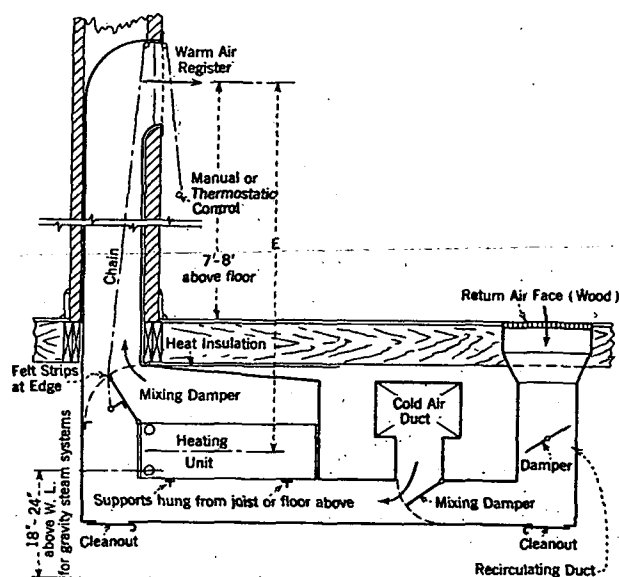


FIG. 6. GRAVITY-INDIRECT HEATING SYSTEM^a

^aSee *Mechanical Equipment of Buildings*, by Harding and Willard, Vol. I, second edition, 1929.

The temperature and volume of the air leaving the register must be great enough so that in cooling to room temperature the heat available will just equal the heat loss during the same time. In cases where ventilation is a requirement, the air volume needed may become so large that the entering air temperature will be but slightly above the room temperature. To establish and maintain a constant heat flow, provision must be made for removing the air in the room, after it has cooled to the desired room temperature, by a system of vent flues or ducts. As the air flow is maintained by natural draft and this gravity head is very slight, it is necessary to make all ducts as short as possible, especially the runs from the heating units to the base of the vertical warm air flues. Gravity-indirect arrangements, such as illustrated in Fig. 6, are not to be generally recommended for hot water systems unless the water temperature can be maintained at a reasonably high temperature and rapid circulation of the water can be had.

PROBLEMS IN PRACTICE

1 • What are the principal differences between a radiator and a convector?

A radiator is commonly thought of as a commercial heating unit having a maximum amount of direct heating surface, whereas a convector is a heating device in which the extended or secondary surface may be several times that of the prime surface. The radiator ordinarily has vertical tubular chambers for the heating medium but most convectors have horizontal tubular chambers to which fins are attached so as to form

vertical flues for the passage of air. While radiators are either exposed, enclosed, or shielded, convectors are concealed by means of a tight-fitting enclosure. Radiators are commonly made of cast-iron but convectors may be made of a combination of metals, such as copper and brass, or copper and aluminum.

2 • How did the term heating effect come into use?

It has been found that a room requiring a radiator of a certain determined capacity could under certain conditions be properly heated, with less temperature gradient between floor and ceiling and with less steam condensation, by the same radiator or by one of a different design having the same commercially rated capacity. This resulted in the use of the term *heating effect* to apply to the useful heat output of a radiator, in the comfort zone of a room, as related to the total input to the radiator.

3 • What is the effect of enclosing a direct radiator?

This will depend almost entirely on the design of the enclosure. If properly enclosed, a radiator can be made to give better heat distribution below the breathing line and to condense less steam than does an unenclosed radiator giving equal comfort.

4 • Does paint on a direct radiator affect its heat output?

Aluminum or gold bronze paint tends to reduce the heat output of a direct radiator perhaps 10 per cent, but ordinary non-metallic paint will have little effect on the heat output.

5 • How can the temperature gradient between the floor and the ceiling of a room be maintained?

Long, low, thin, direct radiators will maintain smaller floor to ceiling temperature differences than high direct radiators. Convectors properly selected and properly installed will accomplish the same result.

6 • Is the method of enclosing a direct radiator different from that required for a convector?

Generally, yes. An enclosure for a direct radiator should provide a space of at least 2 in. between the radiator and the front and back inside vertical surfaces of the enclosure to utilize the radiant heat to best advantage in heating the air stream passing through the enclosure. The enclosure for a convector should be constructed with as little clearance as possible between the inside vertical surfaces and the convector so as to confine the passage of the air stream through the fins of the convector. An all-over face grille, often used when direct radiators are concealed, should never be used for a convector. The essential requirements for a convector enclosure are an air inlet below the convector, a warm air outlet above it, and sufficient height between the openings to provide a stack effect.

7 • Is it necessary to make any allowance for the performance of a convector because it is enclosed?

No. The commercial ratings of convectors have been determined by testing the convectors in proper enclosures with grilles in place just as they should be installed for ordinary service.

8 • On what basis are the capacities of convectors published?

Published ratings of convectors are on the basis of equivalent square feet of direct exposed cast-iron. If any allowance is made for heating effect, the amount of such allowance is generally stated in the manufacturers' catalogs.

9 • How are fins of convectors attached to the tubes or prime surface?

Tubes or a solid core may be forced through piercings in the fins under pressure, or the