what paints are placed on the heater as a priming coat; the results are always dependent upon the last coat of paint. In conductors having a large proportion of radiating surface such as pipe coils or wall coils, the effect of painting will be more marked than in tubular conductors having a comparatively small radiating surface in proportion to the amount of convecting surface. Most finely ground pigments have about the same radiation constant as black cast-iron. Therefore paints having finely ground pigments will usually have little effect. Bright metals have a much lower radiation constant and therefore, bronze metallic paints will reduce the direct radiation emission from a conductor.

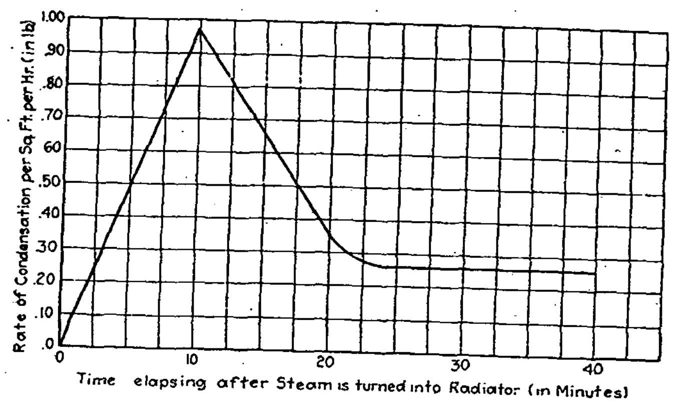

FIG. 2. CHART SHOWS THE STEAM DEMAND RATE FOR HEATING-UP A CAST-IRON CONDUCTOR WITH FREE AIR VENTING AND AMPLE STEAM SUPPLY

The effects of painting a six-section 32-in. three-column conductor as found by Wm. H. Severns are given in Table 2.

Effect of Enclosures

It is assumed generally that an enclosed conductor shows a decreased heat emission. This is borne out by results obtained by Kratz and Fahnestock[1], Table 3. These data indicate that the heat emission from the enclosed heater, equals or exceeds that of an exposed heater only in

TABLE 2. EFFECT OF PAINTING 32-IN. THREE COLUMN, SIX-SECTION CAST IRON COLUMN CONDUCTOR

RADIATOR No.	FINISH	AREA SQ. FT.	COEFFICIENT OF HEAT TRANS. B.T.U.	RELATIVE HEATING VALUE PER CENT
1	Bare iron, foundry finish	27	1.77	100.5
2	One coat of aluminum bronze	27	1.60	90.8
3	Gray paint dipped	27	1.78	101.1
4	One coat dull black Pecora paint	27	1.76	100.0

[1]Effect of Enclosures on Radiator Performance, by A. P. Kratz and M. K. Fahnestock, JOURNAL, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, June, 1927.

the case where the enclosure is much higher than the heater, so as to produce a pronounced chimney effect. There is evidence, however, that under some conditions of installation the enclosure may so improve the distribution of heat to the occupied zone that the decreased heat output will produce a satisfactory comfort condition.

Figs. 3, 4 and 5 give results of a study of the relative heating effect of bare and enclosed radiators as made at the University of Illinois.[2]

Fig. 3 gives the relative heating effect of a bare radiator and the same radiator in a well designed enclosure. The enclosed radiator condensed 13 per cent less steam than the bare radiator and maintained the same breathing line temperature. Below the breathing line the enclosed radiator gave a higher temperature, while the bare radiator gave a higher temperature at the ceiling.

Fig. 4 shows the relative heating effect of a bare radiator and the same radiator in two poorly designed enclosures. The enclosure decreased the rate of condensation slightly, but did not satisfactorily heat the room.

Fig. 5 shows the relative heating effect of a bare radiator and the same radiator with a well designed shield. The shield had the effect of decreasing the condensation by 11 per cent, and gave the same breathing line temperature with a slightly higher temperature below the breathing line and a lower temperature at the ceiling.

These results show that properly designed enclosures and shields will result in greater efficiency and consequently more economical heating. However, this improved effect is not had except where the enclosure is properly designed.

To accomplish the best results, care must be exercised to follow certain rules in designing the enclosure, the most important of which are:

1. Enclosures should be insulated with 1 in. magnesia or asbestos block, lined with bright tin or non-corrosive sheet metal, placed next to the conductor.
2. The surface of the conductor should be painted flat black, maroon japan, white enamel or white zinc. If the conductor is entirely concealed it may be unpainted.
3. The free area of the grille or opening at the outlet should be not less than the free area through the sections of the conductor.
4. The free area of the grille or opening at the inlet should be not less than 80 per cent of the free area at the outlet.
5. If the outlet is in the face of the enclosure so that the air flow is horizontal, the free area of the outlet should be at least 150 per cent of the free area about the conductor, and the clear height between the top of the conductor and the underside of the top of the enclosure should be not less than the depth of the enclosure.
6. Best results are obtained with a tight fitting enclosure, provided the free area about the conductor at point of greatest restriction is not excessive. As a general rule the efficiency of the conductor is inversely proportional to the depth of the enclosure.

TYPES OF HEATERS

Types, sizes, and heat emission for tube conductors and for the various other forms of cabinet convectors and for the extended surface-blast convectors now on the market, are not sufficiently well standardized to give heat-emission tables applicable to all makes of a given type. For

[2]Investigation of Heating Rooms with Direct Steam Radiators Equipped with Enclosures and Shields, by A. C. Willard, A. P. Kratz, M. K. Fahnestock and S. Konzo, JOURNAL OF AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Vol. 35, No. 4, April, 1929.