VALVES FOR USE WITHOUT ACCUMULATORS

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PRINCIPAL CONTENTS

WELL ILLUSTRATED

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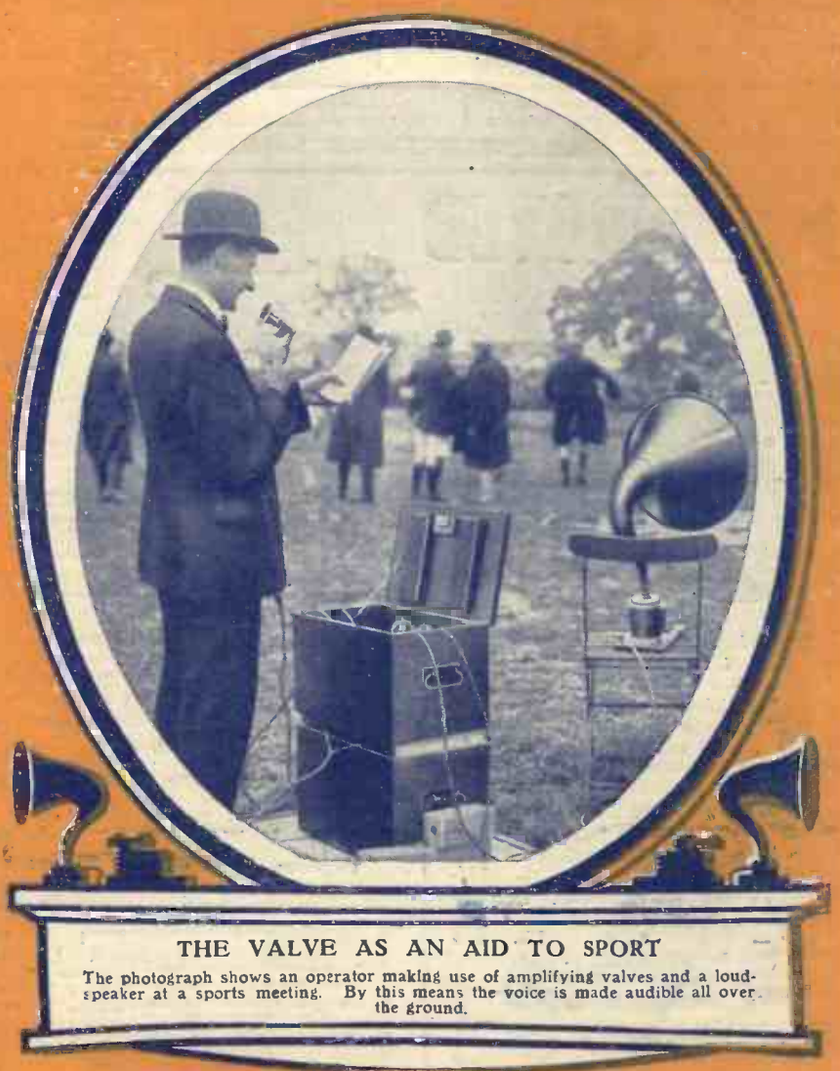

THE VALVE AS AN AID TO SPORT

The photograph shows an operator making use of amplifying valves and a loud-speaker at a sports meeting. By this means the voice is made audible all over the ground.

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Kite Balloons for Wireless

THE suggestion made in this article by Capt. P. H. Sumner is the use of a kite balloon for lifting an aerial to, say, 100 or 200 ft. Such an outfit could easily be transported from one place to another. The kite balloon, constructed of cotton fabric made gas-proof, or of oiled silk, could be conveniently folded or rolled in a compact form. The balloon complete, with 200 ft. of aerial wire, need not weigh more than about 7 lb.

A KITE balloon, it must be understood, is distinct from an ordinary spherical balloon. The spherical balloon in captivity does not gain much altitude with a proportional length of wire payed out. In other words, the balloon will drift to a large extent with only a small increase of altitude. Moreover, with this excessive drift higher tensions will be put on the wire; the pull increasing as the wind increases. In winds above 20 miles per hour yawing would be set up, and it would swing from one side to another and probably break the wire.

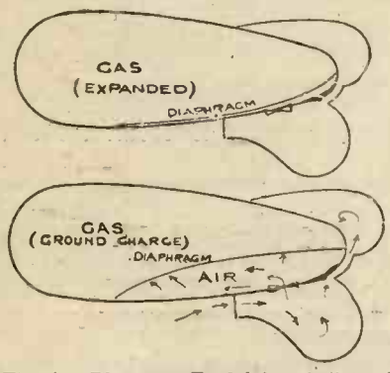


Fig. 1.—Diagrams Explaining Action of Balloonet.

In order to overcome these objections in naval and military operations the streamline kite balloon was designed, and it is now possible to fly this type of balloon in winds up to 70 miles per hour and with only a few degrees of drift from the vertical position.

Calculating Lift

It is proposed that the wireless aerial balloon be filled with coal gas. This will be both cheap and easily obtainable. On the other hand, a larger balloon will be required for a given height and weights lifted compared with the hydrogen-filled balloon.

One cubic foot of coal gas will lift .043 lb., but one cubic foot of hydrogen will lift .07 lb.

Coming now to the size required for a coal-gas-filled balloon, one must first know the weights to be lifted. Supposing we use 18 S.W.G. copper wire for the aerial, the weight per 1,000 yd. of this material is about 21 lb. For a maximum altitude of 200 ft. the weight of wire would be 1.4 lb. nearly. On the basis of 1 cub. ft. of coal gas lifting .043 lb., 32.5 cub. ft. of gas will be required to lift the weight of the aerial. By using the captive wire as the aerial an advantage is gained, inasmuch as the 100-ft. length of aerial allowed by legislation becomes nearly vertical height, thereby making for better reception. We also have a clean line with no proximity to buildings, thus eliminating such capacity effect.

Next the balloon will have to lift its own weight—a point often lost sight of by budding balloonists. The material for the envelope will approximate 2 oz. per square yard. There is still another factor to reckon with: large observation balloons are fitted with a gas escape valve. As a balloon rises into the air, be it coal-gas or hydrogen, the gas within the envelope will expand, and expand in a certain ratio as the higher altitudes are met. If there were no means of escape for the expanded gas, the balloon would burst.

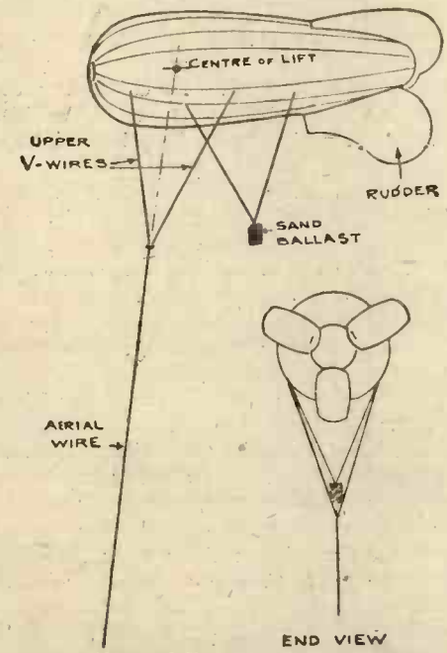


Fig. 2.—Side and End Elevations of Balloon showing Method of Attachment to Line.

The spherical balloon has an open neck; the cone or pear-shaped piece at the bottom is always open to the air. One can try an experiment with the ordinary rubber toy balloon. Tied up at the neck, the toy balloon will gradually get bigger and bigger as it soars up, finally bursting. Indeed, many balloonists in the early days lost their lives through insufficient knowledge of the expansion of gases.

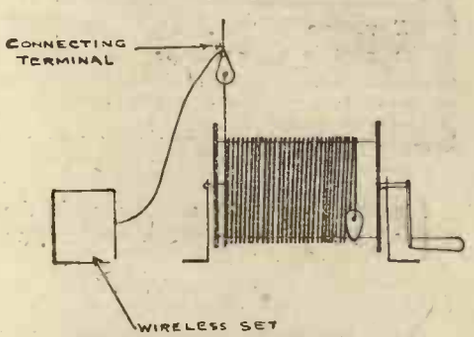


Fig. 3.—Winding Drum and Receiver Connection

Equilibrium Point

Returning to the wireless-aerial balloon, we have a choice of fitting an escape valve or the simple expedient of charging the balloon at ground level with just that quantity of gas that will fill the balloon completely only when in an expanded state at the altitude required of the balloon. A valve, therefore, will be unnecessary. As the kite balloon will not be made of expanding material it will necessarily be in a flabby state with this smaller charge at ground level.

The altitude desired with the required charge of gas is the equilibrium point, or the point where the lift of the gas is exactly equal to the weight of balloon with

weight of wire payed out. In our case 200 ft. will have been payed out for the maximum height. The balloon can then lift no higher.

Taking into consideration weight of wire, weight of balloon, and allowing one-fifth of envelope being unfilled with gas, it will be found that a total volume of 200 cub. ft. will be necessary. This capacity figure, by the way, is only co-incidental to the 200 ft. altitude figure. No constant ratio exists between altitude and capacity in the deduction. The size of a 200-cub.-ft. streamline kite balloon can be calculated from the formula: diameter $= \sqrt[3]{\frac{\text{capacity}}{1{\cdot}713}}$, and length of balloon equals three times the diameter. A length ratio of 3 to 1 of the diameter has been found the best proportion for a kite balloon. Then:

Diameter $= \sqrt[3]{\frac{200}{1{\cdot}713}} = 4.876$ ft., and
Length $= 4.876 \times 3 = 14.628$ ft.

This formula can be used for a balloon of any capacity, the constant 1.713 being derived from a well-defined and suitable streamline for a kite balloon. The diameter, of course, is the maximum diameter of the streamline form.

Our balloon of 200 cub. ft. of gas at .043 lb. lift per cubic foot gives a lifting force of 8.6 lb.

The Envelope

The containing envelope will require about 24 sq. yd. of material weighing about 3 lb.; to this must be added the weight of the kite balloon tails and air chamber diaphragm, etc., the balloon complete approximating 5½ lb.

The total weight, complete with the 200 ft. of aerial wire which we have to lift in the air, will be 5½ lb. envelope plus 1.4 lb. weight of wire, and equals 6.9 lb. This figure deducted from the gross lift of 8.6 lb. when fully inflated leaves us with 1.7 lb. spare lift.

This figure of 1.7 is one-fifth of the total, and is not required for any weight lifting; the balloon will be only four-fifths filled with gas, the remaining one-fifth capacity being allowed for the expansion, variation of temperature, etc., as the balloon rises.

It has been said that the balloon will be flabby at the ground level. At 100 ft. up, the usual working aerial length, the balloon would still be only partially inflated to its proper streamline form. To prevent this state of affairs kite balloons are fitted with an air chamber, or balloonet, as it is called.

One-fifth of the envelope is partitioned off by a light gas-proofed cotton diaphragm. This diaphragm falls down internally on the under side of the envelope, forming a double skin as it were at the bottom and open to the air. Wind enters the scoop provided and blows out the diaphragm, so that the lower portion (one-fifth of the whole balloon) is filled with air, the diaphragm separating the gas from the air (see Fig. 1).

We therefore obtain a true form with a partially gas-inflated balloon. As the gas expands it pushes the air out, a true form being maintained at any altitude.

Line Wire

It is apparent that the wire must be sufficiently strong to withstand the tension produced by the wind pressures on the balloon together with the uplifting force of the gas in the envelope as the wire is being payed out.

Wind pressure will be of two orders, the one "drag," or the force pushing the balloon back, and the other a lifting force or "kiting" force under the belly of the balloon, termed dynamic lift.

At equilibrium height the gas lift of the balloon becomes zero; there is no more exertion from the balloon itself other than holding up the weight of wire. Total tension in the wire will therefore be a little lighter when the balloon is flying at equilibrium height.

It has been mentioned that the kite balloon is more suitable than the ordinary spherical balloon for captive work. This is partly due to the streamline form of the kite balloon, but more largely due to the means employed by which this streamline is kept steady in a wind.

Balance

The wire will have to be connected under the nose of the balloon by four wires splayed out in V-fashion (see Fig. 2). This arrangement prevents any local pull at the balloon; also the position of the point of attachment, or where the single aerial wire joins these four legs, is a matter of importance.

The various forces, etc., on the balloon, and the balancing up of these forces in order to make for stability of the balloon, all have a bearing on the position of this point of attachment. In comparing the airship's streamline to that of the kite balloon, the bluff nose of the latter is conspicuous. Greater lifting force of gas is needed at the nose of the kite balloon. The centre of lift is approximately over the line of the cable, the resultant forces being collected at the junction point of the four top wires.

In the airship the centre of lift is over the car. A finer streamline at the nose, therefore, is permissible.

So far it has been shown that with a proper streamline form and a correct point of attachment of the wire, the kite balloon is able to rise steadily in the air with no spinning set up as would be the case of an ordinary spherical; also a more vertical rise will be obtained as the cable is payed out. These conditions will be well obtained in still air, but in winds up to 15 or 20 miles per hour the balloon will commence to yaw or move from side to side, or may dive up and down. To improve the stability of the kite balloon in a wind, tails or air-filled stabilisers are fitted. These consist of three cotton-fabric lobes sewn on at the stern and open to the air by way of the balloonet air chamber and its wind scoop. Wind enters these lobes, filling them out as an air cushion, thus giving a plane surface to the wind. The lower lobe, or rudder, prevents swinging from side to side, keeping the balloon in a nose-to-wind position. The horizontal pair of lobes prevent pitching, and all three prevent rolling.

Ballast

The balloon is now capable of outriding any wind. A small canvas bag may be slung by cords under the balloon about the centre for containing sand ballast. By adding sand or by removing it the equilibrium height of the balloon can be varied at will.

The balloon is simply and cheaply constructed. If the cable wire position be made adjustable, a few experiments carried out will determine a correct position without the necessity of a study and calculation of the forces to be met.

Constructing the Envelope

The envelope should be made up of several lengths of cotton material (gas-proofed) or of oiled silk. These lengths or "gores" will run from a nose cap towards the tail, and be sewn together at their edges. The larger number of gores used the more circular will be the form as against a prismatic shape, supposing only six gores were used. Sixteen will be a suitable figure. Widths of the gore at different stations on the balloon is important, in order to obtain the correct streamline shape when made up. These widths should be carefully calculated, and if sixteen gores are used one-sixteenth of the corresponding circumferential length of the circle at each particular station will be the width required, plus about five-sixteenths of an inch allowed for seaming.

The streamline form should be firstly plotted out on paper to scale. On an inch to the foot scale, the maximum diameter will be 4.876 in. and the length 14.628 in.

Stations for circumferential measurements should be taken at about ten points throughout the length.

The dimensions taken from the drawing should now be laid full size on brown paper patterns with due allowance for seams, the material of the balloon being cut from these patterns.

The receiving wire from the wireless set on the ground connected to the captive aerial wire must be insulated from the balloon anchorage. An insulator may be used at this point in the manner shown in the diagram (Fig. 3).

If 200 ft. of aerial is to be payed out, insulation at the 100-ft. point must be removed. A short piece of wire will make a bridge.

A balloon can be towed by a car or from a boat, picking up messages at any point.

The outfit might prove a source of attraction at seaside towns, and a profitable undertaking for advertisement or otherwise.

P. H. SUMNER.

Making a Simple Variometer Crystal Receiver

THE following is a description of a simple crystal set (see Fig. 1) which can be very easily and cheaply constructed by the beginner.

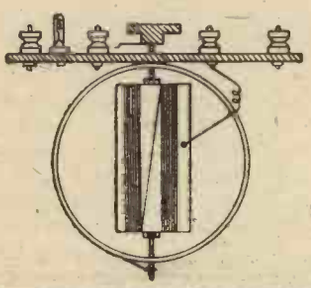


Fig. 1.—Section of Complete Variometer.

The set is designed primarily for reception on the broadcasting wavelengths, but two terminals are provided on the panel so that a loading coil may be used to tune the set to Croydon or the Eiffel Tower. The materials required are as follows: One piece of ebonite 6 in. by 6 in. by $\frac{3}{16}$ in.; inductance tube 4 in. in length and 4 in. in diameter; and one piece 1¾ in. in length and 3 in. in diameter; 2 oz. of cotton-covered wire about 26 S.W.G.; one ebonite knob; six terminals; one crystal detector and hertzite crystal; 6 in. of $\frac{3}{16}$-in. screwed brass rod with four nuts to fit.

The ebonite panel should be "matted" by rubbing down with fine emery-paper. Then drill the six holes for the terminals and one $\frac{3}{16}$-in. hole for the centre spindle of the variometer as shown in Fig. 2.

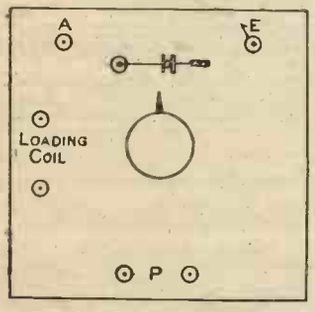


Fig. 2.—Lay-out of Panel.

The crystal detector may be mounted on the panel in the position indicated.

The pasteboard tubes must be well treated with hot paraffin-wax or shellac varnish before winding is commenced. For convenience we will call the outside tube the "stator" and the inside tube the "rotor." The variometer consists of two coils of wire joined in series, one of which is smaller than the other so that it can be rotated inside it. By rotating the inner coil the mutual inductance between the two coils is either increased or decreased, so producing a change in wavelength. Drill a $\frac{3}{16}$-in. hole through the walls of both tubes midway between the two ends as shown in Fig. 1.

To wind the stator, start about 1 in. from the centre hole and wind on eighteen turns, then cross over to the other side of the spindle hole and wind on another eighteen turns. The rotor is wound in the same way, but only fourteen turns of wire are wound on each section, making twenty-eight turns in all. The method of winding is shown in Fig. 1. The rotor

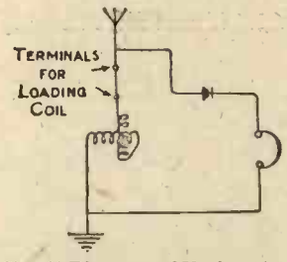


Fig. 3.—Circuit Diagram of Variometer Receiver.

may now be mounted on its spindle and fixed tightly to it by four nuts.

The variometer is attached to the back of the panel by brass screws, using large brass washers between the screw heads and the pasteboard to prevent them from pulling through.

The ebonite knob is then screwed on to its spindle. The connections for the circuit are shown in Fig. 3, and the only point which may present any difficulty is the connection of the variometer itself. This is accomplished as follows. One lead from the rotor is soldered to the brass spindle, the other is fixed to a 6-in. length of flexible wire which is connected to one of the loading-coil terminals, as shown in the diagram.

From the stator one lead is connected to the earth terminal and the other is connected to a piece of flexible wire which is soldered to the brass spindle. The aerial terminal is connected to the loading coil terminal which is still free. Thus when the loading coil terminals are shorted by a piece of wire, as when receiving broadcasting, the variometer is in circuit. If a slab or basket coil is connected to the terminals it will be in series with the variometer and will therefore increase its inductance value. All that is necessary for tuning from 300 to 500 metres is to turn the knob, and for high wavelengths to add a loading coil and turn the knob as for low wavelengths.

C. W. S.

Hard or "Silver" Soldering

GOOD workmanship in wiring-up a receiving set demands that all permanent connections should be soldered. Such joints are always made by ordinary or "soft" soldering.

Sometimes, however, the problem arises of joining together two pieces of metal, where screws or rivets would either be impracticable or too unsightly, and where ordinary solder would not make a joint of sufficient strength. For example, an old rod or spindle having a number of projections for operating multiple contacts may be just the thing required for a new job, except that it is too short. A knowledge of "silver" soldering in such an instance will save the unwelcome task of making a new fitting.

Its Uses

In general, silver soldering is a useful asset in a variety of emergencies, and deserves to be more widely known and practised amongst wireless amateurs.

The process is applicable to brass, copper, iron and steel, and forms a joint which is stronger than that obtained by brazing, which requires a much higher temperature, and often damages the work. Silver soldering, moreover, is a more certain method than either soft soldering or brazing, the silver solder itself being unoxidisable, and the borax being a most powerful solvent for any oxides in the work. It is for this reason that a joint to be silver-soldered does not require to be so scruplously clean as is the case with soft-soldering. Moreover, it is a simple process, in many respects more easy to carry out successfully than the better-known "soft" soldering.

Solder and Flux

First as to the solder. This is sold in

sheet form at many tool and ironmongery stores, but it can always be obtained at any jeweller's material shop. A few square inches will be sufficient for dozens of jobs and only costs a few pence. It is as well to scratch the words "silver solder" on it so that it does not come to an untimely end, and always to keep it with the flux and other soldering utensils ready to hand when required.

The only flux required is powdered borax, which is best applied in the form of a paste made by mixing the borax with a drop or two of water.

Procedure

The most important point to bear in mind is that close contact between the parts to be secured is essential. This not only ensures the ready flow of solder, but also effects considerable saving of the latter. The test of good silver soldering is to be seen in the smallness of the amount of solder that has been used on the job.

When the parts to be soldered have been made to fit closely together, they are held in position with binding wire, which should be wound very tightly and the ends of the wire twisted together, so as to prevent any relative movement. Where one of the articles fits tightly within the other the binding wire will, of course, not be required. In any case, the surfaces to be joined should first be covered with a coating of the borax paste.

A very small piece of solder should next be placed at the junction of the articles in their secured position, the paste of borax serving to retain the silver solder in position until it runs into the joint.

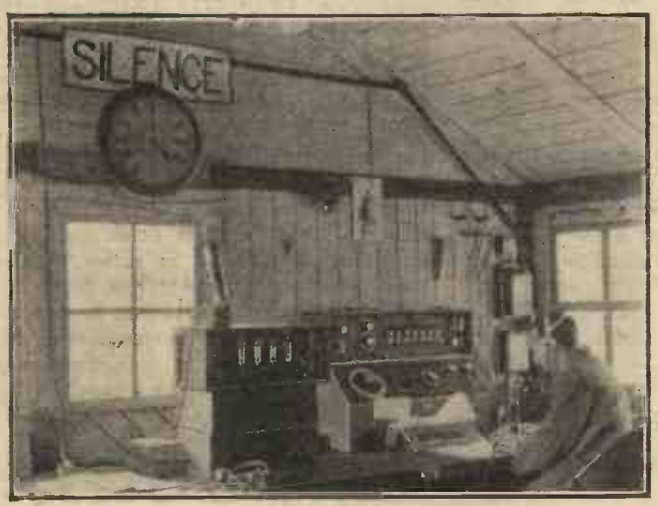
When everything is ready, as described, the parts are heated by a blowlamp, or if the work is sufficiently small a blowpipe will do. First of all, the borax will swell up into a mass resembling "pop-corn." During this time the piece of silver solder may be carried about in a curious manner, but no apprehension need be felt, as it will return "home" and do its work later. As the work becomes more strongly heated the borax melts and forms a glassy covering, running between the adjacent surfaces and dissolving any traces of impurities that would otherwise prevent the solder from alloying with the parts to be secured.

When the final temperature is reached the piece of silver solder melts, sinks through the flux, hesitates, and suddenly disappears. The job is then finished, a bright silvery line showing at the contacting edges of the soldered parts. There is no mistaking this final stage of the process, the silvery line contrasting in a very remarkable way with the bright red heat of the surrounding parts.

Finishing

The work should not be allowed to cool slowly, but should be plunged into water. This has the effect of causing any excess of borax to crumble away, and greatly facilitates finishing off—as the congealed flux is hard enough to ruin a file. It sometimes happens that a portion of the binding wire is accidentally soldered to the work, in which case it must be carefully filed away.

D. A. L.



Apparatus at Croydon Aerodrome for Distant Control of Transmitter shown on the Right.

The Transmitting Apparatus Operated by Distant Control from Another Part of the Aerodrome.

Position and Direction Finding

The Solution of a Subtle Problem in Modern Experimental Wireless :: II.—LOOP AERIALS

IN the last article on directional wireless the manner in which wireless waves are propagated from a transmitting aerial was explained. Loops of electrostatic energy move out across the surface of the earth, changing their intensity and direction ceaselessly. This is usually represented diagrammatically by a "wavy" line. It is important to note that such a curve represents changes in direction and strength.

Change of Direction

If a wireless wave changed its direction only, this characteristic would be expressed diagrammatically by means of a series of straight lines. The change in strength is denoted by the slope of the curve, whilst the change in direction is shown by the position of the curve on either side of the "normal" line. Reference to Fig. 1 will make this clear. The portion AB of the curve represents a current growing from zero to maximum value in one direction. BC represents a decrease in the current from maximum value to zero, whilst still flowing in the same direction. At C (the second zero point) the direction of the current now changes, and the same process is repeated in the opposite direction. Once more, the increase in strength represented by AB is not an equal and regular increase. At first the current rises very rapidly from zero, then not quite so rapidly, then very slowly. During the time interval A to A^1 the current rises to the strength denoted by the height A Y. During the next time interval of equal duration, A^1 *to* A^2, the increase in current strength is denoted by the much smaller distance Y to Y^1. Finally, the amount of current increase during the third equal time interval, A^2 to A^3, is represented by the very small distance $Y^1 Y^2$. This sequence now takes place in the reverse order whilst the current continues to flow in the same direction. The whole process is then repeated

with the current flowing in the opposite direction. This constitutes a complete cycle, and a wireless wave is made up of a succession of such cycles. These elementary facts, although familiar to most wireless students, have been repeated here because of their supreme significance with reference to directional effects.

Incidence on Aerial

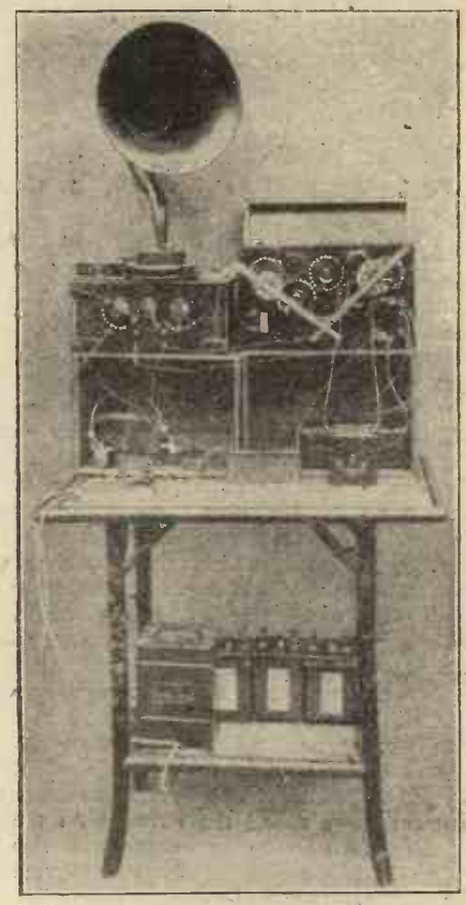
Fig. 2 represents the feet of a series of energy loops comprising a wireless wave. It will be noticed that the strain lines are grouped tightly and loosely together alternately, the successive changes in the direction of these groups being denoted by positive and negative signs. Where the strain lines are densest the current is at its maximum strength; where they are spaced at the greatest distance apart the current is at zero. These characteristics are also represented by the "wavy" line in the same figure. A B and C D are two vertical aerials joined top and bottom. For purposes of explanation this is the simplest way of regarding the closed aerial A B C D. In this diagram the plane of the aerial frame is to be regarded as being in the same straight line as the transmitting aerial. The transmitting aerial may, therefore, be represented by X Y, as shown. Four positions of the aerial frame are given.

In the first position each vertical side is enveloped, as it were, by very dense

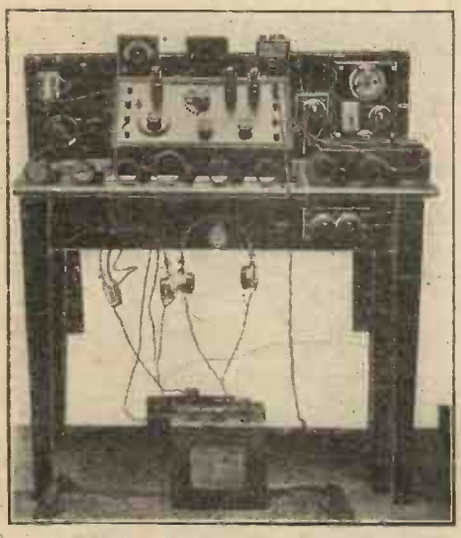
(*Continued on page* 890)

Mr. S. J. Hytch (Wednesbury) and his Home-made Receiving Apparatus.

A Few Representative Examples *of* Amateur-constructed Receivers

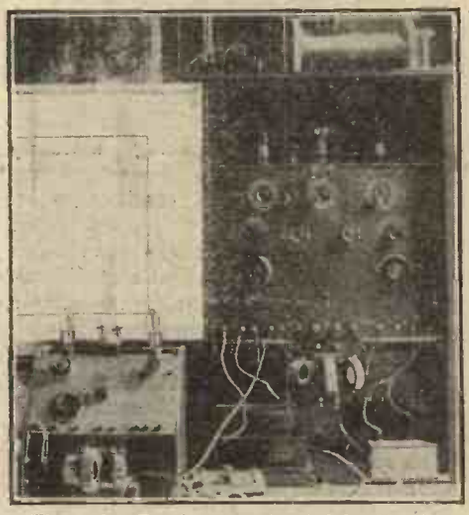


A Short-wave Receiver and Five-valve Amplifier made by Mr. H. G. Ede (Islington) from instructions in the "Work" Handbook "Wireless Telegraphy and Telephony."



A Three-valve Set, the work of Mr. E. Jones, Rhyl.

Master G. C. Turner (Cranbrook) and his Crystal Receiver.



Five-valve Receiver constructed by Mr. W. Greaves, Rishton, Lancs.

POSITION AND DIRECTION FINDING (*continued from preceding page*

strain lines. Considering the side AB first, this will result in a comparatively large current being induced in this aerial, which will flow in a certain direction as indicated by the arrowhead. But a current of equal strength, and flowing in the same

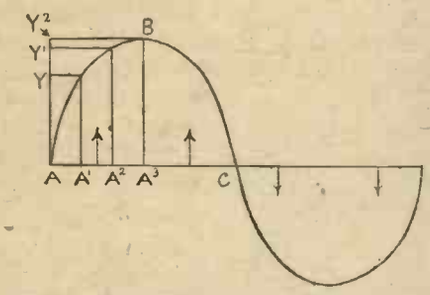


Fig. 1.—Diagram Explanatory of Change of Direction.

direction, will be induced in the side CD. Now, since A and C and B and D are joined electrically, these two currents will oppose each other in the circuit so formed. Moreover, being of equal strength, they will mutually negative each other, with the result that no current will flow.

Let us now consider what happens as the wave passes over the aerial frame. To do this, it will be easier to conceive of the frame itself moving forward to meet the wave, the important thing being the relative motion between the wave and the aerial. As the whole frame moves to the right, then, the side AB moves into a denser area of strain lines, whilst the side CD moves into a less dense area. As a result, the current in AB is increased and that in CD decreased, both currents still flowing in the same direction as formerly. These currents again oppose each other, but, being unequal, a small resultant current flows round the circuit. As the frame continues to move forward this effect is increased, the resultant current growing stronger and stronger. Presently the side CD will begin to move into an area of strain lines which act in the opposite direction to those which continue to surround AB. As soon as this point is reached, the direction of the current flowing in CD will be reversed; that is, it will flow in the opposite direction to the current in AB. These currents will now, for the first time, mutually assist one another, instead of being mutually destructive as before.

This latter effect will continue to increase until the aerial frame takes up the second position shown in Fig. 2, in which position it will have attained a maximum. At this point, therefore, although only a comparatively small current flows in each vertical aerial, the resultant current flowing in the circuit will have reached a maximum. Referring to this second position in Fig. 2, the current flowing in the side AB is represented by the height of the curve at that point, namely MN. Similarly the current flowing in the side CD is represented by the height OP. But the current in AB flows in an upward direction, whilst that in CD flows in a downward direction, the result being that they both flow in the same direction round the circuit.

Increasing Efficiency

It will be noticed that the farther apart AB and CD are from one another the greater will be the individual currents induced in each of them, and hence the greater will be the resultant current. But, also, the higher each aerial is the greater will be the energy picked up by it. In other words, by increasing the height or breadth of a frame aerial we increase its efficiency. In fact, we can express this still more simply by saying that the efficiency of a frame aerial depends on the area of the frame. This is not the only factor, however, which governs the efficiency of a frame aerial. Let us imagine two frame aerials, each comprising a single loop. Each frame aerial will pick up a certain amount of energy from a passing wave. If the two frames are put very close to each other in the same place, each loop will be picking up identical quantities of energy at any particular moment. If now we join up the two aerials in series, the resultant energy available to actuate the telephones will be considerably greater than that which was previously available in either aerial.

Similarly, if we connect up a third aerial in the same manner, the resultant energy will be still further increased, and so on. We may thus regard a frame aerial consisting of a number of turns of wire as a

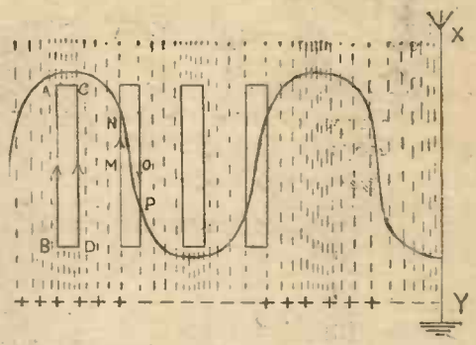


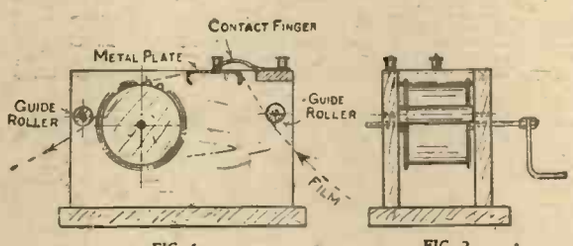
Fig. 2.—Feet of Series of Energy Loops.

number of single-loop frame aerials connected in series, and the greater the number of turns the greater the efficiency of the aerial. Finally, therefore, the efficiency of a frame aerial depends on the area of the frame and the number of turns of wire comprising the aerial. This is usually expressed as follows: the efficiency of a frame aerial is proportional to the product of the "area-turns."

AERIAL NAVIGATOR.

A Morse Practice Transmitter

WIRELESS amateurs who are unable to practise the Morse code with other enthusiasts will find that tapping out messages to themselves is tedious work and, moreover, they will not progress vary rapidly. The use of the machine about to be described will enable them to overcome a number of difficulties.



Figs. 1 and 2.—Side and End Elevations of Transmitter.

A piece of ordinary cinematograph film is perforated with dots and dashes to represent Morse letters. It will be found that the film can be perforated quite cleanly with an ordinary hand or letter punch.

The perforated film is passed under the guide roller and over the metal plate. It is then led over the draw roller, and under the second guide roller the teeth of the sprocket wheels move it forward (Fig. 1). A springy finger makes contact with the metal plate through every perforation and so closes a circuit to excite a buzzer.

This metal plate is connected to one pole of a battery and in series with the contact finger and buzzer, the other terminal of which is also connected to the battery. Then at every perforation the finger touches the plate and completes the circuit. The length of the buzz produced depends upon the size of the perforations. and the speed of transmission is regulated by the speed of the sprocket roller.

The machine can be driven by an electric or clockwork motor, and in this case an even speed can be obtained, or by hand as shown in sketch. No dimensions are given, as

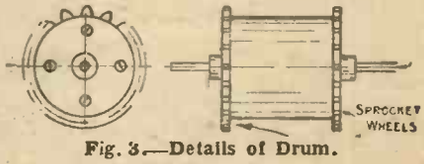


Fig. 3.—Details of Drum.

the instrument can be made any convenient size provided that the pitch of the wheels is $\frac{3}{16}$ in. and the distance between them 1⅛ in.

J. A.

Gamages Stocktaking Clearance of Wireless Sets and Sundries

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MOVING COIL RELAY

A delicate instrument movement of extreme sensitivity. Of the moving coil type and provided with a platinum circuit closer in place of pointer. The contact screws are adjustable, and so arranged that the circuit closer can be set to move through an arc ranging from $\frac{3}{8}$ to less than $\frac{1}{16}$ in. Can be used as an ordinary or polarised relay where the greatest degree of responsiveness is required.

SALE PRICE **17/6**

Post 1/-.

"SONUS" UNIT VALVE PANEL

Comprises Valve Holder, Filament Resistance, Grid Condenser and Leak, 'Phone Condenser and necessary terminals for connections with positions clearly engraved. Finished in polished mahogany and ebonite with heavy brass terminals.

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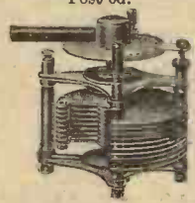

PANEL MOUNTING CONDENSER

Skeleton Type. Accurate and reliable.

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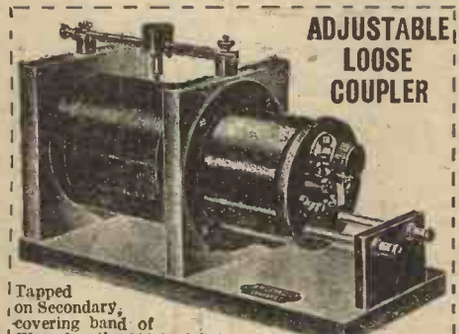
·00045 mfds. SALE PRICE **9/-**

·00008 (Vernier). Post Free. **5/-**



ADJUSTABLE LOOSE COUPLER

Tapped on Secondary, covering band of Wave-lengths 300 to 1,000 metres. Undoubtedly the most efficient for shorter wave-lengths, especially with crystal receivers. Estimated to give at least 10% better results than the ordinary "tight" type. Especially effective when used with a Variable Condenser, either in shunt or series.

SALE PRICE **35/-**

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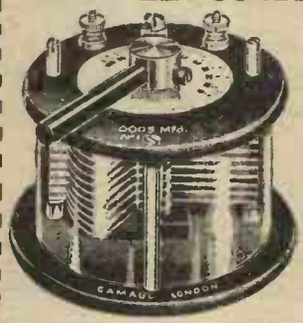
VARIABLE CONDENSERS



Air dielectric type. Faraday House calibration. Circular, ebonite top and bottom, encased in celluloid. Engraved ivorine scale. Without long handle. ·0003 mfds. SALE PRICE **9/6**

·00045 mfds. SALE PRICE **10/6**

Post 6d.

CRYSTAL DETECTOR

London made. Base 3½ × 3 × ⅞ in. of Polished Mahogany, Burnished and Lacquered Brasswork, Ebonite Knob.

SALE PRICE **4/-**

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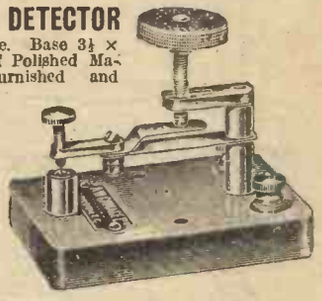

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Every pair tested. Resistance 1,200 ohms.

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Cords 3/6 per pair extra

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Best Quality Geared Type.

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Write for our SALE LIST Post free.

GAMAGES CRYSTAL Receiving SET

A THOROUGHLY efficient instrument, receiving telephony over a range of 25 miles with remarkable clarity. Neat and compact, in polished mahogany cabinet with ebonite top. Tuning inductance is tapped in four places, giving, in conjunction with the variable condenser, a good range of tuning. Sensitive "cat's-whisker" type detector, fitted with the famous "Permanite" crystal. Complete as illustration.

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Carriage paid.

EXTRAS:—'Phones, Sterling, 32/-; Brown's "F" type, 30/-; Aerial Wire, 100 ft., 3/-; Insulators, 3d. each; Earth Wire, 6d. per yard; B.B.C. Tax, 7/6.

INTERVALVE TRANSFORMER

Low-Frequency type highly efficient, small and compact. Ratio 5 to 1. Very suitable for panel mounting.

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VALVE HOLDER

Circular four pin type as illustration, with wide base flange. Made of solid polished ebonite, with four pins for making soldered connections. Very useful for mounting purposes.

SPECIAL SALE PRICE **2/-**

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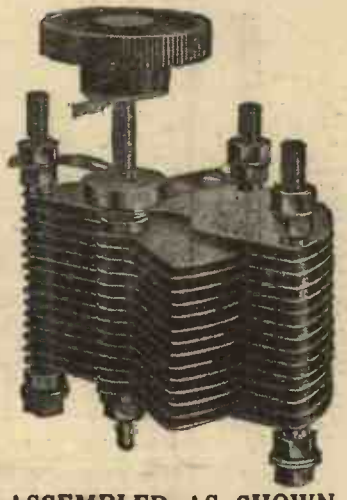
VARIABLE CONDENSERS

ASSEMBLED AS ILLUSTRATED.

Drilled Ebonite Ends to fix yourself, 1/- per pair extra.

Approx. Capacity in Mfd.	No. of Plates.	PRICE
·001	57	6/6
·0005	29	4/6
·0003	19	3/3
·0002	13	2/6
·0001	7	2/3
Vernier	3	1/9



NOT Thrown Together

COMPLETELY ASSEMBLED AS SHOWN

·001	8/-
·0005	5/11
·0003	4/11
·0002	3/11
·0001	3/6
Vernier	3/3

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Twin Flex, 12 yds 1/9. By post, 2/- doz.
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Rotax Accumulators, 4 v. 40 amp., 17/-. Carriage, 2/- each.
Fixed Condensers. Good value. 11d., 1/3. Post, 6d. each extra.
H.T. Batteries, 60 volt, 9/-. Carriage, 2/- each.
H.T. Batteries, 15 volt, 2/6. Carriage, 1/- each.
Ebonite Valve Holders, 10d., 1/-, 1/3. Post, 6d. each extra.
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Basket Coils, 2/8 and 3/6 set. Post, 6d. extra.
Insulated Sleeving, 5d. and 6d. length.
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Tapped Coils on Ebonite, 10 tappings, broadcasting size, price 2/6. Post, 1/- each extra.
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Accumulators, 6 v. 60 a., absolutely the best, 35/-. Carriage, 2/- extra.
Slider Knob and Plunger, 3d. each. By post, 7d. each.
Terminals, W.O., Telephone, P.O. and all patterns, including nuts and washers, not junk, 2 for 3½d. 1/6 doz. By post, 1/- doz. extra.
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Intervalve Transformers, very best, 25/-. Also 12/6 each, 16/-, 20/- each. Post, 1/- each extra.
Knobs, bushed 2 B.A. (best), 3d. each. By post, 7d.
3 Way Coil Holders, Ebonite and brass fittings, 7/6. Post, 1/- each extra.
Dubilier Condensers, at usual prices.
Telephone Transformers (R.I.), 20/-. Post, 1/6.
H.T. Batteries, 30 volt, 4/6; 36 volt, 5/-. Post, 1/- each extra.
Telephone Leads, long, 1/-. Post, 6d. extra.
Filament Resistances, 1/6, 1/8, 2/-, 2/6, 3/-. Post, 9d. each extra.
Transformers, L.F. (Radio Instruments, Ltd.), 25/-. Post, 1/- extra.

D.C.C. Wire Stocked—22, 24, 26, 28 Gauge.

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4,000 ohms (different headbands) (post 1/6 pr.) ... **22/6** and **25/-**
B.B.C. Phones, best quality (post 1/6 pr.) ... **17/-** and **19/6**
T.M.C., 4,000 ohms, stamped B.B.C. (post 1/6 pr.) **24/6** pair.
(Phones supplied by T.M.C. themselves, taken from expensive sets to clear.)
WONDERFUL PHONES, Double Receivers, 6,000 ohms, very loud.
To callers, **18/11.** By post, **20/6.**
They want some beating for value

TO CALLERS!

I sell everything you want for your home-made Sets. No junk. No cheap job lines. All low in price, but first-class quality.

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ON FRIDAY, SATURDAY AND SUNDAY SPECIAL CHEAP PRICES TO CALLERS

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On Your Wavelength!

Wireless Chats

ONE of the most attractive of 2 L O's many features is to be found in the talks and lectures which so many interesting people are giving upon subjects that they have made particularly their own. Through the agency of wireless one achieves a kind of personal contact with quite a number of the celebrities of the day. Somehow you don't feel that you know much about a man when you have merely seen his portrait in the illustrated papers, but when you can actually hear his voice and notice any little mannerisms that he may have he becomes at once a real living personality whom you seem to know quite well. What I do enjoy is hearing an author read one of his own stories. Mr. Pett Ridge and Mr. Gilbert Frankau have both entertained us in this way, and it is to be hoped that other writers will follow their example. A book is so much more interesting when you know exactly what manner of man the writer is. The broadcast reading of a tale forges a very close link between the author and his public.

* * * *

Knowledge without Tears

Thanks to the lectures, we shall, I think, become, if we are not careful, one of the best-informed nations in the world. They provide the easiest possible method of assimilating knowledge upon a variety of interesting subjects without the slightest effort on our behalf, and what could be better than that? We merely turn over the switch and sit contentedly puffing at our pipes, whilst the loud-speaker or the phones do the rest. If the subject bores us, we either switch off or tune in another station. The thirst for knowledge is spreading rapidly amongst one's friends; some are becoming experts in garden lore, others talk glibly of the domestic life of the bee, others again are acquiring a profound understanding of the vitals of the motor-car. The trouble is that all wireless folk are becoming equally learned, so that if we want to air our knowledge we have to seek out some unfortunate who is not provided with a set, and even then we have to be careful, for as often as not he has been listening-in to the talk to which we owe our fund of information on a friend's set.

* * * *

Making Dry Bones Live

One of the best talks that I have heard was that given recently by Mr. Cecil Hallett on the British Museum. Mr. Hallett, who is the Senior Guide Lecturer, has spent ten years in exploring that wonderful storehouse, of which he knows every nook and cranny. To him the ancient things that are contained between its walls are much more than mere quaint pieces of stone, wood or metal. He sees and feels the romance that lies behind each one of them, and in his little chat he let us into some of his secrets. In the fifteen minutes at his disposal he could, however, do no more than speak quite generally about the Museum. Let us hope that there will be future occasions on which he will be able to give us detailed descriptions of such fascinating collections as the Assyrian, the Egyptian and the Early British. If all museums had guide-lecturers like him people would soon cease to call them dull, or to regard them only as convenient refuges from the weather on rainy days!

* * * *

The "Beggar's Opera"

What did you think of the *Beggar's Opera?* I don't know whether my set was a little off colour on that night—there is no reason why it should have been, for I had invited nobody round to listen—but the transmission did not seem so good as those from Covent Garden. The music came through pretty well, but the spoken words were rather indistinct. Possibly this was due to the length of "land line" that had to be used for connecting up the Lyric Theatre, Hammersmith, with 2 L O, or it may be that the acoustic properties of the house are not quite suited to broadcasting. The transmissions of Grand Opera continue to be excellent. One only wishes that there could be more of them. I find that one gets absolutely perfect receptions if one fits up an extra stage of high-frequency amplification and dispenses with reaction. If tuned-plate coupling or tuned transformers are used it pays to stop a little short of the point of maximum strength when adjusting the condensers. In this way any harshness is toned down and the sound is mellowed to perfection.

* * * *

Zizz!

Yesterday and to-day I have been tracing a mysterious fault, the like of which I have never come across before. Though reception was quite good, the slightest jarring of the table produced what I can only describe as a "zizzing" noise. It was rather like that made by an angry wasp just before he darts at the back of your neck and gives you one for yourself. If one kept quite still reception was perfect, but even walking across the floor at once produced that infernal noise. It was eventually traced after much searching to the grid leak of a tuned-anode valve. The leak was tight enough in its clips to all appearances, but the metal ends of the cartridge had become very dull. They must have been coated with a thin film of oxide, for when the thing had been given a polish up with fine emery-cloth the zizzing obligingly disappeared.

* * * *

Our Little Worries

It is curious what absurd little things will occasionally lead to trouble, and how baffling they may be for a long time. I had an S.O.S. letter from a correspondent the other day whose set had become as dumb as a brick wall. As he was a clergyman he could not do justice to his feelings, but reading between the lines I could see that he had had a gruelling fight to preserve his self-restraint. He had tried every blessed thing without success, and was seriously thinking of finding another hobby. I suggested that he should test out circuit by circuit. By return of post came a letter full of fervent thanks. He had found that the anode pin of one valve wanted opening out with a penknife!

* * * *

Valve Pranks

Valves can play up badly at times when they feel so minded. We all know their old trick of allowing the filament to sag wearily down until it rests comfortably upon the grid. This can at times lead one a very merry dance. But there are worse things than this. One of the most difficult to trace is a broken lead inside the valve cap. At times everything is normal, then there is a crack in the phones and all is silence. Next moment another crack is followed by the return of the signals. When trouble does occur it is not half a bad plan to begin the search by getting out a spare valve and using it to replace each valve in turn. Another tip is to go along the row of valves, giving each a gentle blow with the finger. The detector valve will probably respond to this treatment with a loud "pong" in the phones, but that is quite normal. If any of them cause clicks or cracklings when they are tapped, then something is wrong with the fitting of the prongs in the holders, with grid, plate or filament leads below the valve holder, or possibly with the leads within the valve cap. Anyhow, the field of one's searching is narrowed down.

THERMION.

Fig. 2.—Gent Low-frequency Transformer.

Finding the Best Low-frequency Transformer

VI.—One Large and Some Small Types

ONE of the most useful and efficient transformers that it has been my good fortune to come across is the "Universal," made by the Marconi Scientific Instrument Company. A photograph was not made because this transformer is in appearance exactly like the same firm's box-type illustrated in a previous article, save that it has three pairs of terminals instead of two, and that it is considerably larger, measuring 6½ in. in length by 3 in. wide by 3 in. deep. It contains three sets of windings on a common open iron core. The first is wound to a direct-current resistance of 6,000 ohms, the second to 12,000, the third to 60. It can be used as (1) an intervalve transformer, (2) telephone transformer, (3) as a three-coil transformer for dual amplification circuits. The connections are shown in the diagrams *a, b* and *c* (Fig. 1).

Owing to the exceptionally high impedance at speech frequencies, this transformer, when used for intervalve coupling, is remarkably efficient. It is absolutely silent. Reception is free from any sign of distortion, and amplification is good. The open core is, theoretically, not so efficient at low frequencies as the closed, but thanks to its design this transformer leaves nothing to be desired. This type can occasionally be purchased second-hand, and if it is offered at a reasonable price it should certainly be snapped up, for it is as handy a piece of apparatus as the experimenter could wish for, and its uses are many.

Some Smaller Transformers

We come now to a quartet of the smaller transformers, all of them instruments sold at very moderate prices. It would, of course, be absurd to expect them to give results on a par with those shown by the larger transformers, with their larger cores, more numerous windings, and altogether more robust design. Still, these little fellows did very well indeed under test, provided that too heavy a tax was not put upon them. If they are used with two or three stages of H.F. amplification the resulting large variations in current and potential are rather more than they can deal with. In this case distortion is liable to occur, particularly if strong reaction is used. But those who can afford to buy or build sets with a number of H.F. valves will also be able to bear the cost of a big low-frequency transformer, at all events for the first note magnifier.

The small transformer of the cheaper kind makes its appeal especially to those who wish to make a combination of crystal and valve, or to add a note magnifier to an existing single-valve set. They will find that the small transformer usually meets their requirements, provided that they purchase it with due regard to good and bad points, mention of which has already been made, and that they use it with due care.

One may, of course, have bad luck with any transformer. One of those under test—it would be invidious to say which—burnt out within five seconds, though only 65 volts were in use on the plate, and the set was not in oscillation. I could not believe that this was anything but a purely accidental failure due to some cause that was no fault of the makers. A second transformer of the same make was therefore purchased at random at the first wireless shop met with and subjected to a searching test. This one was deliberately burnt out after piling on the H.T. voltage to a point far in excess of that guaranteed to be safe by the manufacturers. When I say that it stood up to six times the voltage that had put the first out of action almost instantly, you will agree that it justified my belief that the original mishap was accidental and quite out of the ordinary run of things.

Those who use small transformers should, however, bear in mind that they are not intended to stand rough treatment. They should therefore not employ a higher H.T. potential than is necessary; the excessive use of reaction—always a fruitful source of harsh receptions—should be avoided, and care should be taken not to allow the set to fall into oscillation. It is important, too, that the grid of the L.F. valve should be receiving just the right potential to confine its working point to the proper part of the curve. The addition of a few extra negative volts may make all the difference. The condenser shunted across the primary has a big influence upon the quality of the receptions, since in small transformers the actual self-capacity of the windings is not sufficient to by-pass stray H.F. currents. Various valves should be tried until the best results are obtained. The .001 microfarad condenser is almost a standard fitting for the primary of the transformer, but it may be found that a much bigger one will give better results.

The resistance-shunting hint previously mentioned should also be made use of. The addition of a resistance of from 40,000 to 150,000 ohms (the best value can be found only by experiment) across the secondary has the effect of "mopping up"

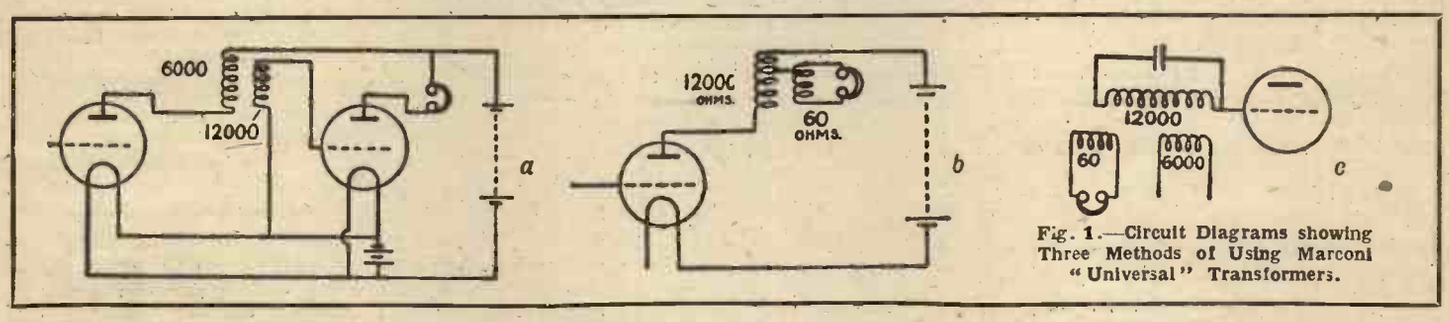


Fig. 1.—Circuit Diagrams showing Three Methods of Using Marconi "Universal" Transformers.

a great deal of the ruggedness noticeable in the receivers, especially when a powerful transmission at fairly short range is coming in.

Gent's "Tangent"

The first of the small transformers is the "Tangent," made by Messrs. Gent. This is really the baby of the family, as it is a

very small and very light instrument. For its size it performs very well indeed. It will not work satisfactorily—it could hardly be expected that it should—on the big set, which gives it too much to do. But when only a rectifier was in use in front of it, it gave results that were as good as could be desired. I like the design of this transformer, and I feel that if Messrs. Gent would turn out a large edition for use in big sets, with a heavier core and with a rather bigger insulation resistance factor between winding and winding and winding and core, they would produce a transformer that would produce a transformer that would be second to none. As it is, the little Tangent can be fitted with every confidence to crystal or to single-valve sets.

The primary contains 3,000 turns of No. 43 gauge wire, the secondary 10,000 of No. 47, the step-up ratio is thus 1-3⅓. The works tests are a flash test with 1,000 volts, and an insulation test with a megger, any transformer showing an insulation resistance less than infinity being rejected.

Each of these transformers is also tested for silent action and for the undistorted reception of speech. The dimensions are: height 2⅞ in., width 1¾ in., depth 1 in.

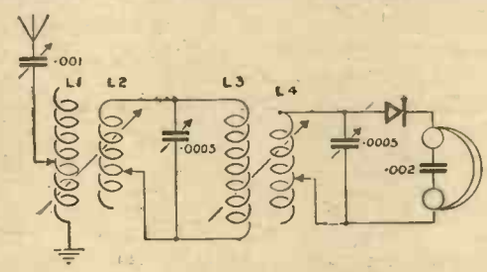
The small transformer manufactured by Messrs. G. Z. Auckland and Co. falls into very much the same category; it is excellent for small sets, but it becomes overdone if it has a combination of valves in front of it. Its dimensions are almost exactly the same as those of the Gent. Both of these transformers would, I believe, work well on larger sets if the iron cores were more heavily made. With either type it is desirable that an earth connection should be made when the instrument is mounted on the set. This can be done without difficulty from the brass plate which bridges the core at its foot and forms a mounting attachment.

R. W. H.

(To be continued)

150 Receiving Circuits

In Diagram and Picture



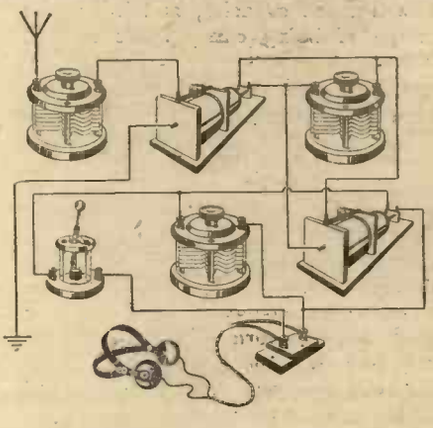
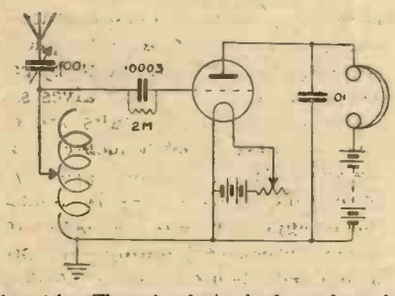


Fig. 14.—A three circuit, or multi-tuner, receiver. Consists of three separate circuits, each of which is tuned to the incoming wavelength. Two loose couplers can be conveniently used in this circuit in conjunction with three variable condensers whose values are given in the diagram.



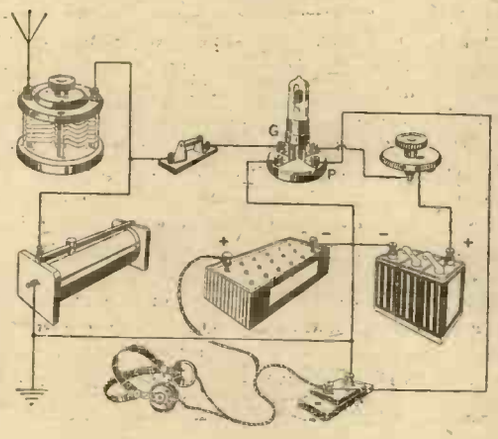


Fig. 15.—The simplest single valve circuit. The inductance coil may be of the single slider type. The variable condenser in series may be dispensed with, tuning being carried out simply with the slider. The grid leak and condenser values are given in the diagram as being values which will generally give results which apply to all valve circuits in this series.

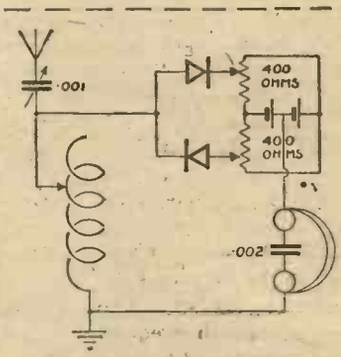
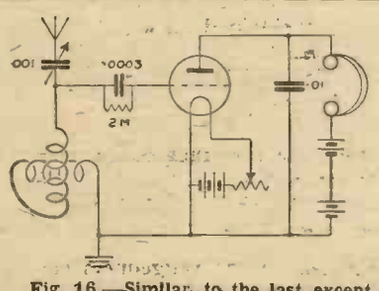


Fig. 13.— A balanced-crystal circuit, useful for experiments in the elimination of atmospherics. It will be seen that the crystals are connected in opposite directions and are connected to the sliders of a double potentiometer. The telephones are placed between the earth terminal and the centre of the 3-volt dry battery across the potentiometer.



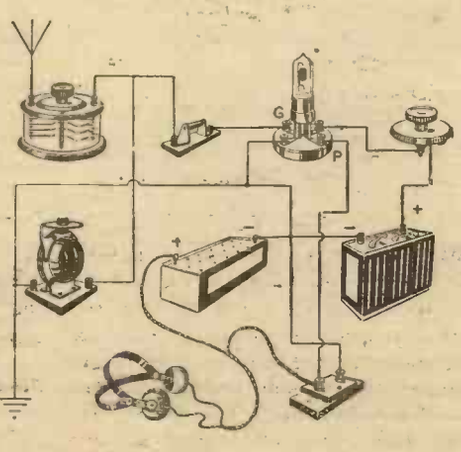
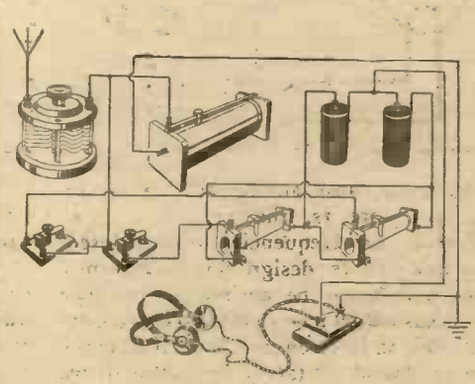


Fig. 16.—Similar to the last except that tuning is carried out by means of a variometer. Here again the series condenser may be omitted, fine tuning usually being quite easy to obtain with the variometer alone. The series condenser, if used, will allow of tuning to a much lower wavelength than would be possible without it.



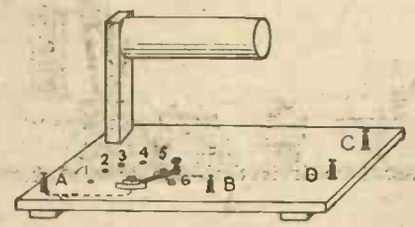


Fig. 1.—Inductance Stand and Base.

A Basket-coil Tuning Inductance

MAKING AND USING

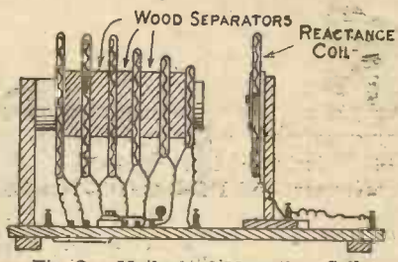


Fig. 2.—Method of Mounting Coils.

THE tuner described below, if carefully made, will be found to be very efficient for wavelengths of from 220 to 4,000 metres when shunted with variable condenser of .0005 microfarad capacity, and it has the advantage of being easily made and at small cost.

For the aerial tuning inductance basket coils are used, and as instructions on making these coils have appeared in previous numbers of AMATEUR WIRELESS they need not be given here. The points to bear in mind, however, are that the greater the number of spokes used the greater is the inductance and mechanical strength of each coil.

Coils

One coil each of 30, 40 and 50 turns, and three of 60, should be wound with 30-gauge d.c.c. wire on a 2-in. former with 17 spokes—bicycle spokes are excellent for the purpose—about 5 in. of wire being left over at each end for connecting to contact studs later. After winding, the coils may be soaked either in hot paraffin-wax or in shellac varnish and dried. They have then to be mounted on a stand (see Fig. 1) in the manner shown in Fig. 2. The stand can be made of old oak or mahogany, and provided that the wood is dry and properly treated it will be found to be practically equal to ebonite as an insulator. The wood should be soaked in hot paraffin-wax, afterwards being varnished with shellac.

Base

The baseboard is 11 in. long by 6 in. wide and about ½ in. thick, and the upright pillar supporting the roller about 5½ in. high by ¾ in. square. The roller should be a little less in diameter than the inside diameter of the coils—1¾ in. by about 5½ in. long will be a convenient size. Before assembling the stand the baseboard should be fitted with four terminals and six contact studs and a switch as shown in Fig. 1. The terminal A is connected to the switch by a wire running under the base. Four small rubber feet should be fitted on the under side of the base.

As the coils when mounted on the roller must be separated from each other by at least ¼ in., some form of separator should be made. Five pieces of wood, treated as before, ¼ in. thick by 2 in. square, with a hole bored in the centre very slightly larger than the diameter of the wooden roller, will be found quite suitable.

Assembling

The stand may next be assembled, the basket coils being fitted on the roller in the order of size as shown, each one being separated from the next by one of the wooden separators. Care must be taken to

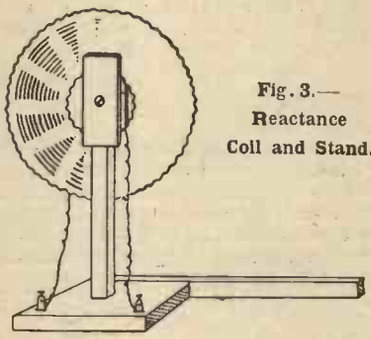


Fig. 3.—Reactance Coil and Stand.

see that the coils are placed so that the windings of all are in the same direction. When this is done the coils have to be joined up in series, that is, the wire left over at the finish of one coil being joined to the commencement of the next. The two outside ends are taken, one to the terminal marked B and the other to No. 1 contact stud, the joined wires of the remainder being taken to each of the remaining five studs. The sketch shows the arrangement quite clearly. This completes the aerial tuning inductance.

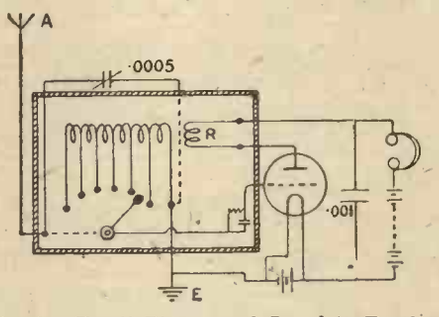


Fig. 4.—Circuit Diagram of Complete Receiver with One Valve Employing Reaction.

Reactance Coil

The construction of the rest of the tuner depends on the circuit it is intended to use. As an example, it may be supposed that a regenerative circuit is wanted. For this purpose a further coil will be required to provide the reactance, and this may be exactly the same as one of the large coils on the A.T.I., having about 60 turns. This has, however, to be mounted quite separately, so that it can be moved to and from the other coils. The sketch (Fig. 3) shows how this may best be done. A small wooden base, about 2 in. by 2 in. by ½ in., with a pillar to support the coil about ½ in. square and 5½ in. high, are required, also two very thin strips of wood, one on each side of the coil, to hold it firmly on the pillar. A long wooden handle ¼ in. square and 7 in. long should be fitted to enable the coil to be moved without the hand having to be brought near the coils, otherwise tuning will be a difficult operation. Two terminals should be fitted, one on each side of the base, and the wires from the coil brought down to them. These two terminals should be connected to the terminals C and D (Fig. 1) on the larger base by flexible wires to enable the reactance coil to be brought close up to or farther away from the A.T.I. as desired. The winding of this coil when mounted should be in the opposite direction to the others.

Tuner in Use

The tuner is now complete, and if used in conjunction with a variable condenser of .0005 microfarad capacity will be found to be very efficient both for telephony and telegraphy. A diagram (Fig. 4) is given showing the connections of the tuner in the circuit under consideration. It will be seen that the lead-in wire is brought to the switch via the terminal A, and the earth is taken from terminal B (Fig. 1).

Tuning is effected by moving the switch over the contact studs, the lowest wavelength being obtained when the switch arm rests on contact stud No. 6 and the highest when on No. 1. Fine tuning is effected by means of a variable condenser either in series or in parallel with the A.T.I. and by moving the reactance coil nearer to or farther away.

It should be understood that this tuner is equally good for other circuits than the one dealt with, and it requires but little ingenuity to adapt the principle to the needs of other circuits.

W. D.

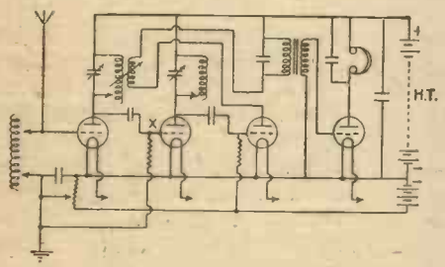
OUR INFORMATION BUREAU

RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply. Always send stamped addressed envelope and Coupon (p. 909).

Adding H.F. Valve to Tuned-anode Set

Q.—Please supply a diagram embodying the tuned-anode circuit of the plate given with No. 52 of "A.W." but with the addition of another H.F. valve using the same type of coupling.—B. S. (East Putney).

A.—The circuit illustrated below will meet your requirements. It will be seen that the grid leak between the first and second valves is connected to the slider of the potentiometer. It is not essential to control the grid of the second H.F. valve by means of the



Four-valve Tuned-anode Circuit.

potentiometer, but it is often advantageous. The reaction coil is coupled into the tuned-anode coil of the first H.F. valve. This allows use being made of the additional H.F. valve as an extra stage of regeneration. Another form of regenerative amplification which may now be used with this modified circuit is as follows: Construct and fit the reaction coil into the second tuned-anode component. Disconnect the lead between the grid leak and the grid of the first valve marked X in diagram. Between these two points the second reaction coil may be joined. This is known as grid-regenerative amplification, and is quite useful in boosting up weak signals. The additional tuned-anode coupling and reaction coil may be similar in design to the original instrument.—C.

Reaction Coil to Couple to Tuned-anode Coil

Q.—How can I arrange a reaction coil to couple to a tuned-anode coil or high-frequency transformer?—C. R. (Peterborough).

A.—For the broadcast wavelengths the reaction coil may be 80 turns of No. 32 S.W.G. S.S.C. wire wound in the form of a basket coil. If the tuned-anode coil is of the honeycomb or slab plug-in variety, the reaction and anode coils may be mounted on an ordinary two-coil holder, different degrees of reaction being obtained by suitable adjustment of the distance between the coils. If the tuned-anode coil is on a cylindrical former, the basket may be suitably mounted inside so that it may be rotated through 180 degrees. Or a former of a shade smaller diameter may be used, wound with about 50 turns of S.S.C. wire, No. 32 S.W.G. This former should be arranged to slide within the anode coil. To couple reaction to a high-frequency transformer, a basket coil wound as mentioned above may be arranged on a moving arm capable of swinging over the top of the transformer if this is of the plug-in type. Different degrees of reaction are obtained by varying the position of the reaction coil with regard to the transformer.—B.

Hydrometer for Testing Accumulator Acid

Q.—Please state how to read the markings of a hydrometer as used in testing accumulator acid.—P. D. (Croydon).

A.—Hydrometers for testing the specific gravity of accumulator electrolyte take the form of parallel-bulb-ended glass tubes, the stems of which are graduated in degrees. The bulb is weighted to cause the tube to float upright in a liquid. According to the specific gravity of the liquid tested the buoyancy of the tube is greater or less, and the graduated stem is more or less immersed: readings of the scale are taken at the liquor-level. The correct specific gravity of accumulator-acid at (nominal) no-charge is 1.200, and this division of the scale is usually calibrated in red, for easy observation.—Q.

Primary and Secondary of Plug-in H.F. Transformer

Q.—I have a plug-in type high-frequency transformer which has no markings to indicate which plugs correspond to primary and which to secondary. Which are which?—E. F. J. (Christchurch).

A.—As these transformers usually have an equal number of turns in primary and secondary it does not matter which winding you call primary and which the secondary. However, the opposite legs on the transformer are joined to either end of the same winding, that is, the legs which correspond to the filament legs on a valve may be called the primary connections, and those which correspond to the grid and plate legs may be called the secondary connections.—P.

The High-Tension Battery

Q.—Why is the plate battery called the high-tension-battery when the voltage is only about sixty or so? I understand that the term "high-tension" is only used in reference to power mains which are stepped up to a very high voltage by means of transformers. —ARTHUR (Reading).

A.—The term "high-tension" when used in wireless, or any other branch of electrics, is only a comparative term. There is always another battery or set of mains delivering current at a lower pressure than the so-called "high-tension" supply, and the lower pressure is termed "low-tension" to distinguish it from the high-tension supply. Thus, in wireless, the filament accumulator delivers a current at a lower pressure than the plate battery, consequently the former is called the "low-tension" battery and the latter the "high-tension."—B.

"C. W." on a Crystal Set

Q.—How can I receive wave telegraphy on a crystal set?—E. W. J. (Stockport).

A.—You may arrange a small buzzer in the circuit between the aerial terminal and the crystal so that the circuit may be rapidly made and broken by the movement of the blade of the buzzer between two stops, one of which will be connected to the aerial terminal and the other to one side of the crystal. The stop on the crystal side will also be connected to the blade of the buzzer. Or you may arrange a cylinder of ebonite or other good insulating material, fitted with metal bars across its periphery so that there is an insulated space between the bars. Two brushes, connected to aerial and crystal respectively, must be arranged to bear on the circumference of the cylinder, and this cylinder must be driven at high speed by means of a motor of some sort. —P.

Charging 4-volt Cells from 230-volt Switchboard

Q.—How can I best charge 2-volt and 4-volt cells from a switchboard carrying two 230-volt circuits, with three and six lamps respectively of 32 c.p.?—D. D. M. (Birmingham).

A.—From the sketch supplied by querist, but not reproduced, it is evident that the two branch lighting circuits are fused on both poles, and it is accordingly a simple matter to take out one of these fuses and connect the cell in circuit instead, so that all the current that passes to the lamps has to traverse the cell first. See that the + pole of the accumulator is always joined to the terminal which tests positive on the fuse blocks. There will be no appreciable dimming of the lamps, as the volts on the cells are so small. The best cheap book dealing with such matters is the "Work" Handbook "Electric Accumulators" (1s. 8d., post free).—Q.

Tuning Coil Necessary with Frame Aerial

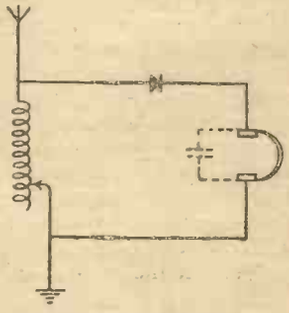
Q.—Is an inductance coil necessary with a frame aerial?—B. J. R. (Clapton).

A.—Strictly speaking, the frame aerial should be so wound that its own inductance value and the capacity of the variable condenser across it will give the wavelength it is desired to receive, but for reception of longer wavelengths than is possible on the frame alone an inductance coil may be included in series with the frame windings.—P.

Simple Crystal-receiver Circuit

Q.—Kindly give me a simple crystal circuit using a single-slide inductance coil, to use on the broadcasting wavelengths.—C. W. (Croydon).

A.—The circuit below will no doubt suit you. The coil should be wound on a former 4 in. in



Simple Crystal Circuit.

diameter with 100 turns of No. 18 S.W.G. enamelled copper wire, and a slider and bar fitted. A telephone blocking condenser value ·002 mfd. may be inserted in the telephone leads, as shown by the dotted lines and will be found to improve the note heard in the phones.—W.

DULL-E VAL

The new type of the need for

Specially written for "Amateur

Fig. 1.—W.D.11 Valve.

THERE can be little or no doubt that the valve of the future is that whose filament will give a satisfactory emission when it is glowing at a dull red heat. The valve most commonly used at the present time for wireless reception has a filament made of fine tungsten wire. To function properly this must be made white hot, which means that a considerable quantity of current at fairly high voltage has to be supplied to it. The current must be absolutely steady, otherwise there will be fluctuations in the output which will cause loud cracklings and clicks in the telephones. The only form of battery that can deliver steadily the amount of current required is the accumulator, which is one of the most cumbrous and most troublesome components of the set. It is heavy, it contains acid which mars or destroys any fabric with which it comes accidentally into contact, it requires careful watching, it is expensive, and it must be taken at frequent intervals to the charging station for a refill.

Accumulators and Current Supply

Those who are lucky enough to have a direct-current supply available from the lighting mains in their houses possibly do not find the accumulator a great nuisance, for if they possess small charging boards of suitable design the battery can be kept always up to the mark without any great difficulty. The majority of us, however, are not so fortunately situated. We are faced only too often with the task of lugging accumulators weighing 40 lb. or so some distance to or from the charging station. Unless we exercise the strictest care in examining the specific gravity of the acid and in keeping an eye on the condition of the plates we can never be sure that they are being well treated.

Valve Current

The current consumed by the average high-temperature valve is really ridiculous. The "R" valve, the Ediswan, and several others consume .75 ampere at a pressure of 4 volts. Each valve, that is, has an input of 3 watts. And what do we receive at the output terminals? From 1 to 3 milli-amperes at the potential of the high-tension battery. A five-valve receiving set fitted with such valves consumes 15 watts. A 100-ampere-hours accumulator, that is an accumulator rated at this amount, though its capacity is really only 50 ampere-hours, will supply such a set for about 14 hours—it will last just a week if the set is used for two hours a day—and the 3¾-ampere rate of discharge is probably considerably more than is really good for it. Even with the Mullard Ora, Cossor, Xtraudion and other valves with smaller needs the current consumption is big enough. Most of these valves call for .5 ampere at 3½ volts, an input of 1.75 watts per valve.

Fig. 4.—New-pattern D.E.R. Valve.

Valves and Greater Efficiency

There are two ways of rendering a filament efficient. The first, which was discovered some years ago, is to coat it with a lime compound. This, however, is not very satisfactory. Filaments so treated are apt to be short-lived, and the valves in which they are mounted are noisy. The second is to blend thoria, the rare earth used for the making of incandescent gas mantles, with tungsten. This has been found most satisfactory. At a given temperature the compound filament has about six times the emission that tungsten has alone. Hence valves fitted with blended filaments can be made to give a sufficient emission at a very low temperature.

New Type of Filament

The new filament—we may call it new, for though it has been known for some time it has not come into general use owing to the high prices charged until recently for low-temperature valves—has other advantages. When tungsten is heated to a high temperature for any length of time its whole constitution is altered, hence the filament of an old "bright-emitter" valve becomes very brittle, and may break under the slightest shock. A very hot filament is apt to produce parasitic noises in the form of cracklings. Lastly, the glare of a white-hot filament is most trying to the eyes of anyone who is engaged in experimental work at the wireless bench for any length of time.

The W.D.11 Valve

The most satisfactory dull-emitter made up to the present is the American W.D.11. Having received reports from the States of their wonderful performances, I managed after great difficulty to obtain one. You may imagine how eagerly I unpacked it and how I looked forward to testing it out with various circuits. As luck would have it, the filament was found to be broken through the jarring sustained in transit. I was therefore unable to try the valve, and had therefore to fall back upon other people's experiences. My information of this valve's feats comes from unimpeachable sources, those who have supplied it being keen and able experimenters in the United States.

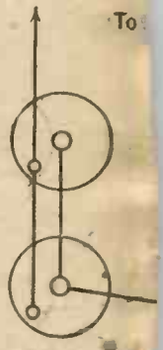


Fig. 2.—Meth Dry Cells fo emitter Val

The valve works with a filament voltage of 1.1, the current consumption being .25 ampere. When it is switched on the filament is so little heated that in broad daylight one may easily not be able to see that the valve is working as it should. It can be run from a single dry cell such as those used for electric bells, and the plate current needed is from 20 to 30 volts.

The "Aeriotron," as it is called, is one of the best valve jobs that I have seen

MITTER VES

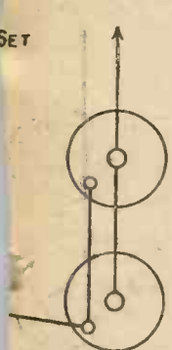
valve that obviates an accumulator

Wireless" by J. Hartley Reynolds

The glass work is beautiful, and owing to the pumping-out process used there is no blackening of the glass. The cap is very firmly fixed, and the prongs seem as solid as rocks. The latter are peculiar. Americans use a valve holder quite different from ours. It is an affair of rather large diameter with four spring contacts. The valve cap has a stud which fits into a bayonet-grip slot, the valve being secured in the holder by a slight turn. The W.D.11 has long prongs spaced exactly like those of our own valves. One hoped that it would fit the standard holder. But this is not the case, for the prong leading to the plate is about twice as large in diameter as the others. Still, one of our holders can easily be adapted by drilling out the plate leg to a suitable size.

As will be seen from an inspection of the photograph, Fig. 1, the main constructional feature of the valve is the tiny size of the plate, which is little more than ⅛ in. in diameter.

In use the valve is found to be in all respects the equal of any general type for rectification and amplification. It is silent, stable and long-lived. To show how efficient it is, it may be said that a single dry cell will run it for two hours a day for five weeks. As the cost of such a cell is about 2s. the economy effected is obvious. (It is not generally known, by the way, that when a dry cell runs down it may be given a new lease of life if holes are punched through its case and it is stood in a jampot containing a solution of sal-ammoniac and water.) The figures given above are for the cell without the aid of any outside help of this kind. The W.D.11 is sold retail at $5.25, which is equal to about 23s. of our money. Naturally it has had a tremendous sale; in fact, it bids fair to oust every other valve on the market over there.



1 of Connecting r-Use with Dull-ves.

British Dull Emitters

Our cheapest dull-emitters are the M.O. Valve Cos. D.E.R., which has just been reduced to 35s., and the Mullard L.F. Ora A and B, whose price is now, I believe, the same or a little less. I have used all of our British-made dull-emitters for considerable periods. I now use nothing but low-temperature valves, for though the initial cost is high, their advantages are so great that it is well worth while to go to the extra expense.

The only one that can approach the W.D.11 in point of efficiency as regards current consumption is the Mullard L.F. Ora A. This valve, which is not illustrated, since it is indistinguishable from the well-known high-temperature Ora except by certain marks on the bulb, can be worked off a single dry cell, though it is best to use two wired in parallel, for it needs the 1.5 volts given by a fully-charged battery. Its current consumption is .2 ampere, which is rather below that of the W.D.11. The L.F. Ora B, which requires the same voltage and consumes .3 ampere, can also be worked off one dry cell, but the cell must be a large one, such as those used for operating electrically-worked railway signals, if its life is to be long. The L.F. Ora C working with the same voltage again takes .4 ampere. Its filament is, of course, thicker, and this gives it a very much longer life than either of the others. Two cells of respectable size wired in parallel will supply its needs.

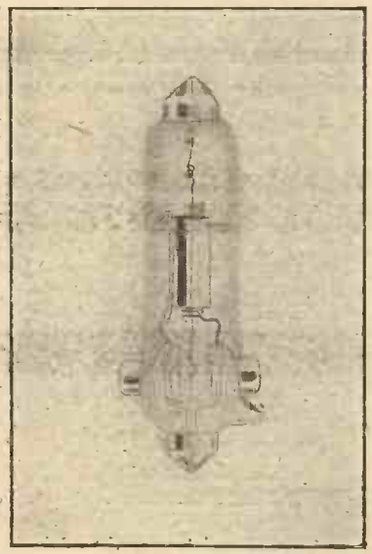


Fig. 5.—D.E.Q. Valve.

The D.E.R., made by the M.O. Valve Company, is just outside the range of even the large single cell, since it requires 1.8 to 2 volts and consumes .4 ampere. A pair of largish cells connected in parallel and wired in series with another pair joined up like the first (see Fig. 2) will, however, give quite satisfactory results. As the E.M.F. is 3 volts in this case a rheostat must be used. It may be mentioned that some battery manufacturers are now marketing batteries suitable for various types of dull-emitter valve.

Fig. 3.—Old-pattern D.E.R. Valve.

The Old and New D.E.R.

The D.E.R. was originally made as a small-sized valve shaped like the old Mullard Ora. This type, shown in Fig. 3, is no longer obtainable. The new pattern is seen in Fig. 4. The bulb is pear-shaped and the grid, filament and anode are mounted on very long supports, which make the valve rather microphonic. The D.E.R. is, however, a thoroughly good valve, efficient, long-lived, quick and stable. Unlike most valves, it does not seem to grow more greedy with advancing age. I have had five in use on one set for the last six months, and the ammeter still shows a total current consumption slightly below 2 amperes for the quintet when they are adjusted so as to give their best performances. When this set was fitted temporarily with five high-temperature valves which had seen a certain amount (though not a great deal) of use, the reading was very nearly 5 amperes; these in their new state should have taken only 3½ amperes, but as their filaments grow old they require a good deal more "juice."

My most economical set contains six valves, but consumes no more than 1 ampere at 3 volts. It is provided with five D.E.V. valves as amplifiers and one D.E.Q. which acts as the rectifier. These valves, which are of the "test-tube" type, are both rated at .2 ampere, but their actual consumption seems to be slightly less.

D.E.V. is primarily an amplifying valve, though on the multi-stage set it acts well as a detector. D.E.Q. (Fig. 5) is designed to rectify without grid-leak or condenser. It also makes a good high-

frequency amplifier when its grid potential is properly adjusted by means of the potentiometer, and as it will stand 200 volts on the anode it can be employed with a special high-tension battery of its own on the note-magnifying unit.

Both D.E.Q. and D.E.V. have very fine filaments. They are therefore not valves that will stand rough handling; they are nevertheless long-lived if they are carefully used. My own are a fairly recent acquisition, but I have a friend who has the same five in use on his set with an average of three hours' work a day for the last ten months. To show what an advantage it is to use these low-temperature valves, I may say that though my sets are in constant use, my big accumulator, which has an actual capacity of 60 ampere-hours, has been charged only five times this year. With ordinary valves it would have visited the charging station about once a week.

Until the low-temperature valve made its appearance the position of those who live in remote country districts seemed rather hopeless as far as wireless reception was concerned. They are often too far from the nearest broadcasting station to be able to use the crystal set with any kind of success, and as they have no source of electric power the constant charging of accumulators is out of the question. The dull-emitter solves their problems. The dry battery will do all that is needed, and owing to their low cost these actually work out cheaper than accumulators if we take into account the initial cost, depreciation, and the expense of recharging. The dry cell when run down too low to be of use for valve-filament heating has still a useful life before it if it is placed in the electric-bell circuit.

Taken all round, the low-temperature valve is a sound economical purchase even at its present price. When our makers see fit to reduce the prices charged to something like 25s., as they could do without suffering unduly thereby, these valves will soon be the only ones seen on wireless sets throughout the length and breadth of the country.

J. H. R.

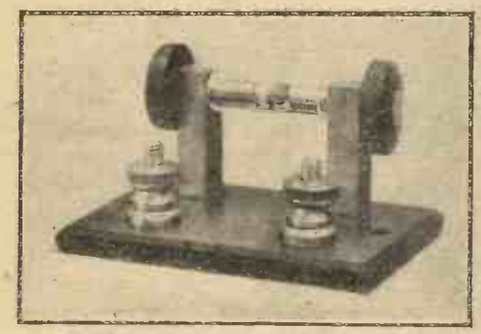
Around the Showrooms

Receiving 2 L O in the North

THE makers of the "Brownie" crystal receiver, the J.W.B. Wireless Company, of 19, Garrick Street, W.C.2, tell us that one of their customers says that he is able to receive 2 L O on one of these sets although he is as far away as Manchester. A folder, "The Brownie Wireless and All About It," will be sent to any interested reader who mentions AMATEUR WIRELESS.

For Broken Crystals

There must be many of us who have felt the want of some device for using up small pieces of crystal. This problem has been solved to some extent by Mr. T. O. Buss, of 77, Clerkenwell Road, who is making an instrument like the one shown in the photograph. Odd pieces of crystal, such as zincite and bornite, can be placed

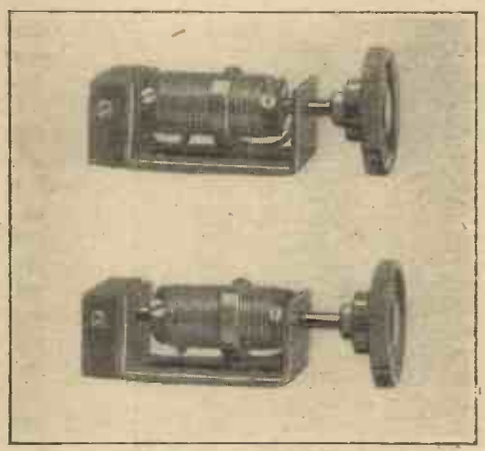


Detector for Broken Crystals

in the glass tube and the screws adjusted to obtain the best pressure. Only combinations of crystals can be used, but different ones can be quickly interchanged, and many interesting tests carried out with various combinations.

New-type Filament Resistance

The great drawback to the ordinary rotary filament resistance is that one cannot obtain a very fine adjustment, as the knob can only be turned through an angle of about 140 degrees. Moreover, the jumping of the contact arm from one wire to the next is likely to cause unpleasant



New-type Filament Resistance.

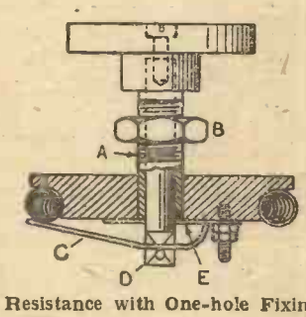
noises. A new type of resistance, shown in the photographs, does away with these objections. To cover the full range of the resistance it is necessary to turn the control knob thirty times. This, of course, allows of a fine adjustment, and there is no jumping from one wire to another, as the screw-motion contact is employed. One does not have to do all this turning every time one wishes to switch on or off, as, by means of a special contact, the circuit can be broken by simply pulling out the knob. Switching on is accomplished by pushing the knob back, as shown in the top photograph. These resistances are supplied by the City Accumulator Company, of 79, Mark Lane, E.C.3, and 10, Rupert St., Coventry St., W.1.

Stopping Valve Glare

We have received from Mr. R. F. Gordon, the sole patentee, a small device designed to stop the irritating glare from some valves. It takes the form of a black split sleeve, made from thin springy material, which slips over the valve. The upper end is contracted so that the pip of the valve is protected from chance blows. At present these sleeves are only being made for tubular valves, but shortly models will be introduced for the ordinary circular type. Mr. Gordon's address is 5, Lansdowne Square, Weymouth.

Resistance with One-hole Fixing

Some beginners, especially those who have had no workshop experience, find difficulty in marking out and drilling ebonite panels. A filament resistance that can be fixed on a panel by drilling only one hole is therefore of interest to many



Resistance with One-hole Fixing.

amateurs. The "Lokap" filament resistance, made by Mitchell's Electrical and Wireless, Ltd., of 2, Gerrard Place, W.1, and 188, Rye Lane, Peckham, S.E.15, and illustrated in the diagram, can be fixed by drilling a hole for the bush A, which is rigid in the former, and screwing the nut B down on the panel. The contact arm C is fixed on the squared spindle D, so that there is no chance of its slipping. The other end of the arm makes continuous contact on the back plate E.

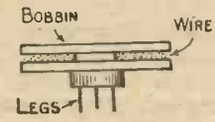
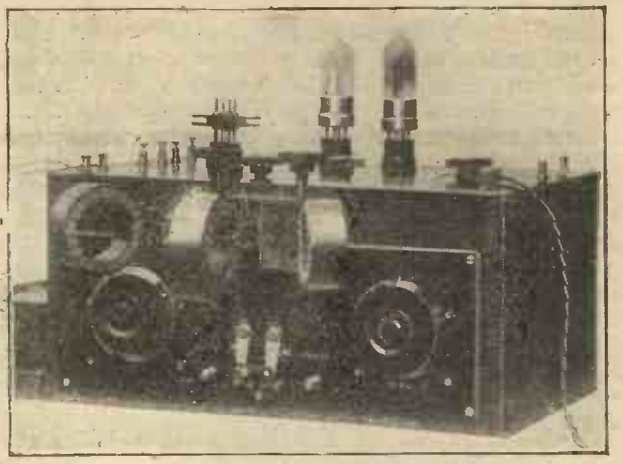


Fig. 1.—Plug-in Transformer.

AMPLIFICATION

Note-magnification :: Tuned-anode :: Resistance-capacity


A Two-valve Set built by Mr. A. Hughes, Wembley.

SOONER or later the enthusiastic possessor of a single-valve set will wish to add more valves to enable him to get louder reception and, of course, increase the range of his apparatus.

Now there are very many ways of adding valves to a set, the type of coupling used depending on what is required. Broadly speaking, there are two methods by which signals may be amplified or magnified. One is known as the high- or radio-frequency method, and the other as the low- or audio-frequency method. High-frequency amplification is employed when very weak signals are to be received. It very often occurs that signals inaudible on a single-valve set may be heard with comfort on a two-valve set having one stage of H.F. amplification.

Low-frequency Amplification

Low- or audio-frequency amplification is employed when it is desired to give "body" to signals already audible on a single-valve receiver. It is also used when it is desired to add a loud-speaker to a set. High-frequency amplification is used before rectification and low-frequency after. In other words H.F. methods are used to "coax" signals into the phones and L.F. to increase the volume of signals already there.

High-frequency Amplification

When it is desired to receive music or speech H.F. amplification is, for the best results, absolutely essential. Too many amateurs are content to buy a three-valve receiver with two stages of low-frequency amplification. When receiving concerts they keep their sets just on the oscillation point, and horribly distorted music is the result, and radiation takes place.

The first method of H.F. amplification is that known as the "plug-in" transformer method, which is admirably suited for medium wavelengths.

Small discs of ebonite are used to make a narrow bobbin (see Fig. 1), which is wound with two layers of wire, primary and secondary, the length of wire depending on the wavelength to be received. The bobbin is mounted on valve legs, the ends of the coils being connected to the legs. These transformers may be plugged into a valve-holder fitted on the set, and separate transformers are required to cover the various ranges of wavelengths. The writer has found these transformers particularly efficient on wavelengths from 1,000 to 3,500 metres. A suitable set for this range consists of four transformers: (*a*) 1,000 m. to 1,500 m.; (*b*) 1,500 m. to 2,200 m.; (*c*) 2,200 m. to 2,800 m.; (*d*) 2,800 m. to 3,500 m. The wire used is usually of about 40 S.W.G. d.s.c.

Fig. 2 shows the method of connecting two valves by means of a plug-in transformer.

The primary winding of the transformer is placed in the plate circuit of the first valve, and the secondary is "fed" on to the grid of the second. The potential of the first grid is adjusted by means of a potentiometer (not shown), so that the aerial current is amplified at radio-frequency. By this means a current similar to that in the aerial circuit, but of much larger amplitude, is caused to "flow" in the plate circuit of the first valve.

As this circuit includes the primary winding of the transformer, secondary oscillations, at radio-frequency, are induced in the secondary coil of the transformer and impressed on the grid of the second or rectifying valve. After rectification the signals are rendered audible in the phones.

Tuned-anode Method

Another H.F. method of coupling valves, which may be used with advantage for

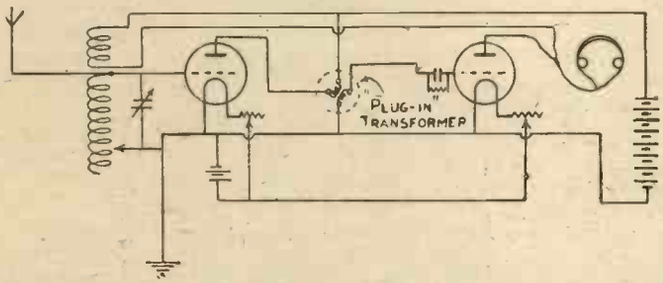


Fig. 2.—Method of Connecting Two Valves with Plug-in Transformer.

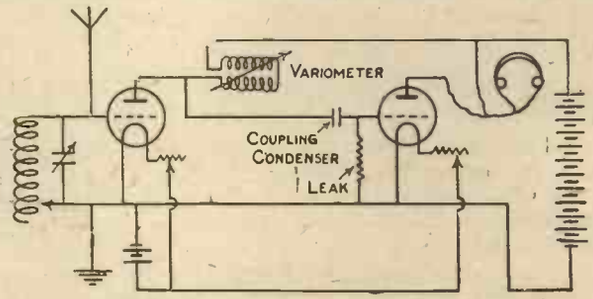


Fig. 3.—Tuned-anode Coupling.

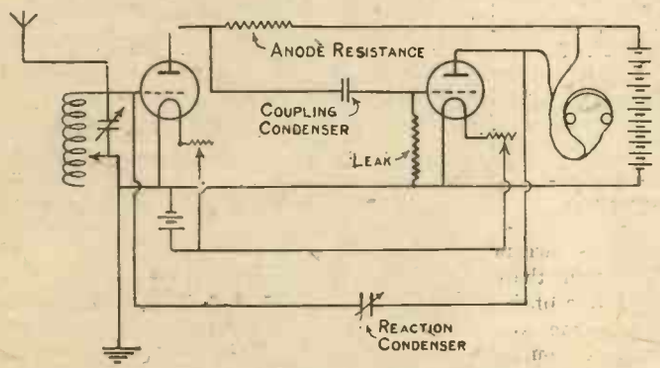


Fig. 5.—Resistance-capacity Coupling.

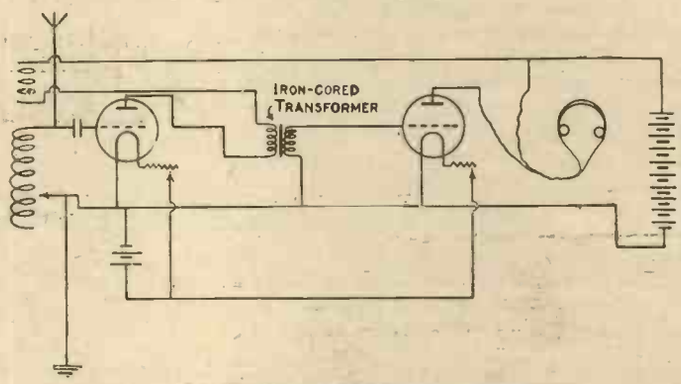


Fig. 4.—Note-magnification Circuit.

short waves, is the "tuned-anode" method. The adjustments necessary are rather critical and involve the use of long handles on condensers and tuning coils, but the results are excellent. A diagram of the connections for a two-valve set is shown in Fig. 3. It will be seen that a variometer consisting of two coils in series, rotating one within the other (thus varying the inductance of the circuit), is placed in the plate circuit of the first valve. A coupling-condenser is also provided (note the position of the grid leak). This arrangement of variometer and coupling-condenser allows of the amplified radio-frequency current, which "flows" in the plate circuit of the first valve, to be "fed" on to the grid of the second or rectifying valve.

A reaction coil is not required in a circuit of this description in order to make the set oscillate. Without going deeply into technical details it may be said that when the variometer circuit is in tune with the aerial circuit self-oscillation takes place. It will be found that the variometer adjustment, though criticial, will amply repay the care taken. The writer has found that a three-valve set with circuits of this type is capable of receiving music in Cardiff from London amateurs.

Note-magnification

The next circuit to be described is one employing low-frequency amplification, or, as it is more generally termed, "note-magnification." Note-magnification is what the name implies, that is, the note in a telephone receiver is magnified after rectification. Compared with high-frequency amplification, note-magnification is simplicity itself, though for the sake of peace and quietness it is not desirable to use more than two stages. An iron-cored transformer, with many turns of wire in the primary and secondary windings, is used to couple the valves. The primary winding is placed in the plate circuit of the first (now the rectifying) valve, and the secondary is "fed" on to the grid of the second.

Fig. 4 is a diagram of the connections of a set of this type.

Resistance-capacity

The last, and one of the simplest methods of amplification which it is proposed to describe, is the "resistance-capacity" method. The point is argued whether high- or low-frequency amplification takes place when this method is used. This circuit (Fig. 5) is especially suitable for long waves, though for the best results it is necessary to use twice the plate voltage as with transformer coupling.

A resistance of suitable value (50,000 ohms, 80,000 ohms, or 100,000 ohms usually) is inserted in the plate circuit of the first valve, and the "feed" on to the second takes place through a small coupling condenser. When signals are received varying potentials are set up across the anode resistance and "fed" on to the second grid. A reaction condenser is employed to bring the set into oscillation. This method is very convenient when receiving long-wave C.W. stations, as it is not necessary to use a reaction coil.

A suitable combination of the circuits described is a three-valve receiver employing one stage of H.F. amplification, one rectifying valve, and one stage of note-magnification.

H. R. J.

Progress & Invention

Assembling H.T. Units

PATENT No. 197,183/23, taken out by G. R. Baynton, of Birmingham, describes an improvement in assembling H.T. units. The arrangement is shown in the figures. Fig. 1 shows the method of suspending the units in a wooden case A.

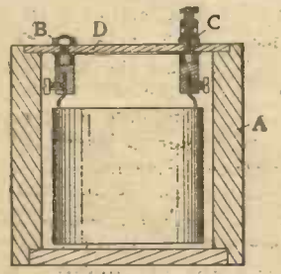


FIG. 1

Assembling High-tension Units. (No. 197,183/23).

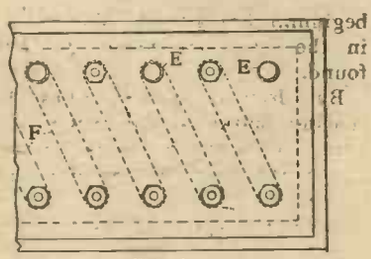
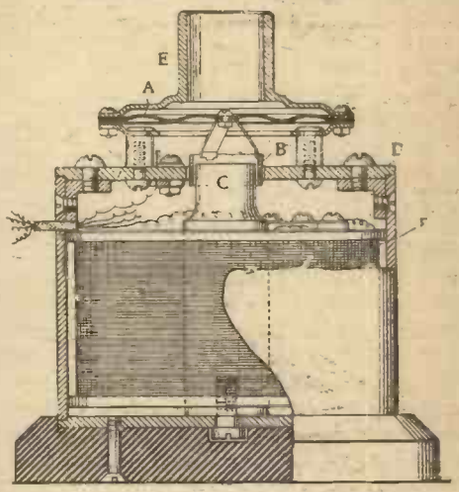


FIG. 2

Two bolts, or a bolt and a terminal, as at B and C, are fixed in an insulating top D, which may be made of ebonite. The batteries may be suspended as shown in the figure, or supported from below by means of some flexible material. The grouping of the bolts and terminals on the ebonite panel is shown in Fig. 2. Terminals E are placed alternately with the bolts along one row, so that tappings can be easily taken. Strips of metal F (shown dotted in the diagram) provide a low-resistance conducting path for connecting the batteries in series.

An American Loud-speaker

A MOVING-COIL loud-speaker is described in Patent No. 197,836/23 (E. S. Pridham and P. L. Jenson, of California, U.S.A. The instrument consists essentially of a diaphragm A, moving coil wound on insulated former B, and

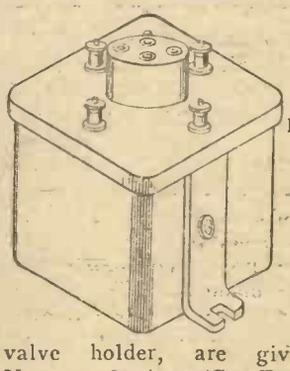


Moving-coil Loud-speaker (No. 197,836/23).

magnet C. The coil is rigidly connected to the diaphragm by means of three supports arranged as a tripod. An outer pole-piece D carried a sound-box E, to which a horn or trumpet may be attached. F is a magnetic coil wound round the magnet C, which fits inside the coil B. Currents flowing in the coil B cause it to cut the lines of force in the field due to F, with the result that it vibrates at right-angles to the magnetic flux and actuates the diaphragm.

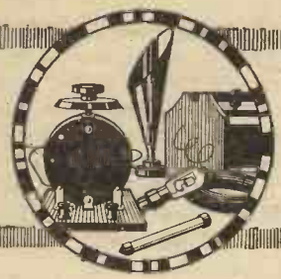
Inter-valve Transformer

PARTICULARS of an enclosed inter-valve transformer, complete with



Intervalve Transformer. (No. 197,854/23)

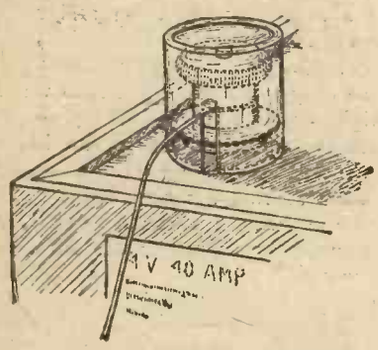
valve holder, are given in Patent No. 197,854/23 (C. F. Elwell, Ltd., of London, and B. E. G. Mittell, of Lee, Kent). The transformer casting, preferably the lid, is provided with a valve holder, the sockets of which are electrically connected to the appropriate parts of the transformer. The holder and lid constitute a self-contained unit with the transformer, in contradistinction with other arrangements in which the valve holder is carried by a panel distinct and separate from the transformer. The small amount of wiring reduces the interaction between the circuits of adjacent valves.



A PAGE OF ODDS—AND—ENDS

A Hint for Accumulator Users

MOST users of small accumulators have experienced the troubles of terminal corrosion caused by creeping and spraying of the electrolyte.



Obviating Corroded Terminals.

The nuisance can, of course, be obviated to some extent by covering the corrodable parts with vaseline, but when the substance is applied it is unsightly in appearance, readily collects dirt and dust, and is very liable to be smeared on to the coat sleeve at some inopportune moment.

A simple and easily constructed device which has been found successfully to overcome the various objections mentioned above is depicted in the adjoining illustration.

A small cylindrical cap made from sheet celluloid or tubing, or other suitable material not likely to be affected by the sulphuric acid solution, is placed over each terminal of the accumulator after making the required connections and covering the corrodable portions of the connecting screws with vaseline.

The caps should preferably be a push fit over the rubber lug collars or the coloured polarity-denoting washers of the accumulator, whichever may happen to be the largest in diameter. The slot in the side of the covers should be sufficiently wide to admit the connecting wires to the terminals. A. P.

Winding Cardboard Tubes

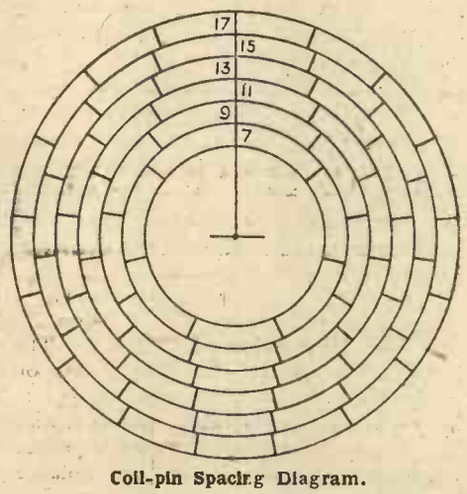
BEFORE commencing to wind wire on a tube, dry it thoroughly before a fire or in a warm oven, so that all moisture is driven out of the cardboard. It should then be placed in a bath of hot paraffin-wax until it is well saturated. Now wind with d.c.c. wire, but do not take any tappings. Complete the winding and join one end to the aerial terminal. Connect a piece of flexible wire to the earth terminal and solder a pin to the other end. Switch on the set and put the phones on. Now prick through the cotton covering of the wire with the pin until the desired station is heard.

A very useful coil is one which will receive the Dutch Concert. Take a tube 3⅛ in. diameter by 6 in. long, and after drying and waxing, wind 5 in. of it with No. 23 d.c.c. wire, leaving ½ in. bare tube at each end. To take tappings proceed as described above, and bare the wire with a knife at these points. If a tuning condenser is used as well, it should be adjusted so that about half of it is in use. In this way the most suitable tappings can be found for all the broadcasting stations, besides ships, Croydon and the Dutch Concert. A short length of wire can be soldered to the bare places and the tappings taken to a switch as usual. R. B.

Coil-pin Spacing

THE accompanying diagram will be found a useful aid to the spacing of the pins or slots in basket coil formers.

The figures on each side of the vertical



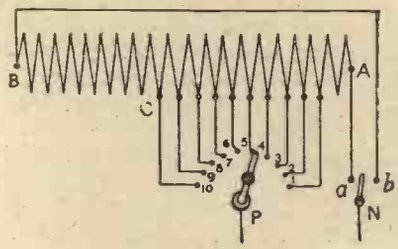
Coil-pin Spacing Diagram.

beginning line give the number of spacings in the rings on which the figures are found.

By drawing pencil lines from the spacing marks to the centre of the diagram or from the marks outward any size former may be speedily spaced out by placing it concentrically on the diagram and transferring the required marks. A. P.

Inductance Connections

INSTEAD of connecting every ten turns right along the coil to a stud on the variable switch, connect up only the first half. Bring each end of the winding AB to *a* and *b* of the small switch N. With the arm on *a*, move P from 1 to 10; this brings in half the inductance up to C. To



Inductance Connections.

add more, shift N to *b*, and move P back to 1. This brings in the whole coil. A. R. M.

A Small Brush for Cleaning

CARE should be taken to clean legs of valve-holders before they are fitted to a panel, as it often happens that dust and metal filings are present between them even when the holder is new. A small brush will be found to be very convenient for this. R. B.

Use Paraffin Wax

PARAFFIN wax is cheap, and amateurs would be well advised to use more of it when building sets. It prevents ingress of moisture and is a good insulator. All formers for tuning coils should be boiled in wax before they are wound. Leading-in tubes can be filled with wax to prevent rain from coming into the station. Many other uses with suggest themselves. S.

A Useful Wall-board

ANY amateur wireless station can be made to look much better with a board on the wall behind the apparatus. Such a board should be as large as possible so as to accommodate all the information that the owner is likely to require. The AMATEUR WIRELESS map and list of call signs may be placed in the centre, and lists of special transmissions, code signs, formulæ, etc., placed round it. Some hooks should also be supplied, upon which one can hang phones, coils, and a watch. A board like this is both useful and ornamental if arranged in a suitable manner. E. A.

Unusual Reception

SIR,—With reference to F. C.'s letter, "What is the Reason?" in No. 54, I note that your correspondent is using a bare copper-wire inductance with a 90-ft. bare copper-wire aerial, and I suggest that he is merely receiving 2 L O with his aerial. I have experimented with receiving 2 L O with good results by dispensing with the inductance altogether, grasping the aerial lead in one hand, and touching the detector terminal with the other. My body evidently served as a condenser, for the sounds were still audible even when the hand constituting the detector circuit was relaxed or even removed from the terminal, the intervening air forming the dielectric.—P. D. S. (London, S.W.).

H.T. Battery Consumption

SIR,—I was much interested in the note, "More About Power Amplification," which appeared in No. 54 of AMATEUR WIRELESS, but I cannot help thinking that the current passed by L.F. valves with high plate voltages is mis-stated. Possibly there is a printer's error, and the last two sentences should read: "A milliammeter (not *micro*-amperemeter) is necessary to measure the current taken off the battery." A sensitive ammeter (instead of milliammeter) only just trembles when put in circuit. If not, your contributor's milliammeter cannot be in proper working order.

If one uses 60 volts on the anodes, H.F. and rectifying valves will pass as a rule from .5 to 1 milli-ampere each. Low-frequency valves with a potential of 200 volts on the anode will certainly pass from 10 to 15 milli-amperes in the anode circuit. On an average 5-valve set using a plate potential of 80 volts throughout the H.T. current consumption is about 7 milli-amperes. These readings are from my own milliammeter, a Weston moving coil, which has been calibrated against a standard instrument.

5 Y M states that the loud-speaker is a power-operated instrument. This is quite correct. Results could not be obtained with it if the current passing through the windings of its magnets were of the order of micro-amperes.

Careful observations of the behaviour of a long series of high-tension batteries of reliable make seem to show that the average life of one of respectable size is, if well treated, about 2,000 milli-ampere-hours; that is, if the battery supplies 5 milli-amperes for two or three hours a day it will survive about five months before it is so run down that it has to be discarded.

Power valves such as the L.S.2 pass considerable amounts of current. The highest reading that I have obtained with this valve is 27 milli-amperes. The plate voltage was then 300. I doubt whether any ordinary high-tension battery of the wander-plug type would stand up to this consumption for more than a short period at a time. After a rest it would, of course, recover to some extent, but its life could not be a long one, for the rate of discharge is too high for the tiny cells of which it is composed.—C. M. B. (Newcastle).

More Appreciation

SIR,—As a constant reader of AMATEUR WIRELESS since the first number, I send just a line of congratulation and appreciation. In my opinion it is *the* paper for the serious amateur, and for clearness of expression both in text and illustration is the best yet.—B. W. H. (Hockley).

Lightning Switches

SIR,—A word of warning to all who "listen-in" and to those who conduct experiments. See that the handle of your lightning switch is insulated. The writer has been using one uninsulated, and recently received a sharp shock caused by atmospheric electricity.—H. A. (Princes Risborough).

The Price of Parts

SIR,—The average enthusiast, having decided what form of instrument to construct, makes a list of the parts required and, armed with the list, sallies forth to the local dealer to purchase. In all probability he will have a similar experience to the writer. Many parts, possibly the most important, he will not obtain. What he will get will be a few small articles such as contact studs, washers, etc., some wire (wrong gauge), a considerable hole knocked in a £1 note, and a firm impression that the vendor, probably a self-styled electrical engineer, knows nothing of the uses of the articles he sells.

Personally, I decided to make the well-known "Work" short-wave receiver, and went to a local electrical shop, attracted thereto by a prominent notice in the window.

The contact studs (first item) were produced all right, but the price, 2s. 3d. per dozen, came as a shock. A few terminals came next, and then the battle commenced. I wanted a 4-in. inductance tube, and the article was promptly smacked on the counter by the "engineer" with the satisfied air of one who can instantly produce any article demanded. While he was rummaging for the wire, I borrowed his rule and found the 4-in. tube had shrunk to 3½ in.

When he appeared again (to tell me the wire required was not in stock), I called his attention to the discrepancy. He was a little disconcerted, but pointed out that as the layers of cardboard were a trifle loose I could unwind them and make a tube of the required dimensions quite simply! Rather dubiously I bought it, but the only use I could put it to was fuel for lighting the fire.

Ebonite knobs, of course, he had not got. I was fortunate (?) in obtaining a few brass screws, a square brass rod and a bottle of shellac varnish. Considering the price charged, I reckon he cleared 300 per cent.

My earnest advice to all beginners is to make out their list, and then send away for the articles to advertisers in AMATEUR WIRELESS. I bought a piece of copper foil a few days ago and paid 6d. an ounce for it; I now find it priced in "A.W." at 2s. 8d. per lb.

Comparing the prices quoted by advertisers is particularly interesting. For instance, I noted that condenser vanes varied from 9d. to 1s., large washers 7d. to 3½d., small 4d. to 3d., No. 2 B.A. screwed rod 5d. to 4d., nuts for same 4d. to 3d., and so on. These variations in prices, however, are trifling compared to those of local dealers.—W. J. E. (Hornsey).

Three-valve Circuit for use with Frame Aerial

SIR,—I wish to inform you that there is a printer's error in my article with the above title in the issue of June 23. The last sentence states, "Experimenters living within two miles of a broadcasting station will find difficulty in tuning out the local station." This, of course, should read, "will find *no* difficulty."—W. E. N. W. (London, W.).

Lissen Regenerative Reaction

SIR,—In your issue of June 16 you gave a review of the Lissen regenerative reactance. We note you call this a "Tuned-anode reactance." This is not the correct description. We should like, therefore, to say that it is something more than a tuned-anode reactance. Below we give some indication of one of the differences in this unit and a tuned-anode coupling. The Lissen reactance method permits sharp tuning and yet allows the proportionate amplification of all the varying frequencies met with in telephony. There is consequently no trace of distortion with

(*Continued on page* 908)

CORRESPONDENCE (*continued from page 906*)

the Lissen reactance method, which embodies all the advantages of the tuned-anode system and also has particular advantages of its own.

To mention some of these. It cuts out near-by broadcasting stations and brings others in. Aerial and earth connections can be dispensed with under many conditions. There is no break in the regeneration over the whole wavelength range.—THE LISSEN COMPANY (London).

Long-distance Crystal Reception

SIR,—I can assure C. B. (Stokenchurch) that he should have no difficulty in hearing 2 L O on a crystal set. Though Stokenchurch is three or four miles farther from London than Wycombe, it is in a much more favourable position. I can get quite good reception of 2 L O using an ordinary set; the great thing is to use as much inductance and as little capacity as possible by inserting a small condenser (about .0001 microfarad) in series with the aerial and tuning by inductance only (variometer or slider coil). I have found "Permanite" very good as a detector; it is stable, and the adjustment is not so critical.—V. G. P. W. (High Wycombe).

Crystals and the Loud-speaker

AN interesting announcement was recently made by the Economic Electric Co., 10, Fitzroy Square, W.1, in their advertisement on page 670, "A.W.," No. 50, which was to the effect that telephony could be received on a loud-speaker within ten miles of a broadcasting station using their "Maxsig" crystal detector and variometer.

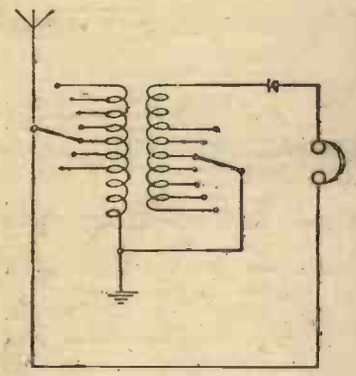


Fig. 1.—"Unisector" Crystal Circuit.

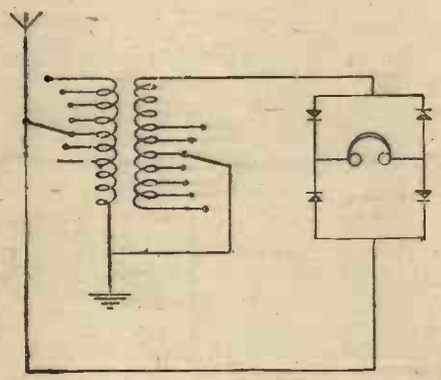


Fig. 2.—"Quadrector" Crystal Circuit.

It was only to be expected that the E.E.C. would be bombarded with letters from amateurs anxious to try this arrangement and asking for the circuit diagram. In Fig. 1 we show this undoubtedly excellent circuit, which they have named the "Unsector" circuit. It will be seen that the two coils are connected together on the variometer principle, but with the difference that a point between the coils is connected to earth. A transformer effect is thus obtained, and fine tuning is achieved by varying the coupling between the coils in the usual way.

The principle involves a unique design of auto-transformer coupling, inasmuch that it is possible to obtain a step-up effect between two coils which have a common junction to earth which obviates the use of variable condensers.

The same principles are made use of in the circuit illustrated in Fig. 2 and termed the "Quadrector" circuit, with the addition of balanced crystal detection, which is designed to permit full rectification, and is particularly admirable when using crystal rectification after H.F. amplification. Both of these circuits appear to open up a new field of experiment for the amateur, and the E.E.C. are to be congratulated upon the production of such neat arrangements.

"A Home-made Clock with Westminster Chimes" is the title of an illustrated practical article appearing in the current issue of "Work" (3d.). Other articles include: "Repairing a Coal-box Lining," "An Easily-made Garden Arch," "A Firescreen in Mahogany or Walnut," "Wireless Tuners," "The Care of Small Circular Saws," "American Notions Illustrated," "Progress Notes."

Correction: Valve Fed from the House Mains. A literal error occurred in the inscription to Fig. 1 in the article appearing in the June 16 issue under the above heading. The inscription was to the effect that the illustration showed a receiving circuit for valve with alternating-current filament supply, whereas the alternating current supply is to the *anode* and not to the filament.

WIRELESS IN PARLIAMENT

(From Our Own Correspondent)

Theatres and Broadcasting

DURING the consideration of an amendment to abolish entertainments duty, discussed during the Committee stage of the Finance Bill last week, Viscount Curzon said he was one of the many members of the House who were fond of listening to broadcasting. If there was one thing that had struck him more than another, it was the attitude of the theatre, and particularly of the variety section of the theatre, in the matter of broadcasting. Surely one of the best advertisements for the Opera was to be able to listen to a portion of it, and yet only a short time ago the greatest singer in the world, Dame Melba, was going to sing at the Opera. What happened? The musical people who were responsible for the Opera got in touch with Dame Melba's agents and persuaded them to put it to her that in no circumstances would they permit her to broadcast even one act of the opera. That was an absolute outrage on the very human desire of thousands of people scattered all over the country who nightly listened in. Those who spoke for the theatrical profession and pleaded for relief from the entertainments duty would get more sympathy from the country had their attitude towards the broadcasters been a little more sympathetic and human.

Eventually the amendment to abolish the duty was defeated by 274 votes to 153.

Quality of Programmes

Captain Martin asked the Postmaster-General whether he would use his influence with the London station of the British Broadcasting Company to provide a musical entertainment which would appeal to a wider section of the public?

Sir L. Worthington-Evans said he would bring the question to the notice of the committee which was considering the organisation of broadcasting.

Leafield Interference

Mr. Frank Gray asked the Postmaster-General whether the traffic at the Leafield wireless station after 8 p.m. was used exclusively for British official wireless news and American Press news of a very general character; and whether, having regard to the nature of this traffic and the fact that at two other times of the day British official news was broadcast, this traffic after 8 p.m. could be discontinued in the interests of those in England interested in broadcasting and in the interests of economy?

Sir L. Worthington-Evans replied that the traffic transmitted from the Leafield wireless station after 8 p.m. included

(*Continued on page 910*)

"WIRELESS IN PARLIAMENT" (*continued from page 908*).

telegrams for Egypt and for ships at sea, in addition to the items mentioned. The traffic as a whole was of an important and remunerative nature; and its discontinuance for the purpose of preventing interference with broadcast reception in the immediate vicinity of the station, where unfortunately interference was unavoidable, would not be justified.

New High-power Stations

The Postmaster-General further informed Mr. Gray that the conditions on which the new high-power stations of the Marconi Company would be worked had not yet been settled, but such steps as were possible will be taken to prevent interference with broadcast-receiving apparatus. It was, however, unlikely that such interference could be avoided in the immediate vicinity of the stations.

New Government Station

The Postmaster-General stated, in reply to Sir H. Brittain, that he expected a definite settlement would be reached shortly with regard to the size of the proposed new Government wireless station; where it was to be situated; and what services would be conducted from it.

Proposed Brussels Broadcasting Station

Mr. Bonwick asked the Postmaster-General whether he was aware that the Société Belge de Radio-Electricité purposed to erect a broadcasting station in Brussels for the transmissions of concerts, etc., without apparently receiving either royalties or share of licences; and whether this would be considered by the committee now sitting on this question in reference to broadcasting in this country?

Sir Laming Worthington-Evans said he was not aware of the proposal to erect a broadcasting station in Brussels on the conditions referred to. The matter would, however, be brought to the notice of the Broadcasting Committee.

Of Interest to Wireless Dealers

A LOUD-SPEAKER demonstration at the branch establishment of the City Accumulator Co., 10, Rupert St., W., on June 11, was stated at Bow Street on June 22 to have caused an obstruction owing to the crowd which collected outside the shop. A summons was issued against the owners by the police, and on the manager of the company undertaking that nothing of the kind would occur again the summons was dismissed, the defendants being ordered to pay 2s. costs. This is the first case of the type to be heard in this country.

RADIOGRAMS

SINCE June 1 the news service by way of Leafield, Cairo, Aden and Karachi has been suspended owing to atmospherics.

■ ■ ■

Complaints are being made of the high charge for "radiograms," which is 11d. per word, considering that ordinary telegrams are only 1d. per word.

■ ■ ■

German farmers have arranged to have broadcast for their benefit the latest news of the rate of the exchange.

■ ■ ■

A master mariner recently was fined for not keeping a continuous watch on duty in the wireless cabin. This is the first conviction of this kind in England.

■ ■ ■

To the people who ask the B.B.C. to broadcast "popular" programmes, the B.B.C. reply with, "What is a popular programme? If we give too much highbrow stuff we have the jazzites on to us, and, on the other hand, if we give too much jazz the highbrows complain."

(*Continued on page 912*)

Guaranteed Wireless Components

ONLY the finest Wireless Components are listed here. Our big manufacturing facilities enable us to quote lower prices and yet maintain the same high quality. Most orders can be filled per return of post. Carriage extra, but paid on all orders of £2 and over.

Head Office (for all Mail Orders):
64, High Holborn, W.C.1

Demonstration Lounge:
99, High Holborn, W.C.1.

Branch:
3, Wellington St., Strand, W.C.2.

INSULATORS

SHELL. Green Vitreous China, each 10d. Miniature size, each 3d.

BARREL. Very high breaking strain, each 7d.

EGG. Small size and light weight. each 3d.

HEADPHONES

Superior quality, with wide comfortable xylonite headbands, 4,000 ohms resistance. Extremely sensitive. Particularly good value Per pair... **21/-**

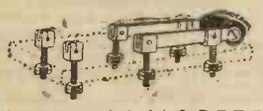
Very latest design adjustable magnet, gives wonderfully clear tone. Magnets are circular—one pole within the other — therefore the centre pull on the diaphragm gives absolutely distortionless reproduction. 4,000 ohms only. Per pair, **30/-**

LOUD SPEAKERS

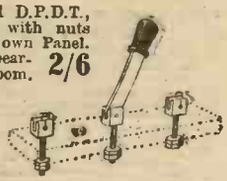
—the Peto-pan Super.

Reproduced exactly as used in the well-known PETO-PAN, but metal horn now replaced with moulded, unbreakable composition. Splendid acoustic effects. Gives true tone values without distortion. 4,000 ohms **63/-**

SWITCHES



Superior nickel-plated D.P.D.T., without bases, ready with nuts for mounting on your own Panel. Extremely smart appearance. Take up little room. **2/6**

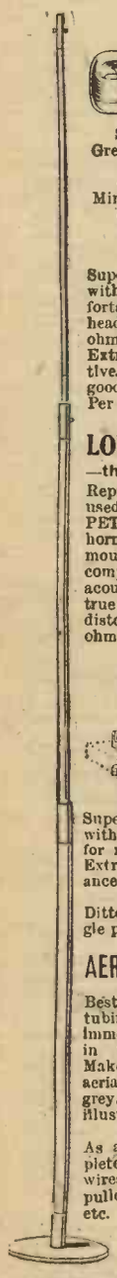


Ditto, but single pole only. **1/9**

AERIAL MASTS

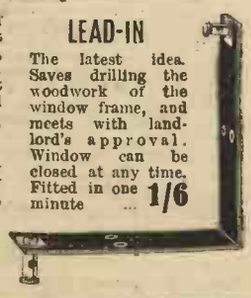
Best quality steel tubing, light yet immensely strong, in three sections. Makes a permanent aerial. Painted grey. As illustrated. **50/-**

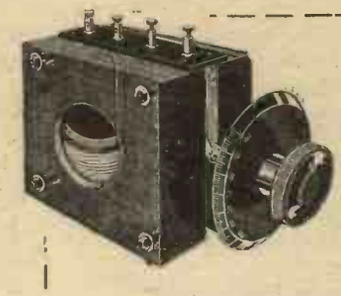
As above, but complete with stay wires, strainers, pulley, etc. **65/-**



LEAD-IN

The latest idea. Saves drilling the woodwork of the window frame, and meets with landlord's approval. Window can be closed at any time. Fitted in one minute ... **1/6**

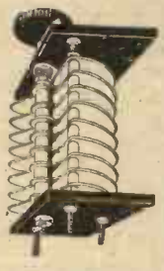




The "Variobloc" Variometer.

An internally wound Variometer of high efficiency conforming to latest American practice. Solidly built, with generous bearings which need no adjustment. Permanent contacts made with copper strip. Fitted with terminals and brass rod so that it can be instantly converted into a Vario-coupler. Made in two patterns: No. 1, 250-720 metres; No. 2, 250-840 metres. Suitable for Redpath Units. **17/6** Postage 6d. extra.

VARIABLE CONDENSERS



Complete with knob scale, pointer, and instructions, and TOP and BOTTOM EBONITE PLATES, ready bushed and connections made. Neatly boxed.

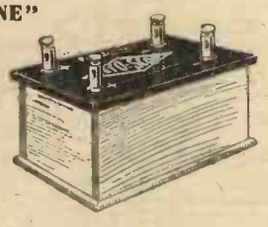
	Parts complete.	Assembled for Panel Mounting.
·001	7/6 ...	12/6
·00075	6,6 ...	11/-
·0005	5/6 ...	9/6
·0003	4/3 ...	8/-
·0002	3/6 ...	7/-
·0001	3/2 ...	6/-
Vernier (Ready assembled) ...	... ...	3/-

CRYSTAL RECEIVER

(De Luxe pattern)

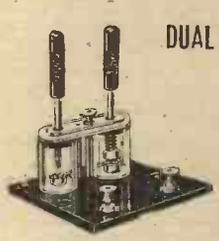
Complete with best quality phones, aerial wire and insulators. Nothing more to buy. Price **£6-6-0**

THE "FILTOFONE"



Specially constructed to eliminate noises in the Loud Speaker and, to improve tonal quality. Merely connect between Set and Loud Speaker. In polished mahogany case. **8/6**

DUAL CRYSTAL DETECTOR



To enable a cat-whisker and crystal or two crystals to be used. Very convenient for any Crystal Set. Both Crystals totally enclosed in glass, and arranged so that one only is in use at a time. On Ebonite base **9/6**

THE "MAX-AMP"

Finest quality intervalve Transformer. Fully guaranteed. Tested to 500 volts between windings. Very silent in action and free from all distortion. Each **21/-**

THE "TUNODE" PLUG

Permits the usual type of honeycomb coil to be used as a tuned-anode coil with exceptionally good results. Simply plug in H.F. Holder and add suitable honeycomb coil. Each **3/6**

THE "MULTI-WAVE" AMPLIFIER

For H.F. Amplification on all wavelengths above 1,000 metres. No. 1 for coupling between H.F. and Detector, and No. 2 for use where more than one stage of H.F. Amplification is used.
No. 1 ... 8/6 No. 2 ... 12/6

ACCUMULATORS

4 volts, 10 amp. hrs. continuous,	14/6
4 volts, 20 amp. hrs. continuous,	17/6
4 volts, 40 amp. hrs. continuous,	27/6
6 volts, 10 amp. hrs. continuous.	20/-
6 Volts, 20 amp. hrs. continuous,	27/6
6 volts, 40 amp. hrs. continuous,	42/-

All Accumulators add 1/- for packing.

SERIES-PARALLEL SWITCH

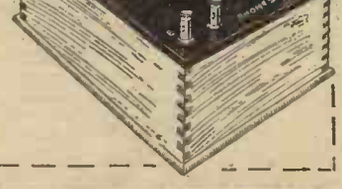
With brass bush, two nuts and spring washer 2/6

RADIAL SWITCH

4-leaf laminated. Complete with bush, nuts and washer, 1/3
Cheaper quality, 10½d.

THE "KOMPACT" CRYSTAL RECEIVER.

Complete in itself for all Broadcast Wavelengths. Consists of very selective Tuner, with tapped inductance and variable condenser for final tuning.
Crystal Detector fully enclosed within glass.
Designed so that standard Peto-Scott Valve Amplifier Units can be added for Loud Speaker use at any time. Sets of parts complete, with full instructions for home assembly **19/6**
Mahogany Cabinet 3/6
Finished Instrument, tested and stamped B.B.C. **37/6**



PETO-SCOTT CO., LTD., Featherstone House, 64, High Holborn, W.C.1

RADIOGRAMS (*continued from page* 910)

The Scotland Yard wireless motor-lorry can travel at a speed of 40 miles an hour without interfering with the transmission or reception.

■ ■ ■

The B.B.C. are still hopeful of coming to an agreement with the theatrical managers.

■ ■ ■

The death of Mr. Walter Seddon recalls the fact that he was the first wireless operator to demonstrate the usefulness of wireless aboard ship. He was chief operator on the ss. *Volturno*, which caught fire in mid-Atlantic in 1913.

■ ■ ■

It is intended to broadcast a concert from 2 L O on Sunday afternoons from 3 p.m. to 5 p.m., commencing next Sunday.

■ ■ ■

We are informed by Ashworth and Smith, Manchester, that a company has been formed, entitled the Carpax Co., Ltd., 312, Deansgate, Manchester, to take over the former's business in the "Homecharger" and "Unipanel" charging boards.

■ ■ ■

The Post Office permission for the Sheffield sub-station has at last been obtained, and Capt. West is in charge of the erection of the station.

As soon as the opera season at Covent Garden is over Mr. Percy Pitt, musical director of the B.B.C., intends to broadcast local glee parties, etc.

■ ■ ■

The new studios for the Manchester and Birmingham broadcasting stations are nearly completed.

■ ■ ■

No date has been fixed for the removal of 2 L O's transmitting apparatus to Wardour Street.

■ ■ ■

Variable condensers now being made in America are fitted with plates machined with washers fixed. After adjustment has been made the plates can be locked.

■ ■ ■

A Parisian newspaper has equipped and sent to the Ruhr two motor-cars fitted with receivers in order that the French army of occupation may be able to hear the concerts broadcast from the Eiffel Tower.

A very excellent tool catalogue is issued by that well-known firm, R. Melhuish Ltd., 50, 51 and 84, Fetter Lane, London E.C.4. The complete list contains 336 illustrated pages, but the firm is now distributing the catalogue in sections, and these will be sent free of cost and also post free to all applicants mentioning AMATEUR WIRELESS. Readers interested in any particular section should at once apply for the part of the catalogue which will individually answer their needs.

ANNOUNCEMENTS

"Amateur Wireless and Electrics." Edited by Bernard E. Jones. Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. It will be sent post free to any part of the world—3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to the Proprietors, Cassell & Co., Ltd.

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," La Belle Sauvage, London, E.C.4.

Some of these transmissions are commercial or official. Wavelengths and times are liable to alteration without notice. The times given are British Summer Time.

London B.B.C. Station (2 L O), 369 metres. Weekdays, 11.30 a.m. to 12.30 p.m., concert; 5.30 p.m. to 6 p.m., women's half-hour; 6 p.m. to 7.30 p.m., children's stories and concert; 8 p.m. to 11 p.m., concert and news. Sundays, 3 p.m. to 5 p.m., concert; 8.30 p.m. to 10.30 p.m., concert and news.

Manchester B.B.C. Station (2 Z Y), 385 metres. Weekdays, 3.30 p.m. to 4.30 p.m., concert; 5.30 p.m. to 6 p.m., women's half-hour; 6 p.m. to 6.45 p.m., children's hour; 6.50 p.m. to 7 p.m., talk on "Current Events," etc.; 7.20 p.m. to 7.45 p.m., concert and news, etc.; 8.15 p.m. to 10.25 p.m., concert, news, men's hour, weather forecast, etc. Sundays, 8.30 p.m. to 10.25 p.m., concert and news, etc.

Birmingham B.B.C. Station (5 I T), 420 metres. Weekdays, 3.30 p.m. to 4.30 p.m., concert; 5.30 p.m. to 6 p.m., women's half-hour; 6 p.m. to 6.45 p.m., children's hour; 7.30 p.m. to 8.15 p.m., concert and news, etc.; 8.45 p.m. to 10.30 p.m., concert, news, men's hour, weather forecast, etc. Sundays, 8.30 p.m. to 10.30 p.m., concert and news, etc.

Newcastle B.B.C. Station (5 N O), 400 metres. Weekdays, 3.30 p.m. to 4.30 p.m., concert; 5.30 p.m. to 6 p.m., women's half-hour; 6 p.m. to 6.45 p.m., children's hour; 8 p.m. to 11 p.m., concert, news, men's hour, weather forecast, etc. Sundays, 8.30 p.m. to 11 p.m., concert and news, etc.

Cardiff B.B.C. Station (5 W A), 353 metres. Weekdays, 5.30 p.m. to 6 p.m., women's half-hour; 6 p.m. to 6.45 p.m., children's hour; 7 p.m. to 8 p.m., concert and news; 8.30 p.m. to 10.10 p.m., concert, news, weather forecast, etc. Sundays, 8.30 p.m. to 11 p.m., concert and news.

Glasgow B.B.C. Station (5 S C), 415 metres. Weekdays, 3.30 p.m. to 4.30 p.m., concert; 5 p.m. to 5.30 p.m., women's half-hour; 5.30 p.m. to 6 p.m., children's hour; 8.15 p.m. to 10.45 p.m., concert, news, men's hour, weather forecast, etc. Sundays, 8.30 p.m. to 10.45 p.m., concert and news, etc.

Croydon (G E D), 900 metres. Daily.

Eiffel Tower (F L), 2,600 metres. Daily, 6.40 a.m. and 11.15 a.m., weather forecast; 6.20 p.m. to 7 p.m., concert, and 10.10 p.m., weather forecast.

The Hague (P C G G), 1,050 metres. Sundays, 4 p.m. to 6.40 p.m., concert. Mondays, 9.40 p.m. to 10.40 p.m., concert. Thursdays, 9.40 p.m. to 10.40 p.m., concert.

Paris Concerts Radiola (S F R), 1,780 metres. Daily, 5.5 p.m. to 6.15 p.m., concert; 8.45 p.m. to 10.30 p.m., concert; also concert from 2 p.m. to 3 p.m. on Sundays.

Rome (I C D), 3,200 metres. Daily, 11 a.m.

Königswusterhausen (L P), 2,800 metres. Daily, 5 p.m. to 6.30 p.m.

Amsterdam (P C A), 1,800 metres. Daily, 2.20 p.m.

Haren (O P V H), 900 metres. Daily weather report on 1,100 metres at 1 p.m. and 5.50 p.m.

Ecole Supérieure des Postes et Télégraphes, 450 metres. Tuesdays and Thursdays, 7.45 p.m. to 10 p.m., concert. Saturdays, 2.30 p.m. to 7.30 p.m., educative lectures and concert. Daily, at 11 a.m., 5.5 p.m., and 9.10 p.m., news and concert.

North London Wireless Association.

Hon. Sec.—J. C. LANE, Northern Polytechnic Institute, Holloway Road, N.

ON June 4 J. Nicol, Esq., gave a lecture on "Inductance." Many experiments were carried out and every point clearly explained. This was of especial interest to the many new members, giving as it did the reason for tuning circuits, and also showing the effect visibly by the aid of special apparatus.

On June 11, this evening being specially set aside for general discussion among members, many questions of interest were asked and answered.

Beckenham and District Radio Society.

Hon. Sec.—J. F. BUTTERFIELD, 10, The Close, Elmers End, Beckenham.

ON June 7 the subject for the evening was "How to Work Filament and H.T. Supply from House Supply," and the speaker, Mr. Knight, by means of a series of sketches, showed how to build up this circuit from an ordinary crystal and valve circuit.

Prestwich and District Radio Society.

Hon. Sec.—H. A. WOOD, Spring Bank, Church Lane, Prestwich.

A MEETING was held on Jan. 11 when Mr. E. Riley demonstrated a new circuit. The result was not as good as was anticipated owing to the temporary nature of the aerial, etc., but quite good enough to show its capabilities. This and the discussion that followed passed an interesting evening.

Honor Oak Park Radio Society.

Hon. Sec.—G. J. PRICE, 22, Honor Oak Park.

THE secretary of the above society will be pleased to forward particulars of the above recently-formed society to prospective members.

Tottenham Wireless Society.

Hon. Sec.—S. J. GLYDE, 137, Winchelsea Road, Bruce Grove, Tottenham, N.17.

THE meeting of the above society held on June 13 was devoted to the demonstration of members' instruments. A number of sets were displayed and tested, ranging from a one- to a five-valve set, including the society's set. Interesting results were obtained from a Flewelling circuit and from an interference eliminator.

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