

ELECTRIC OVEN *for your shop*

By Harold P. Strand

THERE are many uses for an electric oven of the industrial type in small shop and laboratories, where moderate baking temperatures, accurately controlled, are necessary. Small parts, which have been painted or lacquered often require baking. Damp or wet pieces of equipment may require drying out. Windings, after dipping in insulating varnish, need a certain amount of baking. Then too, an oven may be required in laboratory work of a special nature. The oven illustrated was built in an electrical engineering laboratory and has proven invaluable.

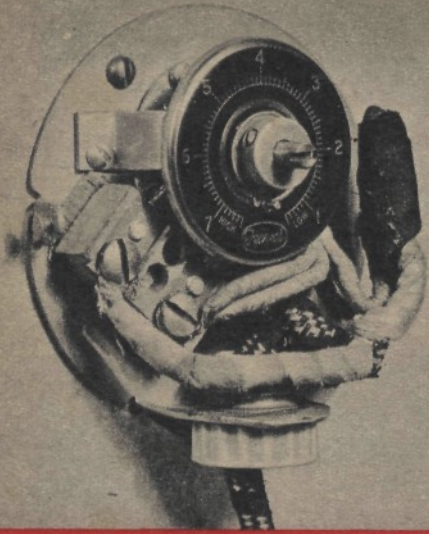
Measuring 24x18x16 in., this oven is small enough to be used on the bench, yet it will accommodate quite a bit of work. Heat is provided by two 350 watt strip heaters, which are mounted to the inside surface of the oven, at each side and quite near the bottom. Control is provided by a Fenwal Thermoswitch, which is mounted on the end of the oven. This device has a brass

tube projecting into the oven space in which thermal contracts are built. With an arrangement of a dial and knob, as shown, it is possible to accurately control a range of settings to 400 degrees Fahrenheit.

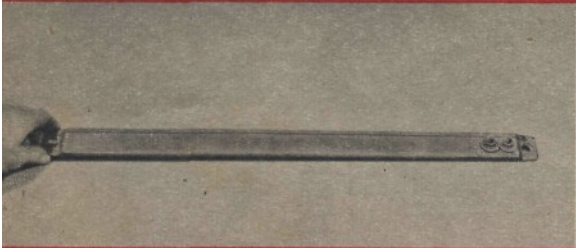
The material used for the sides, top and bottom of the oven is $\frac{1}{4}$ in. asbestos-cement board, known as Transite. Angle iron is used as a framework and the cover is equipped with strap hinges and a wire pull handle.

This insulating and heat resisting material is adequate with moderate temperatures of 140 to 150 degrees Fahrenheit. But at higher temperatures there will be too much heat loss through the material and added insulation will be necessary. A temperature of 200 degrees Fahrenheit is about the limit that can be obtained with the wattage mentioned and the insulating material shown. To go above this, an outer casing can be made from sheet metal, about 3 to 4 inches (*Continued on page 142*)

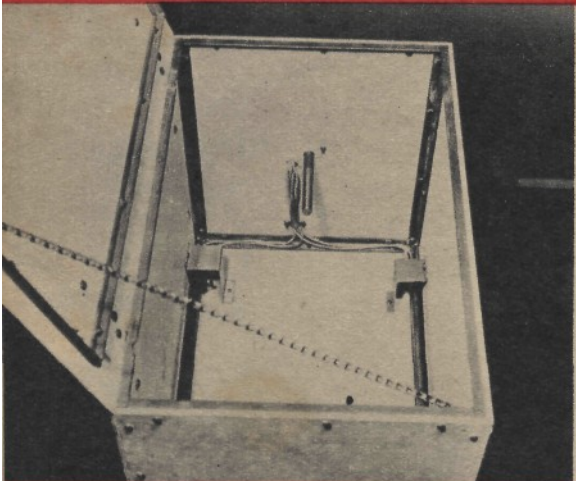
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Thermoswitch with cover removed to show interior. Unit is produced by Fenwal, Inc., Ashland, Mass.



Two strip heaters, like the one above, are used. They make handy ledges for drying racks.



Interior view. Note the position of the Thermoswitch tube and wires leading to the two strip heaters.

larger all around than the oven. Into the space between, rockwool insulation should be placed. With a well-insulated cover, temperatures considerably higher should be possible and safe. One of the drawings illustrates this suggestion. Strip heaters of increased wattage can also be obtained if desired.

To start work on the oven cut two pieces of Transite 24x18 in. and two additional pieces measuring 18x15½ in. Next, cut four pieces of ¾ in. angle iron 21¼ in. long, to make up the four corner braces. Extending ¾ in. below the sides, they also serve as legs for the oven. The sides are positioned on the angle iron and C-clamps used to hold them in place. With a portable electric drill, make four holes to a side through both the angle pieces and the side material, to receive 3/16 in. stove bolts. Make sure the surface of the irons is exactly ¼ in. in from the edge of the Transite, as shown in the drawings, so the end sections can be fitted in flush. The end pieces are then placed in position, holes drilled and bolts used to make the assembly firm.

The bottom section is fitted flush with the bottom edges and angle irons, cut as required are used to secure this section to the sides and ends, using bolts as before. Take care to fit this section tightly, to keep escapement of heat at an absolute minimum.

Angle iron (½ in.) is used to form a frame around the top edge. The oven will now take the form of a large box and should be rigid and firm. The cover is a piece of the same material and should measure 24x16 in. This cover is fitted with an angle iron frame on the inside surface as detailed in a drawing, which adds to its strength and rigidity. Two strap hinges and a wire pull handle, fitted as shown, complete the cover. A chain, secured at one end to the cover and at the other end to the inside of the oven, serves to prevent the cover from going too far back.

The strip heaters, which can be purchased from any large electrical supply house, are of 350 watts, 115 volt rating. Two are required. These should have the terminals at one end of the strips and should be so specified when ordering. They are mounted to the sides, about 2 in. up from the bottom, one on each side.

The Thermoswitch is mounted in the center of the right hand end by drilling a 5/8 in. hole through the insulating material to receive the brass tube. In addition, a hole must be drilled through the metal base of the switch, just to the right of the dial, which should be about 7/16 in. in diameter. This hole is

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carried through the Transite and serves as an opening for the entrance of the wires from the strip heaters. Two small holes to fit stove bolts should also be drilled through the end, which should be in line with the mounting holes provided in the base of the switch.

Wiring is carried out with No. 16 asbestos stranded wire or cable from each heater terminal to one of the switch terminal screws, as shown in the drawing. The remaining wires from the heater terminals, also carried into the base of the switch, connect to one side of the asbestos heater cord as a soldered and taped splice. The other side is attached to the switch terminal. In this way the switch is cut in series with the line and the two heaters, which in themselves, are wired in parallel.

The wires inside the oven should be neatly placed from the opening back of the switch, down to the bottom and then bent at right angles to supply each heater. A small curved clip and a bolt serves to secure the wires. Anglepieces, made from sheet steel or aluminum and 2 in. wide, are placed over the terminals of the strip heaters to prevent accidental contact with the live terminals,

When mounting the hinges it will be necessary to file a slight recess in the top edge of oven to clear the raised part of the hinge at the pin. The latter should be in a line with the top edge of the back side, bending the strap, as required, over the top of the cover.

The Thermoswitch has a dial numbered from 1 to 7. It is possible to loosen two setscrews in the knurled knob and with a screwdriver in the slot in the end of the shaft, the latter can be turned clockwise to reduce temperature and counterclockwise to increase temperature. With this changed setting, the pointer will indicate an entirely new range of temperatures. It is thus possible to adjust the oven to about any degree desired, within the specified limits. Once set properly, the switch will maintain the temperature within about plus or minus of .1 degree Fahrenheit. The switch, a No. A-7700 Thermoswitch, manufactured by Fenwal, Inc., Ashland, Mass., should be ordered with "Regular" contacts, which means that the contacts will close on a decrease in temperature. It will be found in adjusting this switch that one revolution of the sleeve adjustment will provide about 125 degree change in setting.

By carefully checking temperatures it is possible to make adjustments on the Thermoswitch so that current will be cut off at the right point. The switch will then maintain this temperature accurately for an indefinite period. •