would be sufficient, and that where the flow is 100 gpm in the riser branch and riser, a 5-in. size would be correct. Of course these are somewhat excessive flows and the head from the tank is small so that large sizes are to be expected. It would be necessary to carry a 5-in. riser down to the branch to the top floor, then reduce to 4 in. for the branch to the floor below the top, and below this the sizes in Table 2 could be followed. In such a case, flush tank closets should doubtless be substituted.

Had the tank been set 10 ft higher, the head available to be used up in friction, but

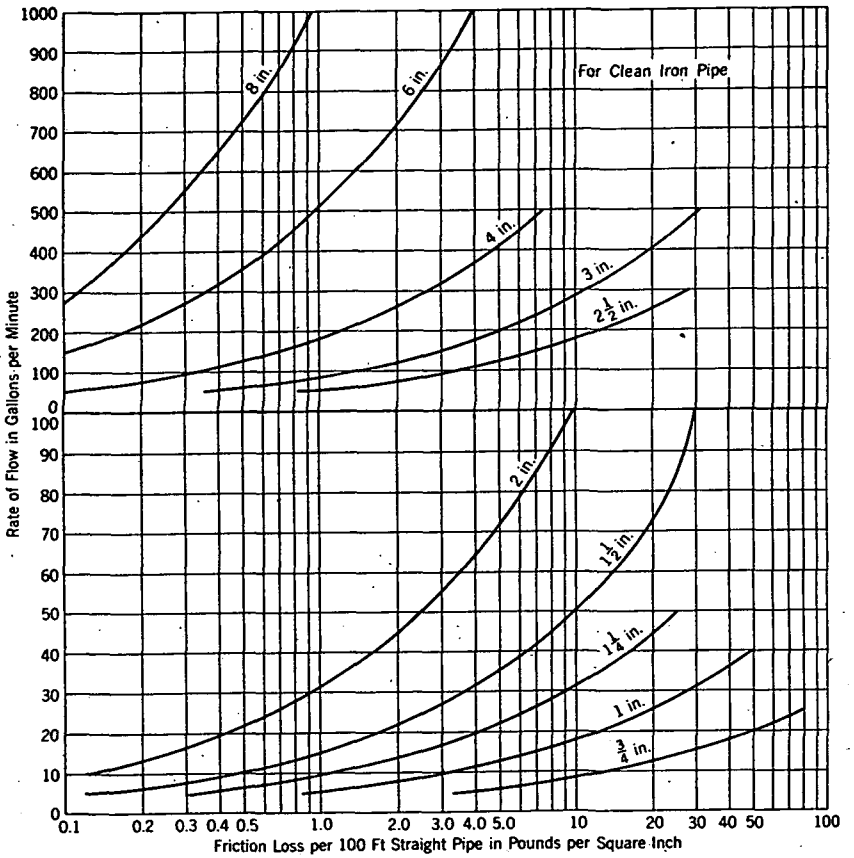


FIG. 3. CHART GIVING FRICTION LOSSES FOR VARIOUS RATES OF FLOW OF WATER

still giving the same pressure at the top fixtures, would have been 0.43 lb × 10 ft or 4.3 lb greater and this, with the 1 lb drop used previously, would give a total allowable drop of

$$1 \text{ lb} + 4.3 \text{ lb or } 5.3 \text{ lb}$$

which, divided by the 600 ft equivalent run gives a drop per 100 ft of

$$\frac{5.3 \times 100}{600} \text{ or } 0.9 \text{ lb}$$

and, with this drop, the sizes according to the chart (Fig. 3) are 6 in., 4 in., and 4 in.,

respectively, while if the run is reduced to 200 ft instead of 600 ft, the allowable drop will be

$$\frac{5.3 \text{ lb} \times 100}{200} \text{ or } 2.7 \text{ lb per } 100 \text{ ft.}$$

This gives 5 in., 4 in., and 3 in., respectively, for the flows of 400, 200, and 100 gpm.

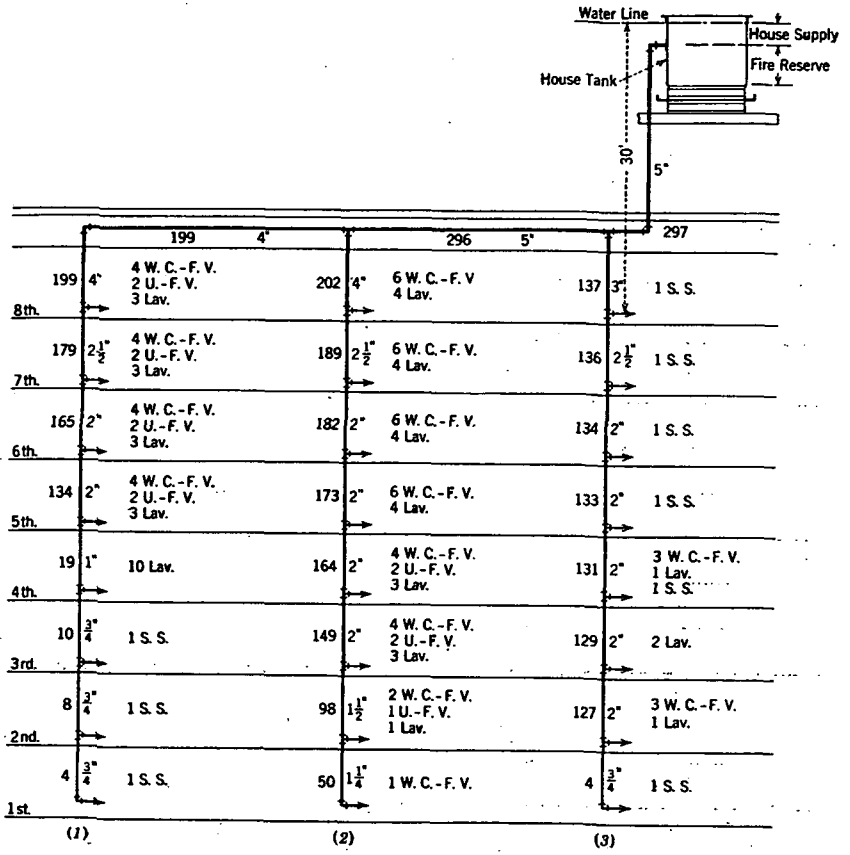


FIG. 4. TYPICAL LAYOUT FOR DOWN-FEED SYSTEM

From Example 3 it is evident that, while the down-feed system possesses certain economies in size for the riser portion, it is quite likely to involve large distribution main sizes especially when the tank is not elevated to a considerable degree.

SIZING A PIPING SYSTEM

Example 4. Fig. 4 shows a typical layout with three risers extending eight stories and with the fixtures noted on each floor. First this will be solved for a down-feed arrangement assuming that the level of the water in the house tank is 30 ft above the fixtures on