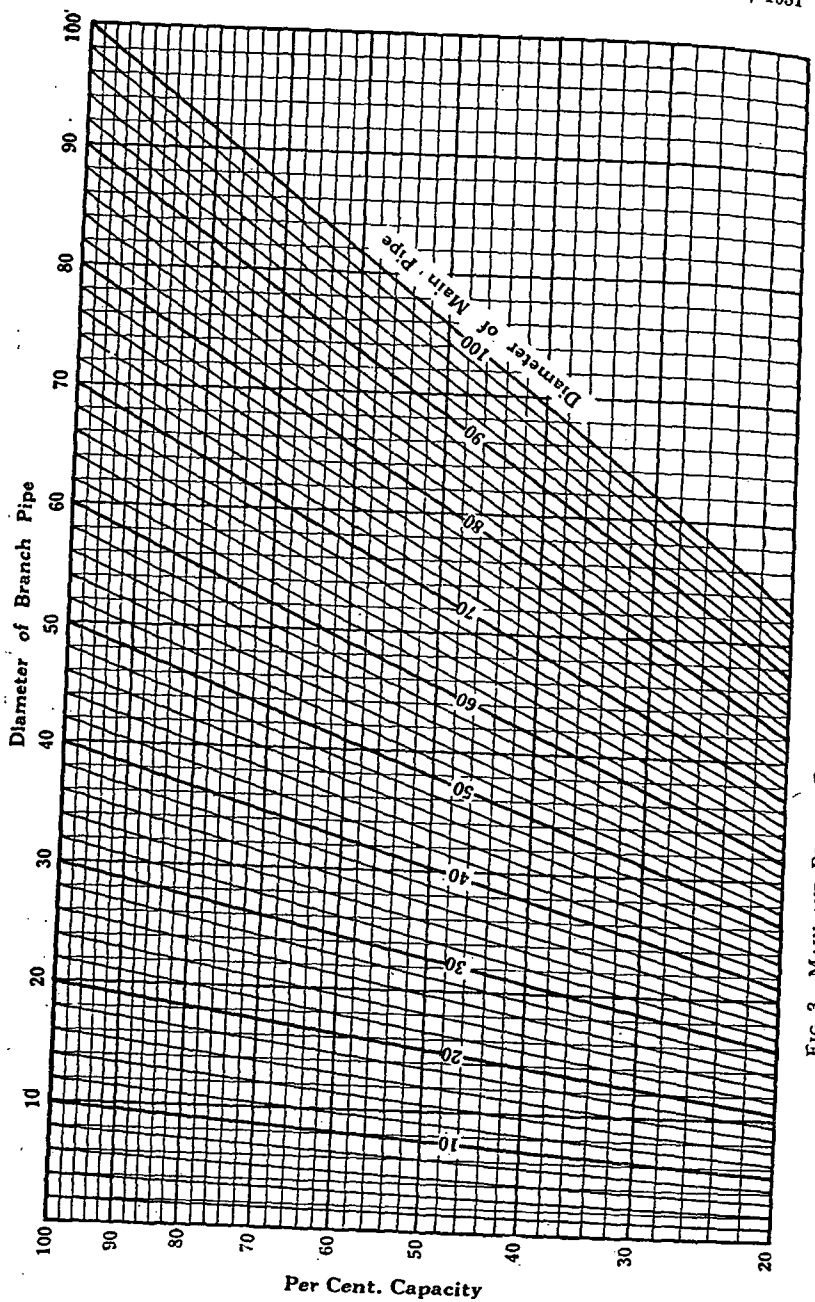

Fig. 3. Main and Branch Pipes for Equal Friction per Foot of Length

The plain lattice grille of cast iron or pressed steel with from 40 to 60 per cent net clear area is the type most generally used in ventilation work, but the data given regarding velocities and measurement of air flow apply equally to ornate patterns. Registers are not as generally used in ventilation work as grilles. It has proved more satisfactory and economical to install a damper in the duct leading to the grille. In some instances the deflection caused by the shutters in a register seriously affects distribution.

The size of the grilles should be such that the velocity through them will be from 200 to 400 ft per minute, depending on the location and kind of installation, as already stated. The velocity through floor registers should vary between 125 and 175 ft per minute. Much will depend on the location of grille, the direction of the blast and the distance it should carry.

MEASUREMENT OF AIR FLOW

The quantity, velocity and pressure of air discharged by a fan or flowing through a duct or grille may be determined by various methods.

Pitot Tubes

Measurements of air velocities exceeding 20 ft per second should be made by means of Pitot tubes. Volumetric determinations from Pitot tube readings must take into account the barometric pressure, temperature, humidity, and the possible dust of the air. These factors determine the weight or density of the air.

In general, no accurate velocity pressure readings can be taken of any air current which is affected by changes of directions of the ducts. Accurate readings can only be taken in a duct which is straight and without turns and elbows for a distance of at least 50 times the diameter of the circular duct, or the greatest dimension of a rectangular duct. Where space conditions do not make such conditions possible, baffling or dividing the duct into numerous smaller ducts by division plates becomes necessary. (See Report on the use of the Pitot Tube, A.S.H.V.E. Transactions, Vol. 20, 1914, p. 211, and Standard Code for the testing of Centrifugal and Disc Fans, A.S.H.V.E. Transactions, Vol. 29, 1923, pp. 407 to 416).

Anemometers

The nature of the air flow through a grille is such that no accuracy can be expected from the use of a Pitot tube. Furthermore, the velocities encountered are usually so low that it would necessitate the use of a gage several times more accurate than the usual type of portable instrument. It is therefore necessary to use the anemometer. This instrument should be calibrated frequently to obtain the most satisfactory results.

The following procedure for obtaining anemometer readings is based on research conducted at *Armour Institute of Technology* in cooperation with the A.S.H.V.E. Research Laboratory:[1]

Supply Grilles. The surface of the grille should be marked off into a

[1] *Measurement of the Flow of Air through Registers and Grilles*, by L. E. Davies [A.S.H.V.E. Journal (Heating, Piping and Air Conditioning), January, 1930].