## WARMING THE RADIATOR

It is often very important to know the maximum condensation that occurs in a radiator when steam is turned on. Fig. 7 shows the condensation rate in pounds per hour for the time elapsing after steam is turned into the radiator. It will be noticed that the maximum condensation occurs 10 min. after steam is turned on, and in that case it amounts to about three and one-half times normal condensation. After the end of 25 min., the radiator had reached a normal rate of condensation. This curve was made from observations at intervals of 10 min. so that the intermediate points between the 10 min. points are not known, and the form of the curve is not exact. It shows, however, that in starting a plant, the demand made upon the boiler may be very much higher than the normal demand.

## EFFECT OF ENCLOSING THE RADIATOR

It is very often desirable to partly enclose or conceal a radiator by means of screens or grills. All such enclosures in general reduce the heat transmission from the radiator, the effect being both to reduce the radiant heat and the convected heat. As in most radiators, the convected heat is at least two-thirds of the heat transmission, these enclosures or screens largely affect the convected heat. It is therefore very desirable that the current of air passing over and through the radiator should be restricted as little as possible. There has been some experimental work done, particularly abroad, with reference to these screens. There are, however, so many different cases that may arise that it will not be possible to discuss all of them but only to take up typical ones.

*Case No. 1.*—In this case, Fig. 8, the radiator is enclosed in a box with a screen in front and at the bottom, and a screen at the top, these screens extending the full length of the radiator. This arrangement reduces the heat transmission of the radiator from 7 to 10 per cent and in all cases, the spaces between the radiator and the wall and the spaces between the casing and the radiator should be at least 2½ in. The reduction of heat transmission will be more in narrow radiators than in wide radiators. Experiments show that the best results are obtained when the opening at the top has twice the width of the opening at the bottom, and for radiators of ordinary type the width of opening at the bottom should be 5 in. and the opening at the top, 10 in.

*Case No. 2.*—It is sometimes desirable to place a screen in front of the radiator, leaving the top entirely open with an opening at the bottom in front for the cold air to enter the radiator, as in Fig. 9. In a case of this kind the effect of the screen is to produce a strong current of air and if this screen is high enough it may even produce a chimney effect which will increase heat transmission from the radiator due to increased circulation. The effect of such screens depends entirely upon their height. Professor Brabbee states that, with a screen 72 in. high and a 49-in. radiator, the heat transmission will be increased 12 per cent.

*Case No. 3.*—Radiators often have placed over them a flat shelf, as shown in Fig. 10. In such case, they should be provided with a deflector as shown. The effect of the shelf very largely depends upon the height of the shelf above the radiator. When the distance *D*—that is the height of the shelf above the radiator—is 5 in. or over, the effect of the shelf may be neglected. When the distance *D* is reduced to 4 in., the heat effect may be reduced by 4 per cent.

*Case No. 4.*—Radiators are often enclosed in boxes with a grill in front or recessed in the wall with a grill placed in front of them as in Fig. 11. In such cases, the height, *D*, is very important. With *D* equal to 2½ in., the heat transmission will be reduced 20 per cent, and with *D* equal to 6 in., the heat transmission is reduced 10 per cent. It is assumed in this case that the entire front of the box is provided with an open grill.

*Case No. 5.*—Sometimes a grill, as shown in Case 4, is partly replaced by a solid panel with openings above and below as in Fig. 12. With the openings the full length of the radiator and 6 in. in height and with *D* not less than 4 in., the heat transmission will be reduced 25 per cent. As *D* is reduced in height, the heat transmission will also be reduced and with *D*, 2½ in., the reduction will be 40 per cent.

*Case No. 6.*—Radiators are often placed under seats as in Fig. 13. In this case the distance between the top of the radiator and the bottom of the seat becomes very important and should be not less than 3 in. and if possible it should be made 6 in. Under favorable conditions, when *D* is at least 3 in. and *A* is equal to 6 in., the heat transmission





will be reduced from 15 to 20 per cent. When *D* is small, however, say 2 in., and *A* is reduced to 4 in., this reduction may be 35 or 40 per cent.

In tests[1] by Prof. K. Brabbee will be found other cases than those cited above.

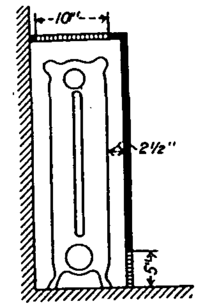


FIG. 8

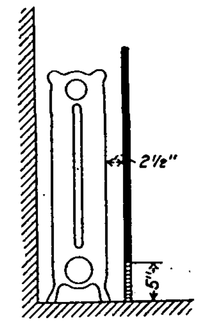


FIG. 9

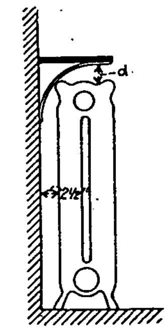


FIG. 10

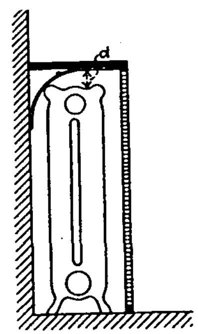


FIG. 11

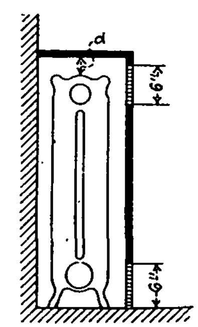


FIG. 12

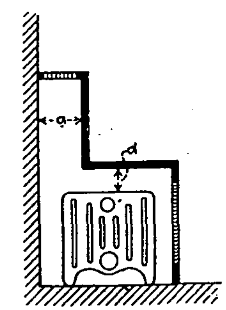


FIG. 13

DIFFERENT ARRANGEMENTS OF RADIATORS IN ENCLOSURES

## EFFECT OF POSITION

The effect of position on heat transmitted by a radiator is a subject that has been investigated to a very limited extent. Experiments that are now available show the heat loss from a radiator is about the same whether it is placed on the floor, at the ceiling or in the middle of the room, air temperatures being the same. It seems to make very little difference whether it is placed near the wall or near the middle of the room, as far as condensation is concerned. There is, however, a considerable difference in the heat of the room and the maintaining of a warm floor. This is particularly the case in rooms in which there is very little circulation of air, due to mechanical means. Many factories that were effec-

[1] Reported by George Stumpf, Jr., in *Heating and Ventilating Magazine*, May 1914, p. 23.