No. 4 is the curve for a silica brick. It is interesting to note that in the paper already referred to it was said:

"It was recognized that silica brick are better heat insulators than fire brick, as may be seen from Wologdine's determinations[3] which show that the heat conductivity of silica is 0.0020 and of fire brick 0.0042."[4]

It appears, however, that in spite of its low heat conductivity this particular silica brick is not a satisfactory insulator. The maximum temperature reached with the silica brick was 670°. The heat loss here was 36 per cent. greater than with the fire brick. It is not very safe to theorize as to the cause of this phenomenon, but it looks as though the radiation from the surface of the silica brick is very much greater than from the ordinary fire brick. The vast differences due to the nature of the radiating surface is not so surprising if a familiar household phenomenon is considered, viz., the great difference in the rate of cooling of the common black iron kettle and the polished silver tea pot.

No. 6 was obtained from an alundum brick, one of the highly refractory ones made by the Norton Company. The transmission of heat was so rapid with this brick that the maximum temperature obtained in the furnace was only 570°. This illustrates well the value of such alundum refractories as crucibles, muffles, etc., where it is desirable to have as efficient transmission of heat as possible.

No. 7 is the curve for a brick made of silicon carbide. The brick is pure silicon carbide, that is, no bond is used in making it. The transmission of heat is extremely good with this brick so that the maximum temperature reached in the furnace was only 420°. Comparing this brick with the fire brick (2) when the temperature in the furnace was the same (420°) it is seen that the rate of escape of energy is 920 watts and 300 watts respectively, or more than three times as great in the case of the silicon carbide brick.

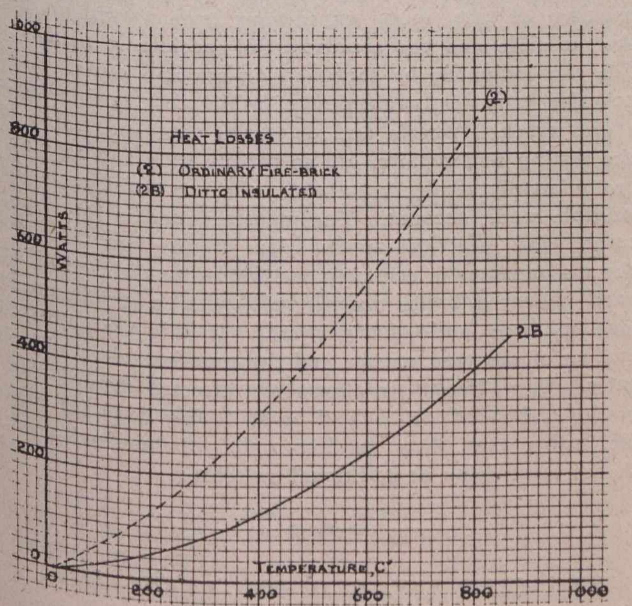

Fig. 3.

Curve No. 9 is that for an ordinary red building brick of the cheapest kind. It is seen to be the best insulator of any of this lot, the heat losses being as much as 34 per cent. less than those for the fire brick (2) at a furnace temperature of 800°.

Curve No. 10 shows the results obtained with a magnesia brick. This was of a standard kind made of brown magnesia and not the Grecian magnesia variety.

[3] Electrochemical & Metallurgical Industry, Vol. VI. (1909), page 383.

[4] These Transactions, Vol. 20, 89 (1911).

In Fig. 3 are shown the results obtained, first with the ordinary fire brick (2) and then after covering the whole furnace built of this brick with a 25 mm. (1 inch) thickness of a special heat insulating material kindly supplied by a well-known manufacturer. It will be observed that this material reduced the heat losses by more than 50 per cent.

In Fig. 4 is a comparison of the heat losses obtained with the ordinary fire brick (2) and a brick specially constructed for heat insulation. Here it will be observed that in the case of the special insulating brick the heat losses are reduced 68 per cent.

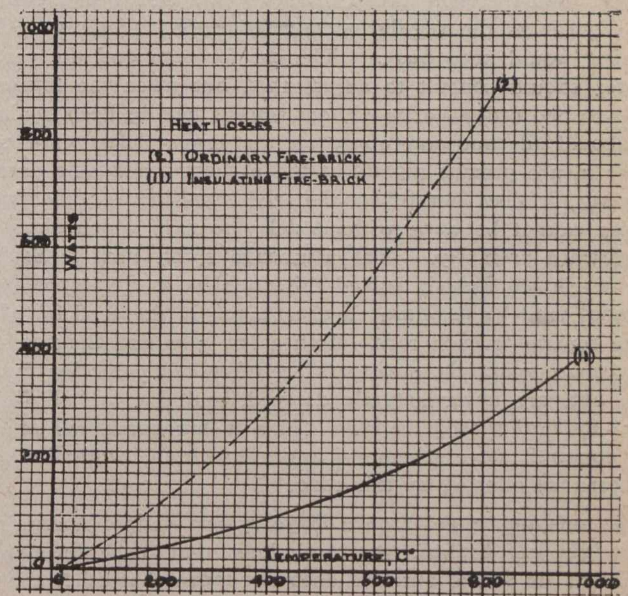

Fig. 4.

The first object of this work is to make a study in the quickest way possible of the heat insulating properties of various kinds of brick used in building furnaces and get some notion of the amount of heat lost with such materials. The ultimate object in view is the production of a heat insulating article, the cost of which will be less than that of the watt-hours uselessly dissipated through furnace walls.

TERMINAL BRAKE TESTING.*

By F. B. Farmer.

As we seek efficient train brakes and as the standard set by law is based on the train, it is obvious that terminal brake tests of trains must be made. Stated differently, the requirements can not be met by confining inspecting, testing and repairing to shops and repair tracks. Consideration of overtime and the sixteen-hour law, as well as expeditious train movement demand the minimum lapse of time between that for which the crew is called and the time the train departs. Hence, a train prepared for departure should require no more brake work after the engine is coupled than, at the most, stopping a few leaks in hose couplings and making the formal test. But often there are greater delays due to making other repairs, or the train proceeds with less efficient brakes than it should have. To avoid this, the repairs required must be determined with arriving trains. The incoming engineer should add to the reduction required for stopping enough to fully apply the brakes, and the brake-

* Abstract of a paper read at the December meeting of the Western Railway Club, Chicago.