Fan convection electric heaters, which include a built-in fan unit, circulate room air over the heating elements at 300 to 400 fpm. Heaters of this type are manufactured in three designs, portable, wall hung and wall insert. The fan draws air from the floor zone through a lower grille, forces it over the heater elements and out through an upper grille into the breathing zone. The improved heating effectiveness of this type electric heater has done much to promote electric heating for residences.

UNIT HEATERS

Fan unit electric heaters, similar to steam unit heaters, having a propeller type fan mounted behind the heating element, are made in many styles and can be located and used much the same as steam unit heaters

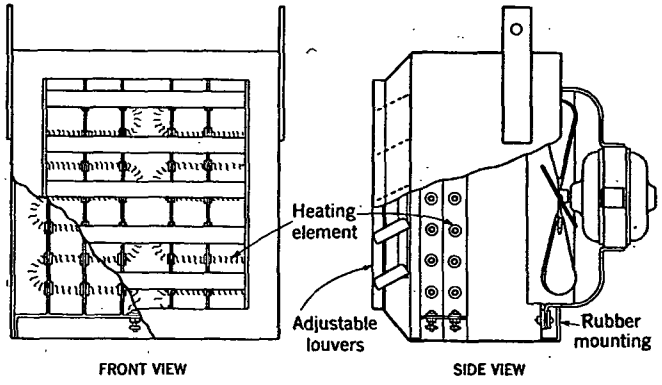

FIG. 5. FAN UNIT ELECTRIC HEATER

(Figs. 5 and 6). These electric unit heaters are used in industrial plants, sub-stations, power houses, pumping stations, etc., where large initial use of electricity for power purposes earns a low rate for electric heating. Portable unit heaters (Fig. 7) of this type are useful for temporary work, such as drying out damp rooms, or for warming rooms during construction.

CENTRAL FAN HEATING

Electric heating elements can be used for the prime source of heat in a central fan electric heating system or in the heating phase of a complete air conditioning system. They can be used in the same manner as steam served heating units for tempering, preheating or reheating the air at the main supply fan location and as booster heaters at the delivery terminals of the duct system. In the humidification phase of air conditioning electric heating elements can be used to provide moisture by the evaporization of water, or for controlling air washer dew-point temperatures when mounted as preheating units on the intake side of the air washer.

In coördinating the input of heat energy and the volume of air circulation, a basic difference between electric heating and steam heating enters into the problem. Steam is approximately a constant-temperature

source of heat for any given pressure as a change in air volume flowing over steam coils does not greatly affect the temperature of the delivered air. The amount of steam condensed (heat input) varies in proportion to the air volume, but the surface temperature of the steam coils remains about the same. Electric heat is quite different, being a constant source of energy. If the volume of air flow over electric heating elements is changed, and no change is made in the electrical power connections, there will be a corresponding change in the temperature of the air delivered because the electrical energy input remains constant and the surface temperature of the heating elements will vary as is necessary to force the air to accept all the heat. With electric heat the total heat is constant

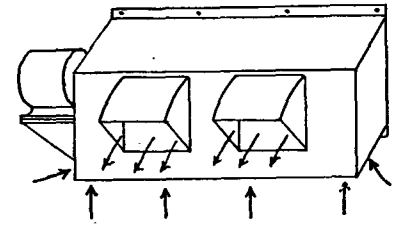

FIG. 6. LARGE INDUSTRIAL TYPE FAN UNIT ELECTRIC HEATER

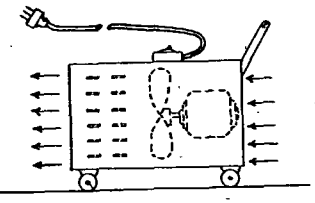

FIG. 7. LARGE INDUSTRIAL TYPE PORTABLE FAN UNIT ELECTRIC HEATER

unless some compensating action is performed by control. Automatic modulation to vary the electrical heat input and synchronize it properly with the air flow has been successfully applied to central fan systems.

ELECTRIC STEAM HEATING

Electric steam heating differs from fuel heating only in the use of *electric boilers* to generate steam. Electric steam boilers are entirely automatic and are well adapted to intermittent operation. Small electric boilers usually have heating elements of the enclosed metal resistor type immersed in the water. Boilers of this construction may be used on either direct or alternating current since the heat is delivered to the water by contact with the hot surfaces. To lessen the likelihood that the heating elements will burn out, they are made removable for cleaning off deposits of scale which restrict the heat flow. Large electric boilers are usually of the type employing water as the resistor. Only alternating current can