

indicated by it, at a white-heat, comparable with the degrees of the ordinary thermometer? The author believes that the laws of Boyle and of Charles will probably hold good at the high temperatures of ordinary furnaces; and, further, the evidence as to temperature indicated by the air-thermometer does not rest upon the expansion of a single gas, as the porcelain bulb may be filled with nitrogen, oxygen, or carbonic anhydride. The question as to the degree of confidence which may be reposed in the numerical values of high temperatures is, however, so important, that the author would refer to the following experiment of Carl Barus, who has devoted years of patient work to pyrometric investigations. Fig. 45a shows the arrangement adopted by him for comparing directly the air-thermometer with the thermo-junction.\* The latter is inserted in a tubulure extending to the centre of the

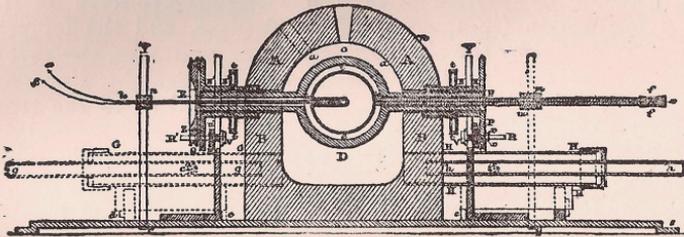


FIG. 45a.

bulb *e*; and the disposition of the various parts of the apparatus is as follows. The walls of a cylindrical furnace *B B* are covered with a hemispherical dome *A A*. The furnace is heated by gas, introduced through the burners *G G*, *H H*; compressed air entering by the inner tubes *g g* and *h h*. The inlets for the gas are *c c*. The furnace can be heated to a high temperature with ease; but in order to equalise the heat, Barus employs an internal globular "muffle," *E C D F*. It consists of two hemispheres of fire-clay, provided with lateral tubes, which pass through the walls of the furnace. The two hemispheres are held together by the iron collars *N N*, *N' N'*. The outer edges of these collars *P P'* are flanged, and fit into the grooves of two friction rollers, *Q Q'*, of which *R R'* are the respective axes. There are adjusting screws at *V V'*, *u u'*, *t t'*. The muffle is rotated by a belt pulley screwed on to the flange *P'*. The air-thermometer is shown in position,

\* *Bulletin United States Geological Survey*, No. 54, Washington, 1889.