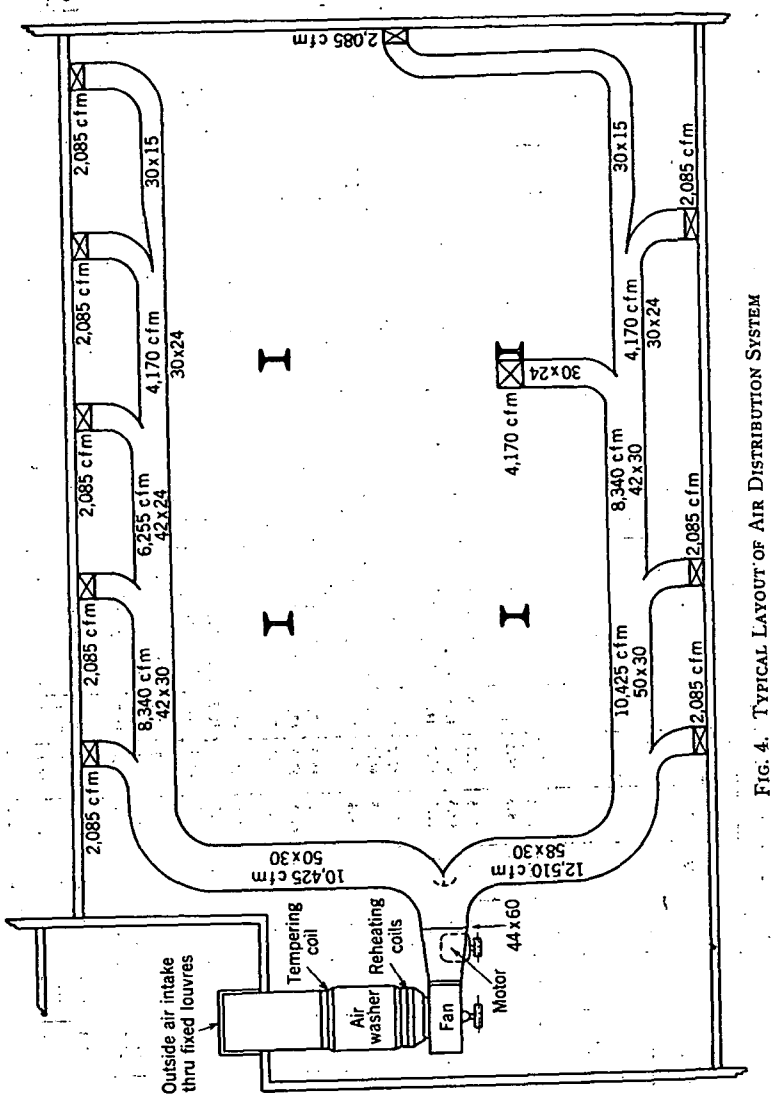


FIG. 4. TYPICAL LAYOUT OF AIR DISTRIBUTION SYSTEM

equivalent to a 22.2 in. diameter round pipe. From Fig. 3, 30 per cent of this is a pipe 14.3 in. in diameter, and referring again to Table 1, the rectangular equivalent branch is 12 x 14 in., 10 x 17¼ in., or any other desirable combination.

Since the friction chart, Fig. 3, and Table 1 were prepared, further research on duct friction under the direction of the A.S.H.V.E. Research Technical Advisory Committee on Air Distribution and Air Friction indicates lower pressure loss values than given in Fig. 3. Included in the work by this Committee is a revision of Fig. 3 and Table 1 to bring them into conformity with recent tests. Pending acceptance by the Society of the Committee's report, the friction chart and the table on circular equivalents of rectangular ducts for equal friction presented in earlier editions of THE GUIDE have been retained.

Multiplying or dividing the length of each side of a pipe by a constant is the same as multiplying or dividing the equivalent round size by the same constant. Thus, if the circular equivalent of an 80 x 24-in. duct is required, it will be twice that of a 40 x 12-in. duct, or $2 \times 23.3 = 46.6$ in.

MAIN TRUNK DUCTS

A main duct with branches is generally used to convey tempered air for ventilation purposes only. In place of individual ducts, a comparatively large main duct supplies air by branches to the room or rooms. The velocities vary according to the nature of the installation and the degree of quietness required. At the start of the run a velocity as high as 2000 fpm may be used, but this is considered the maximum for public building work, and is reduced to from 400 to 800 fpm in the risers. This duct system may be designed so that the loss of pressure in the branches is equalized in a manner similar to that previously described.

Velocity Method

The velocity method of designing a duct system involves arbitrarily selecting velocities at various sections of the duct system with the highest velocities generally chosen at the fan and progressive lower velocities toward the duct openings to the room. To find the total static pressure against which the fan must operate, the static pressure loss of each section must be calculated separately and the total loss found by adding the individual losses of the various sections. This method requires judgment and experience in choosing the proper velocities to approach equal friction for all lengths of run but many engineers believe that the velocity method is handier to use than other methods and will give satisfactory results for most practical applications. The air velocities given earlier in this chapter are helpful in choosing proper velocities. Adjustable dampers or splitters are used to regulate air quantities delivered. In designing a system for a given pressure loss, the equal friction method is often preferred over the velocity method.

Equal Friction Method

Example 3. Fig. 4 shows a typical layout of an air distribution system which is applicable for ventilation of hotel dining rooms and offices.