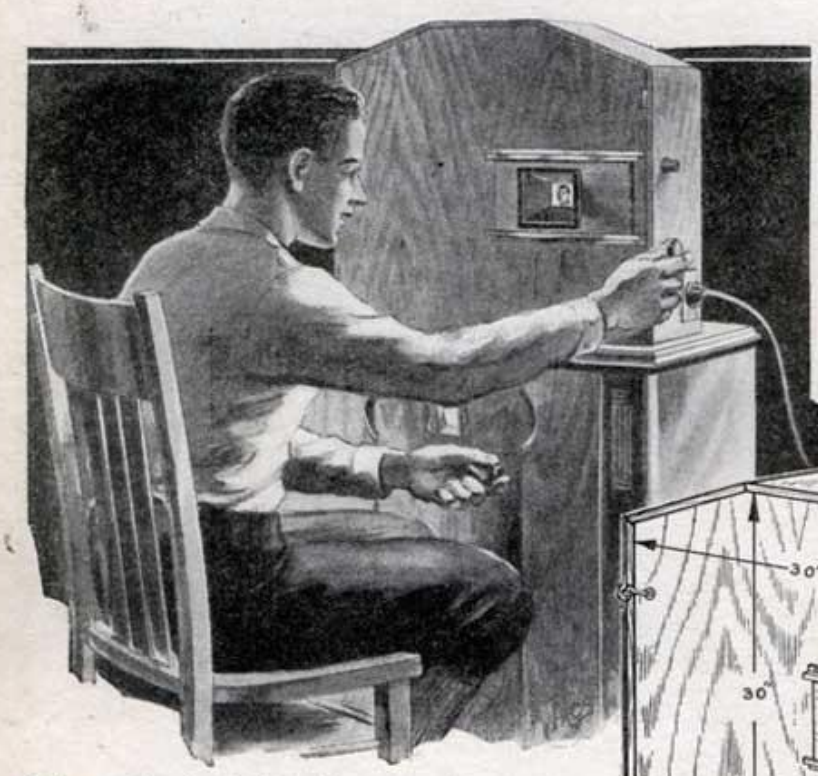
A Fan Motor Television

by L. B. ROBBINS

Here is a simple and easily-built type of television receiver with which you can pick up the television images now being transmitted over the air from a number of stations.



When tuning in television images on the receiver, the room should be darkened for best results.

THE time is now ripe for radio fans who build their own sets to construct a television receiver. Several broadcasting stations are on the air transmitting on both long and short waves, and have so perfected their apparatus that a simple receiver like that illustrated in the accompanying drawings will bring out the pictures with a fair degree of clarity and brilliancy.

The construction of a television receiver is actually not so complicated as the construction of a broadcast receiver, and the expense is probably less. The one herein described utilizes the simplest of parts, and constructional details are simplified as much as possible. Many dimensions are not given because the builder may wish to use certain parts which he has on hand, that are well suited for the purpose.

First, build a cabinet of ½-inch soft wood about the dimensions shown in Fig. 1. The top is shown in three sections, the ends of which cut with a miter box to make a good joint. These joints are glued and nailed to cleats underneath. Such a top adds much to the appearance of the cabinet, but may be discarded if simplicity is desired, and a flat top substituted instead. The back can be

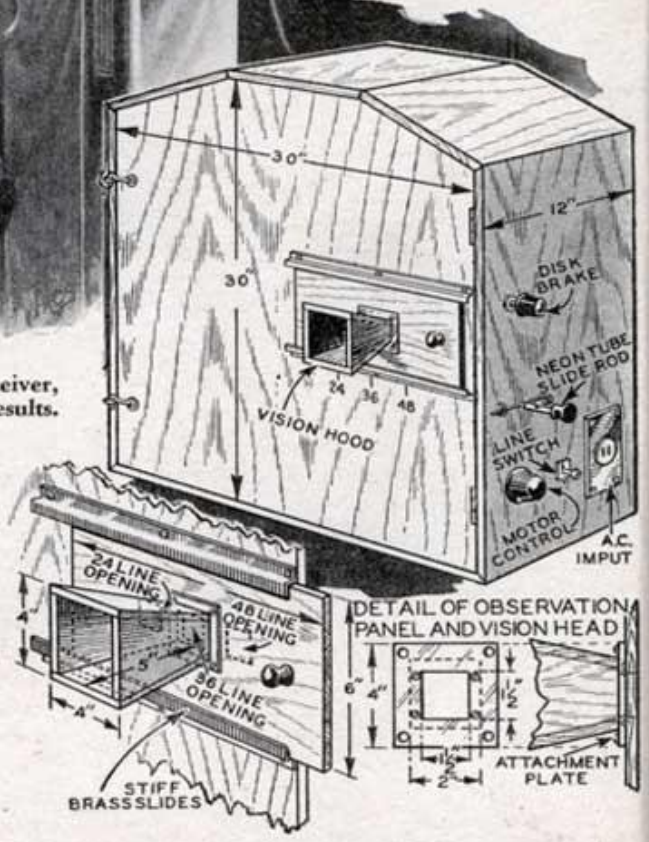


Fig. 1. Cabinet and sliding vision hood is constructed as shown. The panel slides in brass strips to any of the openings. Position of the neon tube is adjusted from the side.

Receiver for Experimenters

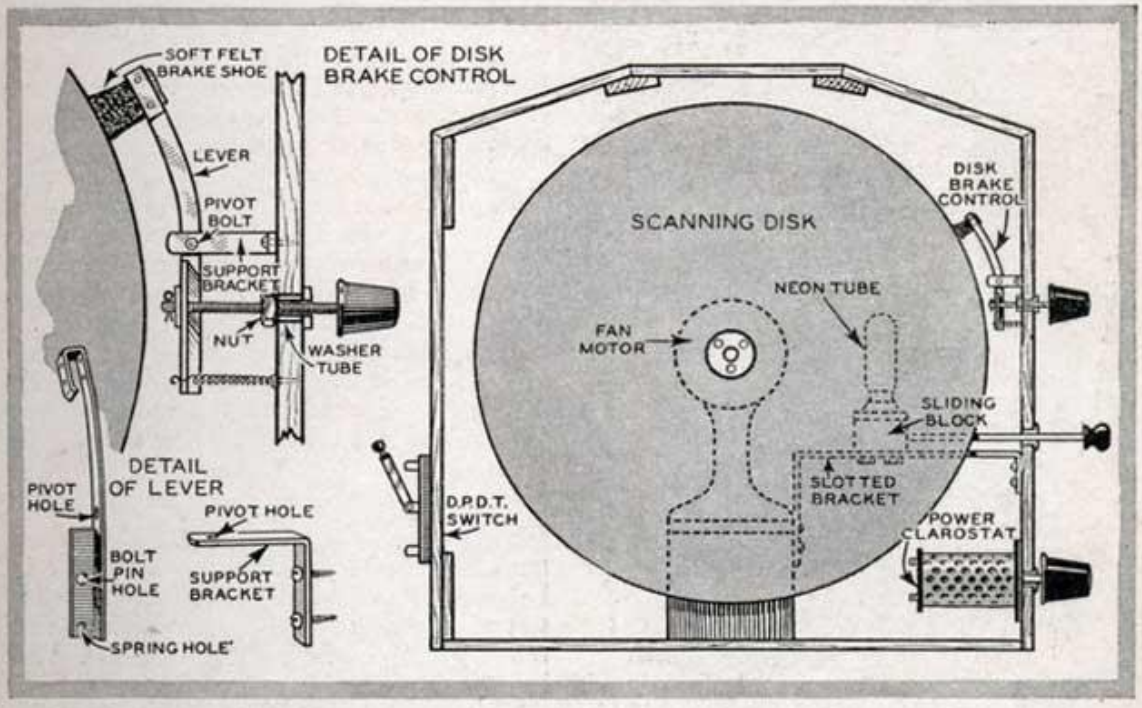


Fig. 2. The above drawing shows arrangement of the parts in the cabinet, and details of the brake which regulates disk speed. The motor table is built so that the motor shaft lines up exactly opposite the center mark on the cabinet front. The D.P.D.T. switch throws receiver from speaker to neon tube.

made from a sheet of stiff wallboard or from boards. You can finish the cabinet in any manner you desire.

The front door should consist of one single piece of plywood 30 in. square if possible, reinforced along the back edges with thin battens.

Hinge it to the right hand edge of cabinet and supply a pair of hooks for closing it. Two cleats nailed to the inside of left hand edge of the cabinet keep the front flush with the edge.

The viewing apparatus is then attached to the face of this hinged front as shown in Fig. 1. First strike a point on the hinged front of the cabinet representing the exact center. From that point draw a horizontal line across the front to the right hand edge. This is the center line for three holes, which are 1½ in. square and 1½ in. apart as shown, cut in the front. The left hand hole should be 4¼ inches from the center spot on the front of the cabinet.

Now over and below these holes attach two stiff brass slides, as shown, into which can easily slide the movable observation panel. This panel is 12 in. long, 6 in. wide and ½ in. thick. In the exact center of this panel is cut a 1½-inch square hole. Over this hole is mounted the vision hood, which is made of thin wood of the dimensions specified in Fig. 1. An attachment plate serves to hold the hood to the panel as shown. Now, scribe a short vertical line under the exact center of each hole in the hinged front and the single hole on the panel. Then when the mark under the panel hole coincides with that under one of the front holes, the hood opening and the hole in the front are properly aligned for viewing. Number the hinged front mark nearest the center with a 24, the next, 36, and the right hand hole, 48. These designate the portions of the scanning disk to be viewed over those numbers. Finally, finish the inside of the hinged front, the back of the movable panel and the inside of the hood in dull black and paint the outside to match or to contrast nicely with the rest of the cabinet.

Power for turning the scanning disk is

Adjusting Neon Tube and Vision Panel Brings in 24, 36, 48 line Signals

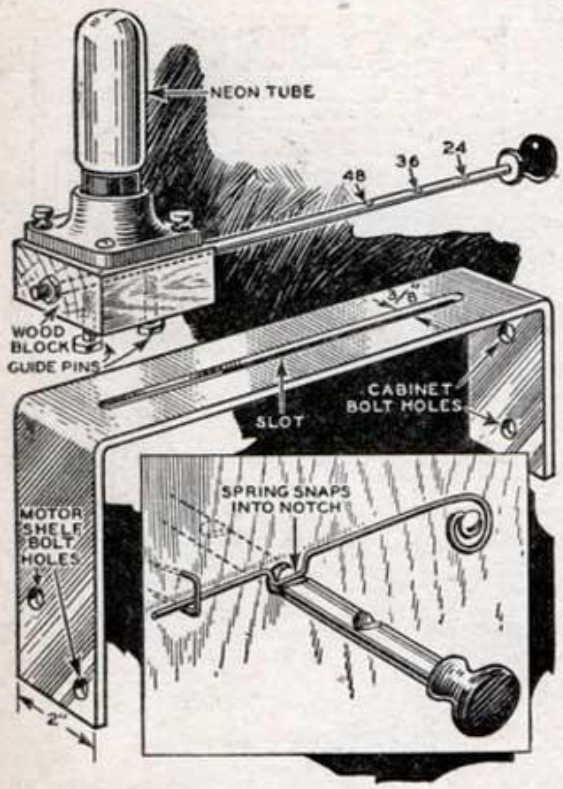


Fig. 3. Neon tube is mounted on a wood block, which slides in the slot of the bracket. Notches are filed in slide rod to show position of tube.

furnished by an ordinary fan motor of suitable power, one that will give varying speeds under the control of the operator. A repulsion induction motor is of course best because of the absence of sparking at the brushes, but any good motor can be used and a fan motor seems to give good results.

First, build a "table" for it in the exact center of the bottom of the cabinet so that the motor shaft lines up *exactly* opposite the center mark on the hinged front. Clamp the motor in position solidly and be sure the table front is far enough back so the scanning disk will easily clear it.

The disk is attached to the motor shaft by the steel hub and stud shown in Fig. 5. The hub should fit snugly over the motor shaft, fastening with a set screw, while the smaller stud, turned down from the hub diameter, is threaded and is of a size to fit tight in the center hole of scanning disk. A wide flange or washer on each side of the disk and a wing nut help to secure the disk solidly to the hub so it will turn without wobbling. Any machinist will turn out this hub and the attachments for a small sum.

This receiver is planned to utilize a scanning disk of sheet aluminum 24 in. in diameter. It must be procured in a perfectly flat sheet and be free from hollows or humps which would tend to give it a wobbling effect when rotating. Use a sharpened steel punch for scribing, good light and a pair of accurate dividers. Lay the aluminum on a flat table or bench and measure a center spot, which should be lightly punched. Then drill through at this point with a drill exactly the size of motor shaft. Next saw off a section of round rod the same diameter as the disk hole, drive it easily in this hole and center punch the plug, as illustrated in Fig. 4. Using this punch mark as the disk center, scribe a 24-inch circle with the dividers, and saw out the circle with a jeweler's saw, afterwards filing the edge of the disk smooth.

This disk is to be designed to carry spirals for 24, 36 and 48 hole vision. Fig. 4 shows the method of scribing the spirals. The 24 hole spiral will be described and the other two can be made in the same manner, with the exception of the radial line count. First lay off 24 points about the circumference of the disk, making them exactly the same distance apart. Connect all points with lightly scribed lines passing through the center mark. This will give 24 radial lines issuing from the center. Planning for a 1½-inch square picture, find a point between two radii 1½ inch apart. This point will lie approximately 5.75 inches from the center and represents the outer point or end of the spiral.

The spiral is scribed with a sharp steel point inserted in a loop of fine, strong wire, as shown in Fig. 4. The other end of the

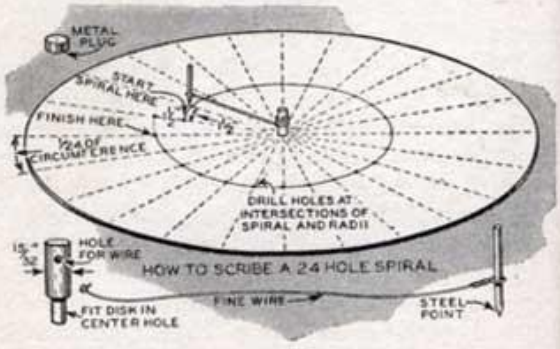


Fig. 4. The twenty-four-hole spiral is scribed as shown above. The outer hole is 5¾ inches from the center. 36 and 48 hole spirals are similar.

wire is then inserted in a hole in a metal spiral scribing stud as illustrated. The stud is 15/32 in. in diameter and turned down if necessary to make a driving fit in the disk center hole.

Remove the center plug from the disk, insert the scribing stud, and wind on the wire until the scriber point rests on the point on the disk just obtained. Then, holding the scriber steady and vertical and pulling on the wire at an even tension, move the scriber from left to right over the disk surface. This winds up the wire, and when the 24th radial line is reached—the line next the starting point—a perfect spiral will be scribed, its end 1½ in. nearer the center than the starting point.

Drill carefully with a No. 50 drill at each intersection of the spiral with the radii. The holes should, of course, be centered with a punch previous to drilling and cleaned carefully of all burrs afterwards.

The other two larger spirals are fashioned in the same manner as the 24-hole spiral, except that there are 36 and 48 radii respectively. Of course one is drilled with 36 holes and the other with 48 holes. Use a No. 56 drill for the former and a No. 65 for the latter. The outer hole of the 36-inch spiral is 8.6 inches from the center, and the outer hole of the 48-inch spiral, 11.45 inches.

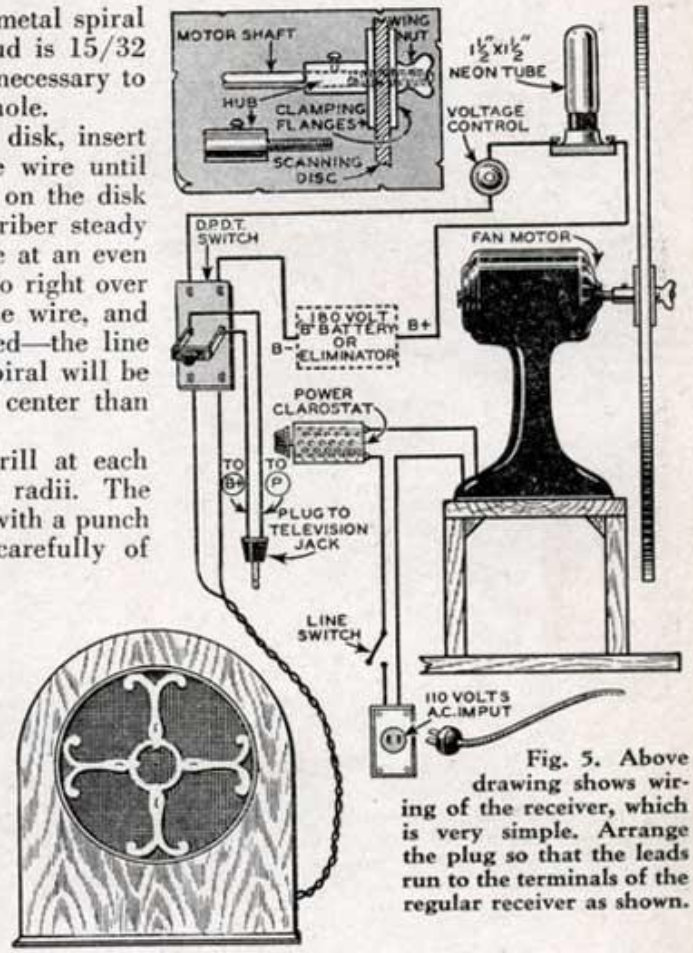


Fig. 5. Above drawing shows wiring of the receiver, which is very simple. Arrange the plug so that the leads run to the terminals of the regular receiver as shown.

When finished drilling the three spirals, polish off both sides of the disk with very fine emery paper. Remove the centering plug, and clamp the disk to the motor shaft permanently as shown.

The controls are the next step in the process of assembly. First drill holes in the lower right hand side of the cabinet, near the front, for attaching a power clarostat to control the motor speed. Beside it, to the rear of the cabinet, fit a toggle switch and then a single receptacle, as shown in Fig. 1.

Above these three appliances comes the neon tube slide and placement control. This consists of a bracket made of flat metal with one short leg which fastens to the inside of the cabinet and one long leg which attaches to the side of the motor table. The horizontal portion should be at such a height that it will support the tube plate exactly opposite the vision holes in the front. In planning the height, take in consideration that the tube is to be mounted in a socket which is supported by a wooden block sliding along the horizontal metal support just back of the disk, as shown in Fig. 3.

In the base of the block are two pins consisting of brass bolts inserted vertically from the bottom and so arranged that when they are in the slot of the slide plate the plate of the neon tube will face flatly opposite the vision holes. Nuts on the pins prevent the block from coming off the slider. A long rod goes horizontally through the block and out through a hole in the side of the cabinet, fitted with suitable bushing. Any serviceable knob is attached to the end of the rod. File three notches in the top surface of the rod to indicate when the tube is opposite any one of the three vision holes. Then attach a spring to the side of the cabinet that will snap down into a notch and hold the rod at that point, as desired.

Some additional disk speed control besides the line rheostat will always be found necessary, and the friction brake shown in Fig. 2

(Continued on page 144)

A FAN-MOTOR TELEVISION RECEIVER for EXPERIMENTERS

(Continued from page 41)

has proved ideal. It is fashioned after the scheme used in governing the speed of phonograph records. The sketch explains it clearly enough without much further comment. It can be made from any cast off stiff metal and workshop parts.

A soft felt brush is held in the end of a clamp on the lever which pivots in an angle iron support screwed to the inside of the cabinet. A light spiral spring is attached to the bottom of the lever and to the cabinet and holds the felt against the edge of the scanning disk. A long, fine threaded bolt is filed down at the end and passed through a hole in the lever, where it is held by a cotter pin against a washer. The other end of the bolt passes through a nut soldered to a brass tube in the side of the cabinet and a facing disk on the outside. By turning this bolt with the knob the pressure of the felt on the disk can be nicely altered and slight variations of speed obtained.

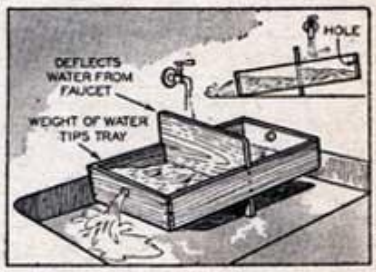
With all controls installed and the motor working to suit, the next task is to wire up the device. Attach the output of your high power radio or power amplifier to the arm of the double-throw double-pole switch screwed to the left side of the cabinet. Then connect one side to the loud speaker. The other side should be connected direct to the two terminals of the neon tube. If there is no voltage control on your set or if the output is small, then insert a voltage control clarostat and "B" batteries or "B" eliminator as shown in Fig. 5.

Wire the receptacle to the switch and to the power clarostat, placing each in series as shown. That's all there is to wiring a television receiver of this sort.

In bringing in television images, throw the D.P. D.T. switch on the speaker, turn on your radio receiver and tune in on the television signals. When they are heard plug in the power to the receptacle, throw the toggle switch and turn on the power control clarostat until the motor picks up to nearly maximum speed. Release the brake entirely. If the announcement says a 48 line picture will be broadcast, pull the slider rod out until the neon tube is opposite the hole marked 48 and slide the vision hood along opposite it. Then throw the D.P. D.T. switch over to the opposite side. The tube plate will light up pink as the power is increased, and when the disk is in step with the transmitting disk the picture will appear. It is best to advance the power clarostat so the motor speed is slightly fast and then reduce the disk speed with the friction brake. The speed will then hold steady. Thirty-six and twenty-four line pictures are handled in the same manner. If the picture appears upside down do not worry, but simply take off the scanning disk and turn the other side out. If the picture is wrong side to, that is, if printing in the picture shows backwards, it will then be necessary to reverse the rotation of the motor. This can be done by having the brushes readjusted by an electrician.

For best results the receiver voltage to the neon tube must be high and the amplifier of the receiver of good design. Most of the present day sets use the best of amplifier equipment and the power runs up to 450 volts. Have the room dark and look quite close into the vision hood. It will take a little time to learn to control a television receiver, but once you have the "hang of it" you will find plenty of amusement and a chance to do a bit of experimenting to further the cause of television, which is bound to improve with time.

Handy Print-Washing Tray



A TRAY for washing prints which automatically changes the rinsing water at intervals, keeping it always fresh, makes a handy addition to the photographic dark room. Such a tray is easily constructed; the drawing above shows the simplicity of its design. Half inch boards are used, the size of the tray varying according to requirements. The center board, acting as a pivot, projects about three inches from the bottom of the tray and six inches above it, forming a deflector for water from the faucet. Holes bored in the ends of the tray permit the water to flow out when it has reached the top, at which point the deflector, directing the water stream into the other side of the tray, overbalances the end and tips it down when full.