8 ● a. Where did radiant heating derive its name?
b. What is actually meant by radiant heating?

a. The term radiant heaters was introduced about 25 years ago to designate flat heating surfaces made to give off practically all their heat by radiant ether waves instead of relying on convected warm air.

b. The term radiant heating now applies to methods of heating where, instead of heating the air to a predetermined temperature, flat heating surfaces are so placed in a room that the average virtual temperature of all wall, ceiling, floor, and glass surfaces exposed to the body is just sufficient to prevent the body's losing too much heat by radiation. The air temperature can be much cooler with radiant heating because radiation losses from the body are compensated.

9 ● What kind of heating surfaces are in general use?

The heating units may have flat iron surfaces heated with steam and placed under windows, or hot water pipes may be embedded in the floor, walls, or ceilings. Electrical radiant heaters are made by embedding resistance elements in porcelain or electric conductors woven into a thick paper which can be fastened to the walls or ceilings.

10 ● What kind of heat rays are commonly generated in radiant heating? Give examples.

All heat rays are generally assumed to be the same as light rays; they travel at the speed of light, but they are invisible and longer. The rays used in heating are 0.00005 to 0.0001 in. long compared with visible red rays of about 0.000027 in.

11 ● What natural evidence have we that air temperature alone is no criterion of comfort and that radiant heat affects the body more quickly?

When standing in the sunshine on a cool spring day, a person feels perfectly comfortable, but when a cloud passes over the sun, he instantly feels much cooler as the shadow reaches him. A shielded thermometer recording the temperature of the air shows no reduction in air temperature in so short a period, so that the person actually feels a sensation of cold which an ordinary thermometer cannot register. This shows that light and heat rays are shut off simultaneously and travel at the same speed; it also proves that radiant rays affect the comfort of the body quicker than air temperature does.

Chapter 39

ELECTRICAL HEATING

Resistors, Heating Elements, Electric Heaters, Unit Heaters, Central Fan Heating, Electric Steam Heating, Electric Hot Water Heating, Electric Hot Water Heating for Domestic Supply, Cooling and Reverse Cycle Heating by Electric Refrigeration, Auxiliary Electric Heating, Control, Calculating Capacities, Power Problems, Insulation, Electric Heating Data

ELECTRIC heating is steadily assuming a more important place in heating, ventilating and air conditioning installations, accelerated in many territories by the load building efforts of the utilities which usually include reduced rates to encourage such installations. Electrical heating has a logical place in the heating industry because of its features of flexibility, cleanliness, safety, convenience and ease of control. Electrical heating practice has many basic principles in common with fuel heating, but there are also important differences. When heat units are delivered to each room by wire, no combustion process is necessary, either at a central plant or at the individual room units. The maximum output of an electric heater is a fixed constant, unaffected by the temperature of the surrounding air and it follows that the maximum total load on an electrical heating system is the total wattage of connected electric heaters, regardless of weather conditions. The real obstacle to the more general adoption of electric heating for buildings is the cost of the electricity itself. Because the heat units produced electrically are more costly, their conservation is of more relative economic importance than with fuel heating, so that sponsors of electric heating give greater attention to temperature-insulated building construction.

All heat is a form of energy. Fuels hold stored chemical energy which is released into heat by combustion. Electrical power is a form of energy which can be released into heat by passing it through a resisting material. Both fuel and electric heating have two divisions: *first*, the conversion of energy into heat; *second*, the distribution and practical use of the heat after it is produced.

In converting the chemical energy of fuels into heat by combustion, there is necessarily a considerable variation in thermal efficiency. This is not true, however, when converting electric power into heat, because 100 per cent of the energy applied in the resistor is always transformed into heat. In electric heating practice the engineer need not be concerned about efficiencies of heat production, but rather about efficiencies of heat utilization. It is the engineer's problem to distribute the electrically produced heat units in such manner as to obtain conditions of maximum comfort with the minimum consumption of electricity.