LESSON XIX

RADIO

Radio on the Farm—The progress has been so rapid with radio in recent years that it has now become possible to enjoy the advantages of radio on almost any farm. The family in the country which not long ago seemed far away from public life and the many influences which make life worth living, may now sit in a comfortable room in the farm-house and enjoy concerts by some of the best artists in the country, lectures by men of prominence, sermons by big church men, and weather forecasts and market and crop reports, as well as daily signals of correct time. Besides this, there are many other phases which interest young people on the farm. Many young people are not able to attend the athletic contests in the colleges and universities but still have great interest in them. By means of the radio, they can have accurate reports of the contests, play by play, even hearing the sound of the referee's whistle and the cheers of the spectators as well as other noises of the game.

The weather forecasts and the market and crop reports probably mean more than any other phase of the use of the radio on the farm. Unless the farmer is very near a large city, he can secure these reports a full day or more ahead of the reports in the newspapers, and sometimes this advance information will enable him to get a much better price for his stock or farm produce than he would get if he had to wait for later reports.

Fundamental Principle of Radio—A radio sending station sends messages by means of the antennae in the form of aerial currents or electric waves which spread in all directions from the point, at intervals. The space or distance between each successive current or wave is commonly called "wave length." Certain stations are confined to sending messages with a certain wave length. This is done to avoid conflict or interference on the part of different stations in the air. These waves, in spreading through the air over the country, affect the antennae or aerial wires, which are over or in the house where a receiving radio set is located. These vibrations are carried down by means of a wire connection to the receiving device in the room of the person who wishes to listen to the message. The problem of the receiving station is to select the particular

series of waves from the station to which it wishes to listen and to sift out the undesirable waves from all other stations. A device which is called the "coupler" will help a great deal in shutting out the undesirable waves.

Radio Receiving Outfits

Crystal Detector Set—The Crystal detector sets are inexpensive and can be very easily made by the beginner. However, messages cannot be received by these outfits at a greater range than from twenty-five to fifty miles. With some of the more simple outfits, sometimes messages are not very distinct at even five or ten miles. With the addition of various devices, the messages can be amplified and brought in stronger at a considerable distance. Unless one is within twenty-five miles' radius of a large city, he cannot hope to do much with a crystal detector outfit from the standpoint of actual service as a business investment. It is well for a boy, however, to start with a crystal detector outfit and learn the operation and care of the receiving device before an investment is made in expensive apparatus. There are so many kinds of outfits on the market, and so many concerns that manufacture different parts with which a receiving set can be constructed, that exact prices cannot be given with accuracy. Dissatisfaction usually results from investment in a very cheap set which is sold by unscrupulous dealers from fifty cents up to several dollars. As a general rule, one can construct his own outfit after having purchased the necessary parts at nearly half the price which is asked for the assembled outfits.

A Homemade Crystal Detector Outfit

(″)=inches; (′)=feet

Materials Needed for a Simple Set—

2 pieces ¼″ x 5½″ x 6″ for sides of cabinet
2 pieces ¼″ x 6″ x 8″ for top and bottom of cabinet
2 pieces ¼″ x 6″ x 8″ for the back and front panel
2 pieces ¼″ x 5½″ x 5½″ for ends of coil box
2 small cleats 6″ long
Some small brass brads
1 oatmeal box
2 rotary switch levers
12 switch points
4 binding posts
2 small brass wood-screws
A small phone condenser
1 large brass binding post

1 brass rod ⅜" x 2"
4 brass bolts and nuts
65 ft. No. 22 cotton-covered copper wire
Several feet of "spaghetti tubing"
1 small piece No. 28 copper wire, about 8 in.
1 piece galena, as a detector

The Cabinet—When constructing a radio set, extreme care must be used throughout as the pieces must fit accurately. While oak makes a better appearance, most any kind of wood may be used. With the brass brads, nail the cabinet together so the sides are between the top and bottom. Then nail the back on, bringing all edges flush.

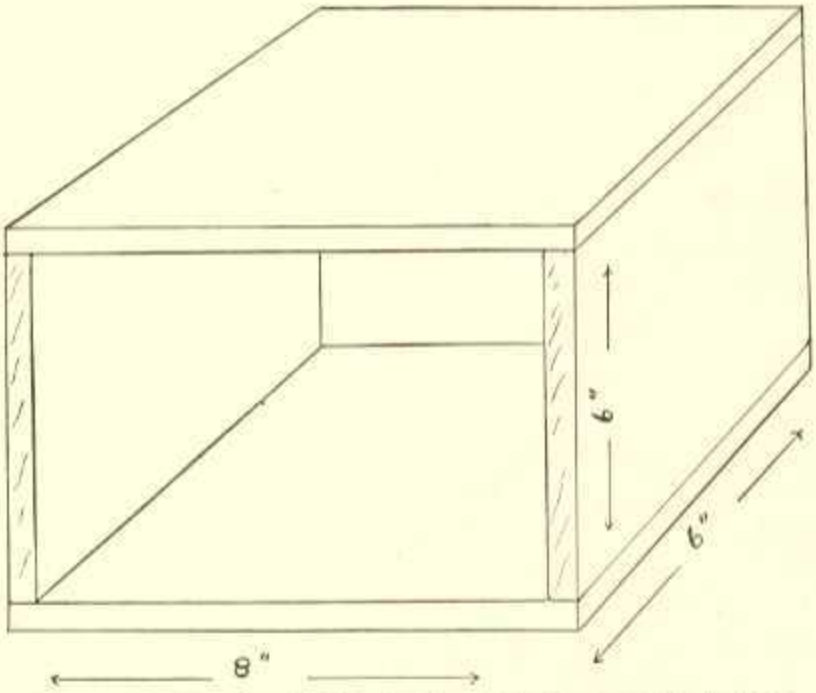

Fig. 1.—The Completed Cabinet without the Panel or Front Piece.

Making the Panel—The panel can be made either of bakelite or of some hardwood, such as oak. Bore four ¼ in. holes in the panel, as suggested by the illustration. Two of the holes are for the switches. These two are 2 in. up from the bottom of the panel and 2½ in. in from each end. The other two holes are for the detector. These are drilled 2 in. down from the top and 3 in. in from each end. The cabinet and panel should now both be given a coat of shellac. Do not use a stain with lampblack or any sort of paint. If bakelite has been used, the shellac will not be necessary.

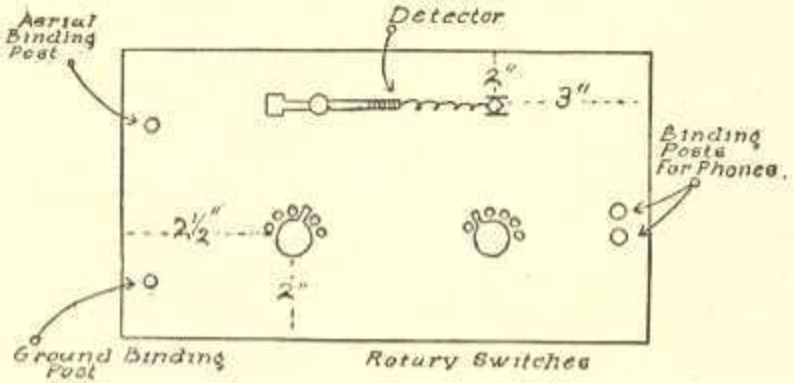

Fig. 2.—The Completed Panel.

Winding the Coil—The tuning coil for the Crystal Detector is wound on a cardboard tube 6 in. long and 4 in. in diameter. Usually, a small oatmeal box or some round paper box can be cut down to 6 in. and used for this purpose. No. 22 cotton-covered, copper wire is wound around this sixty times. First make two small holes about an inch apart at one end of the tube and run the end of the wire in and out of this to hold it in place. Then wind five turns of the wire, making a loop each time a turn is finished. See illustration for method of making loops. To make a loop, punch two holes in the box, make a fold as illustrated, push it in the one hole and out the other and twist it several times. From here on, make a loop at the end of every ten turns, repeating this process until five more loops have been made, or ten loops in all. Finally, make five more turns. Run the end of the wire in and out of two holes as you did at the beginning, to keep in place.

Fig. 3.—Method of Making a Loop.

Assembling the Tuner—Cut two pieces of ¼ in. material 5 in. square. With small brass brads, fasten a cleat on each end and cut a hole in the end of the oatmeal box on each side, through which this cleat will slip, in order to hold the end piece to the oatmeal box.

Mounting Switches—The two rotary switches are mounted in the holes as shown by the drawing, and the six switch points are mounted

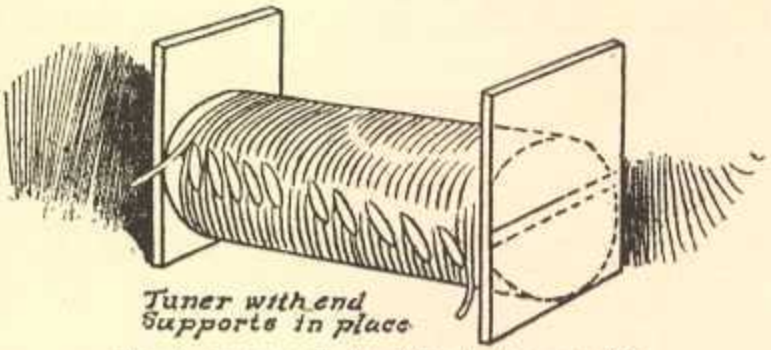

Fig. 4.—How to Fasten Ends to Oatmeal Box.

in semi-circular fashion around each lever. Two binding posts are mounted on the left side of the panel, one for the aerial and one for the ground. The other two binding posts will be mounted later.

Connect a wire from the left hand switch lever to the upper binding post at the left. Also connect a wire from the right hand switch lever to the lower binding post. These wires must be insulated and placed on the back of the panel. Use the same wire for this as you used for winding the tuning coil.

Hooking up the Tuner—The tuner is fastened to the back of the panel with brass screws. The screws pass through the front of the panel into the end supports.

Next connect the end of the coil wire with the first switch point of the left hand switch. The five loops close together are connected in succession to the five remaining points. The loops on the right hand side are connected with the five switch points in a similar way. Remember to scrape the insulation from the wire in making these connections. It is usually advisable to solder every connection.

Mounting the Crystal—The small brass strip is bent into a "U" shape and a brass bolt placed through the side holes. The other bolt is placed through the bottom to hold it to the panel. The "U" is mounted in the right hand upper hole, which was bored in the panel. Wrap a fine copper wire around the end of the brass rod and solder into place. Then wrap the wire around a small nail or something in order to coil it into a spring. Finally place the rod through the binding post and clamp the crystal in the end of the brass "U"-shaped piece.

Mounting the Binding Posts for the Phones—The two binding posts for the phones are mounted on the panel along the right hand edge. They should be near the middle, about one inch in from the edge, and about one inch apart.

Mounting the Phone Condenser—The phone condenser should be mounted on the back of the panel between the end support of the tuner and the phone binding post by means of brass screws. If there are no

eyelets or holes in the condenser for screws, it may be held in place by means of strips of tape.

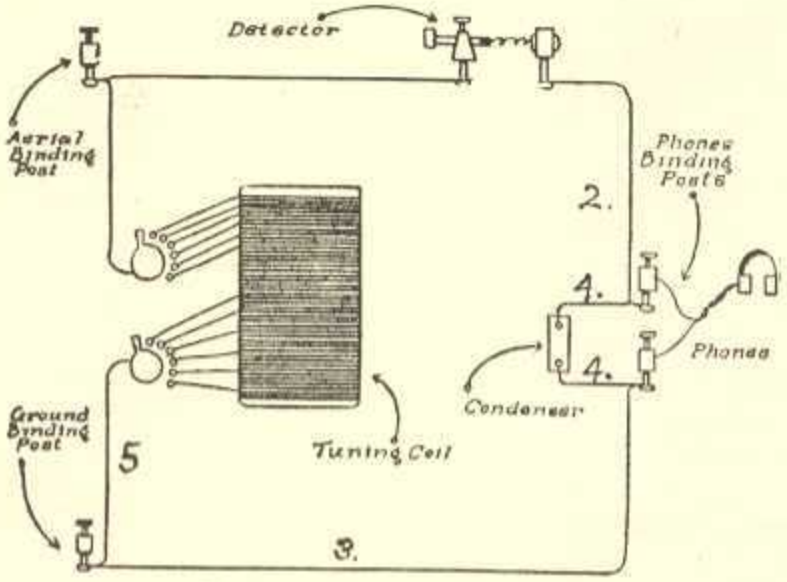

Fig. 5.—Showing the Connections.

Making the Connection—No. 22 wire will be used for making the connections. It is advisable to cover the wire with what is known as "spaghetti tubing." Then make the following connections:

1. Run a wire from the aerial binding post to the detector binding post.

2. Run another from the detector clamp to one of the phone binding posts.

3. Connect the ground binding post to the other phone binding post.

4. Connect the condenser to the phone binding posts as shown in the illustration.

5. Connect the right hand switch to its ground binding post.

The cabinet should then be fastened to the back of the panel by means of small brass screws. Use round-headed screws, or countersink flat-headed screws. The illustration (Fig. 6) shows how the aerial is run through the window frame to the detector outfit. Also how the ground wire is connected. The construction of the aerial consists in putting up a 50 or 100 ft. length of single wire stretched between buildings or poles, 25 to 50 ft. above ground, carefully insulated and equipped by a switch of lightning arrestor at the entrance to the house.

Directions for Operating—To find a sensitive spot on the galena crystal, move the small wire about on its surface. In "tuning in," move the right hand switch over the switch points slowly, one at a time. After

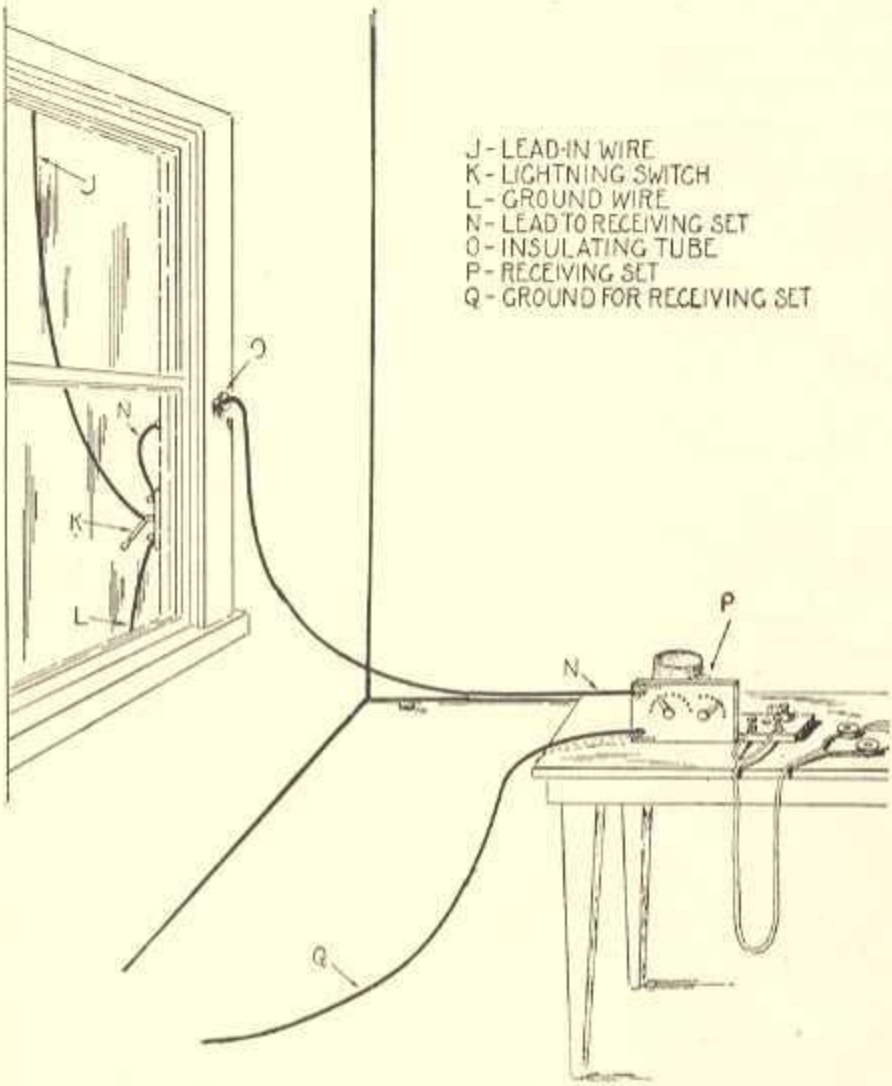

Fig. 6.—Showing How the Aerial is Brought into the House and Connected

each move, rotate the other switch lever over all points and stop when the desired station is heard.

It is wise to keep a note book at hand and jot down the right location of the switch lever for hearing certain stations.

Electron Tube Receiving Outfit

The difference between this and a detector outfit is that an electron tube is used instead of a crystal detector. The tube is more sensitive and has a much greater receiving range, in fact, it is possible to receive messages for thousands of miles with an electron tube set. Various assembled outfits are sold on the market and it usually proves more

satisfactory to purchase the assembled outfit than to try to make one yourself. Various devices have been invented for amplifying the waves, thus making the messages audible to all the people in a room. With all

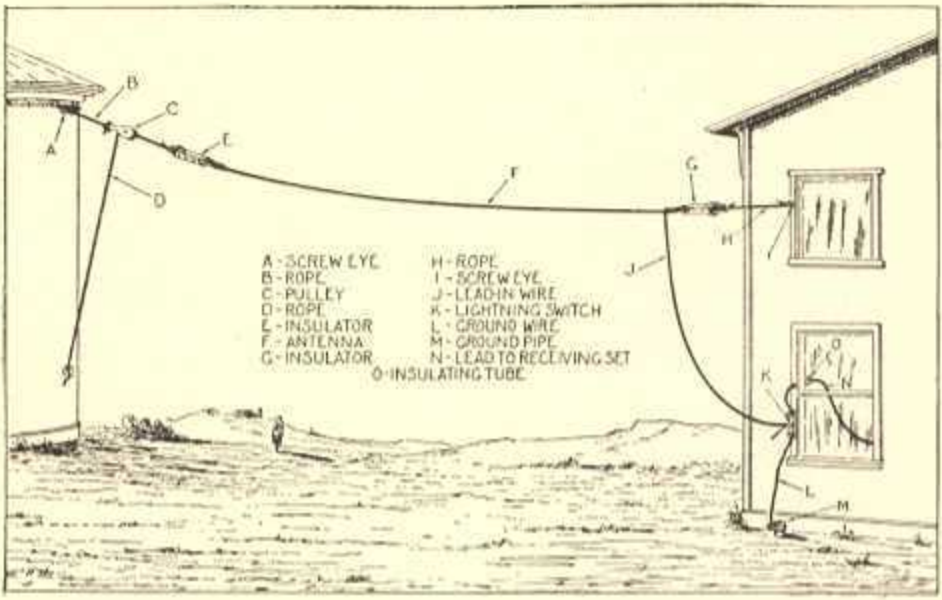

Fig. 7.—Showing How the Aerial is Put Up.

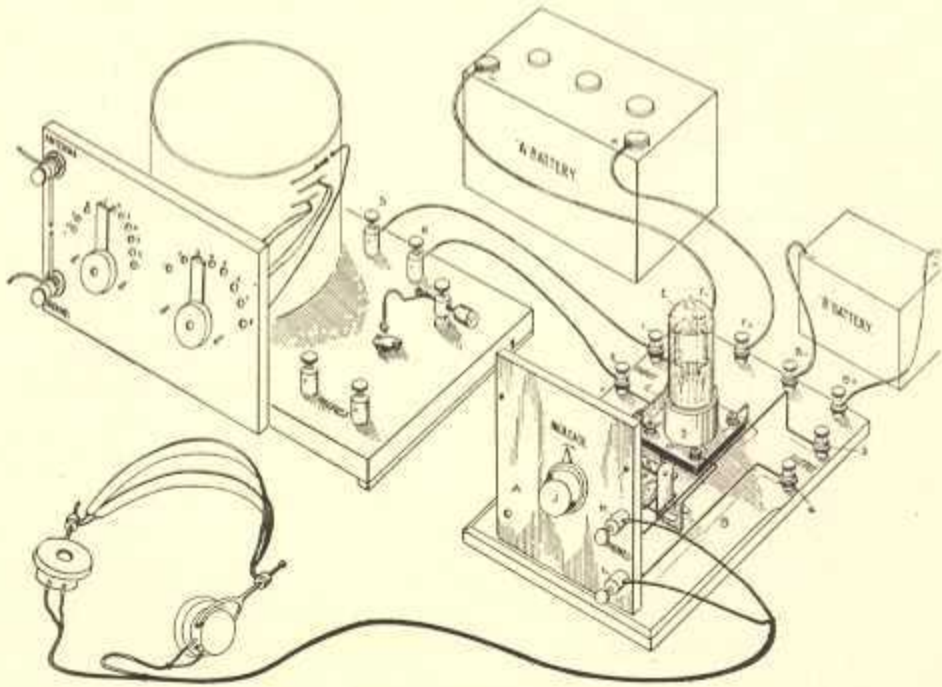

Fig. 8.—Electron Tube Detector Outfit.

these additional devices, it is possible to invest several hundred dollars in a very good outfit. The illustration describes the different "hook-ups" which are possible by adding additional parts to make the set more efficient.

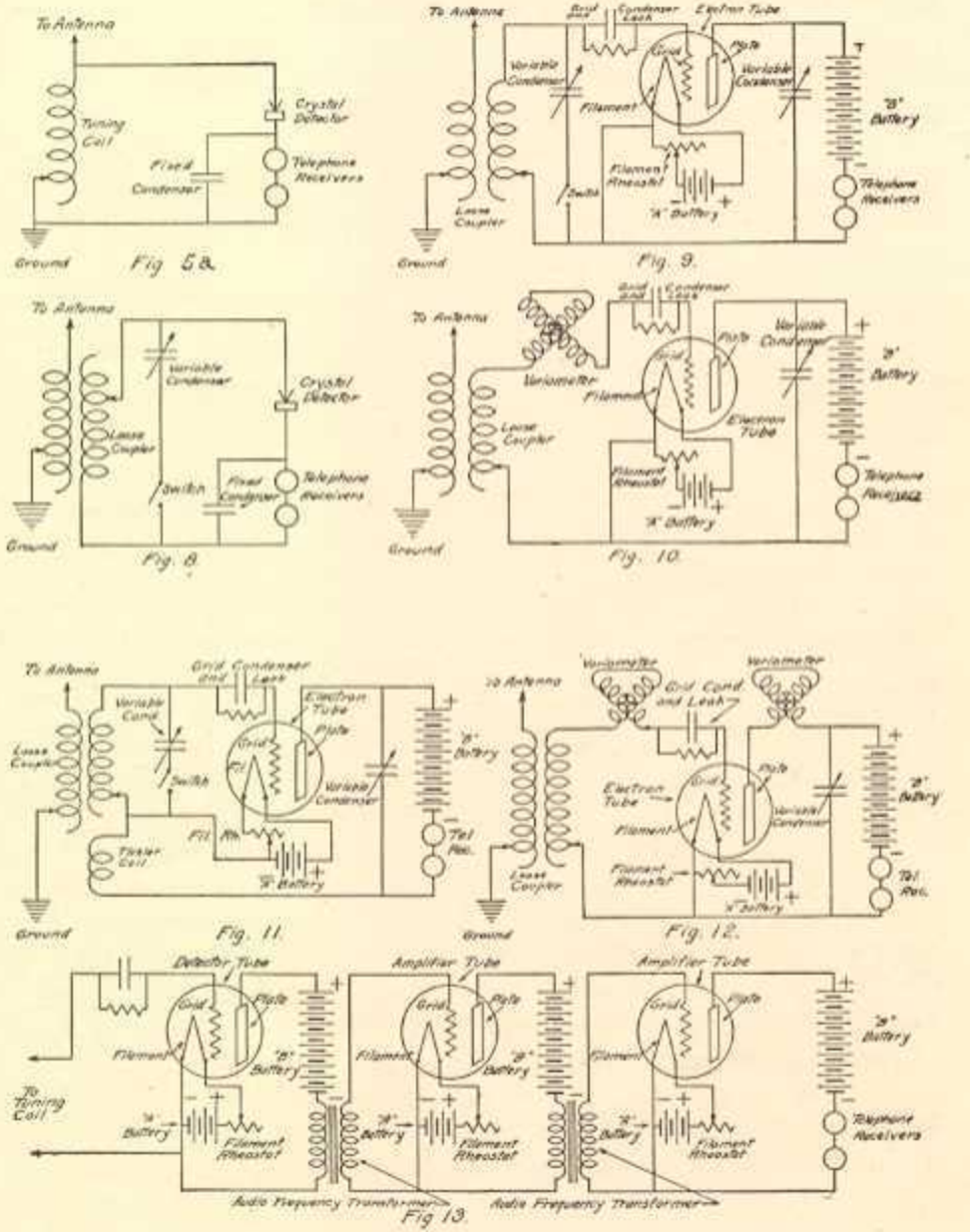

Fig. 9.—Showing Different Hook-Ups.

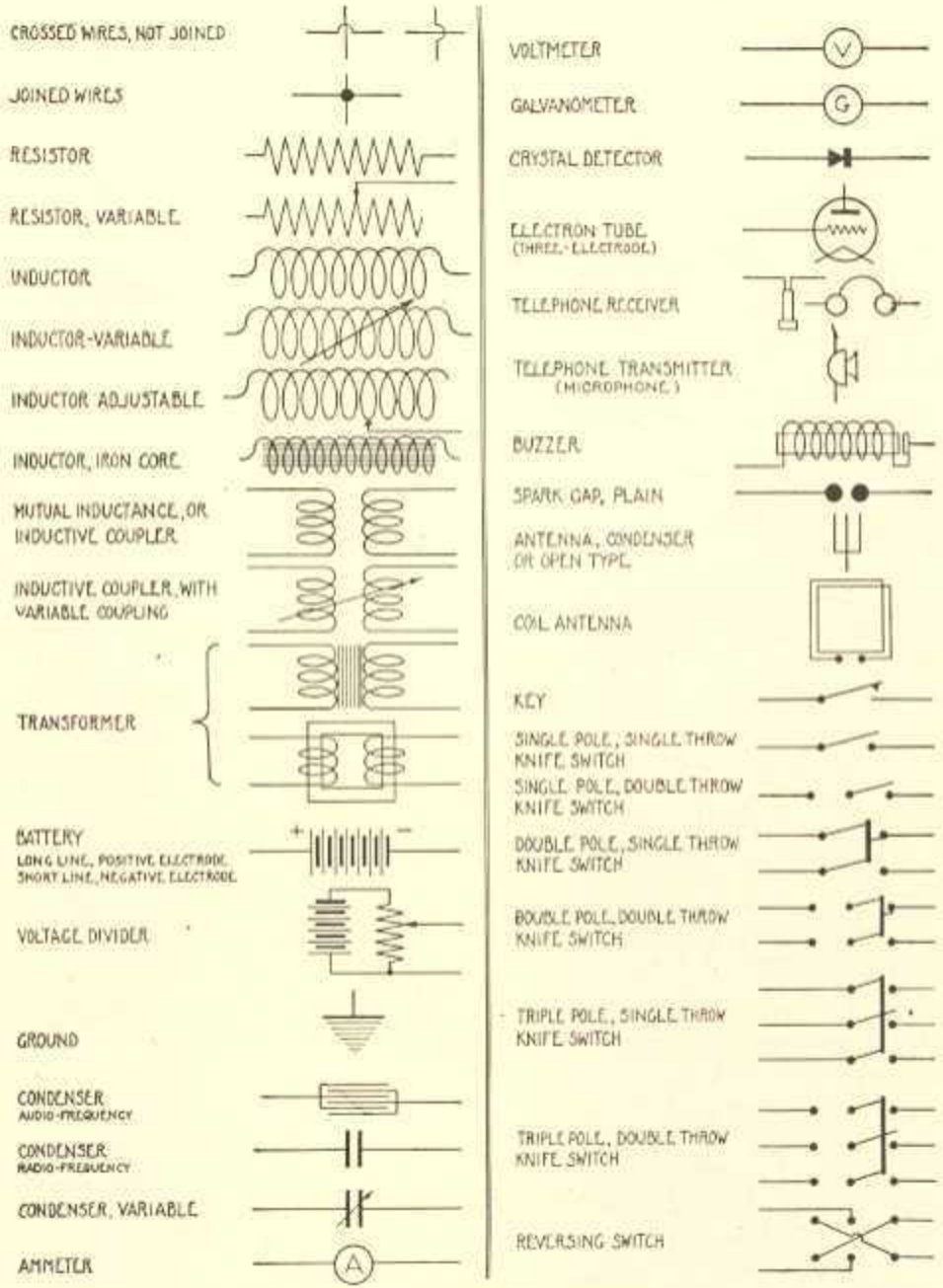

Fig. 10.—Symbols Used in Radio.