

Fig. 12 illustrates diagrammatically the essentials of an oil burner control circuit. Three thermostats are employed as shown in the illustration. Thermostat No. 1 will stop the burner when the room temperature is too high and No. 2 will stop the burner when the temperature of the heating medium exceeds the setting of thermostat No. 2. Both temperatures must be below their respective thermostat settings to start the burner. Thermostat No. 3 responds to the flame temperatures and in conjunction with the control switch acts as a safety to stop the burner if the latter fails to ignite or burn properly as demanded by thermostats Nos. 1 and 2.

Steam and hot water heating plants are often used to provide heat for the domestic hot water supply as well as for heating the building. Fig. 13 illustrates one such system. The burner control is similar to that shown in Fig. 12 except that either the room thermostat or the tank thermostat may cause the opening of the valves in the mains which supply them and start the fuel burner, but the burner will not stop unless both thermostats have closed their valves or the steam pressure shall have reached that allowed by the pressurestat. Much the same control is applied to gas burners and automatic coal stokers.

ZONE CONTROL

Zone control is a step between a single thermostat and individual room temperature control. The building is first divided into sections or zones which may have quite different heat requirements. With this method of control:

First: The zoning should be done with reference to the compass, since the north and west quarters in most localities require considerably more heat during the heating season than do the south and east quarters.

Second: Most large office buildings have more or less space occupied by merchants, and some by clubs, restaurants, etc., which have short hours of occupancy. Much can be accomplished in zoning with reference to the kind of occupancy of space.

INDUSTRIAL PROCESS CONTROL

There are many industrial processes requiring automatic temperature and humidity regulation. The control equipment operates on the same principles that have been described, but is often specially designed for each particular process. Each installation, or the installation for each process, is likely to be a problem peculiar to that process.

Chapter 24

VENTILATION OF PUBLIC BUILDINGS

Ventilation Systems; Objects of Ventilation; Air Quantities; Exhaust Openings; Other Factors Affecting Ventilation; Recirculation; Inside Temperatures; Drafts; Psychological Aspects; Heat Required for Ventilation; School Room Ventilation.

THE original meaning of the word *ventilation* was merely that of air change; *to ventilate* meant to displace the air within a building or other enclosure, by outside or unvitiated air. However, as the art of creating and maintaining satisfactory conditions indoors has progressed, ventilation has come to mean more than the mere displacement of air, and as far as humans are concerned, involves the maintenance of conditions considered essential to the comfort and health of the occupants, which is usually termed air conditioning, and which is treated in Chapter 28. The present chapter is devoted to a discussion of the ventilation of public buildings in the original sense of air change.

VENTILATING SYSTEMS

Ventilating systems are classified as *natural* and *mechanical* according to the motive forces by which air change is brought about. Information concerning the design of mechanical exhaust systems of ventilation for industrial buildings is given in Chapter 25. Natural ventilation is treated in Chapter 26. Central fan systems of heating and/or ventilation for public and industrial buildings are covered in Chapter 31, whereas unit ventilators for schools and public buildings are discussed in Chapter 36. When, in the case of mechanical ventilation, the heating is accomplished with radiators separate from the ventilating equipment, it is called a *split* system. If the ventilating equipment also provides for the heating, it is a *combined* system.

OBJECTS OF VENTILATION

The primary objects of ventilation are (1) to supply the necessary oxygen for respiration, (2) to remove odors, (3) to remove toxic, poisonous or harmful substances, and (4) to remove the heat and moisture given off by the occupants and the heat given off by power and lighting equipment, particularly in warm weather.

Air for Respiration. A comparatively small quantity of air is required to take care of the needs of the lungs. An adult at rest breathes about 0.25 cu ft of air per minute and exhales about 0.01 cu ft of CO_2 in the same period, or at the rate of 0.6 cu ft per hour, thus removing about 4 per cent of the oxygen from the air actually breathed. This does not necessarily