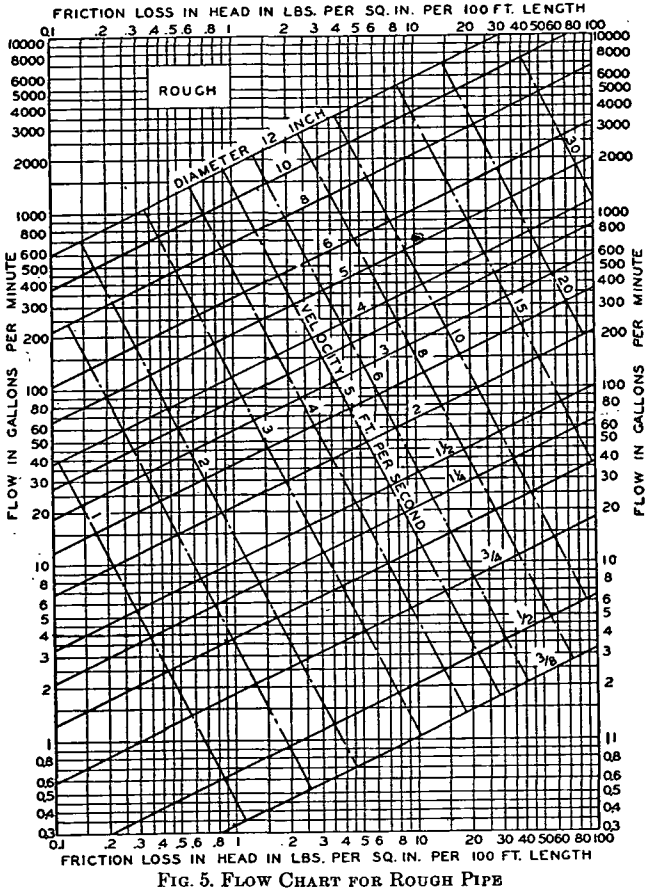

FIG. 5. FLOW CHART FOR ROUGH PIPE

Example 1: A 2½ in. fairly rough pipe supplies 100 gpm of water. Find the friction loss in head if the pipe length is 200 ft.

Solution: Enter Fig. 4 at 100 gpm, and move along this line until it intersects the 2½ in. diameter line. From this intersection point, move vertically down and read 4.5 psi friction loss per 100 ft of pipe length. Then the total friction loss will be $2 \times 4.5 = 9$ psi.

The pressure losses in the distributing system will consist of the pressure losses in the piping itself, plus the pressure losses in the pipe fittings, valves, and the water meter, if any. Approximate design pressure losses for disc-type meters for various rates of flow are given in Fig. 6. Flow limits for disc-type meters, which may be regarded as the limits of recommended ranges in capacities, are given in Table 3. Manufacturers should be consulted for data on exact pressure losses and capacities since these vary for meters of different internal design.

Fig. 7 shows the variation of pressure loss with rate of flow for various types of faucets and cocks, based on experimental data obtained at the *State University of Iowa.*

The loss of pressure through any fitting or valve can be expressed in

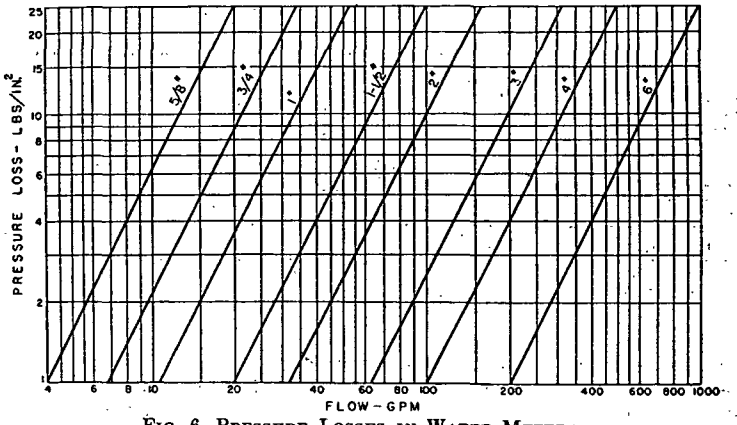

FIG. 6. PRESSURE LOSSES IN WATER METERS
(See manufacturer's data for exact value for meter used)

pounds per square inch for any given rate of flow. Experience has shown, however, that the simplest method of expressing losses in fittings and valves is to use the concept of an equivalent length of straight pipe. Thus it has been found, for example, that a 1 in., 90 deg elbow introduces a loss equivalent to 2.2 ft of straight 1 in. pipe. Therefore, for each 1 in., 90 deg elbow, 2.2 ft of 1 in. pipe are added to the total length of 1 in. pipe.

Estimated pressure losses for pipe fittings and valves in terms of equivalent pipe length are shown in Table 4.

Table 5 lists the equivalent lengths for various special types of apparatus and fittings. The loss in water meters varies considerably with the design even in meters of the same nominal size. The values given in Table 5 are ample for the well-known meters now on the market.

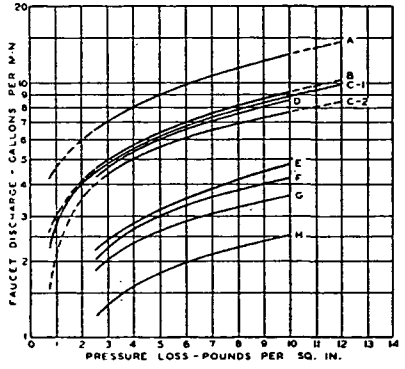

FIG. 7. VARIATION OF PRESSURE LOSS WITH RATE OF FLOW FOR VARIOUS FAUCETS AND COCKS

A. ¾ in. laundry bibb (old style).
B. Laundry compression faucet.
C-1. ½ in. compression sink faucet (Mfr. 1).
C-2. ½ in. compression sink faucet (Mfr. 2).
D. Combination compression bath tub faucets (both open).
E. Combination compression sink faucet
F. Basin faucet.
G. Spring self-closing faucet.
H. Slow self-closing faucet.
(Dashed lines indicate recommended extrapolation)