERS.—A variable condenser is formed from metal coatings separated by very thin sheet mica. The metal coatings are relatively movable, and at least one must be very thin. In one form, a thin bronze band presses a mica sheet against a vulcanite drum half sheathed in brass, the capacity being varied by rotating the drum which may be paraffin lubricated.

198,700.—BRITISH THOMSON-HOUSTON LTD.—VALVES.—The electrodes for low-capacity amplifying valves are arranged in a special manner, and are then sealed into the bulb so that the anode leading-in wire enters at the opposite end to the grid lead-in. The valve is ultimately clipped into supports which engage the leading-in wires.

198,757.—MARCONI'S WIRELESS TELEGRAPH CO., LTD.—VALVE GENERATORS.—Short wave oscillations are generated by a two or three electrode valve having parallel wires leading to the grid and filament, the grid lead being connected to the H.T. positive and being separated from the filament lead by a condenser. A negatively charged metal cylinder may surround the valve if only two electrodes are used, and the wave-length generated is adjusted by altering the length of the parallel leads.

R/R

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