

FIG. 5. SECTION THROUGH A RADIATOR-HEATED ROOM

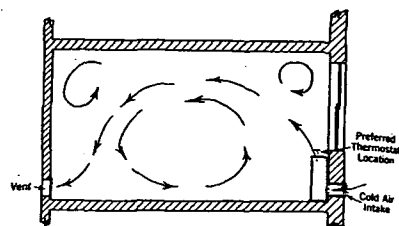


FIG. 6. SECTION THROUGH A UNIT VENTILATOR-EQUIPPED ROOM WHEN HEATING

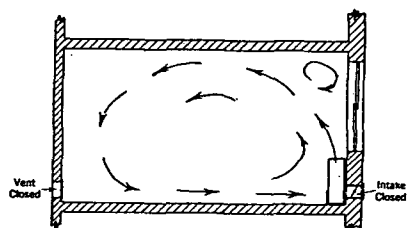


FIG. 7. SECTION THROUGH A UNIT CONDITIONER-EQUIPPED ROOM WHEN COOLING

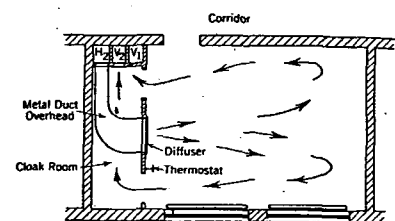


FIG. 8. PLAN OF A CLASSROOM IN A SCHOOL VENTILATED BY A CENTRAL FAN

In Fig. 8 the cloakroom ceiling is furred down so as to conceal the metal air supply duct, which is close to the ceiling. The air for ventilation usually is controlled by a duct thermostat near the fan, at a temperature slightly higher than the temperature required in the room, to allow for heat losses in the duct system.

THEATERS

Theaters are usually ventilated or cooled by introducing pre-conditioned air. No ventilating system for a theater should be given consideration without definite provision for cooling. Theater cooling generally is far more important than theater heating. There are two widely different methods of theater air distribution, the *upward* and the *downward*.

Upward System

If no inlet openings are possible in the ceiling, the upward system may be the least objectionable alternative. Fig. 9 shows a section through a theater with the upward system of air distribution. The occupants often suffer from drafts due to the cool air which comes from the unoccupied zones.

When the entire seating area is occupied, the upward system gives little trouble when cooling, and since very little heating is required under such conditions, practically no difficulty is encountered. The maximum

volume of air to be introduced with the upward system is about 25 cfm of air per person at a low velocity, say at 150 fpm (linear), and at a temperature not more than 6 deg below the room temperature. For partial occupancy, higher entering air temperatures can be used, with correspondingly less danger from drafts.

Downward System

Theaters usually are equipped with downward air distribution with horizontal diffusion of the entering cool air so as to combine it, both as to temperature and dilution, with the heated air which inevitably must rise from the bodies of the patrons. The waste or the recirculated air is withdrawn from the room at the floor. If the theater is large, and if the

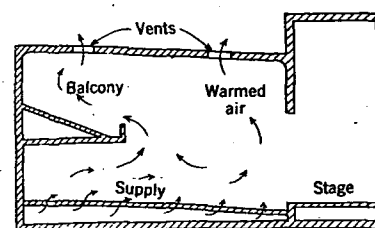


FIG. 9. THEATER WITH UPWARD SYSTEM OF VENTILATION

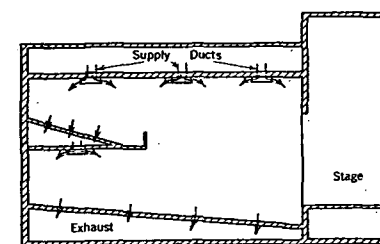


FIG. 10. SECTION THROUGH A THEATER WITH DOWNWARD VENTILATION

exhaust openings are placed in the side walls at the floor, drafts may be felt by the people who sit near the openings. There is no objection, however, except that of cost, to the use of small exhaust openings under each seat. These may be cleanable floor grilles or may have mushroom covers.

In a downward system, if the entering cool air is not deflected horizontally, it will fall through the surrounding much hotter air, and will reach high velocities by the time it strikes the heads of the occupants. Air at a temperature 10 deg below that of the surrounding air is decidedly objectionable when forced over one's head at a velocity of nearly 400 fpm.

Fig. 10 shows a section through a theater with downward ventilation. The deflectors cause the entering cool air to be spread horizontally so that it will mix with the hotter air. The final escape is through well-distributed openings in the floor. There have been cases in which the downward system of air distribution such as that illustrated in Fig. 10 gave trouble due to overheating at the rear, both above and below the balcony; especially when not provided with refrigeration for cooling, and when not adequately controlled. It is especially necessary that adequate removal of the heated air be provided at these low-ceiling points and it is probable that auxiliary exhaust at or through the ceiling after the manner of the arrangements shown in Fig. 5 would be helpful.

VANES

In order to cause the supply air to a room to take a fixed or desired direction when leaving the inlet opening of a flue, stationary vanes may