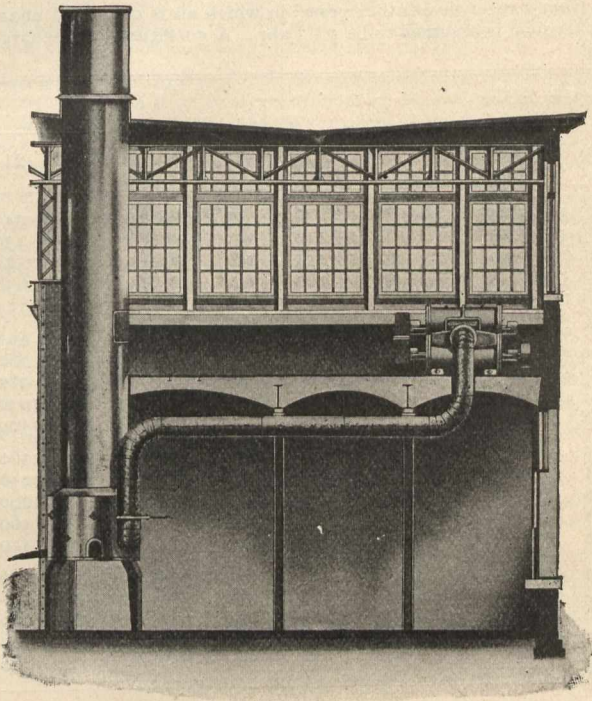


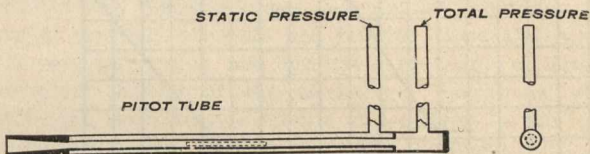
MEASUREMENT OF VOLUME, PRESSURE AND HORSE POWER AT PRESSURES OF ONE TO TEN LBS. PER SQUARE INCH.

Velocity.—The volume of air discharged from an orifice or pipe is, theoretically, equal to the product of the velocity of the air flowing and the area of the orifice. Hence for the



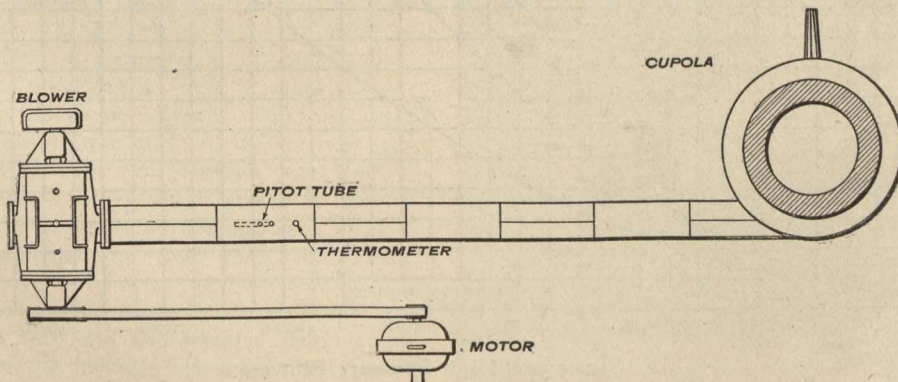
Blower Connection to Foundry Cupola.

calculation of volume, the velocity is an important factor. To determine the velocity, the Pitot tube is commonly used as shown in the accompanying illustration. It should be inserted in the centre of a straight run of blast pipe within about ten feet of the blower. One part of the Pitot tube transmits the total pressure, which is the sum of the static



pressure and the velocity pressure. The other part, in communication with the slots shown above, transmits the static pressure. Evidently the difference is the velocity pressure. Each is connected to a water gauge which should show magnified readings so that the difference may be accurately determined.

Accuracy.—Great care should be exercised in measuring the velocity pressure, and the instruments should be care-



fully calibrated. In the ordinary blast pipe for conducting air from the blower to the cupola or furnace, the velocity should not exceed two or three thousand feet per minute. As this velocity corresponds to a pressure of only about 0.4" of water, the measurement requires care, but with good instruments the readings will be accurate enough for all practical purposes.

Volume.—The velocity pressure being known, the volume of free air passing through the pipe may be determined from the following formula:—

$$V = av = \frac{60acP}{P} \sqrt{\frac{2gp}{d}}$$

in which V = the volume of free air in cubic feet per minute.

c = coefficient of Pitot tube, which should be determined for each tube;

a = area of the pipe in square feet,

v = velocity in feet per minute,

$2g = 64,32$,

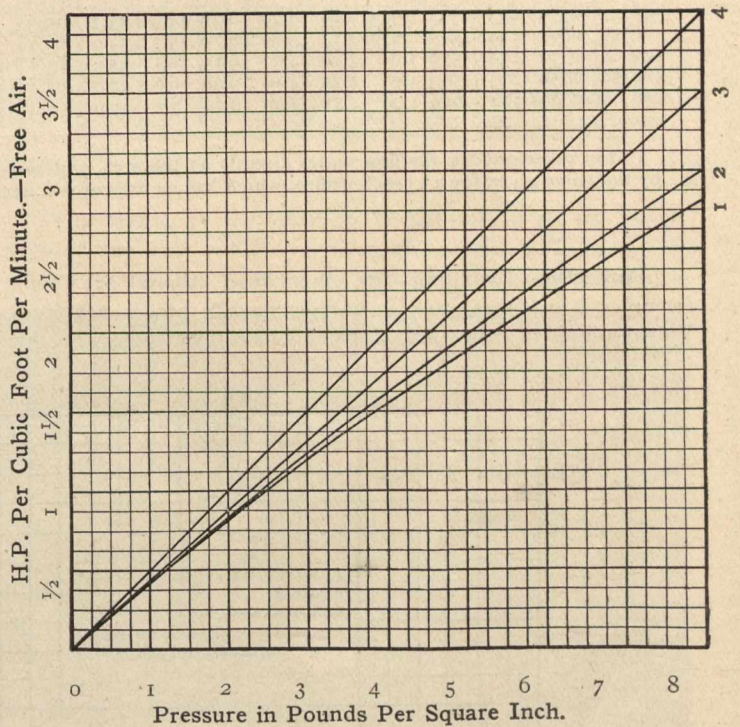
p = velocity pressure in pounds per square foot;

p is the difference between the two pressures observed on the Pitot tube,

d = density or weight per cubic foot of air at pressure, temperature, and humidity at point of observation,

P_1 = absolute pressure of air in the pipe in pounds per square foot,

P = atmospheric pressure in pounds per square foot.



Horse-power.—Assuming that the air is compressed without cooling, the H. P. may be found from the following:

$$\text{Horse power} = \frac{VP \left[\left(\frac{P_1}{P} \right)^{\frac{1}{\gamma}} - 1 \right]}{11,000}$$

in which V = volume of free air in cubic feet per minute, as found above,