

THE "P.W." SET: FULL WIRING DIAGRAM.

Popular Wireless

PRICE 3d.

No. 63. Vol. III.

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

August 11th, 1923.



THE "P.W." COMBINATION SET.

Some of the Technical Staff receiving 2 L O on the "P.W." Combination Set, using a frame aerial on the roof of "Popular Wireless" offices.

FEATURES IN THIS ISSUE.

Grading Signal Strength.

Notes on 5 W A.

Inexpensive Tool Kits.

Summertime Wireless (Part III).

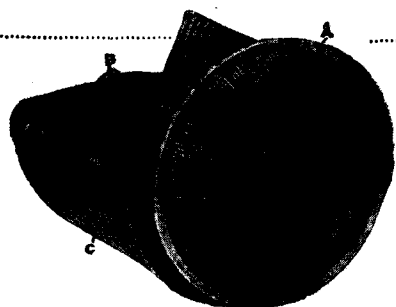
Outline of the Neutrodyne.

Changing and Repairing 'Phone Cords.

Practical Ideas for the Amateur.

Windows: from a Leading-In Point of View.

OUR IMPROVED



Complete in every respect, and exactly as illustrated, to the following specification.

Rotary, Air Dielectric, 22 Gauge Aluminium Vanes, Metal to Metal Adjustable Bearings. Spacing between plates sufficient for pressure up to 1,000 volts. Engraved Ebonite Dial. Is suitable for mounting on any panel up to 1/2" thick by drilling 3 holes. Supplied with screws for fixing.

Plates	PRICES:	
57	.. .001	10/-
29	.. .0005	8/6
19	.. .0003	6/9
13	.. .0002	5/6

Postage and Packing:
1, 1/-; 2, 1/3; 3, 1/6.

If more than 3, kindly include ample for packing and carriage.

Most Dealers stock these. If unable to obtain locally, buy direct from us.

Don't allow our low prices to prejudice you. They are no criterion whatever of the value we offer. Our motto is QUALITY FIRST, and every Condenser carries our money-back guarantee.

REPUTATION
Your Condenser is not a "FALLON" unless the name "FALLON" appears on same.

type A II CONDENSER

—for Panel Mounting—

—is unsurpassed for workmanship, quality of materials employed, efficiency and PRICE, which, by the way, has NOT been INCREASED.

TESTIMONIAL—ONE OF HUNDREDS:—

Dear Sir,—The three .0005 Condensers you supplied me with recently are excellent, and equal to some I paid 35/- for. I have never seen better value for money, and I have been an experimenter for years.

The points of excellence are—
(1) Connection to moving plates, although frictional, gives no trouble whatever as in many Condensers.
(2) Both connections made by nuts and NO loose wire hanging from the moving plate connection as in the case of some, this wire frequently breaking.
(3) Absolute rigidity.
(4) Completeness (supplied with dial, etc.).
(5) LAST—but not least—PRICE.

This letter is entirely unsolicited, and you can make any use you like of it and my name.

Yours truly, A. E. D. KENNARD,
Wireless Officer in France and Instructor at R.A.F. School of Wireless during the War.

ALL ORIGINALS CAN BE INSPECTED.

WARNING!

Don't buy shoddy sets of Condenser parts which are well-nigh impossible of assembly, or half assembled Condensers, which are merely thrown together. BUY OURS. We specialise in Condensers. Complete in every respect and exactly as illustrated.

FALLONS

Prompt Delivery.

THE CONDENSER PEOPLE,

Cash with Order.

230a, HERMITAGE ROAD, LONDON, N.4.

Finsbury Park, near the Manor House.

Agents: London, W.C.2: Vanstones, Ltd., 61, Chandos St., Cardiff & District: Western Radio Co., 52, Bedford St., Cardiff.
FALLON CONDENSER MFG. CO., LTD., Makers of half the World's Variable Condensers

HULLO!!! C.Q. WILL DAY CALLING

attention to some New Lines which cannot fail to be of interest to all Experimenters with New Circuits.

AMERICAN INTERVALVE TRANSFORMER. Perfect in its action, complete Metal Shrouding, tested to 1,000 volts, ratio 4 1/2 to 1. Price 22/6 each

A NEW TYPE OF VERNIER RHEOSTAT. 10 ohms resistance; instantly switched off or on Price 4/- "

VARIABLE GRID LEAK. 0.5 megohms, with Detachable Condenser, any Stock Capacity Price 7/6 "

CARTRIDGE RESISTANCE. Guaranteed Constant Capacity 100,000 ohms, 75,000 ohms, 50,000 ohms Price 2/6 "

All parts in stock for the S.T. 100, Flewelling, and Neutrodyne Circuits.

These are only a few of the new lines we have to offer. We are shortly receiving a supply of the latest American Wireless Novelties, so do not fail to give us a call.

SHEET EBONITE. Grade A, cut to any size. Every requisite in Stock for Wireless. **TRADE SUPPLIED.**

Write for our New Catalogue. Now ready. Postage on all goods extra.

Try the NEW "DAYZITE" Regd. The Super Marvel Crystal with Silver Detector Point, 2/6 each, or mounted in Brass Cup, 2/10, postage 3d. extra.

WILL DAY, LTD.,

19, Lisle St., Leicester Sq., London, W.C.2

Phone: Regent 4577. Telegrams: Titles, Westrand, London.

YOU CAN "LISTEN-IN" WITHOUT ERECTING AN AERIAL by fitting to your Electric Bell-Push

The "BELRADIO" Adaptor

(Patent Appn. 10208.)

Can be fixed instantly and used in any room where electric bells are fitted. No current used. No condenser required. Does not interfere with use of bells. Of special service to occupants of flats

PRICE 2/6 EACH

In box with full directions

JOHN MACLENNAN & CO.,

115, Newgate St., London, E.C.1. 166, Ingram St., Glasgow.

TRADE ENQUIRIES INVITED

SPECIFICATION.
Set comprises solid best ebonite drilled detector panel, wound induction coil, tuning slider, screw clamp crystal cup, best quality crystal, universally jointed detector, giving accurate and easy adjustment, terminals, screws, and all parts for assembling by our patent method.

The "BROWNIE WIRELESS" CRYSTAL RECEIVER.
7/6 COMPLETE. BY POST 8/6

Contains every part necessary for simple erection. A Scientific Achievement. Guaranteed equal to sets costing many times the price. Full and complete instructions enclosed with each outfit. London make. Money returned if not as advertised.

Read what "POPULAR WIRELESS," June 23, says: "This little set, which retails at 7s. 6d., is worth every penny of that sum. I connected it to quite an ordinary aerial 12 miles away from 2 L.O. and the reception was excellent—quite as good as that obtainable with another and much more expensive receiver."

Send postcard for folder "The Brownie Wireless and all about it."

The J. W. B. WIRELESS COMPANY,
19, GARRICK STREET, LONDON, W.C.2.
(When writing mention "Popular Wireless.") (First Floor.)



POPULAR WIRELESS

August 11th, 1923.

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

[Every Friday.

TOPICAL NOTES AND NEWS.

Short and Sweet.

THE other day an amateur made formal demand at a Post Office for a copy of a form of application for a licence for the reception of broadcast matter. This was the written reply he received on the back of his note: "There is no W.T. licence application form. Go to the P.O. nearest the address of W.T. set. Ask for W.T. licence. Pay 10s. Walk out. Finish."

American Points of View.

DR. LEE DE FOREST, who visited Britain a few weeks ago, has now arrived back in America. Interviewed by the Press, he said he gained the impression that English newspapers were boycotting the broadcasting of news items and that members of the British theatrical and musical professions were opposed to wireless broadcasting. Mr. C. Rypinski, chairman of the Associated Manufacturers of Electrical supplies, who also lectured recently in this country, has stated on his return to America that in his opinion the British public have been quick to take up broadcasting, and that he was very impressed with the unified control over broadcasting vested in the B.B.C.

D.F. Station.

A WIRELESS direction-finding station will shortly be established by the Federal Government on the West Coast of Vancouver Island for the benefit of shipping. The latest type of apparatus, on the aperiodic aerial system, will be installed.

Ex-Service Men.

THE other Saturday evening Sir Montague Barlow, Minister of Labour, made an appeal by wireless for a final effort to find jobs for the last 6,000 or 7,000 ex-officers and men still unemployed.

Wireless for Mountaineers.

THE installation of a wireless service between huts in the Alps and the valleys is expected in the near future for the benefit of climbers.

"The Cares that Infest—"

I QUITE appreciate what a certain amateur said about 2 LO's "last words" on a recent Sunday evening. The humorous side does strike the "ten-watter" rather forcibly sometimes, but it is rather a fitting ending from the point of view of the average listener-in.

Dull Emitters Cheaper.

A MATEURS residing in country districts, or those intending to make portable sets, will welcome the news that dull emitter valves are to be reduced in price. From August 1st the price of Mullard Ora dull emitters (L. F. Ora B, and L. F. Ora C) is to be £1 7s. 6d., a very useful reduction,

Long Distances.

FROM all reports 2 O M appears to be shaking the Denmark ether fairly violently, being audible at one place on a two-valve set. At Versailles he is easily understood on one valve only. Well, he deserves all his success, for 2 O M is one of the hardest working of all the amateurs, and that's saying a lot.

Highway Aerials.

IN connection with the proposal of the Sheffield Corporation to levy an initial fee of 21s. with an annual fee of 5s. for wireless aerials crossing highways, the local amateurs are protesting, and state that only a nominal amount should be charged.

Collapsible Loud Speaker.

A NOVELTY in loud speakers has been designed by Professor Low, who has invented a collapsible loud speaker horn. The trumpet, in spite of its metal composition, does not "ring," and the system, on the collapsible drinking cup principle, makes a very convenient portable loud speaker.

Relay Wireless.

A BOUT four million potential listeners-in will be catered for by the suggested scheme of the B.B.C. which is to erect eleven wireless relay stations for retransmitting the programmes of the main stations.

WHAT OUR VISITORS THINK.

HERE are the names and addresses of some of the gentlemen who witnessed a demonstration of the "P.W." Combination Set at our offices on Monday, July 30th, together with their candid opinions of the receiver. The demonstrations held daily between 12.0 and 12.30 are quite informal, and those attending can handle the set and closely inspect the internal lay-out and wiring.

M. D. Harding, 4, Hillside Rd., S.W.2: "One of the best reflex circuits I have tried." G. Wilson, 45, Bartholomew Rd., S.W.: "Perfect set." I. W. Ireland, 11, Florence Rd., Wimbledon, S.W.19: "Good set. Intentions of making." S. E. Honnor, 61, Court Hill Rd., S.E.13: "Appears to be worth making up. Intend to do so immediately." J. R. J. Learson (Vice-Chairman Walthamstow Radio Soc.), 98, Grove Rd., Walthamstow: "Best Dual Circuit I have heard." F. D. Woodman, 3, Rowantree Rd., Enfield: "Very good indeed." G. W. Humphrey, 170, Blomfield Terrace, W.2: "Excellent." S. G. Stephenson, 2, Park View Rd., Addiscombe, Croydon: "Seems excellent." Edward Welshe, 1, Moy Mall, Merrion, Dublin: "Very good." A. K. Kirk, 54, Kingbridge Avenue, S.W.16: "Excellent."

In every case attention was drawn to the fact that no trouble can arise from "self oscillation," and the fact that even capacity effects are imperceptible called for some considerable comment. In these days of "stunt" circuits, a receiver capable of "super" results without verging all the time on the point of "howling" is worth the attention of every amateur in the country.

That the original model built by the Technical Staff of POPULAR WIRELESS is open to public inspection should go a long way towards convincing doubtful readers that here is a set that will really work, and is not merely something worked out on paper by an "expert" for enthusiastic amateurs to discover whether or not satisfactory results are possible. This offer will close on Wednesday, August 15th.

THE EDITOR.

and one that will meet with a ready response. The "P.W." Combination Set with a dull emitter valve provides a very efficient and handy portable receiver.

"2 O M"

I WONDER what will be the end of 2 O M—as a transmitter of wireless telephony, I mean. He seems to have thoroughly imbibed the doctrines of M. Coué, and even infused them into his apparatus, for he assuredly gets "better and better." Not content with carrying out tests with Glasgow, he has been busy disturbing the ether of Versailles and even of Denmark.

P.M.G. and the Scheme.

THIS scheme is subject to the company obtaining permission from the Post Office, and getting the necessary extension of the wave band allotted to them. The scheme includes stations for Plymouth, Liverpool, Sheffield, Leeds, Bristol, Hull, Bradford, Wokingham, Portsmouth, Stoke-on-Trent, Leicester, and Edinburgh.

Interesting Figures.

THE approximate figures of the population served by the main broadcasting stations in existence or contemplated

(Continued on page 882.)

NOTES AND NEWS.

(Continued from page 881.)

are: London, 10,000,000; Manchester, 7,000,000; Birmingham, 4,000,000; Cardiff, 2,700,000; Newcastle, 2,600,000; Bournemouth, 700,000; Glasgow, 2,000,000; Aberdeen, 500,000; a total of 29,500,000.

The Sheffield Station.

IF the Sheffield station proves a success the B.B.C. intend that three-quarters of that station's programmes shall be items relayed from the nearest broadcasting centre, one-eighth from London, the remainder to be transmitted straight from the station on 350 meters.

Future Items from 2 L O.

FRIDAY, AUGUST 10TH. 7.15 p.m.—Mr. G. A. Atkinson, on "Cinema Criticism." 9 p.m.—Mr. Mark Allerton on "Serial Stories."

SATURDAY, AUGUST 11TH. 9 p.m.—Lt. Col. E. Gold; on "Weather Forecasting."

MONDAY, AUGUST 13TH. 9 p.m.—Mr. B. Rackham, on the Victoria and Albert Museum.

TUESDAY, AUGUST 14TH. 9 p.m.—Prof. Lefroy, on "Insects, and the World's Cloth."

WEDNESDAY, AUGUST 15TH. 7.15 p.m.—Mr. Archibald Haddon, on "Dramatic Criticism."

A Novel Evening.

AN impromptu concert given a short time ago by the Uncles of 5 N O created great amusement, and letters poured in which the next day vouched for the complete success of the venture. With all the talent available at 2 L O such an evening should prove an interesting feature if adopted by that station.

Forthcoming Events from 5 N O.

Monday, August 13th, dance-music by the Wireless Orchestra.

Tuesday, August 14th, Miss Winifred Fisher, the well-known soprano, and Mr. Lyell Johnston, bass.

On the 15th, the first and second act of "Faust," with chorus and orchestration, with Miss Beatrice Miranda of the British National Opera Company, and Mr. Williams Mitchell taking the leading parts.

On the 17th, the band of the Irish Guards.

Glasgow.

THE British National Opera Company will pay a visit to 5 S C about the end of August. William Anderson and Beatrice Miranda will be included in the cast. The former, by the way, is making the "P.W." Set—so he told me the other day.

Mr. Carruthers, the 5 S C director, is making arrangements with a local producer for the broadcasting of Shakespearean plays.

Manchester.

THE first night of Shakespeare at 2 Z Y was quite good, but at times the voices of the actors were not quite loud enough. We must not be too critical, however, in respect of the first night, as there was every indication that, with a little more experience, 2 Z Y will soon be almost beyond criticism.

Mr. Herman Darewski.

AN interesting concert was given at Newcastle recently by Mr. Herman Darewski and members of his company. Later, Mr. Darewski gave a talk upon writing a popular song.

Wireless in the Desert.

ONE of our visitors who came to see the "P.W." Combination Set states he is going to make this receiver and use it in the Sahara Desert, where he hopes to go on a tour. I do not know what he expects to hear. I asked Harry Tate what he



"Carmo," the well-known illusionist, and his two pet leopards listening-in.

thought about it, and he replied that the results depend on the "chameau d'un cylindre"—in other words, the horse-power of the camel he will be using.

New Arrangements for 2 L O.

MONDAYS will soon be devoted to popular orchestral music: Tuesdays to classical, orchestral, chamber, quartet and band music; Wednesdays to popular orchestral music; Thursdays to the re-transmission of "outside" shows—i.e., plays, concerts, etc., and the wireless orchestra; Friday will be given over to special orchestral programmes—i.e., symphony concerts, special bands conducted by various composers; Saturdays will remain "dance nights"; and Sundays will be reserved for miscellaneous items of good quality, organ recitals, etc.

Australian Wireless.

A FRIEND of mine in Australia writes that the broadcasting regulations are now awaiting ratification by the Australian Cabinet; also it is probable there will be more than one broadcasting company which will have the right to manufacture receiving apparatus, which means that you can buy wireless sets from any of the broadcasting companies and pay the same company an annual fee, thus admitting you to the reception of their transmissions.

Constructor's Licence.

IN his letters he says: "Thank heavens we are going to have a home constructor's licence." Australia has learnt a lesson from English and American methods.

The Secretary to the B.B.C.

THE secretary to the B.B.C., Major P. F. Anderson, is resigning. After a well-earned rest, he will start out on his own. Major Anderson points out that every year brings more work for the company secretary, and it is only the qualified man with heaps of experience who can cope with this particular work. The smaller companies are not able to pay the necessary salary to such a man, but a qualified man can take on a number of such companies. The major will provide staff, board-room, etc., and will have centrally situated offices.

Rather Give Notice!

THE Wandsworth Housing Committee have notified their tenants that 10/- will be charged before permission will be granted to erect an aerial. Two of the tenants have refused to pay and have given notice.

2 W Q.

A NEW experimental station will be shaking the ether somewhere around August 15th. A series of experimental telephony transmissions with power ranging from 20 to 50 watts, on 440 metres, will be given intermittently between 12.30 and 1.30 p.m., and 4.30 to 5.30, and in the evening 11 o'clock to 11.30 on weekdays, and on Sundays 11.30 to 1 o'clock. Reports on the transmissions will be gratefully received by the Midland Radiotelephone Manufacturers, Ltd., Brettell Lane Works, Stourbridge.

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 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.
			3 to 5.40 p.m.
			(Sundays.)
The Hague P C G G	1,050 "	8.40 to 9.40 p.m.
			(Mondays and Thursdays.)

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

THE "P.W." COMBINATION SET.

Built and described by the Technical Staff.

Although by now many amateurs will have satisfactorily completed the construction of this receiver, there are still one or two slight additions they may care to make, which will increase its adaptability still further without in any way impairing its external appearance, or necessitating any alterations in its existing lay out.

ALTHOUGH the construction of the two units has now been fully dealt with, there are yet two or three refinements that the ambitious amateur may wish to embody in the receiver. These additions are not essential to the efficient working of the instrument but they will be found decidedly useful and will allow the wave-length range to be extended to any desired limit.

The first item to come under consideration is a series parallel switch for the aerial circuit. A very slight modification of the wiring is necessary; reference to the diagram, Fig. 2, will make this perfectly clear. It is advisable to number the studs of the switch, at least mentally, in order to facilitate the connections. The switch itself can be mounted on the panel between the two variable condensers. In the case of the original receiver a switch on a separate base is used, although a neater job perhaps could have been made of it had the switch been constructed and mounted on similar lines to the other two change-over switches. However, this is quite a small point and one that each individual amateur will be able to solve with little trouble himself.

The Anode Coil.

Care should be taken in connecting up the series parallel switch, and the wiring should be followed point to point, and line for line in comparison with the diagram, as even the most advanced of amateurs can quite easily trip up in this quarter.

Having completed the additional switch wiring, terminals can be provided for the purpose of loading up the anode coil. Obviously this will be necessary in order to bring the anode circuit into line with any increased range introduced into the aerial tuning circuit. These two terminals can be mounted behind the valve holder and a brass strap provided to short them neatly when not required. The wiring is simplicity itself. One of the leads going to the anode coil, it doesn't much matter which, is broken, and each end taken to one of the terminals. Thus, when the shorting strap is removed any coil connected to these terminals will be placed directly in series with the anode coil.

Will Not "Howl."

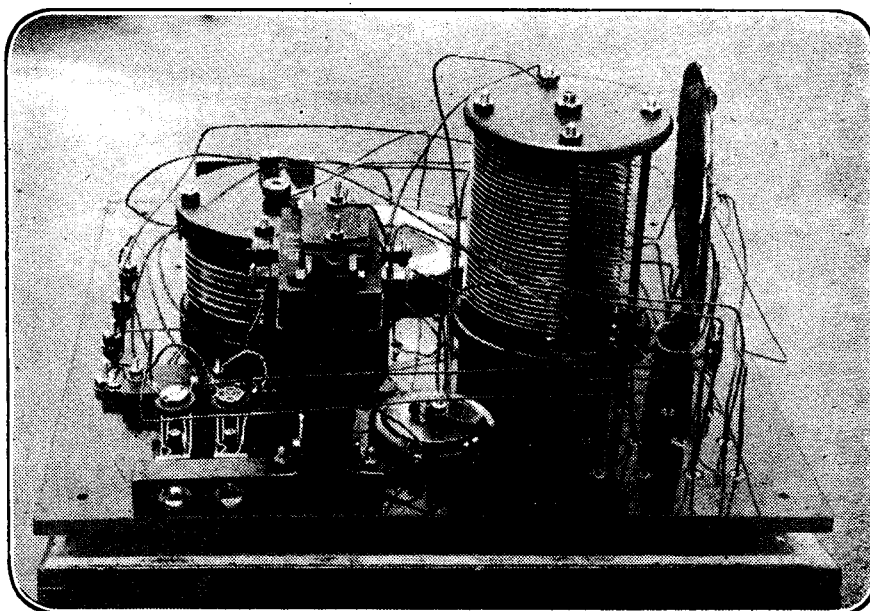
A third addition is the fixed condenser and small tumbler switch, the mounting of which is very clearly shown in the photographs. When the switch is closed the fixed condenser is brought into circuit in parallel with the '0002 mfd. variable condenser. This fixed condenser is only necessary for the longest ranges of wave-lengths. In order that the value of even this fixed condenser could be varied with a minimum of delay should it be found to be necessary, the "Grelco" type, which consists of two knife clips and removable plug-in condensers, was employed.

With the above three additions it is possible to bring the wave-length range

up to any point desired. The inductance loading of the aerial circuit is carried out merely by placing suitable coils in series with the aerial terminal of the set and the aerial lead-in. The set can now be reckoned to have reached the 100 per cent. mark of adaptability, and it is difficult to conceive anything more extraordinary than the fact

that its design is such that even with these additions not the slightest tendency to "howl" is evinced. It must not be considered a matter of luck, however, that this is the case, as any serious diversion from the essential values of the circuit or the lay out will very quickly prove. A con-

(Continued on page 884.)



The interior "lay-out" and wiring can be very easily followed by comparing this photograph with the wiring diagram that appears below.

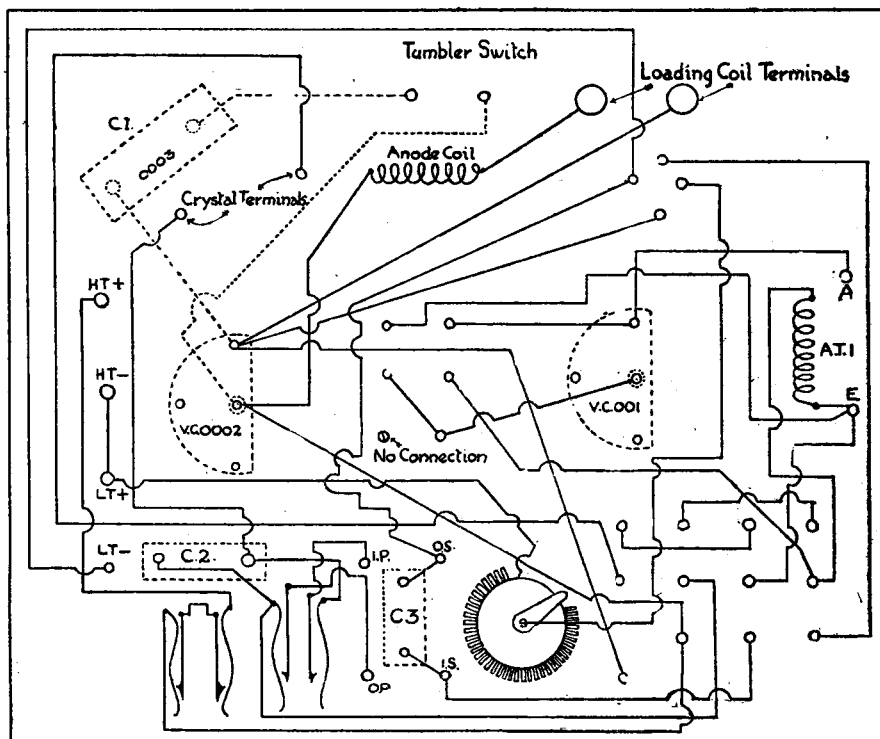


Fig. 1. The full diagram of connections, showing in dotted lines the wiring of the additional anode condenser.

NOTES ON 5 W A.

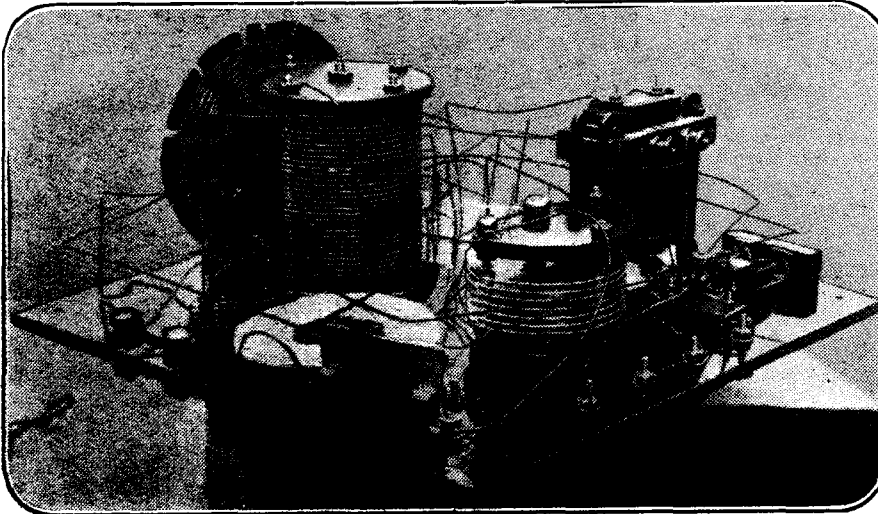
By "KYM-RADIO."

"A POLICEMAN'S lot," as W. S. Gilbert once remarked, "is not a happy one." We should like to know what that witty author would have to say concerning the lot of a broadcasting station director. The archangel Gabriel would be sorely tried in such a post. But in spite of little ups and downs the Cardiff station is extremely successful.

On Monday, July 23rd, 5 W A gave us as joyous an evening as one could wish. Everyone was in great form with merry quips; Mike, the station cat, mewed his wireless greetings (we suspect a pinching of his tail); Mr. Price submitted to an orgy of leg-pulling; Mr. Corbett-Smith gave us Chevalier songs and sketches; the orchestra played the dance music with the abandon of Viennese; and after a warm tribute by the station director to the hard work and loyalty of Mr. W. N. Settle, the deputy director, and the staff, the evening ended with "Auld Lang Syne," echoed, we are sure, in thousands of homes.

Of recent happenings an all-British orchestral night gave us much pleasure, especially as it included a performance

of Edward German's "Welsh Rhapsody." We are content to balance that against the somewhat dull performances of Shakespeare's "Falstaff." The intention of these was worthy of all praise: but, as Dr. Johnson remarked, "Sir, I have no patience with a man who *means* well." On the other hand, "Paola and Francesca" proved a veritable triumph for all concerned. It was admirably produced, and Miss Haidée Gunn, most distinguished of Shakespearean actresses after our beloved Ellen Terry, came down to play Lucrezia.



Another view of the interior of the "P.W." Combination Set. The additional anode condenser can be seen in the immediate background.

THE "P.W." COMBINATION SET.

(Continued from page 883.)

siderable amount of time was spent in solving the problem of obtaining a "silent" circuit, and amateurs undertaking the construction of the units will be well advised to strictly adhere to the instructions laid down in the first four sections of the article.

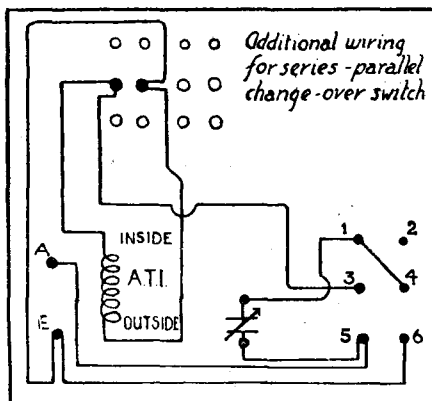


Fig. 2.

Probably it will be noticed that the photographs show the inclusion of an R.I. low-frequency transformer. Due credit must be paid to the manufacturers of this instrument inasmuch as when the transformer, the construction of which was detailed in a previous issue, was taken out and the present one put in its place, a decided increase in signal strength was noticeable, fully justifying the additional expense involved in purchasing this component.

No doubt quite a number of amateurs not in possession of lathes or suitable winding machines will prefer this course to that of tediously winding a transformer by hand, and in this case the R.I. type is to be strongly recommended.

In conclusion it is to be hoped that the constructional details have been found sufficiently clear to permit the reader to carry out the construction of the set without

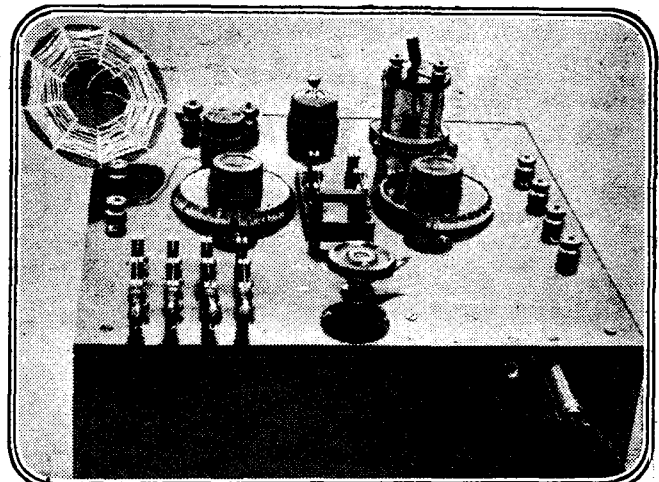
Her reading of this, the finest part in the drama, together with her exquisitely beautiful voice, came as a revelation to us all and gave us great pleasure. There are rumours that we are soon to welcome Miss Gunn once again in some Irish plays. Headphones will be at a heavy premium that evening.

High Praise.

A Sunday or so ago we had another Wagner night, with the "Siegfried Idyll," the Preludes to "Parsifal" and "The Mastersingers," and Mr. John Perry, the well-known Wagnerian tenor. On August 5th the series of Beethoven symphonies were continued with No. 2, and the "Egmont" overture.

Incidentally, the constant performance of such worthy music is having a marked effect throughout South Wales and the West Country. A distinguished Bristol musician, writing to the station director, has summed it up in the words, "Speaking soberly, I consider that, at the present time, you are the greatest musical force in Wales, and you should be very proud of your work." The remark is borne out by the ever-increasing number of letters received at the station with appreciative comments and request items of genuine merit. The "popular" requests are as steadily decreasing.

difficulty, but should any reader find himself unable to grasp any little detail the technical staff will be only too pleased to help him out. All letters in respect of the POPULAR WIRELESS Combination Set should be addressed to the Queries Dept. in accordance with the instructions given on the Radiatorial page of this issue.



Unit One, showing a loading anode coil. The switches and plug are in the "dual" position.

INEXPENSIVE TOOL KITS FOR THE WIRELESS AMATEUR.

By RADIOGRAPH.

ONE of the most attractive features connected with the construction of wireless apparatus as a hobby is that wonderful results can be obtained by the aid of a few simple hand tools, provided that these are carefully selected and properly used, and whilst most of us aspire to the possession of a full-grown workshop, we do not intend to delay our experimental researches until our ambitions are realised. Wireless amateurs are drawn from all occupations and therefore many are somewhat handicapped when about to select the tools and equipment they require to enable

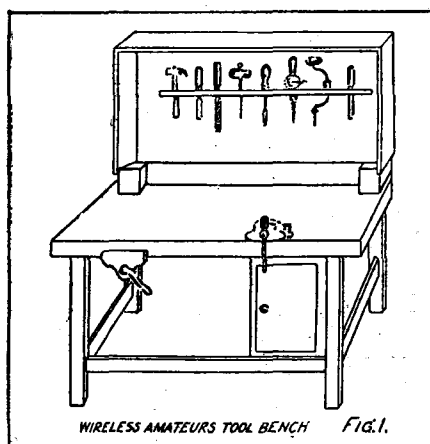
bench illustrated in Fig. 1, which can be purchased ready for use or constructed by the amateur himself if he happens to be skilled in the use of woodworking tools. When the lid containing the tool rack is closed down, the bench can be used as an ordinary table, and may even replace the kitchen table used in small houses, a fact that will possibly induce Mrs. Wireless Amateur to allow it the necessary space in her kitchen. The cupboard beneath the bench can be used for storing parts of work in progress, stores and accessories, whilst by fitting an aerial and earth terminal the bench can be used for the support of instruments undergoing tests. A woodworking vice, fitted in the position indicated, is a very valuable addition, and a small detachable metal vice of the kind to be described later should be regarded as indispensable. The great advantage such a bench possesses is that it enables one to clear up at the end of an evening's work leaving everything in order, and ready for the next evening's efforts, at the same time offering no real obstruction to the busiest housewife who graciously allows the kitchen or back room to be used as a temporary workshop.

Use of Callipers.

The Selection of Suitable Tools and Measuring Instruments.—First let me point out that you will need a circular wire gauge and an adjustable calliper gauge, which serves as a rule, inside callipers and outside callipers. The micrometer mentioned in connection with purchasing parts is more useful to amateurs who use a lathe, and whose needs will be discussed later. In addition to the rule on the calliper gauge, a 6 in. steel rule marked off in $\frac{1}{16}$ in. at one end and a good boxwood rule of the 2 ft. folding type will be required, and above all the amateur should accustom himself to

a more ambitious programme will require other measuring instruments, but for the time being we will confine our selection to such as the indoor amateur will require.

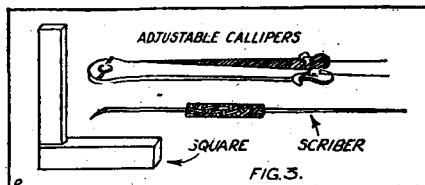
Tools for Cutting Metal Sheet.—Those who have endeavoured to cut sheet metal with an ordinary hack saw find that they have discovered a very quick method of ridding the blade of its teeth, and if the process is persisted in the tool bill for cutting a small piece of metal sheet may amount to far more than the metal is worth. Shears are the



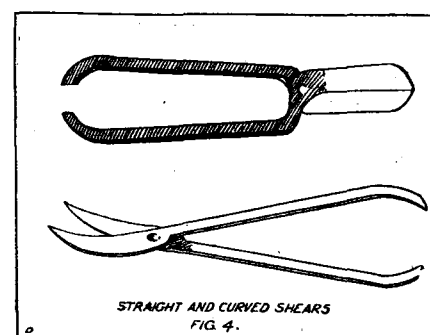
them to produce receiving sets, and so I am offering a few suggestions on this subject in the hope of assisting those of my brother amateurs to whom such may appeal. Sometimes our excursions into the realms of scientific research would be regarded less unfavourably by the goddess who presides over the kitchen or back room which has to be converted into a temporary laboratory, if our efforts were not accompanied by such a dreadful mess. The best way to avoid adverse criticism of this kind is to arrange our tool equipment in an orderly fashion, which in addition will save an enormous amount of our precious leisure hours and enable us to produce better results all round.

A Neat Arrangement.

The Wireless Amateur's Tool Bench.—For amateurs who have to conduct their operations in some part of the house, there is nothing better than the kind of tool



working to very accurate measurements from the start. A great deal of time and trouble can be saved in marking off condenser, variometer and other scales, the position of switch studs, and the like by the use of the form of protractor shown in Fig. 2, which can be purchased at any tool store for about 4s. In Fig. 3 a selection of other useful tools is shown, consisting of a square, a scriber, and pair of adjustable callipers. The latter can be used for inside and outside measurements, by replacing the ends a set of which is provided. Separate ends, can also be fitted so that the instrument can be employed for marking off work as dividers or odd legs. Those who undertake



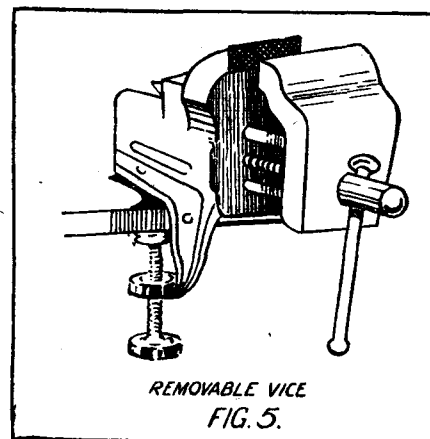
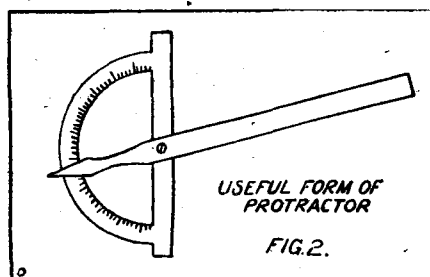
proper tools to use for the purpose, for if carefully operated they will cut the metal straight and clean, in a fraction of the time taken by the saw and without chance of injury to the implement.

Essential Tools.

Two kinds of shears are recommended, these being shown in Fig. 4 having straight and curved blades respectively. They need not be too large, and if both pairs are about 8 in. in length they will be found suitable for any job we are likely to encounter, the prices for these tools are about 1s 5d. and 2s. 1d. Whilst considering the purchase of shears we should not forget to buy a strong pair of ordinary scissors of convenient size, as these will be continually required.

There are a good many inferior vices on the market which should be carefully

(Continued on page 886.)



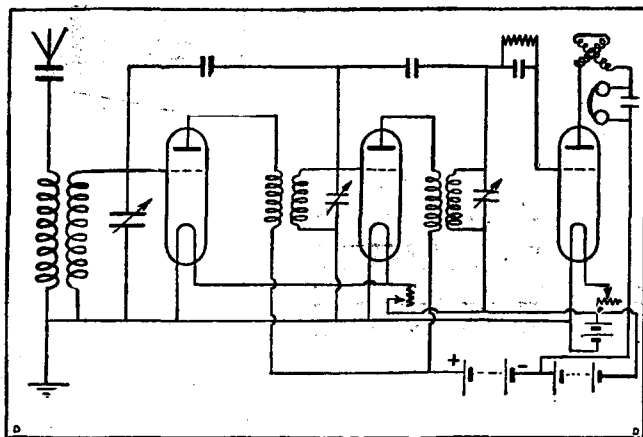
OUTLINE OF THE NEUTRODYNE RECEIVER.

Briefly describing a new circuit designed with a view to permitting stable H.F. circuits to be employed.

ONE of the greatest problems confronting the designer of high-frequency amplifying units is the elimination of oscillatory effects which are set up in the receiver circuits owing to the action of either valve self capacity or transformer coupling. The neutrodyne receiver is the outcome of experiments which have been conducted with a view to overcoming the difficulty, and the research has been attended with a great deal of success.

Stabilising Condensers.

The circuits of the neutrodyne receiver are shown in the theoretical diagram,



and it will be observed that the wiring is similar to that employed for the ordinary type of high-frequency amplifier, but possesses in addition two very small capacities between the grids of the various valves.

These capacities are shown in the diagram as two small fixed condensers, although in the actual circuit under con-

sideration they consisted of two pieces of insulated wire, each wire passing through a small brass tube.

It will thus be realised that the resultant capacities are very small—they should equal about one quarter of the capacity of the valve—and that the components referred to actually constitute two small capacities in series.

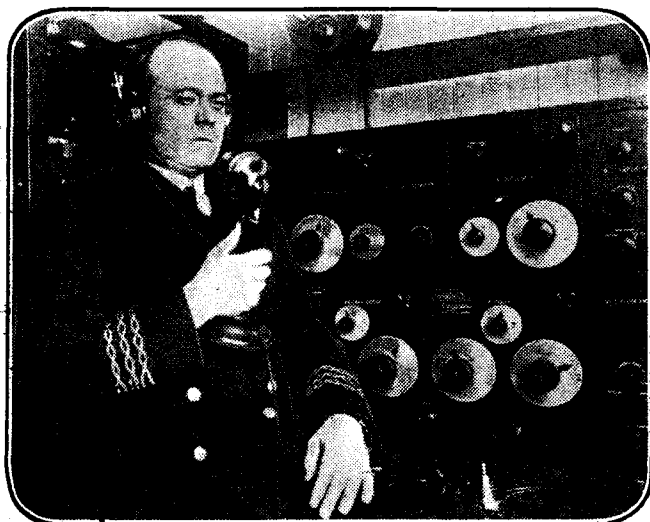
Their adjustment, which is somewhat of a delicate operation, will vary according to the type of valve used and should be found by actual test. The chief claim for this design of receiver is that the internal capacity of the valve is "neutralised," and that, therefore, any tendency of one stage of amplification to react on to another is prevented.

of the coupler, an additional coil was wound over the secondary winding and earthed, thus preventing energy from passing to the secondary from the primary through the capacity between the windings. If several stages of amplification are employed, each stage should be shielded to prevent the effect of magnetic reaction.

The introduction of a variometer or a tuned coil into the plate circuit of the detector valve will increase the amount of amplification, but such regeneration will be found to give the best results on low wavelengths round about two hundred metres.

Interference Eliminated.

It should be understood that owing to the properties of the circuit the inclusion of reaction will not energise the aerial, the oscillations being confined to the detector circuit. It will thus be seen that continuous wave reception is possible with this receiver without jamming other receiving stations in the locality, the heterodyning action being confined to the detector circuit without energy being conveyed to the high-frequency amplifying circuit and thus to the aerial.



The Chief Wireless Officer operating the radio equipment of the gigantic American liner S.S. "Leviathan."

INEXPENSIVE TOOL KITS FOR THE WIRELESS AMATEUR.

(Continued from page 885.)

avoided, for as the vice is required more frequently and more continuously than any other tool, nothing but the best is good enough. We have to remember, too, that our vice must be readily detachable from its fixture, in order that the lid of the tool bench can be closed down when we have finished work, which factors lead me to recommend the pattern illustrated in Fig. 5. The size with 2 in. jaws only weighs 3½ lbs. and costs 6s. 6d., but a smaller pattern of the same type can be bought for 3s. 3d. It will be noticed that a small anvil is formed on the fixed portion which will be found very useful

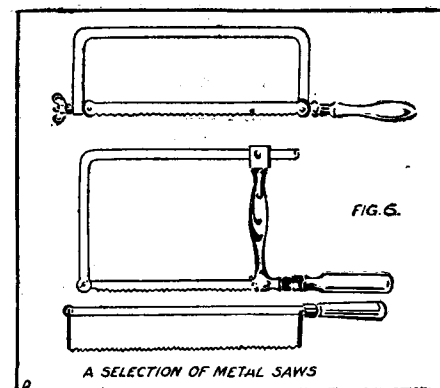
for various purposes, though the reader is cautioned against making use of this small anvil for continuous and heavy work.

Various Saws Necessary.

Saws for Wood, Metal, and Ebonite.—The ordinary wood saw, about 18 in. in length, will be needed for the various woodwork jobs encountered by the wireless amateur, and a 9-in. tenon saw is worth its place in the outfit, though neither of these tools should be used on ebonite, and, of course, no one dreams of trying to cut any kind of metal with them. Ebonite has the peculiarity of taking the edges off all tools used for cutting it, and therefore only partly worn blades should be used for the purpose. The hack saw shown in Fig. 6, is useful for round ebonite as well as metal, but sheet ebonite should be cut with the use of a frame saw, similar to that shown, for in attempting to cut the material with a shallow frame saw the latter is apt to get in the way and perhaps split the material.

The brass hack saw shown makes a further useful addition to the selection of saws, and is valuable for dealing with such parts as valve legs, plug ends of coils and similar fittings.

(To be continued.)



You are destroying your Valves— Spoiling your Tuning—DO YOU KNOW IT? Why LISSENSTAT Control has been introduced—

The filament of a valve most often breaks at the moment of cooling. Switch off with your wire rheostat—see how suddenly your valve goes out. This jerky, violent effect of your wire rheostat results in the sudden cooling and contracting of the delicate valve filament—very bad for the valve. And if the filament of your valve happens to be jarred ever so slightly at the instant you switch off with your wire rheostat the filament will break ninety-nine times out of a hundred, even though the valve be brand new. Apart from its inefficiency, the wire rheostat RUINS VALVES.

The alternative is the new LISSENSTAT control, which, apart from its efficiency, allows the delicate filament to adjust itself to finely graduated temperature change. LISSENSTAT CONTROL LENGTHENS THE LIFE OF VALVES OFTEN ONE-THIRD TO ONE-HALF. The LISSENSTAT is smooth, stepless, noiseless—such a fractional current can be passed through the valve filament that it is impossible to trace a glow in the metal. Yet control is in one knob. The LISSENSTAT should be used for long distance work always.



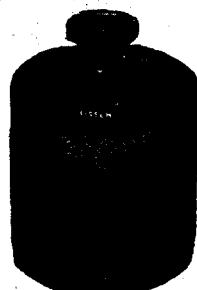
Control the Detector and each H.F. valve with a separate LISSENSTAT. One LISSENSTAT may be used to control three stages L.F. (although individual control is better even here). REPLACE ALL EXISTING FILAMENT CONTROL DEVICES WITH LISSENSTAT CONTROL—LISSENSTATS should certainly go into every new receiver to SAVE VALVES AND IMPROVE TUNING. Length under 2", diameter 1 1/2"—LISSEN ONE HOLE FIXING

IT SAVES ITS OWN COST

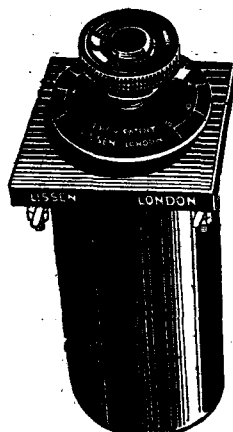
Use also the LISSEN TUNER

150 to 4,000 metres with a .0005 condenser (preferably use the LISSEN MICA VARIABLE CONDENSER) complete with 11-point switch already mounted and connected—4" long, diameter also 4"—LISSEN ONE HOLE FIXING

**WATCH FOR LISSENAGON
(P. Pat.) AIR SPACED COILS**



DO NOT USE A REJECTOR CIRCUIT!



Choose any station and bring it nearer— with LISSEN REGENERATIVE-REACTANCE (P. PATENT). A rejector circuit depends upon the use of an extra inductance and variable condensers. It may make tuning out possible, but the variable condensers damp down signal strength so much that tuning-in becomes extraordinarily difficult. This muffling effect makes a rejector circuit practically useless for long-distance work. It is certainly most unsuitable for English Broadcasting conditions. Obviously it is the negative way of achieving selectivity.

The LISSEN REGENERATIVE-REACTANCE (P. PATENT), on the other hand, is in itself highly selective, and at the same time it actually builds up signal strength. It is possible to cut out 2 L O from close in—Birmingham, for instance, will come through loudly on two valves without a sign of 2 L O. The other Broadcasting stations also come in, and the tuning in of the Continental Station is extremely easy—at FULL BUILT-UP STRENGTH. The LISSEN REGENERATIVE-REACTANCE (P. PATENT) is the constructive method and very much the better. Always tune the LISSEN REGENERATIVE-REACTANCE (P. PATENT) with a vernier (preferably the LISSEN VERNIER, barely 1" diameter, designed for fine tuning in H.F. circuits, price 12/6).

Range 150-4,000 metres—WITH REGENERATION OVER THE WHOLE RANGE WITHOUT A BREAK. £2 12s. 6d.
ONE KNOB CONTROLS TUNING AND REACTION.

All good Radio Dealers will show you these—if any difficulty, take no substitute, send direct to Factory, and goods will be immediately despatched, Post Free.

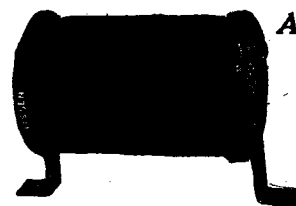
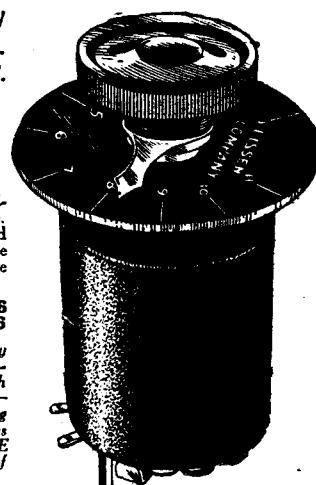
Dealers should please order a few days ahead—ask your factor, or order direct if any difficulty.
Make sure you are given the genuine LISSEN.

Where this LISSEN REACTANCE (Prov. Patent) should be used.

This LISSEN REACTANCE (Prov. Patent) can be used by itself for one or two stages H.F. The best combination is LISSEN REGENERATIVE-REACTANCE for the first stage and this LISSEN REACTANCE for the second stage. Either unit can be purchased first, and the other added in the appropriate position when the second stage of H.F. is desired.

Range, 150 to 600 metres... 27/6
Range, 150 to 10,000 metres 32/6

Blue prints sent out show the easy connecting-up of the LISSEN radio-frequency units—there is no switch to connect—everything is complete—no soldering even, although soldering tags are provided—no complications—and LISSEN ONE HOLE FIXING makes fitting a matter of 2 minutes.



AUDIO FREQUENCY

The Transformer behind the Detector

Valve should have a high primary impedance, but not a high ratio. A ratio of 4 or 5 to 1 is not suitable. The LISSEN Type T1 DISTORTIONLESS TRANSFORMER is the only transformer whose design and

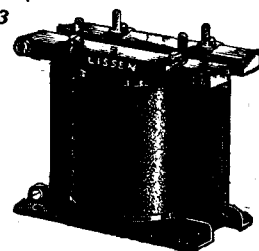
windings make it ideal for the exacting conditions of the first stage of L.F. amplification. No other transformer has the correct ratio or a sufficiently high primary impedance for this purpose. The LISSEN T1 has a beautiful coil—the most expensive of any. It weighs 8 ozs. Every turn of its many thousands is wound by patent process. Use it (particularly) for the first or any stage

For 2nd and 3rd stage L.F. the Transformer

need not have such a high primary impedance, and the ratio may be higher. The LISSEN Type T2 Transformer should therefore be used

POPULAR LISSEN TYPE T3

This is the transformer described in the recent tests as one of the best light transformers made. Amplifies equal to many much more expensive transformers. No trace of distortion. Carries the LISSEN name guarantee, and is really an excellent transformer



LISSEN COMPANY

8-16, Woodger Road, Goldhawk Road, Shepherd's
'Phone: 1072 Hammersmith. Bush, London, W.12.

N.B.—Close to Goldhawk Road (Met.) Station, Shepherd's Bush (Central London) or Hammersmith Tube. Buses 11 and 32.

LISSEN APPARATUS—WELL THOUGHT OUT, THEN WELL MADE.

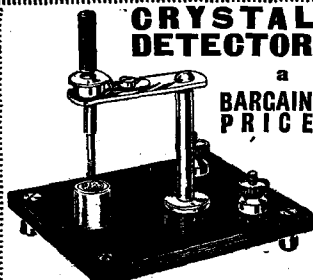
If in trouble, let Gamages help you

EFFICIENCY

is our first consideration when designing new apparatus, and, coupled with our usual high standard of quality, assures the amateur of complete satisfaction when purchasing his Wireless requirements from Gamages.

CRYSTAL DETECTOR

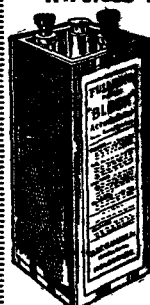
a
BARGAIN PRICE



Lacquered brass, mounted on ebonite. Ball joint and "cat's whisker." Fitted with our famous "Permanite" Crystal. Price **4/6** Post 6d.

FULLER'S BLOCK

Wireless Accumulators



SPECIAL OFFER OF 500,000 stock, but absolutely unused. Exceptional value.

2-volts 40 10/6
amps
Postage 1/-

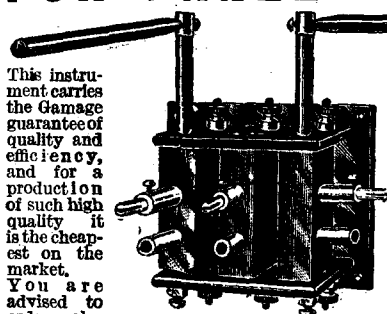
4-volts 40 21/-
amps
Postage 1/-

6-volts 40 31/6
amps
Postage 1/6

Boxes to hold 5 of these, fitted with lid and carrying strap. Each, 1/6
Postage extra

Five accumulators and box sent carr. free

THE IDEAL COIL HOLDER FOR PANEL MOUNTING



This instrument carries the Gamage guarantee of quality and efficiency, and for a production of such high quality it is the cheapest on the market. You are advised to order early.

Three Coil Type (Post 9d.)

14/6

Two Coil Type (Post 9d.)

12/6

FOR BEST RESULTS USE
PERMANITE

Highly sensitive and remains in adjustment longest. Clear, powerful results. Per large specimen. Price, post free

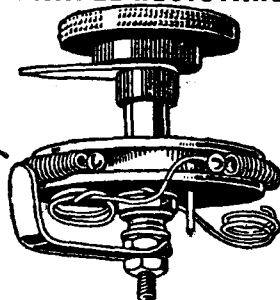
1/6

GAMAGES

HOLBORN, LONDON, E.C.1

WIRELESS CATALOGUE POST FREE ON REQUEST.

VARIABLE RESISTANCE



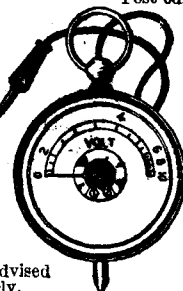
A high-class Variable Resistance for one or two valves, with a perfect movement. This is of Gamages' usual high standard of quality. Price **3/-** Post 6d.

VOLT-METERS

A very Special Purchase. Very accurate and well made. In four readings: 0-6; 0-10; 0-15; 0-20 volts only.

Price **3/9** Post 6d.

Customers are advised to order early.



SELLING AGENTS:
MANCHESTER: 19, Bridge St., Deansgate.
NOTTINGHAM: W. J. Furse & Co., Traffic Street.
BIRMINGHAM: 14/15, Snow Hill.
SCOTLAND: 57, Robertson Street, Glasgow.
N.E. ENGLAND: Milburn House, Newcastle-on-Tyne.

Look for these marks
when buying
Ericsson 'Phones

WHEN you ask for a pair of **Ericsson Telephones** see that you get them—with their trade mark and BBC stamp. Certain dealers are pushing another line made abroad as Ericsson's which do not approach in efficiency **our** world-famous make. So when you want **Ericsson** 'phones firmly refuse any telephones without these marks.

Write to-night for lists, also particulars of our valve and crystal sets.

THE BRITISH L. M. ERICSSON MFG. CO. LTD.
International Buildings,
67-73, Kingsway, London, W.C.2.

Ericsson
(British)
Telephones

2,000 ohms, price 31/-; 4,000 ohms, price 32/-. All resistances in stock.

SUMMER-TIME WIRELESS.

By OSWALD J. RANKIN.

PART III.—Frame and Kite Aerials. Describing some novel types of aerials suitable for out-of-doors wireless work.

SO far we have been concerned with ordinary single wire aerials with "free" or "open" ends; that is, with aerials connected through the receiver to the earth. It is now proposed to describe a simple frame aerial suitable for use with an outdoor portable set.

Before proceeding with constructional details, it may be well to explain briefly the difference between the "open" and the "closed" or "loop" aerial. It has already been pointed out that the efficiency of an open aerial depends mainly on the height and length, and for this reason it is erected out-of-doors, where space is less limited. This does not mean that it is not possible to arrange a similar aerial indoors, neither does it imply that closed aerials are not suitable for outdoor work.

Selectivity.

An outdoor aerial having an open end will respond more readily to the incoming electrical vibrations than a frame aerial having both ends joined to the receiver and thus closed. Where the open-end aerial will effectively operate a fairly simple receiver, the frame aerial will require a certain amount of boosting up before it will perform the same duties. Broadly speaking, the strength of the signals received on any frame aerial, however efficient, will only equal about 35 per cent of the actual signal strength obtained on an outdoor aerial, using the same receiver.

This means that a greater degree of amplification must be employed when using a frame aerial. It is obvious, therefore, that for general purposes the open aerial is preferable to the loop. The selection of either is, in many cases, a matter of convenience; and this also applies to outdoor portable installations, since the frame aerial becomes more adaptable to receiving units on moving cars, etc., than the

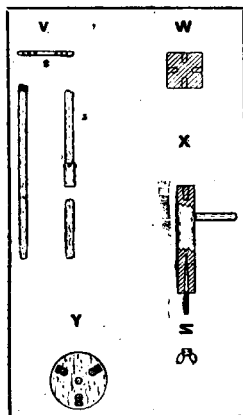


Fig. 5a.

ordinary aerial and earth system.

We must not overlook the fact that the frame aerial, although necessitating a little extra outlay on the receiver, possesses one or two admirable features. It is highly selective; that is, its directional properties tend to minimise interference or jamming from other stations working on near-by wave-lengths, and also permits very sharp tuning. By simply winding the wire round an insulated frame, in helix or spiral formation, we obtain a modified form of an inductance coil, and by winding on a sufficient number of turns to correspond with

the wave-length used by the transmitting station the aerial actually functions as a tuning inductance, and in most cases the receiver is tuned in with no other tuning device than a large capacity variable condenser.

Maximum results are only obtained when the frame is pointing edgewise to the transmitting station, because of the difference in phase produced in the opposite sides of

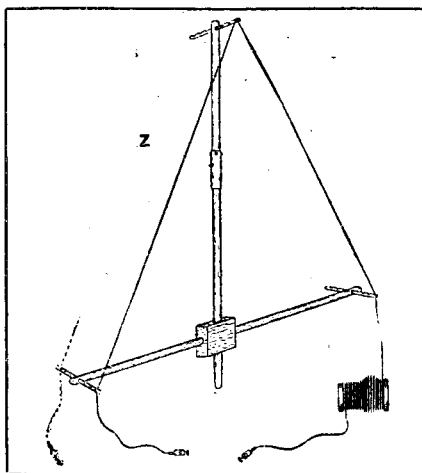


Fig. 6.

the winding. The incoming waves strike one side before they reach the other, and this alternate striking results in the production of high-frequency currents, as in the case of an outdoor aerial arranged in one single length. If the frame is rotated through an angle of 90 degrees so that it squarely faces the transmitting station, no signals will be heard because the waves will then strike both sides of the winding simultaneously and produce an equal and opposite potential which results in neutralisation.

Construction of the Frame.

From this it will be seen how simple it is to tune out any unwanted station and to determine the exact position of any particular station. These remarks apply to frame aerials generally. The instrument to be described has been specially designed by the author to give maximum results with suitable outdoor portable sets on the broadcasting wave-lengths.

The general arrangement of this will be easily understood by referring to Figs. 6 and 7. The stand used by the author was an old half-plate camera tripod, but a suitable substitute can be made up in the manner described below. Broom-handles feature rather prominently in this instrument, but if they are well smoothed down with glass-paper and given two or three coats of shellac varnish, they have a happy knack of becoming less domestic and more scientific-looking. Altogether, ten broom-handles will be required, each 1 in. in diameter by about 4 ft. long.

Two of these are cut 2 ft. 7 in. long, slightly tapered off at one end, and drilled through the other end to take a piece of $\frac{3}{8}$ in. round ebonite or fibre rod, as shown in Fig. 5a. These rods are each 8 in. long, provided with small grooves 1 in. apart, as shown at 2, Diagram V, and made a "friction-tight" fit in the holes in the ends of the arms. Two other pieces of broom-handle are each cut 3 ft. 3 in. long, and one of these is fitted with a brass tubular socket, as shown at 3, which is made to fit tightly over the end of the other piece. These two sections form the main upright arm, and a third spreader is attached to the top. A block of hardwood, 3 in. square by 2 in. in thickness, is bored with a $\frac{3}{8}$ in. auger, as shown in the sectional Diagram W, and the tapered ends of the arms were made to fit firmly into these holes.

The Aerial.

One of the short lengths left over from cutting the arms is tapered at both ends and driven securely into the bottom of the block, as shown at Z. Another of these short pieces is also tapered at one end to form a handle, when fitted into the manipulating pillar, X, which consists of a 12 in. length of wooden curtain rod, 2 in. in diameter, bored down the top to take the lower end of the short tapered peg attached to the bottom of the block, and provided at the lower end with a 4-in. length of $\frac{1}{4}$ in. round brass rod with a thumb-screw and spring

(Continued on page 890.)

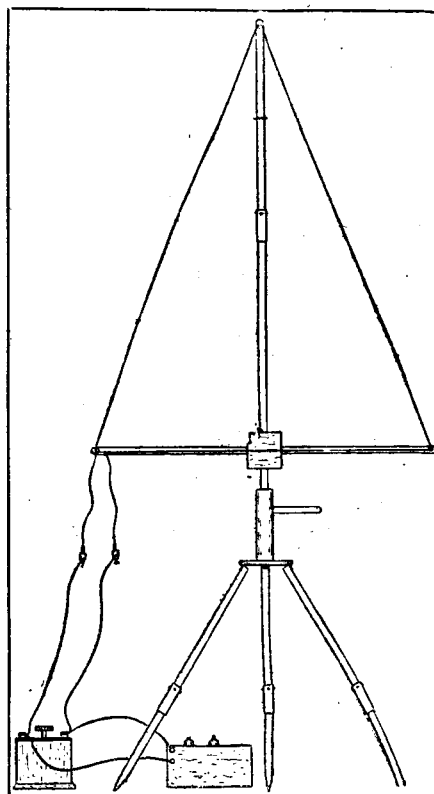


Fig. 7.

SUMMER-TIME WIRELESS

(Continued from page 889.)

washer. This rod can be tapered off to a point and firmly driven in, or clamped to a metal flange which is screwed to the bottom of the pillar.

If an old camera tripod is not available, it will be necessary to construct a simple collapsible stand. This is made up from three lengths of broom-handle hinged to a wooden disc drilled through the centre to take the $\frac{1}{4}$ in. brass spindle, as shown in Diagram Y, and joined to three other lengths by means of brass tubular sockets.

All the wooden parts are now given two or three coats of thick shellac varnish, and, when dry, they may be strapped together to form a very neat bundle, all ready for the journey. The aerial consists of a 100 ft. hank of 7/26 stranded bare copper wire, with a small terminal soldered to each end, and this is preferably wound on a large diameter wooden reel. At the selected spot erect the frame, pushing each section into its respective socket with a slight twisting movement, and see that the spreaders are at right-angles with the central hub.

No Coils Necessary.

Wind on the whole hank of wire, commencing the winding by taking a few turns round the outside groove of the lower left-hand spreader, and winding in a clockwise direction. This amount of wire will equal five complete turns. The other end is anchored in the same manner, the exact position of this being on the other end of the same spreader, as indicated by the dotted line in Diagram Z. About 18 in. of wire will be left over at each end, and two insulated leads are taken from the terminals to a .00075 or .001 mfd. variable condenser, which is then connected to the aerial and each terminal of the receiver, as shown in Fig. 7.

The receiver should be minus the usual aerial tuning arrangements, the tuning being accomplished by the large capacity variable

condenser. An ordinary receiver, complete with tuning arrangements, can easily be adapted to a frame aerial by simply disconnecting the coils and connecting the leads from the condenser to the grid and negative filament of the first valve.

Results.

This aerial, constructed and wound exactly as described, has always given excellent results on the broadcasting wavelengths, under both favourable and adverse circumstances. During the early tests, prior to its appearance in the limelight, it was situated outside the workshop, in a low-lying neighbourhood, surrounded on all sides by corrugated iron buildings.

A simple valve-crystal circuit to be described; among others, shortly, was selected chiefly on account of its simplicity, and the morning concert from 2 L O came through even better than when using the ordinary aerial, which is 35 ft. high. This, of course, was attributed to the directional effect. With the same circuit on the Surrey Downs the results were really

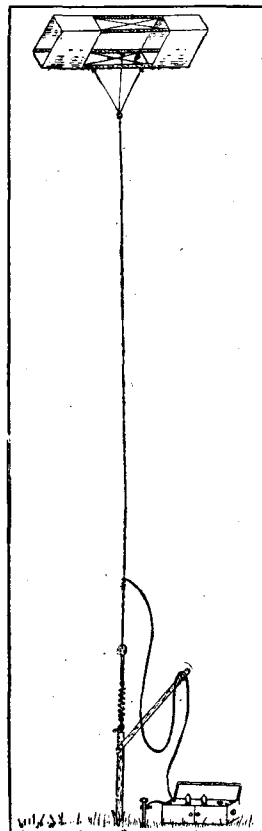


Fig. 8.

astounding, and most of the other circuits to be described gave equally good results.

Those who prefer something in the nature of a novelty, and who are possessed of a fair amount of patience and good temper, can find an outlet for their ambitions by trying a few experiments with a kite or balloon aerial. Those, however, who have had little or no experience with kite flying are strongly advised to first take a few lessons before entertaining the idea. It is a mistake to walk into a toyshop and invest a shilling on a toy kite with the idea that success will attend the venture. Naturally, the more expensive the kite, the more efficient will it be, and the last ounce of efficiency is required in this case.

The aerial wire, which should preferably be of 22 S.W.G. bare aluminium, is attached direct to the kite and carefully "played out" until the kite is "riding" nicely. An egg type insulator is attached to the lower end, and this is secured to a stake, firmly driven into the ground, by means of a piece of cord and a torsional or "compensation spring." A rubber-covered lead-in wire is connected to the aerial and should be sufficiently long to allow for the swaying of the aerial, and preferably suspended over an insulator attached to a supporting arm, as shown in Fig. 8.

A Warning.

There is ample scope for experimenting in this direction, and if one is at first not altogether successful, he at least has the satisfaction of knowing that he has had a certain amount of fun out of the venture. Success will depend chiefly on knowing how to handle the kite.

Half a dozen or so of large rubber balloons, filled with hydrogen and enclosed in a light net, may be used in place of the kite, if desired. These can be filled for a trifling sum at a chemist's. The general arrangements of such a method would be similar to that shown in Fig. 8. This type of aerial will have a strong tendency to collect atmospheric electricity, and under no circumstances should experiments be attempted when there is thunder about.

GRADING SIGNAL STRENGTH.

WHEN carrying out tests or taking observations on reception, amateurs will find that the following system will prove extremely useful. There is nothing new in it, it was employed by the wireless sections of the various services and in the Marconi Company years ago, but it will doubtless prove new to the new enthusiast. The word "new" is used in respect of those people who have adopted wireless as a hobby since the advent of broadcasting in this country. Briefly, the system consists of coding the various strengths of signals in the following manner.

Simple Divisions.

R1 is taken as representing so faint a signal that it is almost inaudible, and certainly not understandable or readable, while

R9 indicates a "loud speaker" signal. Between these two limits graduation is carefully obtained by calling R2 practically inaudible but with straining just readable, R3 very faint but readable, R4 just comfortably readable, R5 comfortably readable, R6 comfortably audible and a bit to spare, R7 loudly audible in telephones, R8 louder still, and R9 extremely loud. "Readable" refers of the deciphering of Morse code, but it can be adjusted to understandable in the case of telephony.

This system cannot claim to be scientifically accurate in its interpretation of the strength of signals, but it is wonderful to

note the similarity in the reports of operators well versed in the coding of signals when listening-in to the same station under exactly similar conditions.

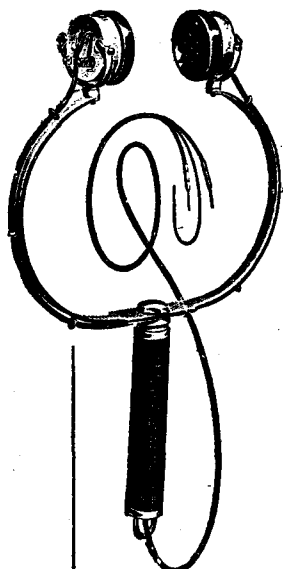


5 B T, one of the experimental stations connected with the Fellows Magneto Co., Ltd.

STERLING

BRITISH MADE

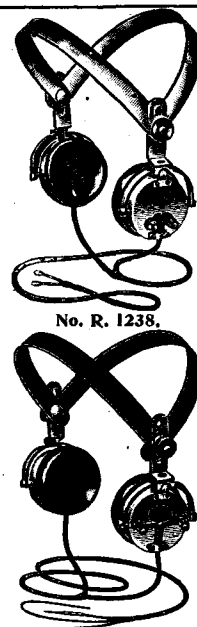
RADIO HEAD TELEPHONES REDUCTION IN PRICES



No. R. 1281.

R. 1238.	Double Head Telephones.	120 ohms.	- £1 17 6
"	"	2,000	" - 2 0 0
"	"	4,000	" - 2 2 0
R. 1239.	Single Head Telephones.	1,000	" - 1 1 9
"	"	2,000	" - 1 2 9
"	"	4,000	" - 1 5 6
R. 1260.	Double Head Telephones.	120	" - 1 2 6
"	"	2,000	" - 1 4 0
"	"	4,000	" - 1 5 0
R. 1281.	Ladies' Hand Telephones.	120	" - 2 16 0
"	"	2,000	" - 2 19 0
"	"	4,000	" - 3 0 0

Obtainable from all Electrical Dealers and Stores.



No. R. 1238.

No. R. 1260.

STERLING TELEPHONE & ELECTRIC Co., Ltd.,

Manufacturers of Telephones and Radio Apparatus, etc.

(WHOLESALE ONLY)

Telephone House, 210-212, TOTTENHAM COURT ROAD, LONDON, W.1.

Telephone: Museum 4144 (7 lines).

Telegrams: "Cucumis, Wsdo, London."

BIRMINGHAM:
150, Edmund Street.

CARDIFF:
10, Park Place.

MANCHESTER:
14, St. Peter's Square.

NEWCASTLE-ON-TYNE:
9, Clavering Place.

WORKS:
Dagenham, Essex.

AMPLION

**Buy your Loud Speaker
where you see
this sign.**

Demonstrations at
our Showroom ::

**THE ALGRAPHONE
SALON,**

25/26, Savile Row,
Regent Street,
London, W.1.

'Phone: REGENT 1075.



**MANUFACTURED BY THE
PIONEERS IN LOUD SPEAKING
TELEPHONY.**

ALFRED GRAHAM & COMPANY,
St. Andrew's Works, Crofton Park,
LONDON, S.E.4.

'Phone: Sydenham 2820/1/2.
'Grams: Navalhada, Catgreen, London.

SCOTLAND:
Mr. F. M. Milligan,
25, Renfrew Street, GLASGOW.

IRELAND:
Mr. A. R. Munday,
41, Chichester Street, BELFAST.

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

WIRELESS! WIRELESS! WIRELESS! and EVERYTHING for it.

DON'T PAY MORE!

Great Britain's largest
exclusive Wireless Stores.

NOTE. We are exclusively **WIRELESS** — NOT DABBLERS!

Pioneers of Cheap Prices.

Quality, Quantity and Consistency our Motto.

See our six window display of popular bargains.

SPECIAL OFFER

**"ELKAY" LIGHTWEIGHT
HEADPHONES** (4,000 ohms),

12/9 ERICSSON

(Genuine French Phones, maker's name
embossed), 4,000 ohms.
Each pair tested and
Our Price **16/9**

guaranteed. Don't pay 32/-.

N. & K. 'PHONES, the Genuine
Article
SIDPE HEADPHONES, 4,000 ohms,
genuine, our price **12/9**
THOMSON-HOUSTON HEADPHONES
(FRENCH), 4,000 ohms, our price **15/3**
**BROWN'S FEATHER-WEIGHT HEAD-
PHONES**, stamped B.B.C., 4,000
ohms, our price **23/9**
MULLARD "ORA" VALVES **12/9**
DUTCH VALVES **8/3**
EDISWAN VALVES **12/3**
(All Guaranteed New.)
L.F. TRANSFORMERS, Ratio 5 to 1. **11/3**
All guaranteed (postage 1/-) each
CRYSTAL DETECTORS 1/9, 1/3, and 10d.
" " enclosed in glass case 2/6, 2/3, 1/6
SWITCH ARMS, 4 laminations, ebonite
knob, complete with panel, bush, nuts,
and spring washer **8d.**
AERIAL WIRE, 7/22, guaranteed hard- **1/10 1/2**
drawn copper, 100 ft. (postage 1/-)
CONDENSER VANES, fixed or moving,
per doz. **3d.**
REAL GOLD CAT'S WHISKERS each **2d.**
" " per doz. **1/5**
SILVER "CAT'S" WHISKERS each **1d.**
" " per doz. **7d.**
CONDENSER SCALES, 0 to 180 each **3d.**
IVORINE LABEL SET, 12 different titles
the set **6d.**
BATTERIES, 41 volts, each **3d.**; per doz. **2/9**
BASKET COILS, set of 6, up to 3,000
metres **2/4**
SLEEVEING, 3 yds. assorted colours, for ... **11d.**

NUTS, 2 B.A. per doz. **2 1/2d.**
NUTS, 4, 5, 6 & 8 B.A. per doz. **2d.**
WASHERS, 4 B.A. per doz. **1d.**
WASHERS, 2 B.A. per doz. **1 1/2d.**
FILAMENT RESISTANCES, smooth
action, marvellous value **1/10**
With engraved dials **2/9**
CONTACT STUDS, with nuts and washers
per doz. **4d.**
STOPS, with nuts per doz. **6d.**
TERMINALS, with nut and washers,
each **1d., 1 1/2d., and 2d.**
EBONITE KNOBS, 2 B.A., each **1 1/2d., 3d., & 4d.**
SPACING WASHERS, large per doz. **2 1/2d.**
SPACING WASHERS, small per doz. **1 1/2d.**
CRYSTAL CUPS, 2 screw each **1d.**
CRYSTAL CUPS, 4 screw each **2d.**
FIXED CONDENSERS, all capacities each **10 1/2d.**
EBONITE, cut to any size by machinery
while you wait per lb. **3/6**
TELEPHONE TERMINALS, nuts and
washer, each **1 1/2d.** per doz. **1/3**
W.O. TERMINALS, nuts and washer,
each **2d.** per doz. **1/7**
PANEL BUSHES, drilled each **1 1/2d.**
" " per doz. **1/3**
TOP "CONDENSER", bushes each **1d.**
" " per doz. **9d.**
BOTTOM "CONDENSER", bushes each **1d.**
" " per doz. **7d.**
BELL WIRE, tinned copper, 12 yds. **6d.**
VALVE LEGS, nut and washer each **1d.**
" " per doz. **10d.**
VALVE PINS, nut and washer each **1d.**
" " per doz. **9d.**
PLUNGER "SPRINGS", complete each **1d.**

SLIDER ROD, brass, 13 ins. long, 1 in.
square, drilled each **3 1/2d.**
SLIDER KNOB each **2d.**
SWITCHES ON EBONITE, S.P.S.T.
(quality the best) each **1/8**
SWITCHES ON EBONITE, S.P.D.T.
(quality the best) each **1/11**
SWITCHES ON EBONITE, D.P.D.T.
(quality the best) each **2/9**
CONDENSER SPINDLES, all sizes in
stock, from each **1 1/2d.**
SCREWED ROD, 2 B.A., 12 ins. long each **3d.**
SCREWED ROD, 4 B.A., 12 ins. long each **2 1/2d.**
**RUBBER - INSULATED LEADING - IN
WIRE** per yard **1 1/2d.**
INSULATORS, white reel, 2 in., each, **1d.**
1d.; per doz. **11d.**
INSULATORS, white egg, each **2d.**
per doz. **1/8**
WOUND INDUCTION COILS (postage 9d.)
12 x 4 9 x 4 8 x 2 1/2 6 x 3 6 x 2
2/5 2/3 1/11 1/8 1/5
TAPPED INDUCTANCE COILS, 20 tap-
pings, wound to 1,800 metres each **2/6**
VARIOMETERS (Tube type), complete
with knob 3/11 and 2/11
DOUBLE "PHONE CORDS, full length **11 1/2d.**
HERTZITE, Genuine Large Piece **9 1/2d.**
TALITE, " " " **9 1/2d.**
PERMANITE, " " " **9 1/2d.**
ZINCITE, " " " **9d.**
BORNITE, " " " **6d.**
MIXED CRYSTALS (6 kinds) **9d.**
CARBORUNDUM **5 1/2d.**
ZINCITE and BORNITE, both in box ... **1/-**

IMPORTANT NOTICE. We have repeatedly said **DON'T PAY MORE**, and having served the masses well,
the large return of business has made it necessary for us to acquire extensive additional premises adjoining our present address. Follow the Crowd to Elkay Corner

"ELKAY" WIRELESS CO., 225 & 227, Bishopsgate, London, E.C.2.

Open Saturday all day. To the Trade—New Trade Counter now open. Send for NEW LIST.

We open Sundays 11 to 2.30.
Please remit ample Postage.

Note new Telephone No.: Central 8544.

GRAND FOOTBALL COMPETITION

**£500 for only 10 Results
MUST BE WON**

For Full Particulars see this week's

ANSWERS

PROGRESS AND POPULARITY.

"Wireless should be treated as a commercial proposition and not as a toy. The whole business should be taken out of the hands of bag-makers, paper merchants and opticians, and controlled by properly qualified people. Then it would indeed boom," says Mr. L. E. Wilson, A.M.I.E.E., the well-known electrical engineer, in an interview with our Manchester Correspondent.

TRENCHANT and telling sentences these, spoken to me in the course of a most interesting conversation I have had with Mr. L. E. Wilson, A.M.I.E.E., electrical engineer, famed in the North as a pioneer of electrical enterprises and practically concerned with the broadcasting of music under the old electrophone system.

"The coming thing," he said, "is the broadcasting of public speeches. People who address huge gatherings will make themselves heard over a very wide area. This sort of thing, Mr. Wilson reminded me, has been developed already in America. It means that an audience of a hundred thousand can hear one man at a time, hear the voice uniformly and evenly.

"We shall," Mr. Wilson persisted, "see appliances of this kind very shortly in this country. They can be used, too, at coal exchanges and cotton exchanges for disseminating news which every member ought to hear, doing away with notice boards, usually besieged by big crowds, and a multitude of people who have at present to be employed. I may say I have already approached the Master of the Manchester Royal Exchange with the view to this practice being adopted there.

"I have also suggested to the Altringham (Cheshire) show authorities that they should transmit music so that everybody in the showground can hear the same band playing. If the entertainment-tax were only removed we should be able to do it. To realise what can be done in this direction, you have only to look at the great Brighton enterprise, where the music of a band is projected so that it can be heard the whole length of the promenade."

Then Mr. Wilson proceeded to urge that wireless should be treated as a commercial proposition and not as a plaything, but quickly added that he was hopeful because the telephone, when first invented, was regarded as a scientific toy,

Interesting History.

"A Manchester cotton man," he said, "was the first to see the business value of the telephone. He financed it, and the first telephone exchange was erected in Manchester. The French had a service called the theatrophone, and we in this country, thinking it might be applied to church services, brought out an instrument which we called the electrophone. In 1898, when the then Prince of Wales was laid up with an injury at Waddeston Hall, music was broadcast to him by means of this electrophone, so that broadcasting is really a very old institution.

"An instrument was erected at Windsor Castle by which Queen Victoria, who had never used a telephone in her life, heard music. This was the beginning of the development of broadcasting.

"Now we have reached the wireless stage. One thing I will say for the old system, we never forgot we were catering for music-

loving people, and the purity of our transmitters was perfect. As engineers we did not dare to thrust discordant noises on our subscribers."

"Looking to 'Popular Wireless.'"

Mr. Wilson says that we are suffering today because advantage has not been taken of the best electrical study.

"The whole trouble," he said with emphasis, "is that the business has got into the hands of bagmakers and paper merchants and opticians, and I look hopefully to a powerful organ like POPULAR WIRELESS being able to direct it into the hands of properly qualified people. What is lacking is the advice of the expert. One result is that commercial men are not taking the interest in wireless that they would otherwise do.

"Tradesmen have made experiments the result of which any expert could have told them beforehand. They have experimented upon the British public instead of making their experiments in the laboratory. Let us see to this at once and wireless will not only go, but will boom."

I asked Mr. Wilson if he thought Manchester was holding its own in

Glasgow started months after Manchester, but were better advised, consequently they got better results long before Manchester.

Cheap Crystal Sets.

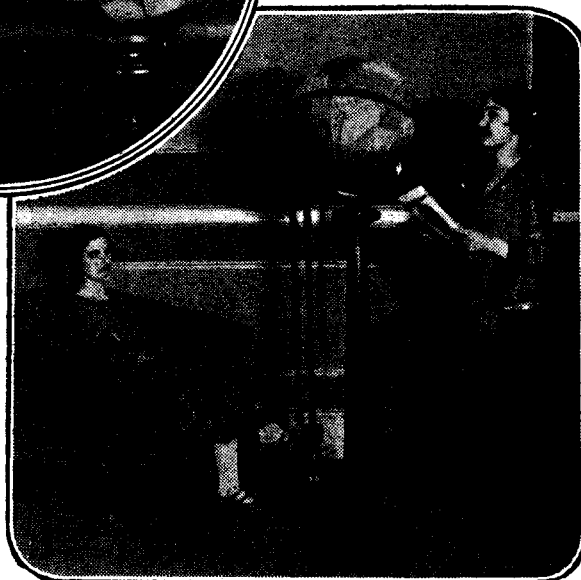
"As for the ordinary man in the street," says Mr. Wilson, "he wants to get enjoyment from broadcasting with the minimum amount of expense, and without requiring any technical knowledge. Therefore the cheap crystal sets are the ideal thing for him, because there are no accumulators and the connections are simple, if only they could give range. A boy of seven could use the crystal set without any difficulty or danger. Developments are taking place by which the public will get valve sets taking the minimum amount of current and abolishing the use of the accumulator. That is a step in the right direction.

"We can look forward to the day," he said in conclusion, "when there will be no power required at the user's end, but that all the power will be supplied from the broadcasting station. That is the ideal system, and it is one that the telephone has to some extent evolved. One need have no fears concerning the future of wireless. It does not present any of the difficulties of telephony. Passing a current over a copper wire is a far more complex business than most people imagine. The popularity of wireless has rather hampered than helped its development in the past. Now we must settle down and apply it scientifically to practical business uses."

Mr. Wilson's last remarks aptly put the whole position of wireless, as applied to broadcasting, in a nutshell. There is no doubt but that a considerable amount of hindrance to the advance of this science has been caused by the sale of inferior apparatus and attempts to boom wireless by wrong methods, and a public once disappointed or taken-in is difficult to convince where the real social and commercial advantages of broadcasting are concerned.



The new type double transmitter, which will be employed at the new broadcasting station on the Aeolian Hall, New York.



the national movement. There was no doubt, he said, that Manchester transmission at the present moment was quite good, and almost equal to any other station in the country; but at one time it was notoriously the worst. It was the old story, Manchester had tried to carry too much on their own shoulders without getting into touch with people who knew something about it.

A NOVEL WIRELESS DEMONSTRATION AT WINDSOR.

Describing a series of interesting experiments concerning wireless receivers on light cars.

By Capt. RICHARD TWELVETREES, A.M.I.Mech.E.

THANKS to the courtesy of the directors of the Daimler and Marconi Companies, I had the opportunity of inspecting a new wireless outfit for small cars on Saturday last. A 12 h.p. B.S.A. car was placed at my disposal for making the journey, and with a party of friends I joined in an imposing convoy of cars starting from Marconi House and bound for Windsor.

apparatus was prepared in a few seconds after the cars arrived, struck one as being very remarkable.

A Compact Receiver.

There is no actual difficulty in making a receiving set work satisfactorily whilst the car is in motion, but the installation on the small B.S.A. cars is not designed with this object. The main practical objection to receiving in motion is the cost of the apparatus in the case of small cars, and it was therefore decided to provide a special form of aerial which can be slung up very easily, and which rolls on to a compact reel when not in use.

The apparatus is made in two types, one consisting of a two-valve "Marconiphone" with two headphones, and the other comprises the last-named set with the addition of a two-stage amplifier and a loud speaker. The smaller set costs £25 complete, so that in buying a new car one would hardly

notice the small additional charge. The complete set with the loud speaker is listed at £55, but it possesses advantages which are well worth the extra cost.

The entire outfit in both cases is mounted inconspicuously on the running-boards of the car, and is neatly covered with a solid leather case, protecting the instrument from dust and rain. A further feature of interest is that the apparatus is arranged so that it can be removed quite easily from the car for use in the house or elsewhere, so that wireless enthusiasts can make use of the one set for a dual purpose.

The current necessary for supplying the valve filaments is derived from the ignition accumulator, which obviates the necessity of carrying extra accumulators whilst touring, as well as the inconvenience of discharged accumulators. Both the "Marconi-



Tuning-in the London Station (2 L O).

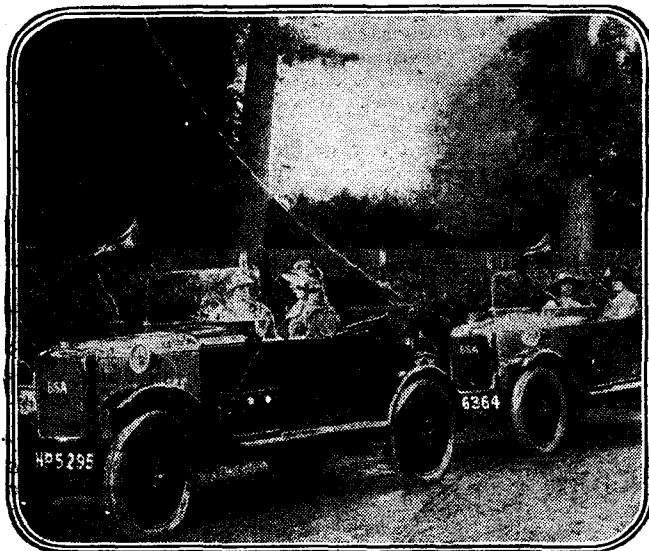
phone" and the loud speaker have rubber pads fitted to their bases, and the whole of the apparatus is constructed in a very workmanlike manner.

The thing which could not fail to attract the attention of the interested observer was that the design had been worked out with the fullest possible appreciation of the wireless-loving motorist, who naturally does not want to spend time on the road in fixing up elaborate and complicated apparatus. The absence of loose external wiring was very conspicuous, and the addition of the set in no way detracts from the appearance of these smart little cars.

A Useful Addition.

When the final bars of the National Anthem had died down, the four wireless cars packed up and, almost before one had time to look round, were spinning along the road towards London, leaving the spectators to gasp at their sudden disappearance and to reflect upon the enterprise of the two companies which hold such prominent positions in their respective spheres of British industry.

In conclusion I should like to advise all motorists to add to their pleasures by taking a wireless set with them on their tours; it is certainly worth the slight extra expense and trouble involved.

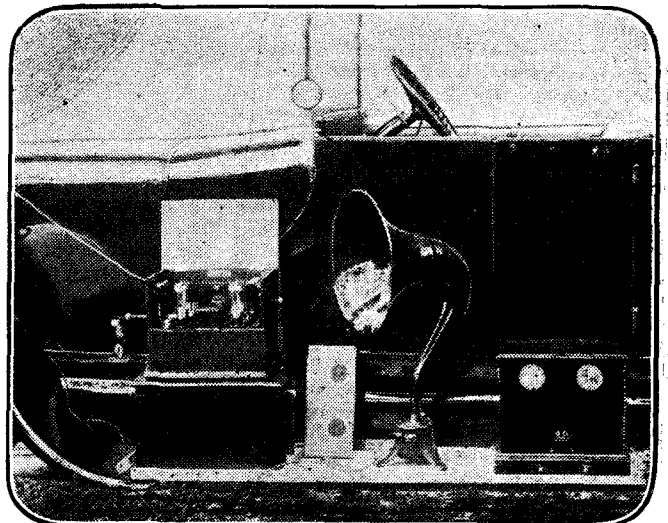


Two of the four B.S.A. light cars built by the Daimler Co., that took part in the demonstration.

Recent advances in the construction of wireless apparatus and the ever-growing popularity of listening-in have excited the interest of motorists in common with all other sections of the community, but the powerful car with its expensive wireless equipment is beyond the means of all but the more wealthy of motorists. The earlier experiments were not brought to a successful issue without a good deal of experimental research, for some difficulty was found in screening the apparatus from the electrical equipment on the cars, as well as from that of passing cars and other vehicles. Ultimately, however, the success was so marked that it was decided to fit out a small B.S.A. car, built by the Daimler Company, with a less-expensive form of receiving apparatus, and four of these little vehicles came up from Coventry for the purpose of demonstrating the apparatus in a practical form.

Rapidly Fitted Up.

The four wireless-equipped cars were lined up in the Great Park at Windsor awaiting the arrival of the convoy of visitors, who were given the opportunity of inspecting the whole outfit very thoroughly, and later of hearing the usual Saturday evening transmission from 2 L O. In spite of rather a bad attack of atmospherics, the musical items came through with great clearness, and the ease with which the



Showing the Marconiphone Receiver comfortably mounted on the running-board.

WINDOWS: FROM A LEADING-IN POINT OF VIEW.

One of the first problems that people installing wireless apparatus come up against is that of getting the aerial into the house without the necessity of leaving a window open. In this article instructions are given for dealing with this in a neat and efficient manner.

A CARPENTER, when about to bore a hole through a window frame, will, after a preliminary inspection, start boring, and the twist bit of the auger will emerge on the outside precisely where he intends it to do. Knowing the construction of the window, he can avoid obstacles. There are not many of the latter, but when one is met with it is nearly always necessary to start an entirely new hole.

A window consists of a frame built in, or fixed to the wall, and a sash which carries the glazed part or parts. The latter may be: (a) permanently fixed, (b) hinged vertically or horizontally, and (c) sliding vertically or horizontally. The majority of windows, therefore, come under the C class, sliding vertically.

If the sash moves, it cannot be used for leading-in purposes, and a way must be made through the frame. If the movement of the sash is up and down, some sort of balance weights are required, which are accommodated within the frame; if, however, the sash is hinged or slides horizontal, the frame may be, and usually is, solid.

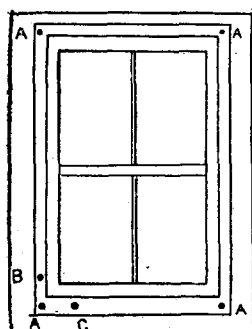


Fig. 1

dated within the frame; if, however, the sash is hinged or slides horizontal, the frame may be, and usually is, solid.

Boring Solid Frames.

The hole may be started at any part of the upright frames excepting the point marked A, Fig. 1. This is unfortunately just the very place where a novice would select; but there are usually nails there, and even a light nail when embedded in wood will utterly ruin a bit. When a jar or click is experienced at each half revolution, it is almost certain a nail is in the way of further boring. Therefore, keep about 2 in. higher or to the side of this point, B or C, Fig. 1.

Secondly, do not bore the hole level, but very slightly inclined, so that the outside or "weather" end is a little lower than the other.

This prevents moisture creeping in on the insulating tube or lead-in wire. Thirdly, make certain when boring through the frame uprights that there is sufficient clearance outside for the bit.

If you decide to try point C, see that the

hole clears the bottom of the sash. This hole will be a much deeper one than B, as it will go through the wooden sill, usually of oak or teak, and sloping down a little to throw rain water on to the stone sill. Make due allowance for this slope when starting the direction of the hole. Imagine the window cut down through the centre and then looked at sideways it would appear as Fig. 2 (or in vertical section). The arrow indicates the correct path of the auger, or bit, through the sill. Endeavour to arrange matters so that the outside hole is close to the upper edge of the wooden sill.

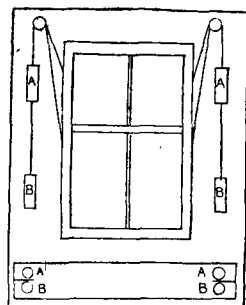


Fig. 3

the correct path of the auger, or bit, through the sill. Endeavour to arrange matters so that the outside hole is close to the upper edge of the wooden sill.

Boring through Hollow or Cased Frames.

The ordinary window with two sashes, one or both movable, has a hollow frame in which are the sashweights required

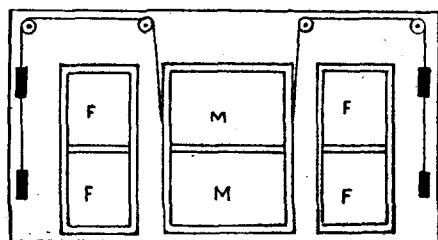


Fig. 4

to balance the sashes. The previous remarks also apply to this type of frame, and in addition the sashweights and supporting cords must be avoided. Weights A A are attached to the bottom sash and descend as it rises, and B B to the top sash ascending when the sash is pulled down (Fig. 3).

There is usually ample space between the bottom of the lowest weight and the edge of the frame to bore even an inch hole. If boring at the top, keep as high as possible; a sharp bit will easily cut the sashcord, dropping the weight to the casing bottom, no easy job to make good again.

Before leaving the subject of wooden frames, a word of warning concerning that type of window known as "Centre-hung Venetian" may be given. Fig. 4 shows the balancing system and the danger of boring over the narrow fixed sashes where one may quite unexpectedly cut through a sashcord.

Steel Casement Windows.

Modern steel casements are arranged to open in various ways, some, but not many, are permanently fixed. In every case the space between the window side and the glass is small. However, that portion of the casement embedded in the cement, etc., is usually quite small, and by carefully chipping out (from both sides) with a sharp cold chisel a way outside the frame may be cleared, suitable for a rubber-covered leading-in wire, or an ebonite or fibre tube well warmed and bent to a suitable curve to pass through the hole. The external portion of the tube should turn downwards, to exclude rain-water.

Should the window possess some small fixed panes, a small section of one may be cut out and replaced by an ebonite or hardwood sheet, thicker than the glass and recessed as in Fig. 5. This sheet should be drilled and fitted with a turned down lead-in tube before finally fixing with putty. Alternatively, the glass itself may be drilled, a process already described in POPULAR WIRELESS.

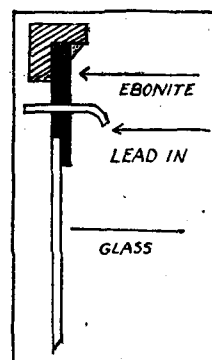


Fig. 5

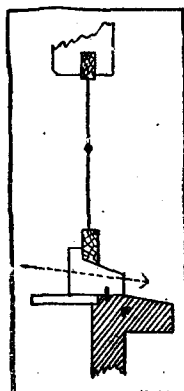
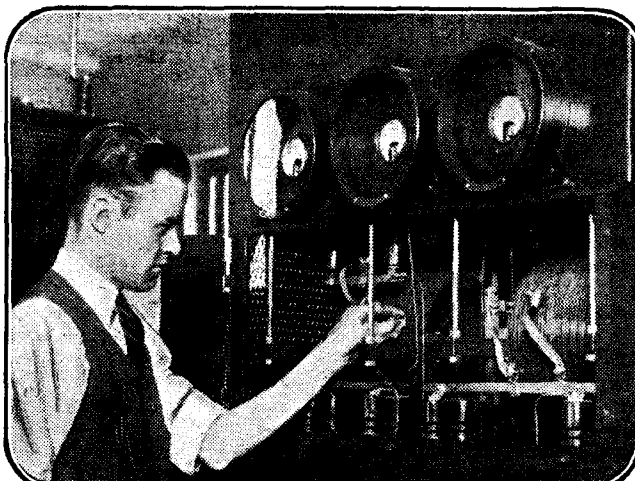


Fig. 2



Adjusting W J Z, the new American broadcasting station, to 455 metres.

"Stand By—"

POLOHU STATION

At Loggerheads—Mathematical Cinquevallis—An Old Joke—Fifty-Fifty—Sizing Up—A Joint Effort—The Valve: A Pussyfoot Version—Animals and Wireless.

At Loggerheads.

THERE are times when that peskily clever secretary of our local wireless club gets me on the oscillation point. The discussion had been on what our president had called a mathematical formula to determine how many beans make five, or something else equally important. In the formula was the word log. Being always ready to display my ignorance in the form of a dark background for the bright and scintillating intelligence of men of genius, I blandly asked what a log was. Our clever secretary replied curtly:

"A log is an index, of course."
 "Really," I could not help retorting, "and a snark is a boojum, of course."

Mathematical Cinquevallis.

Seriously, though, I do admire those mathematical Cinquevallis who can do such wonderful conjuring tricks with letters and figures. When a mathematical prodigy, however, begins to throw pies and logs about, I, for one, am bound to seek cover. From what I can make of it, this mathematical juggling looks a bit risky. One little plus sign in the wrong part of the boat and the whole cargo goes overboard.

Still, I suppose that we could not get on very well in wireless without the mathematician, and as far as wireless is concerned we must obey the Chief Scientific Adviser to POPULAR WIRELESS when he lays down the law in "Wireless Review" that after figures the unit of measurement should always be stated.

An Old Joke.

I once bought it very badly on this particular business of mentioning the unit of measurement. The occasion was my first entry into a science class at school.

"How old are you?" asked the man of science.

"Twelve, sir," I replied bravely.

"What, months?" bellowed the man who held first-class diplomas in odifery and the theory of explosives.

The joke is an old one, and has been perpetrated millions of times, yet it emphasised to my mind the importance of just mentioning the unit when giving a numerical statement.

Fifty-Fifty.

"To say that the height of a post is 50, means nothing," says Sir Oliver Lodge.

Right, but for an American to say that he will go fifty-fifty with you over a deal means a *good* deal to you if you keep the insulation covering off your eyes.

Sizing Up.

I can imagine that peskily clever secretary of our local wireless club selling a pair of boots to a customer after having read his "Wireless Review."

PESKILY CLEVER SECRETARY: "And what size may I get you, sir?"

CUSTOMER: "Sixes."

P.C.S.: "Sixes in what?"

C.: "Boots."

P.C.S.: "Thank you, I understand that, but I am not clear as to the unit of measurement implied. Sixes in what unit?"

C. (rising to the occasion): "Feet."
 (Collapse of Peskily Clever Secretary amongst his boot-laces.)

A Joint Effort.

Joints both of the electrical and of the meat variety should be avoided if possible, especially during the hot weather. A



The King of Spain (right) listens-in on a Marconi portable wireless set.

badly done joint, or one that has a high frequency, may introduce sufficient impedance into the family circuit as to cause hysteresis. Some joints are better when treated with spirits of salt, others are better when treated with salt, while the worst of them should be promptly earthed.

The Valve: A Pussyfoot Version.

Without undue exaggeration, I think I may claim to have read all the popular expositions on the way a valve works, but I have never read anything so good and so refreshingly original as Captain Eckersley's article on the valve in POPULAR WIRELESS of July 21st. The description of the little people with their parcels of

electricity, the tremendous attraction the "Positive" pubs. have for them, and the way they remain glued to the bar inside the pub. until other little people, more drunken than themselves, push them out of the bar, is the most attractive and illuminating thing I have read on valves.

In due respect to our cousins on the other side of the Atlantic, I consider it necessary to give a dry or non-alcoholic version of Captain Eckersley's simile.

Right thar along Main Street, Toobe City, Texas, the li'l electron guys hiked it, jostling and cannoning and swarring. Gee, but I guess it was some hot. Each of the li'l electron guys was chewing gum, but nobody, not even Ed. Armstrong, knew what was in that gum, only on the outside of the paper containers was written "Wrigley's Hee-lectricity." Gee, but it was some hot.

The li'l electron guys reeled along, expectorating on the bare plank sidewalk now and then to kule things down a bit. Pelham R. Oton, the foremost hiker, hitched up his pants and beat it harder, for he disarned an ice cream parlour with the li'l positive sign at the corner of the next block.

The li'l electrons were thirsty. They wanted strawberry sundaes and orangeade, but none of them had that longing for near beer which comes from being far from it.

Pelham R. Oton and the li'l electrons rushed the parlour, only to find thar a bunch of the negative boys from N'Yark.

"Beat it, you doggarned guys!" says Pelham R.

"Beat it yous-selves," say the negative boys from li'l N'Yark.

"You'd best beat it," says Pelham.

"We will not beat it!" say the N'Yarkers.

Then the li'l electron guys put it across the guys from li'l old N'Yark, and made them quit. So the li'l electron guys sat on the tall stools in front of the bar and sucked ice cream sodas through long straws from tall tumblers, and ate ice-cold sundaes with cardboard spoons. Thar they sat frozen to the icy bar for thousandths of a second, and thar they stuck until more li'l electrons thirstier than Pelham R. Oton and his bunch of the electron boys came and called on them to beat it. And so the li'l electron guys with Pelham R. Oton hitched up their pants and beat it, and progress was made along Toobe City Main Street.

Animals and Wireless.

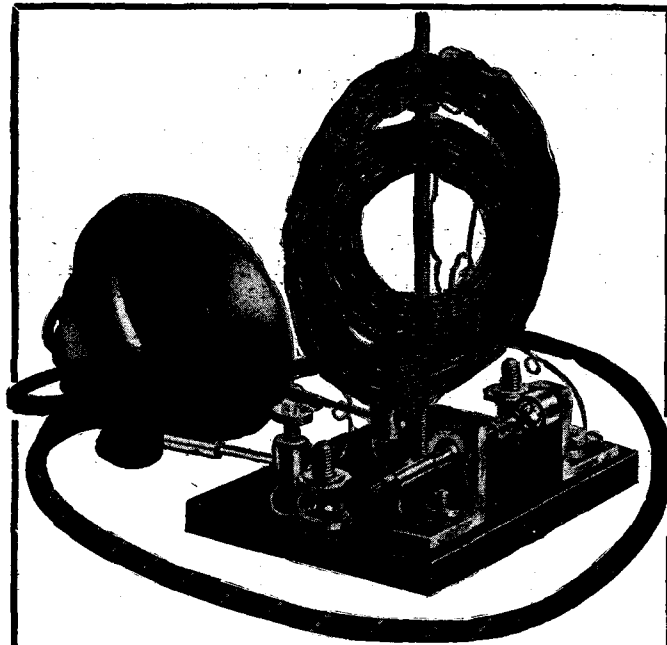
A loud speaker has been installed in the New York Zoo in order that the effect of wireless on the animals and other living creatures there may be studied. We understand that the first experiment with the wireworms was not successful, and that the glow-worms have lodged a formal protest against the indiscriminate use of valves.

It may be noted that fishes are quite used to working on a natural wave-length while the whale does a lot of spouting, though not from a transmitting station. A couple of giraffes would make a fine portable aerial, while the mole is exceptionally good at making an earth-run.

The chameleon is a wonderful transformer and the spider can make the most perfect basket coils.

If Bruin has to listen to the wireless our only hope is that he will be able to bear it.

KNOB TURNER.



Your Own Pleasure at Your Own Price

The Neatest little set imaginable, and yet it does all the work of a large expensive crystal set.

Easily mounted and connected up, it will pick up all signals including broadcasting to perfection within a range of 15 miles.

In your home, scoutroom, schoolroom or garden, you have a real set, not a toy, at the very low price of

12/6

complete with headphone, coils, crystal and wiring diagram.

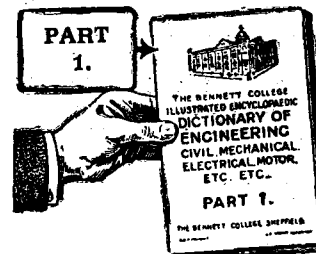
FELLOWS MAGNETO Co., Ltd.,
LONDON, N.W.10.

Telephone: WILLESDEN 1560-1. Telegrams: "QUIX MAG." PHONE, LONDON.



For they are jolly good Fellows

FREE



To extend the name of the Bennett College to everyone engaged in the different branches of Engineering, we are publishing an **Illustrated Dictionary of Engineering**, in about 24 **MONTHLY PARTS**. You can have each monthly part as it comes out **FREE**.

1/- Postage only to pay.

The Dictionary is free to those engaged in any of the following trades: **Engineering, Civil, Mechanical, Electrical, Structural, Motor, Sanitary, Boiler, Internal Combustion, Draughtsmanship, Marine, Shipbuilding, Naval Architecture, Building, Architecture, Quantity Surveying, Aviation, Chemistry, Foundry Work, Metallurgy, Matriculation, Mining, Surveying and Levelling, Telegraphy, Telephony, Wireless**, and the conditions are that you send your name and address, your age and occupation, with three penny stamps (to cover postage), writing your name and address very clearly. We shall then place your name on our Free List and send you Part 1 at once. The others will be forwarded as issued. Address your application fully to:

(Do not fail to give the particulars required and use this full address.)

Department D 106,
The Bennett College,
Sheffield.

THAT HA'PORTH O' TAR



HOW many times has that old adage, "Why spoil the ship for a ha'porth o' tar," been quoted? Never was it more applicable than in the case of the wireless receiving set. Your set may be perfect in every detail, the conditions ideal for reception, but if your connections are not soldered, your instrument is not in the perfect state it should be, and, consequently, the receptive qualities are apt to suffer; therefore, why spoil the "Set" for a ha'porth o' "Solder" — and why say soldering's a bother, when there's **FLUXITE** to help you? Soldering is child's play when you've a tin of **FLUXITE** at hand to help you, or, better still, a complete Soldering Set that we have had specially prepared for the convenience of customers. Ask your Ironmonger or Hardware dealer to show you the neat little

bother, when there's **FLUXITE** to help you? Soldering is child's play when you've a tin of **FLUXITE** at hand to help you, or, better still, a complete Soldering Set that we have had specially prepared for the convenience of customers. Ask your Ironmonger or Hardware dealer to show you the neat little

FLUXITE SOLDERING SET

It is perfectly simple to use, and will last for years in constant use. It contains a special "small-space" Soldering Iron, with non-heating metal handle, a Pocket blowlamp, **FLUXITE**, Solder, etc., and full instructions. Price 7/6 Sample Set, post paid, United Kingdom.

FLUXITE SIMPLIFIES SOLDERING

All Hardware and Ironmongery Stores sell **FLUXITE** in tins, price 8d., 1/4, & 2/8. Buy a Tin To-day.

Reduced Price
7/6



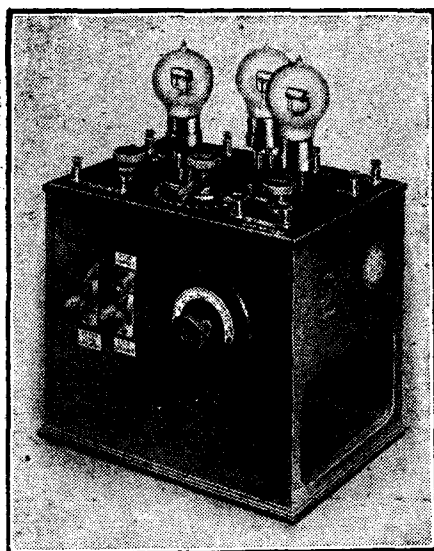
For the tool kit of your car or motor-cycle, or any soldering jobs about the home.

FLUXITE LTD., 324 Bevington St., Bermondsey, England.

WHERE WIRELESS APPARATUS IS MADE.

A Special Representative of "Popular Wireless" visits the T.M.C. Factory at Dulwich.

THE T.M.C. are renowned for their telephone receivers, more than anything else, since they have made these for commercial purposes for many years, even before they took them up from a wireless point of view. In their large factory at Dulwich they not only manufacture telephones, but also the well-known "True Music" loud speaker. Complete sets, both crystal and valve, and components, are also made in great numbers.



A typical B.B.C. stamped T.M.C. Receiving Set.

Not long ago I inspected this factory, and was surprised at its size, compared with some of the factories I have been over. The amount of glass used was surprising, but this factory is noted for its efficient lighting.

14,400 a Day.

I first passed through the store-room, where all the material is stored ready to be taken to the laboratory for test when required for use. I was again surprised at the vastness of the machine-shop.

Here there are lathes, etc., of every description, all the machinery being, of course, thoroughly up to date. While I passed through, one machine was turning out telephone terminals, and it surprised me to see a piece of brass being fed into the machine and coming out in a few seconds, after several stages, in the form of an extremely neat and highly polished terminal.

When I counted the number of these machines, I was, perhaps, hardly surprised to hear that it is not at all uncommon for them to turn out one hundred gross of terminals per day. Various other terminals, connecting strips, etc., were also being made here.

Then there was another machine turning the aluminium cups for the loud speakers,

after which they are sent to the polishing room, where they are highly polished. A special guillotine cuts out washers, lugs, and various pieces of metal at an alarming rate.

Another "guillotine," with a pressure of fifty tons, cuts out the magnets for the telephones from tungsten, which is an eighth of an inch thick. Yet another "guillotine" is busy at work, this time cutting out the diaphragms from large sheets of stallo which have already been gauged and passed as pure.

There is a special magnet hardening furnace which automatically deals out the hardened magnets which are fed into the top of the machine.

I was next taken to the electro-plating room. Here all the apparatus to be plated is hung in the vats until the required thickness of plating is obtained.

The loud speaker horns are made by a secret process, the outline of which is as follows: A mould of the horn is placed in a vat containing a solution of copper which deposits a coat of copper on it until it is of the required thickness. After this the

mould is withdrawn, leaving a perfect copper horn. These horns are then sent up to the spraying room, where they are thoroughly enamelled.

While we were downstairs, we crossed the yard and entered another shed. This was the "tool" shed, another surprise awaiting me when I learnt that they made all their own special tools. From here I happened to look at the roof of the main building, and saw, not only one aerial, but five. This allows a considerable number of complete sets to be thoroughly tested.

Rapid Winders.

Upstairs we came to the assembly room. Here the sets, 'phones, and loud speakers are all assembled and wired. An interesting corner here was the winding benches where the bobbins for the 'phones are wound. They have 3,700 turns put on, which are counted automatically. A pair of magnets, which are wound on a patent machine, take five minutes to wind. The magnets are then tested for continuity, resistance, and covering, any that are at all inefficient being rejected.

The complete instrument—transformers, crystal detectors, telephones, loud speakers, etc., are sent to a special testing room after completion, where they have to pass very hard tests before they are classed as perfect.

Should, however, one of the loud speakers be pronounced as not perfect, it is sent to the laboratory for further tests, where any faults are corrected.

ADDITIONS TO THE "POPULAR WIRELESS" DIRECTORY OF AMATEUR STATIONS.

Call Sign.	System.	Name.	Address.
2 S F	T.T., C.W., and Telephony	C. Midworth, A.M.I.E.E.	"Sumia," Ridgeway Rd., Osterley, Middlesex.
5 C C	Spark 180 metres, C.W. & Telephony	A. Wm. Young ..	Bath Electric Plating Works, Foxcombe Road, Bath.
5 F I	C.W. & Telephony..	H. D. Webb ..	59, Bradford Street, Walsall.
5 F R	Spark, C.W., T.T. & Telephony	J. L. Jeffree, F.R.A.	191, St. James Road, Croydon.
5 F Z	—	Lincoln and District Amateur Wireless & Scientific Soc.	Lincoln Technical School, Lincoln.
5 O D	—	Ralph Bates ..	Holmside, St. Catherine's, Lincoln.
5 N P	Telephony & C.W...	Eric P. Burgess ..	2, Queen's Rd., Manningham, Bradford.
5 U M	—	H. Allchin ..	78, Chester Rd., Forest Gate, E.7.
5 S W	—	C. Bedford ..	Turton Hall, Gildersome, nr. Leeds.
5 V K	C.W. & Telephony..	Bernard Caldwell ..	Caverswall, Lower Walton, nr. Warrington.
5 W M	Spark, C.W., T.T. & Telephony	J. B. Renshaw ..	Wireless House, Old Chape St., Blackburn.
6 A A	C.W., T.T. & Telephony	Durham and Northumberland Collieries Fire & Rescue Brigade (F.P. Mills)	854, Scotswood Rd., Newcastle-on-Tyne.
6 A B	C.W., T.T. & Telephony	(Portable set)	854, Scotswood Rd., Newcastle-on-Tyne.
6 A G	C.W., T.T. & Telephony	W. H. Fortington ..	237, Dudley Rd., Rotton Park, Birmingham.
6 C C	W. & Telephony ..	David Burne-Jones	"Gwalier," Rustic Ave., Streatham, S.W.16.
6 C W	—	Burne-Jones & Co., Ltd.,	Montford Place, Kennington Rd., S.E.11.
6 D W	Telephony & C.W.	Douglas H. Johnson	131, Clapton Common, E.5.
6 G Z	—	R. C. Neale... ..	Farnborough Rd., Farnborough, Hants.
6 H D	C.W. & Telephony..	National Wireless & Electric Company	Church Rd., Acton, W.3.
6 H V	—	W. J. Butler ..	15, Algernon Rd., Edgbaston, Birmingham.

CHANGING AND REPAIRING 'PHONE RECEIVER CORDS.

Describing methods of locating faults in 'phone cords and how to deal with them without the necessity of purchasing new leads.

'PHONE cords which have been in use for some time become frayed and perhaps develop faults, which are usually of an intermittent and therefore irritating nature. It is within the scope of all readers to fit new cords, which, if necessary, may be much longer than the length usually supplied with the 'phones.

The various faults likely to occur may be classified as: (1) Contacts, due to isolated broken strands penetrating the covering and touching the other conductor. In such cases, if the contact lies between the fork of the cord and the terminals of the set, both 'phones are put out of action. A contact between the fork and one receiver will only put the latter out of action.

(2) Disconnections, due to a broken conductor. Both 'phones will fail to respond.

(3) High resistance faults, due to bad connections causing wheezing and grating noises.

(4) Leakage due to dampness. The remedy is obvious.

Lay the long portion and the single 2 ft. 6 in. strand together, as shown diagrammatically in Fig. 1, and having first marked the ends of the single piece, twist up with the free ends of the long piece, thus making the fork. (See Fig. 2.) This point should now be well bound up with strong waxed thread, as should also the points where the flexible branches to the set terminals and the receivers.

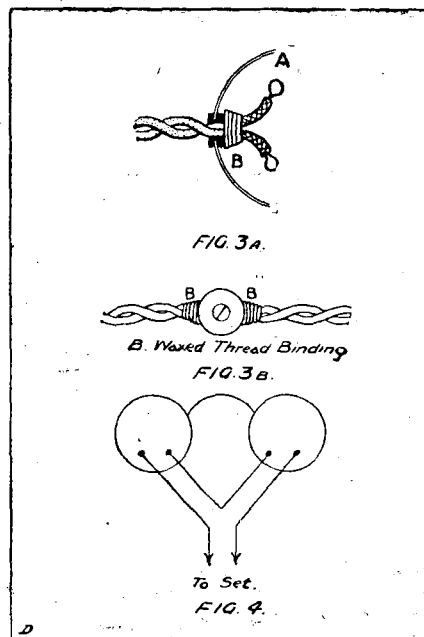
The insulation should now be carefully removed from the six ends, and suitable loops being made and bound as before, for the receiver terminals and the set connections. If straight ends are required the flexible conductors should be well cleaned and then tinned, which will provide what is practically a solid wire.

Minor Adjustments.

The secret of successful cord connections consists in so arranging things that no actual strain is taken by the terminals. This is usually provided for at the receiver ends. Fig. 3A shows one method when wiring receivers with internal connections. The cord when passed through the receiver case is pulled well through and then bound in such a manner that when pulled back again the binding butts against the inside of the case.

That part of the cord between the binding and the terminal should have a little to spare when connected up, and this also applies to Fig. 3B, which shows a small grooved ebonite or hardwood washer slipped in between the twisted strands of the flexible and secured by binding. This washer is then screwed to a suitable part of the set.

The permanent magnets of the 'phones have, of course, a fixed polarity, and they

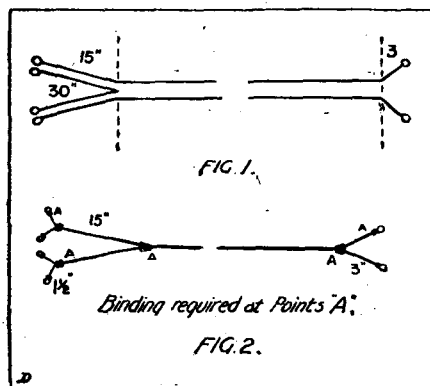


usually operate best when incoming currents augment this polarity. When connecting up the receivers it is advisable to see that both are joined up in the same direction. For this reason the ends of the 2 ft. 6 in. single strand flex were marked, and Fig. 4 shows the connections. When these are correctly made the set ends may be arranged to give the best results.

Essential Details.

Although the difference is slight, more especially with crystal working, a keen ear can easily detect an improvement when the 'phones are working in a certain direction and every help to efficiency, however small, should be considered.

Another tip which may be useful, though it does not concern the repair of 'phone leads exactly, is that the diaphragms of the earpieces should be changed over occasionally. After a time the diaphragms become bent towards the magnets and this should be rectified every now and then by reversing each diaphragm.



Intermittent faults of class 1 and 2 may be located by joining the 'phones up to a single cell, not a battery or accumulator. At the instant of connecting up a single sharp click will probably be heard in the receivers. Now work gradually along the cord, moving it about between the fingers until a point is reached which, when moved, causes a loud grating noise. This is the position of the trouble. Should no click be heard when joining up proceed in the same manner.

Replacing the Leads.

To replace faulty cords, procure a length of ordinary electric light flexible cord 35/40 or 14/36. As the description implies, it may consist of 35 strands of 40-gauge copper wire or 14 strands of 36-gauge copper wire, rubber insulated and finally covered with silk or cotton. Numerous colours are obtainable, and the cost is but a few pence per yard. Purchase a piece 2 ft. 6 in. longer than the final length of cord is intended to be. Cut off the 2 ft. 6 in. piece and remove the twist until the strands are separated, as only one is required to make the series connection between the receivers.



A corner in the testing department attached to the factory of Radio Instruments, Ltd.

GEARY RUNS A REVOLUTION.

By HIGHAM BURLAC.

How the affairs of state concerning a South American Republic centred for a brief moment around the doings of our old friend Geary.

IN a certain drinking cellar in the little Central American town of San Blanca, where the Civil Guard at the corner of the Plaza is safely sleeping and the snuff-coloured lads gather round the little green tables for their evening vermouth-and-soda, the name of Geary is execrated as that of one of the blackest-hearted gringos that ever sold the liberty of the proletariat for counterfeit Mexican dollars with holes punched in them. It's a sad story, and Geary does not care much for it to be told; but as he has given up honest aeriels and uses a frightful affair disguised as a framed picture of "The Soul's Awakening," which comes away from the wall on hinges, he is to all intents and purposes dead to polite society, so I have no scruples in giving him away. After all, it's a matter of history.

What? Did I say he *run* a revolution? The printer again! That was a misprint. I meant "ruins a revolution." Yes, he jammed one of the brightest and merriest little blood-letting propositions in the fair pages of San Blanca's records. Don't ask me how he came to be in San Blanca, for that is a yarn which belongs elsewhere—Scotland Yard, I expect. (I always told you I suspected Geary, didn't I?)

Well, once upon a time Geary was walking down the street of Ten Thousand Holy Snakes de la Something or Other, which was the only street in San Blanca; the other street had been sold to the neighbouring State by the President. He was dead sick of beating off the mosquitoes—big chaps as hefty as parrots—and kicking the vendors of lottery tickets. The bull fight had been postponed sine die, because they could not borrow a bull and the matador had the wind up about his pigs, which he said were developing croup and needed constant attention. Nobody seemed interested in wireless, and the only other vice was a queer sort of card game at which you either won a dud dollar or got your throat slit. Murder by shooting had been declared a Presidential monopoly. So Geary went on down the street of, etc., feeling as bored as a lion tamer at the cat show. All of a sudden things happened about as fast as the incidents in one of Tom Mix's films.

Effects of a "Tonic."

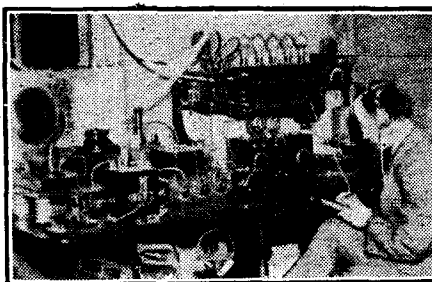
A long dago wormed out of a fonda and approached Geary, bowing and scraping like these fellows who try to sell a complete set of Shakespeare's works on the instalment plan, "complete with fumed oak bookcase."

He said, "'Scuse, please. You wanting whisky-drink? Yes? No? How do you do?"

Geary replied, bluntly and without emotion, "Yes."

I do not know why. When a strange, long greaser anywhere in Central America offers you a buckshee whisky, what do you do? You hop it, by Jove, and you don't stop till you get to the frontier and over. But Geary said "Yes." Now, I ask you!

So down they went, past the fake counter where you buy the contraband tobacco, down to where they draw pictures of gallows on the walls in chalk. Five assorted dagos were sitting round a table, and these, upon Geary's entrance, arose with expressions of politeness. A real, guaranteed non-corrosive whisky conjured itself into Geary's hand and in a few seconds down his dry gullet. Little lights came and went in Geary's head, so that he was aware that he hated the nose on the largest dago. Accordingly he smote that nose with his clenched fist, and Senor Don Jaime Lopez y Tortillano, giving vent to muffled sounds indicative of agony and vermouth, rolled upon the ground; but not a blade was drawn, not a Carramba spoken. Can you believe it? Instead of melodrama, the strange long greaser let off about twelve reels of Spanish to the other sons of sorrow, and then began his beautiful English again.



Mr. S. W. Heath, of 77, Clifton Place, Plymouth, operating his efficient amateur station.

Geary "Falls" For It.

"You seet dawn, mister. Oll raight-Liss-ten. You 'ave the fighting sangre. Perfectamente. Bueno. Me an' my amigos make the revolution. Savvy? Beeg, beeg shoots. 'Orrible row. We keel Presidente—w'at you call 'bump 'im off.' Bueno. Keeled the Presidente, me and my amigos; all same you say 'Jollyolpals,' we geeve you concessions. Oh, lots of dough! Soft job. You 'elp us? Yes? No? God save King and all zat. Ip ooray!"

Geary got most of this, and, without asking for repeat signals, answered: "Righto, Don Quicksoat! On general principles I'd do in any honey-tinted dago President—where'd you put the bottle?—but if there's boodle in it, too, my name is Two-Gun Geary. Vamos. What do I do?"

"You are telegrafista, eh? Make the spark—pzz-pzz. Wat they say—how call dam sing—mm mm—telegrafia sin hilos. Oh, yes, wahlless! Leetle Marconi boy, yes? We wantin' you telegrafiar up dere. Give Carlos time when bump Presidente."

The long, strange greaser pointed to the Presidential residence which crowned the hill.

Now, Geary agreed to do what was wanted, and, having inspected the radio installation, which was housed in a mule-shed and consisted of a sulphated accumulator and a cheap medical coil, he bimbled

off to his hotel. But the morn brought counsel. Geary went out to look at the pock-marked wall against which they shot revolutionaries, and decided he was a loyalist. On the other hand, he positively had to remain in San Blanca for another month, and the idea of the long dago looking for him with a pork-knife at all hours of the night made him shudder at a frequency approaching H.F. So he walked up the hill to see the Presidente.

Geary Changes Sides.

He found the Presidente smoking cigarettes and waving long, thin fingers in the face of an angry concession-hunter. The ruler professed to be quite helpless in the matter, but added that whatever the matter was—and he did not know—he thought tomorrow would do as well as any other day. The concession-hunter confided the immortal part of the Presidente to Halifax—or it might have been Wigan—and departed. Then Geary opened out and woke up the six-foot sleeper with his news. What excited old Garcia—or was it Manuel?—was not the imminent bumping-off which Carlos had ready for him, but the information that there was a wireless set in the State of —. He wanted it for the state army, which was playing chuck-farthing in the state stable just then. To cut a long story short, Geary had to sneak the transmitter, while the President determined to arrest Carlos severely and bag his receiver. Vaya, a complete wireless station. Would Geary be state operator? Yes? No? 'Scuse, pliss.

At the appointed hour Geary crept up to the mule-shed and made the spark gibber a bit; whereupon the long dago and his bunch of stiff, with assorted cries of "Down with tyranny!" "A bas l'income-tax!" "Vive independence and death to the destroyer of the dole!" tossed off a bumper of hot blood, and, seizing the state blunderbuss, rushed forth to—to meet eight state policemen, who knocked the stuffing out of them.

Fruits of Loyalty.

In return for the transmitter the Presidente sold Geary a concession on all the mahogany in the Republic across the road for ten dollars. Geary sold it back to him for five dollars (paper), and in the morning they formed a syndicate and sold the mahogany to the concession-hunter for a case of whisky.

The whisky was bad methylated spirits. There is no mahogany in the Republic across the road. Geary found that the paper dollars were printed by the previous administration and had been repudiated by the state army, who owned the state printing-shop. So he came away with the medical coil in his left trouser leg and Carlos' telephones in his hat.

After this revelation perhaps Geary will kindly return the transmitting valve he borrowed from me. This is Clapham, this is; not San Blanca.

The Marconi-Osram 'D.E.R.' Valve has now been reduced from £2 to 27s. 6d.

Apart from its cheapness, the outstanding advantages of the 'D.E.R.' (the Valve which is fitted to the famous Marconiphone V2) are:—

- (1) It consumes little more than half the current used by the ordinary Valve.
- (2) Its effective life is from 6 to 8 times longer.
- (3) It can be used with filament dry-batteries if desired.

The 'R'-type Valve has also been reduced from 17s. 6d. to 15s. 0d.

The Marconiphone V2 is also cheaper.

In consequence of the reduction in the price of the 'D.E.R.' Valves, the Marconiphone V2 is now sold at

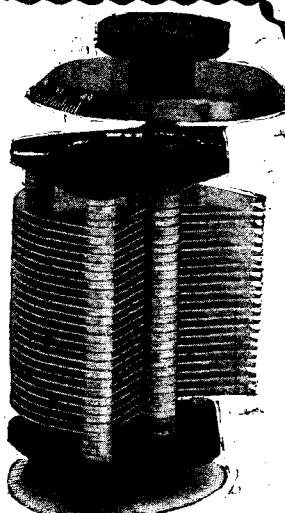
£22 15 0

complete with Headphones, Valves, Batteries, etc.

The
Marconiphone
The Triumph of the Master Mind

Your local dealer can supply you. In case of difficulty apply to:

MARCONI'S WIRELESS TELEGRAPH COMPANY, Ltd
Marconiphone Dept., Marconi House, Strand, London, W.C.2



JUST WHAT IS WANTED!

A Variable Condenser
of right capacity.

Try a

JB

WHICH HAVE BEEN
THOROUGHLY TESTED
AND FOUND CORRECT

**The ACME of
PERFECTION**

SCIENTIFICALLY DESIGNED
BY EXPERTS.

ONE HOLE only for FIXING
to PANEL. Large METAL to
METAL BEARINGS.

Completely assembled, as illus-
trated, including

KNOB and DIAL.

'001	.. 8/6	Packing and
'00075	.. 8/-	Postage
'0005	.. 7/-	extra.
'0003	.. 5/9	One only, 9d.
'0002	.. 5/-	Two .. 1/
VERNIER	4/-	Three .. 1/3

Can be inspected and purchased in
LIVERPOOL at Messrs. LEWIS'S LTD.
(Wireless Dept.), RANELACH ST.

Unsolicited. Original can be seen at
our Office. London, E.17.

Messrs Jackson Bros.

Dear Sirs,—It will be of interest to
you to know that I have tested the 12
Variable Condensers bought from you
and of your make. Types '001 to the
Vernier.

The Condensers came through the test
with very satisfactory results, being of
the capacity specified. It is with
pleasure I write these few lines to con-
gratulate you on the excellent results.
—Yours faithfully, A. W.—A.M.I.E.E.

Obtainable through your dealer or direct from:—

JACKSON BROS., Condenser
Specialists

(First Floor), 8, POLAND STREET, OXFORD STREET,
LONDON, W.1. TRADE ENQUIRIES INVITED

Phone : Gerrard 6187.

"WIRELESS REVIEW AND SCIENCE WEEKLY"

On Sale every Tuesday Price 3d.

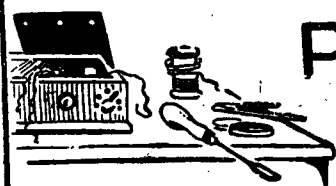
EVERY amateur interested in wireless generally, and not solely and particularly in "listening-in," has realised by now that *Wireless Review and Science Weekly* is the leading high-class weekly journal. Its contributors are for the most part men of universally accepted eminence in the world of Wireless and Science: it has correspondents, specially retained, in Berlin, Paris, Russia and America, to supply news of developments in Science and Wireless worthy of the British amateur's interest, and in conjunction with *Popular Wireless* it supplies its readers with an unrivalled information bureau. Every query from a reader receives the most careful attention. If necessary it is sent to the Scientific Adviser-in-Chief, Sir Oliver Lodge, for expert elucidation.

If you are really keen on your hobby, you will not fail to purchase

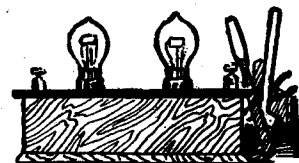
"WIRELESS REVIEW AND SCIENCE WEEKLY"

Price 3d.

Every Tuesday



PRACTICAL IDEAS FOR THE AMATEUR



AN ADJUSTMENT WRINKLE FOR VALVE SETS.

IT is perhaps not generally realised what an important part the grid leak plays in the ordinary type of valve receiver. The fact that the actual component itself is simple to construct—nothing, surely, is easier than making a few lines with a piece of soft lead pencil—may have a lot to do with the summary manner in which it is disposed of by the ordinary amateur; and yet it is not too much to say that a detector valve without a grid leak and condenser is inoperative.

Value Critical.

Certain readers may remember that in "pre-grid leak" days the potentiometer and battery combination answered the same purpose. One has, however, only to look at a dozen modern valve receiving sets to see that up-to-date valve apparatus has nothing in common with the last-mentioned means of obtaining prolonged rectification, and it would to-day be difficult to find a receiver on the market employing a potentiometer and dry cells.

The correct ohmage value of a grid leak is undoubtedly best appreciated by those amateurs whose apparatus depends upon a single variable condenser or adjustable inductances for tuning.

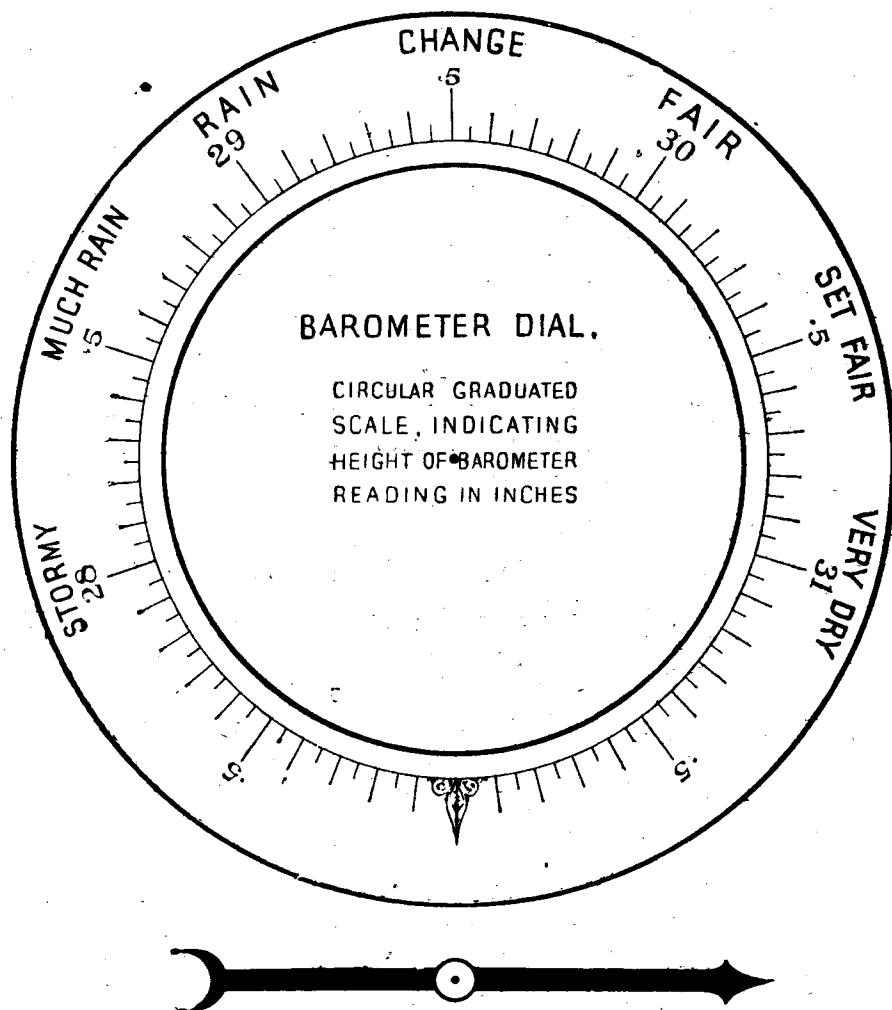
Simplicity of control is the aim of all designers of valve receivers, and the advantages to be derived from apparatus which can be adjusted by the movement of one control, such as the simplified form of "flivver" circuit, are obvious.

Such circuits, however, will, according to the condition of the atmosphere, be found to vary a good deal in sensitivity of reception, and the elimination of jamming often becomes a formidable problem.

The Variable Leak.

Those readers who have experienced the annoyance of achieving exceptionally good results—and talking about them—and then failing dismally, perhaps the very next day, to justify such remarks to others, will do well to use a variable grid leak.

It is not, of course, an infallible cure for all the troubles experienced by the "listeners-in," and it is not claimed that its inclusion in the circuit is a sovereign remedy for atmospherics; but when next your favourite circuit fails to function to your satisfaction, and you have tried without success a hundred-and-one tests to find out why, give a thought to the too often forgotten grid leak, and try varying its value—you may be surprised at the result.



A WIRELESS BAROMETER.

AMONG the items regularly broadcast are the daily weather reports and barometrical readings. But how many listeners-in have studied the barometer with care for themselves, or classified weather as other than "good" or "bad"? To these the announcements must convey a very vague impression. A definite means of following the weather report is provided by the accompanying simple barometrical dial. Below this has been separately drawn a pointer, and the suggestion is that those interested should cut out the dial and pointer, and paste them on to card-board.

Useful Research.

Then fix the pointer to the centre of the dial, so that it can be turned to correspond with the report of the day. In this way some real knowledge of weather conditions should be gained from the account given by the broadcasting stations. For example, should the daily reading at some point or other be 31 inches, then the forecast in that quarter will be "Very Dry," whereas 28.5 inches indicates "Much Rain." Intermediate points are graduated accordingly.

A useful field for research is also opened up in that the readings of the barometer can be compared with the atmospheric conditions. The types of atmospherics experienced at various readings of the barometer should be noted and tabulated. It will be found that to a large degree the weather can be foretold by the nature of these discharges, and much useful information on this little known subject may be compiled.



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.

The Beckenham and District Radio Society.

On Thursday, July 12th, the above society introduced a remarkably able lecturer and exponent of dual amplification circuits in Mr. Voigt, who was very ably assisted by Mr. Knight, A.M.I.E.E.
Sec., Mr. J. F. Butterfield, 10, The Close, Elmers End, Beckenham.

Croydon Wireless and Physical Society.

At the ordinary meeting on July 7th, Mr. C. W. Hale (2 H S) described and demonstrated a three-valve set (1 h.f., 1 det., and 1 l.f.) of his own design.

Owing to the holidays, the next meeting is held over until the middle of September.

Hon. sec., B. Clapp, Meadmoor, Brighton Road, Purley.

The Radio Society of Great Britain.

On Thursday, July 5th, at 7.15 p.m., a special message was broadcast congratulating this society on the attainment of its tenth anniversary.

At the next general meeting of the Radio Society on July 25th, a paper was read by Mr. Philip R. Coursey which has been contributed by Mr. Lionel J. Hughes, entitled "Resistance Capacity Coupled Amplifiers."

Hon. sec., Leslie McMichael, M.Inst. R.E., 32, Quex Road, West Hampstead, London, N.W. 6.

North London Wireless Association.*

On July 9th, 1923, Mr. W. L. Johnson gave his lecture on "Radio Metal Craft."

A resolution was carried declaring the association closed during the month of August.

Hon. sec., Mr. J. C. Lane.

The Yiewsley and West Drayton Radio Society.

A meeting was held at the Chapel Rooms, Ernest Road, Yiewsley, on July 11th.

Mr. Alan Smith, of "The Studio Electric," Yiewsley, had brought a camera along, and a few exposures were made.

Mr. L. N. Tyrrell gave a lecture on the following Wednesday.

Hon. sec., J. H. Sutton, Esq., 47, Acacia Avenue, Yiewsley.

The South Norwood and District Branch of the Radio Association.

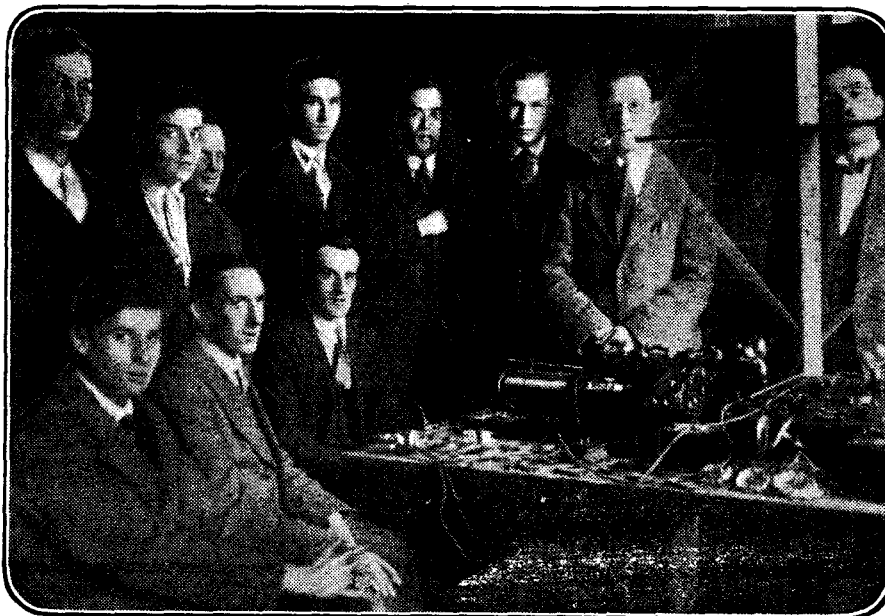
The meeting on Thursday, July 12th, was a discussion on "Broadcasting," opened by Mr. S. W. Butters (5 V U).

Mr. Butters spoke of the "good old days" of 2 M T and led up to the present day, comparing the British with the American methods of broadcasting.

Mr. E. A. Saunders then gave his views on the subject, suggesting an "aerial hunt" by radio society members organised by the P.M.G. in an attempt to run to earth the pirates.

After this discussion Mr. Butters and Mr. Saunders each gave a short lecture on "Television and Photos by Wire and Wireless." Mr. Butters remarked at the conclusion that both himself and his colleague were experimenting in this direction and hoped to bring the results of same before the branch within a few months.

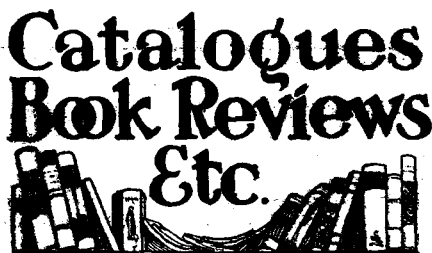
NOTE.—Mr. A. Trill, a member of the above society, was successful in winning a £5 prize in the "Man Hunt" recently organised by 2 L O. Mr. Trill followed the "Uncles" on a cycle for



Some members of the Tottenham Wireless Society, together with the Club Set.

half an hour, and only gave up the chase when the chain of his cycle broke.

Hon. sec., C. H. P. Nutter, Radio Corner, Selhurst Road, South Norwood, S.E. 25.



Two interesting leaflets have been forwarded to us by "Siemens," one dealing with their loud speaker and the other with a special type of dry battery to be used for the dull emitter valve. In these batteries provision has been made to counteract the natural drop of voltage through usage by the addition of a few spare volts above the three required for this type of valve. The

loud speakers are extremely neat, and it is claimed that they are acoustically perfect. They are supplied in three different resistances.

A very neat and well-printed catalogue has lately been issued by C. F. Elwell Ltd., the makers of the well-known Aristophone receivers. Besides depicting these complete receivers, the catalogue contains many illustrations of every type of component from a telephone tag to complete aerial equipment.

Radio "Stocks" have forwarded price list No. 157. This leaflet contains a very good selection of accessories, wonderfully cheap yet of good class. We note that this firm guarantees to fully refund for any material not giving satisfaction without question.

It is not necessary for those living in the Midlands to get their wireless apparatus from London when such a good selection can be viewed in Halifax, for instance, at

the showrooms of the Electrical Supply Stores. This firm's catalogue fully bears this out, it being filled with details of highly efficient complete sets and well-made accessories, etc.

An interesting little leaflet has been forwarded to us by W. V. Webber. It is descriptive of many neat accessories, also pricing complete valve sets. Particular attention is drawn to the valve panels which are fitted with a fuse, thus saving any fear of burning out a valuable valve.

We have received a sample of "Receptite" crystal

from Messrs. Cook & Co., and have found it gives very good results. As a detector for use with an H.F. amplifier or a dual amplification set the crystal is wonderfully stable without losing its sensitivity.

Generally speaking, head telephones used with a horn as a loud speaker do not give good results, but the "Premier Telephone Co." state that with the large pattern "Sidpe" phones, for which they are the sole agents in Great Britain, excellent results can be obtained with a horn, owing to the clear and loud signals these phones give.

A variable grid leak is a very useful addition to any valve set, and should be used when valves are being constantly changed. A. H. Hunt, Ltd., have forwarded us a leaflet descriptive of a very neat variable leak which they have placed on the market. The advantage of this leak is that it is made to work conveniently either for panel mounting or otherwise.

RADIOTORIAL.

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

It is indeed good news to hear that dull emitter valves are now obtainable for 27 G. At this price they are within the reach of any amateur contemplating the employment of a valve set, because of the economy they effect in respect of the accumulator. Two volts will suffice to supply the necessary current, and as the current consumption even at this reduced pressure, is but half that of the ordinary type of valve, it will be seen that a 4-volt 20 amp. accumulator could be replaced by a 4-volt 5 amp. accumulator using a single dull emitter.

It is interesting to note that dull emitters can be used on the "P.W." Combination Set with quite satisfactory results. This increases the usefulness of this receiver for portable work to a considerable extent, and permits a maximum of efficiency for a minimum of bulk and weight—important points in the case of out-of-doors wireless work.

Visitors continue to attend the morning demonstrations at the offices of "POPULAR WIRELESS" in steady numbers, and the universal opinion of all those that examine the receiver and hear it working is that it is THE set of the day. Mr. B. Simmons, F.Sc., of 132, Brooke Road, E. 5, who attended the demonstration on July 31st, expressed but the general opinion when he remarked that the "P.W." Combination Set is "All that the designers say."

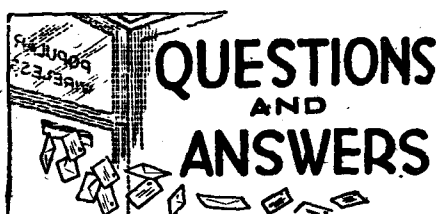
THE EDITOR.

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.



"DANIEL" (Bristol).—I am told that I can charge my accumulators by means of a Daniell cell. Is this possible?

Yes, the accumulators may be charged by means of Daniell cells (you will, of course, require more than one). Thus for a 4-volt accumulator you will need approximately six cells, while you will need about nine for a 6-volt accumulator. Large cells should always be used and will not need constant attention. The zincs should be carefully looked after and renewed when eaten away. The copper solution must be kept at its right strength. The cells should, of course, be connected in series, the copper being taken to the positive terminal of the accumulator. These cells are only useful for keeping up an accumulator as they give out too small a current for initial or full charging.

S. C. (Walworth).—I have built the Flewelling circuit, in fact, I have taken it down and

put it up three times, but fail to get any sign of whistle, while 2 L O is only just comfortable on the 'phones. Can you give me any possible faults that I may look for?

In the first place it should be stated that, owing to the fact that this circuit relies on its strong reaction properties, it is not permitted by the P.M.G. for broadcast reception. As you seem to have wired the circuit up correctly, the trouble cannot be looked for in this direction. Possibly your coils are wrong—the reaction should be half as large again (or even more) than the A.T.I. The H.T. battery also should be variable and should give a maximum of about 100 volts for best results. Make sure that the windings of the two coils run in the correct directions, otherwise no reaction effect will be obtained. A little experimenting with the values of condensers will probably result in the whistle being obtained. Once obtained the difficulty is to tune it out, this being accomplished by varying the coupling between the coils and the values of the leaks.

A. Q. T. (Wimbledon).—In the article on valve-crystal circuit in "P.W." No. 48, there appeared (Diagram 3) a dual amplification circuit. I have built up this set and am getting very good results. To increase my range I wish to add reaction. How is this accomplished?

Reaction may be obtained in this circuit by coupling the anode coil, that is the one in the crystal receiver, to the A.T.I. Note that this type of reaction is not permitted by the P.M.G. for broadcast reception.

A. S. K. (Brighton).—What is the reason for applying a negative potential to the grid of an L.F. valve? How can this be applied to a dual amplification set?

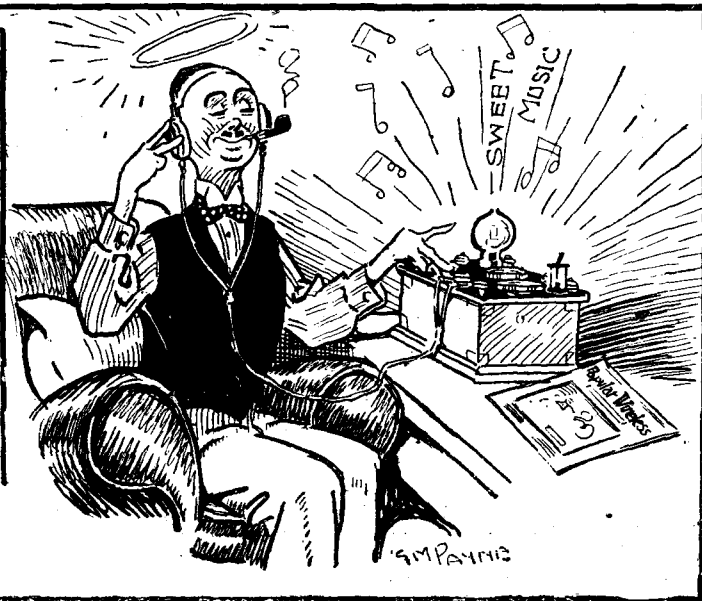
The effect of a negative bias on the grid of an amplifying valve is to make the valve work on a different part of its grid volts—anode current curve. During usual working the valve operates on the straight, steep portion of the graph, and the anode current is proportional to the grid potential. If we operate the valve at a bend in its characteristic curve, by giving the grid a negative bias, we then find that an increase of 1 volt, say, in the grid potential will produce quite a large increase in the anode current, while a decrease of 1 volt only results in a small decrease in the anode current. If carried to excess this bias will result in distortion or loss of signal strength, so that a variable bias should be employed. The simplest method of applying the negative potential to the grid is to connect a dry battery, preferably tapped at frequent intervals, in the grid circuit between the filament and the grid. The filament battery is connected so that the minus goes to earth (or grid), and the grid battery is placed in series with the L.T. negative and the earth connection—that is, to negative filament socket of the valve and to the earth terminal of the set.

(Continued on page 906.)

(1) TRIALS OF A "STUNT" SET.



(2) JOYS OF THE "P.W." SET.

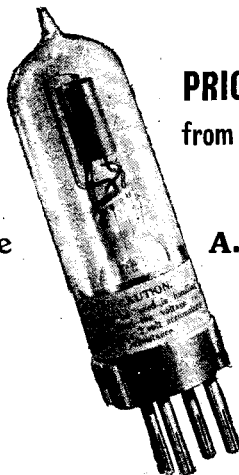


EDISWAN

New Low Temperature (Dull Emitter) VALVE

PRICE REDUCED
from £2 to 27/6

PRICE REDUCED
from £2 to 27/6



Type

A.R.D.E.

*Every care must
be taken that not
more than two
volts are put
across filament.*

Filament Volts ..	1.8—2.0
.. Current ..	.30
Anode Volts ..	20—30.
Bulb Diameter ..	29 m.m.
Overall Length including pins ..	110 m.m. max.
Cap	Standard 4-pin.

July 1st saw the reduction in price of
our R. Valve from 17/6 to 15/-.

**NOW we announce another enormous
price reduction—our Dull Emitter
Valve type A.R.D.E. previously costing
£2 is reduced to only 27/6.**

*Improved methods of production, coupled with years of
experience in Valve manufacture, make this wonderful offer
of ours possible to-day.*

Use this Valve under proper conditions and reliable per-
fection is the result. Simply see that only 2 volts are
passed across the filament.

*We also manufacture complete Receiving Sets, Accessories,
H.T. and L.T. Batteries. Ask for Descriptive Leaflets.*

*If your usual Dealer cannot supply you send us a p.c. with
his name and address.*

FREE.—Illustrated Booklet entitled "The Thermionic
Valve." Have you had your copy?

EDISON SWAN ELECTRIC CO., LTD., & REDUCED

Contractors to H.M. Admiralty, War Office, Royal Air Force.

**123/125, Queen Victoria Street, E.C.4,
and 71, Victoria Street, S.W.1.**

Works: Ponders End, Middlesex.

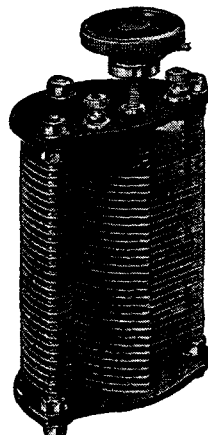
Branches in all Principal Towns.



HULLO EVERYBODY

VARIABLE CONDENSERS

COMPLETELY ASSEMBLED WITH EBONITE
ENDS AS SHOWN IN SKETCH.



*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

ASSEMBLED BUT WITH-
OUT EBONITE ENDS

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, 3/6.
Moulded Valve Holders, with
nuts, 9d.
Perikon Crystal Detectors, glass,
2 crystals, 1/4, 1/6 and 2/8.
Glass Dustproof high-class De-
tector (whisker), 3/-.
Contact Studs and Nuts, doz. 4jd.
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 3jd.
Valve Legs and Nuts, 1d. each,
9d. doz.
Valve Legs with shoulder, 2 for
2jd., 1/- doz.
Switch Arms, very good, 8d.,
10d., 1/3.
Twin Flex, 4 yds. 7d., 12 yds. 1/7.
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 Insula-
tors, the lot, 2/6. No post
orders.
Real Ebonite Knobs, 2 B.A. Bush,
3d.

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 3/4 and 2 1/4. 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 3jd.
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 3jd.,
1/- doz.
D.P.D.T. Switch, compact, high-
class article, 2/3d.
4 yards Copper 18-gauge connect-
ing wire, 2d.
6 yards Bell Wire, 2jd.
6 yards Bell Wire, D.C.C., I.R., 3jd.
Radio Instruments, Ltd., L.F.
Intervalve, 25/-.
6 v. 60 a. Accumulators, extra
bargain, 30/-.

Please note that a special dis-
count 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.

**SPECIAL PRICES RADIO CLUBS
AND TRADE.**

IN STOCK.—Mullard Ora,
Coscor, 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/- 1jd. in the
1/- (or any part). Over 20/- carriage paid (Condensers excluded).

M. RAYMOND,

27, LISLE STREET, W.C.2

Right opposite DALY'S Gallery Door.

Open 9-8.

Saturdays 9-6.

Sundays 11-2.

'Phone: Ger. 4637.

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 904.)

A. J. B. (Doncaster).—What is the formula for calculating wave-lengths to which an aerial circuit can be tuned, having the A.T.C. (1) in series; (2) in parallel?

For standard aeriels, the capacity of which can be taken to be about '0003 mfd., the following formula is used, $\lambda = 1885 \sqrt{L \times K}$, where L and K are the total inductance and total capacity of the aerial circuit. If the A.T.C. is in series you will have to calculate the total capacity from the formula $\frac{1}{K} =$

$\frac{1}{K_1 + K_2}$. Thus, if the condenser you intend to use has a capacity of '001 (max.), and is in series with the aerial, you will reduce the capacity of your aerial system, the resultant capacity being found as follows:

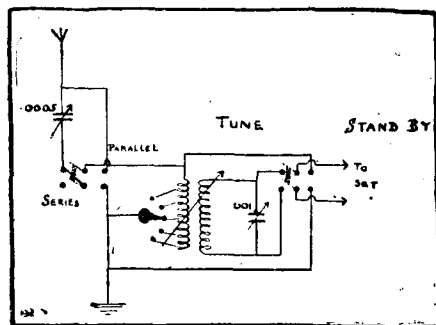
$$\frac{1}{K} = \frac{1}{'001} + \frac{1}{'0003}$$

The resultant capacity is then used in the formula $\lambda = 1885 \sqrt{L \times K}$, where it takes the place of '0003 for K . If the condenser is used in parallel, then the maximum wave-length will be given by $\lambda = 1885 \sqrt{L \times K}$ where K is $(.001 + .0003) = .0013$ mfd. In each case the answer is only approximate, as the capacity of the aerial system (.0003) is only roughly correct. The inductance of the coil in microhenries must be calculated from the ordinary formula for inductance. The inductance of the aerial will be fairly low.

* * *

A. P. D. (Wandsworth).—I have built a four-valve set, using a loose coupled tuner, but find it very difficult to tune in distant stations. Would a "stand-by tune" switch help at all?

A switch would be very useful in that capacity, as it enables you to tune in on the aerial circuit before bringing in the selective tuning of the loose coupler. The connections of a "stand-by tune" switch are shown in the diagram. A series parallel switch is also shown,



and is always a useful addition to any receiving set. To tune, place the series parallel switch in series or parallel, the former to decrease the wave-length, the latter to increase same, and place the "stand-by tune" switch in the "stand-by" position, and tune until best results are obtained on the primary coil alone. Having obtained loudest signals on this, switch over to the "tune" side, and then readjust, but this time with the aid of the secondary. Tuning on a multi-valve set, using both primary and secondary coils, is usually very tedious, and the "stand-by tune" switch does much to simplify this always tricky operation.

* * *

P.W. C. (Hull).—In the "P.W." Combination Set would the dull emitter type of valve give just as good results as an ordinary R type? May variometers be used in place of the coils shown? Can a vario-coupler be used? How is reaction obtained on this circuit?

Yes, the D.E.R. valves can be used on this circuit, and one that we are trying at present is giving excellent results. Variometers may be used. In this case the variable condensers could be dispensed with as far as fine tuning is concerned, the only advantage in leaving them in being that they would decrease or increase the wave-length if put in series or parallel. Note that the anode variometer should for best results be larger than the A.T.I. Reaction is obtained by coupling the anode and A.T.I. together. This, of course, would be a difficult operation using variometers. Note that this reaction would not be per-

mitted by the P.M.G. during broadcasting hours. As regards the vario-coupler, it could be used, but in what capacity you do not state. You could, instead of only using a primary coil, add a secondary in the usual manner, making the stator act as primary and rotor as secondary. Again, the stator could be used as A.T.I. and the rotor as anode, but the remarks above as regards reaction during broadcasting still apply. As a matter of fact, it is advisable to keep to the details as given in POPULAR WIRELESS as far as possible, otherwise the full result from the set may not be obtained.



THE "P.W." COMBINATION SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—We thank you for the copy of the article on your POPULAR WIRELESS Combination Dual Amplification Circuit. Since receiving the above we have had pleasure in testing this circuit, and as regards results can safely state that it is very excellent. One of the chief characteristics of this circuit is its stability and the ease of operation.

We are glad to note that the filament rheostat is placed in the positive lead of the filament battery instead of the negative lead. This greatly assists in obtaining both efficient and stable operation.

There is just one point which we think should be attended to with a view to obtaining under all conditions good results, and that is a condenser should be placed across the high tension battery; this condenser having a capacity of at least .05 mfd. The advantages of this condenser will not be noticeable with a new anode battery, but if an old battery is in use, or one possessing a fairly high internal resistance, this condenser will tend to eliminate any bad effects due to such a resistance.

It is of course important that an R.I. transformer is used.

The omission of a grid resistance rod is a good point, and of course if aerial reaction were resorted to still better results could be obtained.

We can confidently state that your circuit is a sound one.

Yours faithfully,

RADIO INSTRUMENTS, LTD.

12, Hyde Street,
New Oxford Street, London, W.C.1.

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 sensitivity, 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,
A. E. T.

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

P.O.Z. ON A CRYSTAL.

The Editor, POPULAR WIRELESS.

Sir,—With reference to the reception of P O Z on a crystal set, I receive this station regularly on usual single-slide coil type on an indoor aerial of 17 ft. span. This is arranged in a loft under the ridge of the roof and is about 38 ft. above the pavement.

On the same aerial, but with loose coupled crystal set, 2 L O (4 miles) can be heard (and read) 15 ft. from the 'phones, and Birmingham has been heard occasionally.

Yours faithfully,

E. F. FULLFORD.

8, London Road, Clapton, E.5.

IN THE MEDITERRANEAN.

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to the letter from "Birdcage" re P O Z time signals in your issue of July 7th, I would mention that these signals are easily received in the Mediterranean on a small cargo boat—where the aerial attains no large dimensions—using crystal only, and are frequently received, atmospherics permitting, in the Red Sea and Indian Ocean at midnight, G.M.T.

With valves, on a ship's aerial, these signals can be read in Japan.

Yours faithfully,

"SPARKS."

Aberdeen.

FEW CORRECTIONS NECESSARY.

The Editor, POPULAR WIRELESS.

Sir,—I was surprised to see the fuss your correspondents are making in your issue of July 21st about the reception of the Nauen Time Signals on a crystal. This place is farther from Nauen than any part of the British Isles, yet when I was control officer at Ismid (60 miles east of Constantinople) soon after the Armistice, I took the time signals regularly from Nauen and F L on a plain piece of galena.

I was also much amused at the glib manner in which your correspondent "Anode" presumes to instruct his fellow-readers as regards both the Nauen and F L signals without apparently knowing what he is talking about. He tells us poor ignorant people that the letters M G Z which follow the Nauen call-letters P O Z are "the German equivalent for 'time signals'!" They are nothing of the kind; they are simply the initial letters of the German words, "Mittag Greenwich Zeit" that is, Greenwich Mean Time, on which both the Nauen and F L signals are based.

Then your well-informed correspondent "Anode" says the F L signals begin at 10.45, whereas they really begin at 10.44 G.M.T. That corresponds with about 12.44 local time here.

I am, etc.,

W. GORDON CAMPBELL.

Constantinople.

CORRESPONDENCE.

(Continued from page 906.)

To the Editor, POPULAR WIRELESS.

Dear Sir,—With reference to "Bird-cage's" letter in P.W., July 7th, I find that most amateurs gaze at you open-mouthed when you tell them that: "Oh, yes, Nauen time sigs. come in so-and-so!" They say, "On a crystal?"

Now, there is no reason why any amateur who has bought a good crystal set, no matter how simple, or who has taken the trouble to make one, and who is under average conditions, should not get P O Z.

One's aerial should be high and long and well-insulated. Nothing else matters. My aerial is 50 ft. from the ground, but, on the average, 5 ft. above the lead roof (the whole length). It is 75 ft. long. In one place I have actually had to bind the wire with rubber tape, because it rests on a gable. Its capacity is huge, because a coil made according to P.W. instructions, to tune to 700 metres max., brought in Croydon (900 m.) at the half-way point, using no tuning condenser. This aerial, which is in the "wireless shadow" (with relation to Berlin) of the high part of Hampstead, brings in P O Z at midday with perfect clearness, and at midnight, with several times the loudness, F L (Paris) can be read with 'phones on the table.

The following notes may interest:

The earth is another lead roof at lower level. A loose coupler has not much advantage over a single-slide inductance.

The crystal is galena and a 24 or 26 gauge $\frac{1}{2}$ in. copper cat's whisker, and the following is important. One can listen to weak amateur telephony and set one's crystal to a nicety for that wave-length—say, 450. One then tries for, say, P O Z, which is also weak, but on a vastly different wave-length (3,100). The result is probably nil if the signals, if there, are *very* weak. The crystal wants re-setting for the new (very different) wave. This phenomenon is very noticeable on weak signals, and the only way out is to set the crystal by listening to a station on or near the desired wave-length.

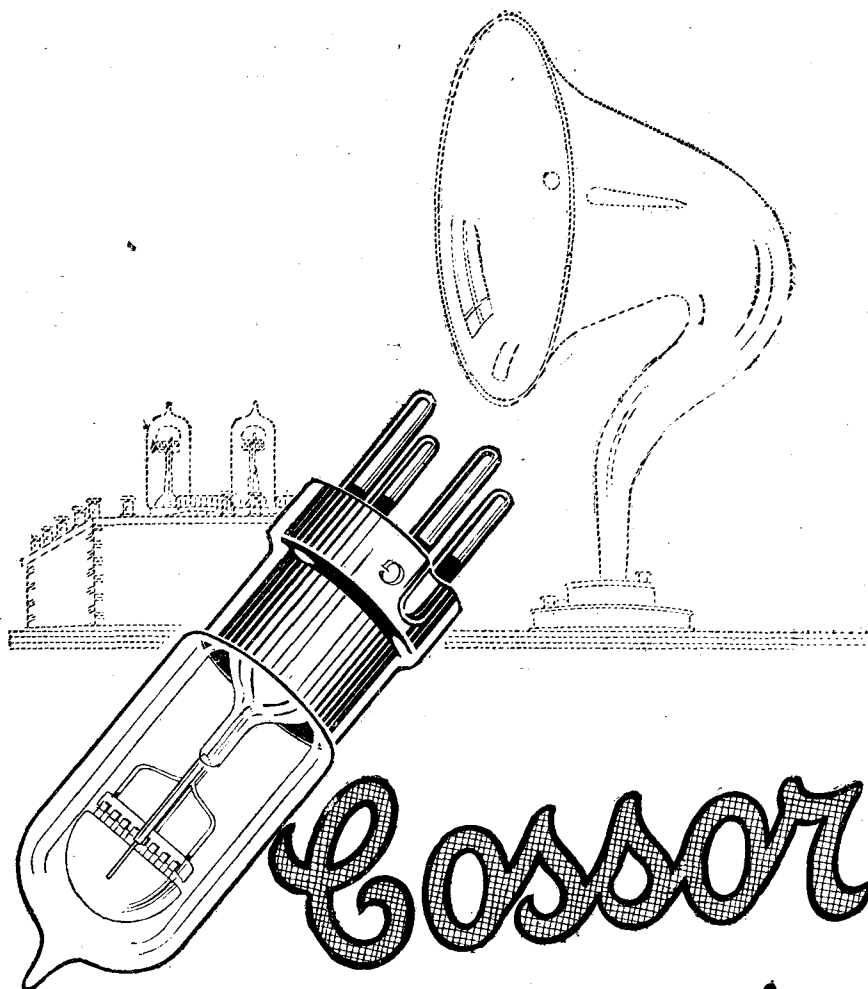
The 'phone condenser is a necessity for spark signals, strong or weak. Never use less than .01 mfd. (this refers to crystal sets only). I often use 3 mfd. My 'phones are of 300 ohms (total) resistance (ex-Govt.), and are not improved by a transformer. I have tried out N. & K. (German, 3,000 ohm) 'phones, Sterling (4,000 ohm), and Federal (American, 4,400 ohm) against my own, and find all about equal (used separately). The condenser notes apply to these latter 'phones, also.

If the amateur uses more than one pair of 'phones at a time, they should all be of the same resistance; and if he uses first one pair and then another of different characteristics—i.e. resistance—he should reset the crystal and the tuning if this is sharp.

All the foregoing remarks *re* crystals may not apply to all kinds of crystal, but they may be of help to some who have failed in long distances if you will publish, at least, that part of my, I am afraid, very long letter.

By the way, one more thing. In dealing with fickle high-frequency currents one's

(Continued on page 908.)



Cossor

-especially for
Loud speaker use

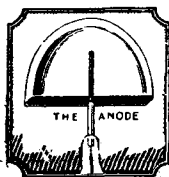
If your Loud Speaker results have been disappointing, make sure that the distortion is not due to your Set. See that the L.F. Transformers are spaced well apart, with the cores at right angles and preferably earthed.

Above all, note whether your Valves are of the right type. The unique construction of the **Cossor** renders it ideal for Loud Speaker use. The curved filament glowing inside the hood-shaped Grid and Anode uses practically the whole of the electron emission, and is responsible for a wonderful volume of sound quite free from all distortion.

To be quite certain of the best possible results, use **Cossors**—once tried you will never use any other Valves.

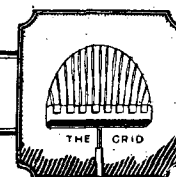
EACH
15/-

Sold by all Dealers
in Wireless
Components and
manufactured
solely by
**COSSOR VALVE
Co., Ltd.,**
Highbury Grove, N.5.



Gilbert Ad.

Amplifies - rectifies



ELECTRADIX RADIOS

**Immediate Delivery
from our Huge Stocks.**

Everything from a Wave Meter to
an Earth Clip.

The best equipped City Depot.
COME AND SEE US.

9, Colonial Avenue is first opening on
left in the Minorities, near Aldgate
Station, Metropolitan Railway.

LESLIE DIXON & Co. Tel.:
Avenue 4166
9, Colonial Avenue, London, E.1.

TALITE CRYSTAL, 6d. each

Also at 1/- Silver and Gold Cat's-whiskers, 3d. New lists.

See last week's advert. Phone 202 Yeovil.

THE BRITISH GENERAL RADIO CO., LTD.,
74, Hendford, YEovil.

SPENCER'S STORES

4-5, MASON'S AVENUE,
BASINGHALL STREET,
LONDON, E.C. 2

TELEPHONE. LONDON WALL 2292

"Philips" Dutch Valves ... 10/6 post free
Morse Keys, Adjustable Beat ... 3/6 post free
Brown's "F" Type Phones ... 25/- pair
Famous "Picard" French Phones ... 17/6 pair
VALVES REPAIRED ... 8/9 post free
Our Method of Repair will Please You.

TO WIRELESS EXPERIMENTERS. PATENT YOUR INVENTIONS.

They may prove very valuable. Particulars and consultation free. **BROWNE & CO.** Patent Agents,
9, Warwick Court, Holborn, London, W.C.1. Estab.
lished 1840 Telephone: Chancery 7547.

—AVON "N & K" HEADPHONE— 4,000 Ohms.

Everyone knows the famous "N & K." The
"AVON" N & K is the latest IMPROVED
MODEL. ... Est. free. £1.0.0.
See that the Ear Case is stamped "AVON." Not
genuine otherwise. Sole Concessionaires for U.K.

UTILITY & RADIO CO.,

329, High Holborn, London, W.C.1.
Factor Agents wanted in all towns.
Book your orders NOW for the winter trade.

CATSEYE CRYSTAL DETECTOR.

Ever-set and ready. Smallest, Loudest.
Latest. Complete with holder 1/6

Post Free.
APAIL, 37, Red Lion St., LONDON, W.C.2.
AGENTS WANTED.

FOR HOME ASSEMBLY

you should get our Two-Valve
High-Frequency Reactance Set.
This is thoroughly up-to-date in its design and refinements.
Features in Brief:—H.F. Valve, Tuned
Anode or Transformer Coupled at will.
Radiax Variable Reactance Aerial.
Fine and Vernier Tuning. Selective
Secondary Tuning, separate Filament
Resistances, Switch for valves.
We include illustrated instructions for
assembly, list of all parts and their
uses, and instructions for working.
A splendid Long Distance Set for £8.5.0
RADIAX, Ltd., 10, Radio House, Percy Street,
Tottenham Court Road, London, W.1.

RADIAX

WE SATISFY YOU

BEST DUTCH VALVES, 7/- EACH

Guaranteed. Round Bulb. Horizontal Grid.
Trade terms on application. Phone: Regent 1791.
HARRIS & RUSSELL, LTD. 15, Great Chapel St.,
Oxford St., W.1.

THE "MYSTIC" AERIAL

Will increase the Signal Strength of your Crystal
Set or increase the Range of your Valve Set
INCREDIBLE RESULTS ARE OBTAINED

HARD COPPER, 100 ft. ... 7/6
SILICON BRONZE, 100 ft. ... 10/6

HENRY HOLLINGDRAKE & SON, LD.
(ESTAB. 1814).

STOCKPORT.

SOLE AGENTS (LANCASHIRE & CHESHIRE)
for THE CITY ACCUMULATOR CO., LONDON.

**ELECTRONITE CRYSTAL AND
TORDINODIUM WIRE**

CORRESPONDENCE.

(Continued from page 907.)

insulation cannot be too good. Always
use ebonite or porcelain everywhere, even
if only in small pieces to mount each
terminal on separately.

Yours sincerely,
"EXPERIMENTER."
Hampstead.

EUROPEAN TIME SIGNALS.

To the Editor, POPULAR WIRELESS.

Dear Sir,—With reference to "Bird-
cage's" letter in your columns on the 7th
inst. on the reception of the time signals
from Nauen P O Z on a crystal set. This is
unlikely to be a freak, as he thinks possible.
I receive this station regularly every night,
using a crystal. For the daytime signal I
find the addition of one H.F. valve neces-
sary to make the signal audible.

I append the following list of some of
the European time signals sent out every
day, including Sundays, together with the
minimum number of valves which I find
necessary for their reception:

PARIS, F L, 2,600 metres, spark—

Time signal (international), 09.25 to
09.30. (Crystal alone.)

Time signal (rhythmic beats), 10.00 to
10.03. (Crystal alone.)

International collective met. forecast,
10.05 to 10.25. (Crystal alone.)

U R S I, signal, 10.34. (Crystal alone.)

Corrections for scientific time signals,
10.36. (Crystal alone.)

Time signal (French system), 10.45 to
10.49. (Crystal alone.)

Time signal (rhythmic beats), 22.00 to
22.03. (Crystal alone.)

Corrections for ditto, 22.35. (Crystal
alone.)

Time signal (ordinary), 22.45 to 22.49.
(Crystal alone.)

NAUEN, P O Z, 3,100 metres, spark—
Time signal (international), 11.55 to 12.00.
(1 H.F. and crystal.)

Ditto, 23.55 to 24.00. (Crystal alone)

MOSCOW, R A I, 5,100 metres, spark—
Time signal (Russian system), 21.55 to
22.10. (1 H.F. rectif. with react. to
H.F.)

Above times are G.M.T.

Yours faithfully,
J. W. PALLISTER.
Stockton-on-Tees.

MUSIC FROM F L.

To the Editor, POPULAR WIRELESS.

Dear Sir,—The following may be of
interest to your readers. Using only a
crystal (galena and cat's whisker), I can
receive both music and speech from the
Eiffel Tower. The speech is clear enough
to read, and the circuit I am using is a
simple crystal circuit. The inductance is a
No. 250 De Forest coil, '0005 condenser,
and a pair of Brown's 8,000 ohm 'phones,
and no blocking condenser.

I have a very good twin aerial of 140 ft.
in length.

I can also hear Croydon and London
telephony, and a very faint sound of
Radiola.

Yours very truly,
G. S. HARRISON.
Goring-by-Sea, Sussex.

RECENT WIRELESS INVENTIONS.

The following abstracts are specially con-
tributed 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.

198,362. — W. DUBILIER. — CON-
DENSERS. — The plates are secured
together by two or more tubes passing
through the stack and riveted over at
their ends. Terminal members may be
placed over the tube end before riveting,
and the end plates may be of fibre, etc., in
which case the condenser may constitute a
grid leak if a pencil line be drawn across the
plates from one terminal to the other. A
number of condensers may be clamped
together by bolts passed through the tubes.

198,368. — MARCONI'S WIRELESS
TELEGRAPH CO., LTD. — BROAD-
CASTING. — In order to render broadcast
signals unintelligible to unauthorised re-
ceivers, the carrier wave, in addition to
having the desired signals, is modulated by
confusing tones and signals such as tones
outside the speech range, music, or com-
binations of tones, which may be changed
from time to time. The interferences are
eliminated for authorised receivers by
supplying filter circuits, etc., the coils of
which may be set in cement to prevent
duplication.

198,469. — A. J. R. STREADWICK. —
GRAMOPHONES. — For controlling the
sound of a gramophone, etc., an aper-
tured diaphragm is provided in the sound
passage, and carries guides in which slides
an apertured shutter whereby the volume of
sound emitted may be adjusted.

198,499. — J. TIMMS. — BATTERIES.
— Wood pulp boards used as separators in
storage batteries are protected from the
action of acid by impregnating with paraffin
wax.

PAYING THE PENALTY.

What is the Crook's view of Crime and
Punishment?—and what is his attitude
towards society? In the current issue of the
"Detective Magazine" a master crook, an
intelligent and educated man, gives his
reminiscences ("The Inside of the Under-
world"), which have been verified by the
lawyer who often defended him.

This is a new angle from which to regard
crime, and is in keeping with the originality
of the other articles and stories in the
"Detective Magazine." "The Smoke Devil"
is another instance of this atmosphere of
the unusual which pervades this unique pub-
lication. We have all heard of smoke bar-
rages in the war, but the idea of a criminal using
this method to commit his crime and cover
his escape is certainly new. The "Detective
Magazine," price 7d. everywhere, strikes an
altogether new note, and is guaranteed to
interest the most jaded reader.

A LOUD SPEAKER FOR 7/6

Comprises superfine horn, bush and nut com-
plete for attaching to ordinary headphones.
RIVALS ANY SMALL LOUD SPEAKER.

Call or write—**MALONE RADIO DEPOT,**
17 Piccadilly Arcade, LONDON, S.W. 1.
And at 7, Hart Street, Mark Lane, E.C. 3.
7/6, or by post 8/6.



THE WIRELESS PRESS LTD.,

THE PIONEER HOUSE FOR WIRELESS PUBLICATIONS.

12-13, HENRIETTA STREET

LONDON, W.C.2.

**recommends to your notice five books which you,
as experimenters, will appreciate.**

THE RADIO EXPERIMENTER'S HAND-BOOK. Parts I & II. By Philip R. Coursey, B.Sc., F.Inst.P. (Research Editor, The Wireless World).

These books are the joy of the genuine experimenter, whose aim should not be to build an installation from complete working drawings, but rather to design the set to meet his own special requirements. These books indicate the chief features of such design work, and the principles upon which it depends.

Part I. deals with the General Principles underlying the design of radio receiving equipment. The Aerial and the Aerial Circuit; Receiving Tuners; Amplifiers and Detectors; Heterodynes. Part II is devoted to Data and Actual Quantitative Design. The Measurement of H.F. Current and Voltages; Fundamental Formulae and Data; Aerials and the Tuning Circuit; Tuning Coils and Inductances; Condensers; Valves and their Constants; Simple measurement with Valve Circuits.

Price 3s. 6d. per part.

Post free 3s. 10d.

PRACTICAL WIRELESS SETS FOR ALL—HOME CONSTRUCTION MADE EASY. **By Percy W. Harris.**

This is a book for the amateur who wishes to make thoroughly reliable and highly efficient sets. Full working instructions are given, and the excellent photographs and diagrams showing all wiring connections leaves no possibility of doubt in the mind of the constructor.

It explains how to make a Crystal Set; One Valve Note Magnifier; Two Valve Set; Two Valve Note Magnifier; Three Valve set for All Wave-lengths; and How to Fit Indoor Aerials.

Price 1s. 6d. net.

Post free 1s. 8d.

THE AMATEUR'S BOOK OF WIRELESS CIRCUITS. By F. H. Haynes (Assistant Editor, The Wireless World).

The 111 practical circuits contained in this book have been specially prepared to meet the requirements of all users of wireless apparatus.

You will find in this book all the circuits you need, each one accompanied by practical advice, and condenser values are shown in every case.

The pages measure 10x6½ inches. This size has allowed the author ample space for setting out clearly the most complicated circuits, even to the smallest detail.

Price 2s. 6d. net.

Post free 2s. 10d.

CONSTRUCTION OF AMATEUR VALVE STATIONS. By Alan L. M. Douglas.

The amateur who wishes to make his own apparatus, but does not quite know how to design it correctly, should get this book. It takes you carefully through the theory of the valve, gives suitable circuits for one, two, three, four, or seven valve sets, explains the construction of valve control panels, various types of tuners, condensers—fixed and variable, deals with transformer and resistance-capacity coupling, H. and L.T. battery circuits, telephone receivers and loud speakers, Morse inkers, aerial and earth circuits, and what to do and what to avoid when connecting up apparatus.

Price 1s. 6d. net.

Post free 1s. 7d.

MAST AND AERIAL CONSTRUCTION FOR AMATEURS. By F. J. Ainsley, A.M.I.C.E.

When results are poor, don't blame your set, the real trouble lies more often than not in your earth or your aerial.

This book puts before you the essential points of outdoor, indoor, or frame aerials. With a copy of "Ainsley" at hand you can face the erection of any type of mast, without doubt or fear as to the ultimate result. Frail masts are dangerous; make sure that yours is safe.

Price 1s. 6d. net.

Post free 1s. 7d.

Send a postcard for our Catalogue of 75 Wireless Books.

The Wireless Press Ltd., Dept. P.W., 12-13, Henrietta St., London, W.C.2

MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

FOR BROADCASTING

Important Announcement



REDUCED PRICES

Owing to greatly increased demand, and to improved methods of production—resulting in decreased manufacturing costs—the prices of

MARCONI VALVES
MADE AT THE OSRAM LAMP WORKS

("R" and "D.E.R." Types)

are REDUCED as and from August 1st, 1923, as follows:

	Old Price.	REDUCED PRICE.
"R" Type ...	17/6	15/-
"D.E.R." Type ...	40/-	27/6

Sold by:

**Electrical Contractors,
Wireless Dealers, etc.**

(Wholesale only):

THE GENERAL ELECTRIC COMPANY, LTD.

Head Office: Magnet House, Kingsway, London, W.C.2.



BACE TRADE MARK

Branches throughout Great Britain
and in all the principal markets of
the world.



BACE TRADE MARK