Control of Unit Ventilators

The unit ventilator presents a different control problem than the unit heater. Generally this type of unit draws its supply of air from the outside, heats it, and introduces this air into the room under control. There are many types of unit ventilators on the market. Some have a mixing damper by which the temperature of the air entering the room may be varied, others have valves for this purpose, and still others use a combination of the two. Regardless of the construction of the machine, the essential requirement is that the temperature of the air delivered to the room should change slowly and remain as near room temperature as possible. Frequently direct radiators are used in conjunction with the unit ventilators to supply additional heat in extremely cold weather or for quickly heating up the room.

The four general types of control for unit ventilators are as follows:

1. A damper operator, the supply of power to which is controlled by a room thermostat, is attached to the mixing damper. When the thermostat calls for heat, the damper is moved to a position which forces more air through the heating unit and thus increases the amount of heat supplied to the room. This action must be gradual so that the air temperature may be changed slowly to prevent the drafty condition caused by supplying first hot and then cold air.

2. In mild weather the heating unit frequently supplies sufficient heat to cause overheating of the room, even though all of the air is by-passed around the heating unit. To avoid this fault a valve is placed on the heating unit to close the steam supply when the damper is by-passing all of the air. This valve is used in addition to the damper operator explained in the foregoing paragraph.

3. In some unit ventilators one or more heating units and no mixing damper are used. A gradual-acting valve on each heating unit controls the supply of steam to the unit to give the proper amount of heat required to maintain the desired room temperature. A thermostat to govern each valve may be installed in the room, or one thermostat may be used for all valves.

4. Another type of unit ventilator is arranged so that all recirculated air passes through the heating unit, and the outside air is introduced into the room for cooling purposes only. The outside air damper and the recirculated air damper are interlocked so that one damper operator will control them. In addition a valve operator is placed on the heating unit. Both of the operators should be gradual to avoid drafty conditions. When the thermostat calls for heat, the damper operator slowly closes the outside air damper and opens the recirculating damper simultaneously; if this does not meet the demand, the valve on the heating unit opens until the room temperature reaches the desired point.

Fig. 8 shows a unit ventilator which may or may not be used in conjunction with a direct radiator. It is generally considered advisable to shut off the steam to the direct heating surface, if any, first, so that the control system will allow the unit ventilator to supply the full heating requirement where possible. For additional information on the control of unit ventilators, refer to Chapter 13.

Central Fan Heating and Ventilating Systems

The numerous types of central fan systems present many control problems. In general they all have one point in common, namely, that the temperature change may be very fast due to rapid circulation.

System for Ventilating Only (Split System). Fig. 9 shows an accepted control for ventilating systems. Thermostat *A* located in the outside air

duct set just above freezing, controls a valve *C* on the first heating coil. This valve is either completely open or completely closed. The by-pass damper *B* and the other two valves *D* and *E* are controlled by a duct thermostat *F* located in the discharge duct from the fan. If the temperature of the air surrounding the thermostat *F* increases, the damper is moved to admit more cold air. Should this not reduce the temperature sufficiently, the valves on the heating coil will be closed gradually and in sequence until the correct temperature is reached. The opening or closing of the damper *B* and the valves *D* and *E* must be gradual or there will be a wide fluctuation in air temperature.

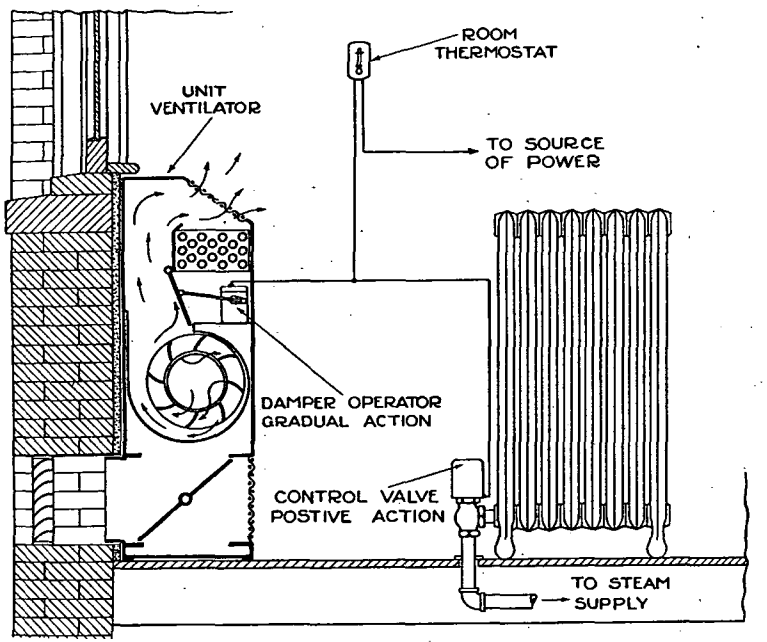

FIG. 8. CONTROL OF UNIT VENTILATOR AND RADIATOR

In ventilating systems it is customary to supply air to the ventilated spaces at an inlet temperature approximately equal to the temperature maintained in the rooms. The radiators therefore are designed to take care of all the heat losses from the room. Hence, in order to maintain controlled room temperatures it is further necessary to use room thermostats governing control valves placed on the radiators. With this type of central fan system it is possible to ventilate a large number of rooms by means of one fan.

In some installations, such as in theaters or auditoriums, it is difficult to install sufficient direct heating surface to offset the heat losses from the room. Also there are installations where a short heat-up period is allowed before occupancy of the room, and it is advisable to use the