

city, for which a coil having 68 closely wound turns of 24 S.W.G. double cotton covered wire will be suitable. It is desired, however, to make provision for those who have a condenser on hand of some other capacity, so the following little table has been provided to acquaint them with a suitable winding for their particular condenser:—

| | |
|-----------------|----------------------------|
| Condenser. | |
| .0005 mfd. ... | Winding 54 turns 22 D.C.C. |
| .00035 mfd. ... | Winding 64 turns 24 D.C.C. |
| .0003 mfd. ... | Winding 68 turns 24 D.C.C. |
| .00025 mfd. ... | Winding 70 turns 24 D.C.C. |

All windings are close wound and will occupy some 2 inches on the former. The winding should be started $\frac{1}{2}$ inch from the bottom of the former—after first securing the bared end of the wire under the nut of a small screw—and continued until about the fifteenth turn, when a tapping loop is passed through a hole in the former and secured under the head of another screw, the portion of the loop in contact with the screw being, of course, first bared. The winding is then continued until the required number of turns is reached, when the bared end of the wire is passed under a third screw, this one being mounted at the top of the coil instead of the bottom.

Mounting the Components.

THE mounting of the components will present no difficulty. The practical wiring diagram shown in Fig. 5 is drawn accurately to scale and considerable care should be taken to mount each component precisely in the position shown, making use of the small scale printed below the diagram. The main terminal strip is 6 inches long, the terminals being centred 7-8 in. from each other, while for the other terminal strips and the condenser mounting any scraps of ebonite which happen to be handy may be used.

It is hoped that the many constructors who are unable to wire a receiver from a theoretical diagram will have no difficulty in doing so from the practical wiring diagram shown in Fig. 5; certainly no effort has been spared to ensure this. Just to make absolutely certain that no mistakes are made, the constructor should check his wiring from the following list of connections:—

- (1) Aerial terminal to tapping on coil.
- (2) Terminal on frame of variable condenser to bottom connection of coil, thence to negative filament terminal of detector valve-holder, thence under baseboard to earth terminal, thence to "A—" terminal, thence to "B—" terminal, thence to "C plus" terminal, thence under baseboard to negative filament terminal of first audio valve-holder, thence under baseboard to negative filament terminal of second audio valve-holder.
- (3) Low potential end of detector gridleak under baseboard to "A plus" terminal, thence under baseboard to positive filament terminal of detector valve-holder, then under baseboard to the positive filament terminal of the first audio valve-holder, thence under baseboard to positive filament terminal of second audio valve-holder.
- (4) "B plus" terminal under baseboard to one end of first plate resistance, thence under baseboard to one end of second plate resistance, thence to "Loudspeaker" plus terminal.
- (5) Other end of first plate resistance to one end of first coupling con-

denser, thence to plate terminal of detector valve-holder.

(6) Other end of second plate resistance to one end of second coupling condenser, thence to plate terminal of first audio valve-holder.

(7) Grid terminal of first audio valve-holder to other end of first coupling condenser, thence to high-potential end of first audio gridleak.

(8) Other end of second coupling condenser to high-potential end of second audio gridleak, thence to grid terminal of second audio valve-holder.

(9) Low potential end of first audio gridleak to "C" minus $1\frac{1}{2}$ terminal.

(10) Low potential end of second audio gridleak to "C" minus $4\frac{1}{2}$ to 9 terminal.

(11) Plate of second audio valve to "Loudspeaker" minus terminal.

(12) Insulated terminal of variable condenser to top connection of coil,

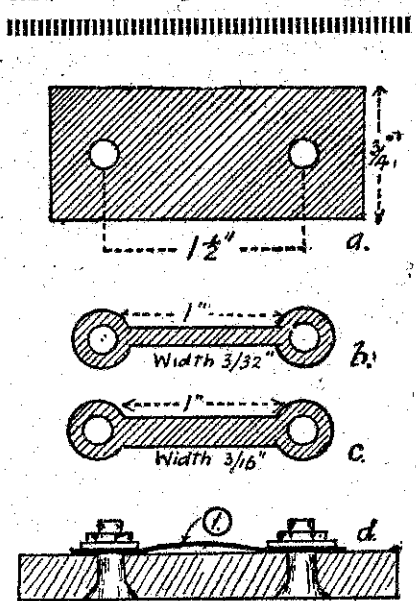


FIGURE 3.—A, B, and C.

Dimensions of pieces of prepared blotting-paper for resistances and gridleaks.

D.—Method of mounting resistance or gridleak on strip of ebonite.

(1) Strip of prepared paper.

thence to one end of grid condenser. (13) Other end of grid condenser to grid terminal on detector valve-holder, thence to high potential end of detector gridleak.

Two Valves Only.

WHERE only a two-valve version is contemplated, the continuation of the wiring to the last valve-holder and associated apparatus may be omitted, the plate terminal of the first audio valve-holder being connected direct to the "Loudspeaker" minus terminal.

Wiring may be carried out either with insulated wire, such as Glazite, which is bared where it is desired to make a connection, or with tinned copper wire of about 18 or 20 S.W.G., over which insulating sleeving is slipped wherever there is a danger of two wires touching or of a wire touching any piece of apparatus. The method of doing part of the wiring under the baseboard involves drilling a fair number of holes to pass the wires through, but this is not difficult.

Valves to Use.

UNLESS the constructor is already in possession of an accumulator or valves of a different voltage it is recommended that a 4-volt accumulator and valves of the 4-volt class be purchased. Whatever the filament voltage of the valves the first should have an impedance somewhere between 7000 and about 20,000 (e.g., Mullard P.M.4 D. or P.M. 3 Marconi or Osram D.E.L. 410, Philips A415 or A409, Cossor 410 B.F.). The first audio valve should have similar characteristics, any of the foregoing valves being suitable; while the third valve should have a rather lower impedance of somewhere about 5000 to 8000 ohms (e.g., Mullard P.M. 4, Marconi or Osram D.E.P. 410, Philips B409, Cossor 410P. Care must be taken to obtain the type of base for the valveholders used.

been made, and all batteries should be at once disconnected and the mistake traced before going any further.

On inserting the valves the local station should be tuned in without the slightest difficulty, and the writer ventures to prophesy that the constructor will be agreeably surprised by both volume and tone. If results are not what they should be, and home-made condensers are used, feel the first and second audio valves in turn. If the first is appreciably warm or the second uncomfortably warm, it is probable that a mistake has been made in assembling the coupling condenser preceding the offending valve.

The "B" battery should be hastily disconnected and the condenser taken out and tested by connecting it in series with a grid bias battery and a flashlamp bulb; if the bulb lights, there is obviously no insulation be-

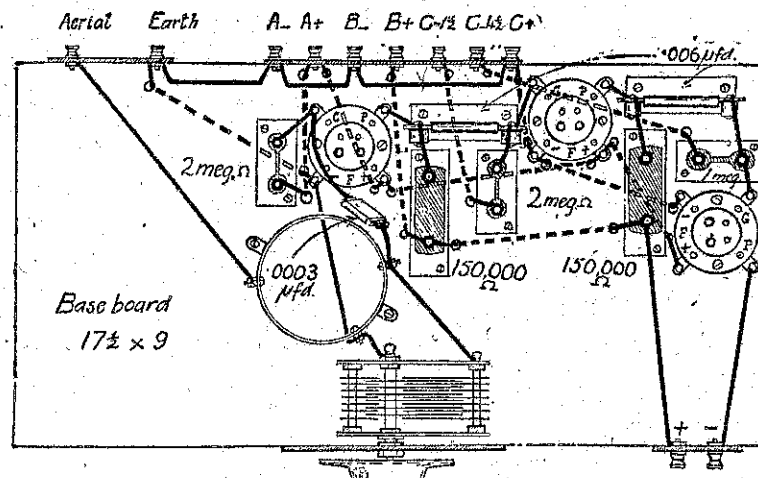


FIGURE 4.

Layout showing positions of components. Continuous heavy line denotes wire above baseboard. Broken heavy line shows wire beneath baseboard.

Batteries.

THE "B" battery should be at least 90 volts and preferably more, up to a maximum of, say, 135 volts. The "C" battery must be of the type having a tapping at $1\frac{1}{2}$ volts negative. The maximum negative potential required from the "C" battery is determined by the type of valve used in the last audio stage and by the voltage applied to its plate (i.e., the voltage of the "B" battery).

Information regarding the negative bias necessary at different plate voltages will be found on the maker's instructions accompanying the valve. Note, however, that notwithstanding any instructions given by the valve manufacturers, the negative bias applied to the first audio valve is not to exceed $1\frac{1}{2}$ volts.

IT will be noted that no on-off switch is fitted to the receiver. This omission will be remedied so soon as we describe the fitting of a proper panel, but in the meantime it will be necessary to disconnect the "A" negative lead from the accumulator when it is desired to "switch off" the set. If a battery clip is used this will entail no hardship.

The batteries should be connected up for the first time before the valves are inserted. If a vicious blue spark is encountered on connecting any of the batteries, a mistake in wiring has

tween the two sets of plates in the condenser, and a reassembly is indicated.

The only other likely source of trouble, provided the valves are sound, is a mistake in wiring, and every precaution has been taken to ensure that the constructor will not be guilty of this. The receiver in its present form is unsuitable for distant reception, so nothing should be expected of it in this direction; the disability will be remedied in due course.

The speaker should be connected so that the flex lead having a red tracer is connected to the terminal marked "+" and the other lead to the "—" terminal.

In closing, it may be noted that if care is taken to buy valve-holders and other components having terminals, no soldering at all is necessary, so that the constructor who dreads the soldering iron need have no fears on this score.

The next article will deal with various small improvements, these including the fitting of a proper panel and the wiring into circuit of a filament switch.

MANY a good indoor antenna is spoilt by the fact that the lead-in wire from the antenna is placed too close to metal pipes or similar objects, which subtract a certain amount of the energy which should reach the set.