

on the return line may be installed to stop the motor when the temperature in the return line is below a predetermined point as shown in Fig. 4. When the fan and the steam are controlled simultaneously, such thermostat will also prevent the blowing of cold drafts. The net result in any case will be that the fan will run only when there is heat in the coil.

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 as shown in Fig. 5. There are many types of unit ventilators available. Some have a mixing damper by which the temperature of the air entering

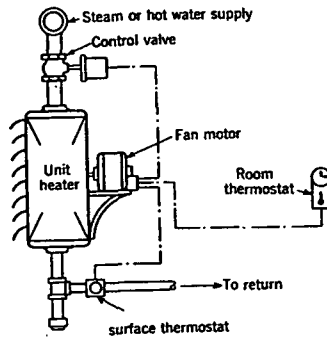


FIG. 4. UNIT HEATER CONTROL

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, 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. This simplest arrangement is often condemned because it frequently results in drafts.
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, but though giving better results, it may fail to prevent drafts.
3. In some unit ventilators one or more heating units are used without a mixing damper. 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, but unless a thermostat is placed directly in the air stream of each unit, drafts may be encountered.

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 move gradually to avoid drafty conditions. When the thermostat calls for heat, the damper operator slowly closes the outside air damper and simultaneously opens the recirculating damper; if this does not meet the demand, the valve on the heating unit opens until the room temperature reaches the desired point.

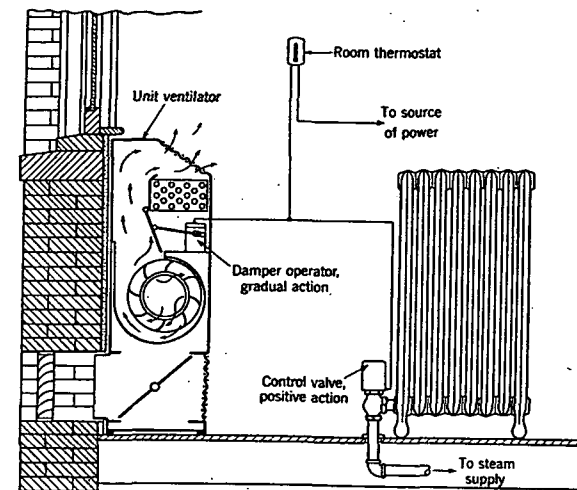


FIG. 5. CONTROL OF UNIT VENTILATOR AND RADIATOR

For additional information on the control of unit ventilators, refer to Chapter 12.

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 because of rapid circulation.

System for Ventilating Only (Split System). Fig. 6 shows an accepted control for ventilating systems. Thermostat *A* located in the outside air duct is set just above freezing, and controls a valve *C* on the first heating coil. This valve is either completely open or completely closed. The bypass 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 automatically to admit more cold air. Should this not reduce the temperature sufficiently, the valves on the heating coil will be closed