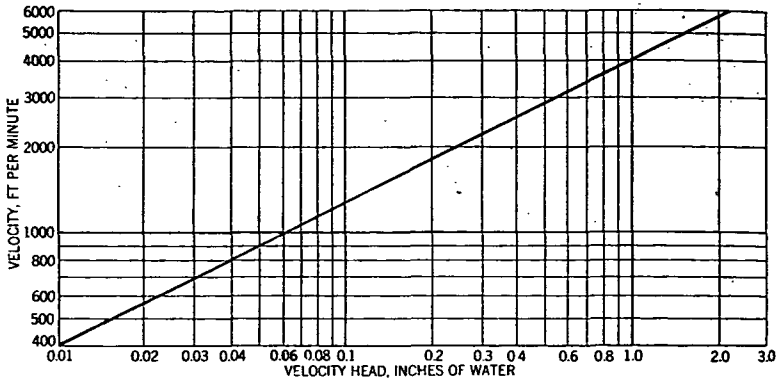

FIG. 7. RELATION BETWEEN VELOCITY AND VELOCITY HEAD FOR STANDARD AIR

where the aspect ratio, $H/W = 1/4$, then if the bend of the same radius ratio had been made in the plane of the narrow dimension giving an aspect ratio, $H/W = 4$.

Data now available for losses in compound bends,[7, 8] where two or more elbows are close together, do not warrant refinement of design calculations beyond use of the sum of the losses for the individual elbows. Actually, the losses are somewhat less than for two bends when they are placed to form a U bend, and somewhat more when they form a reversed, or S bend.

Where angles of other than 90-deg bend are encountered, the loss may be considered as directly proportional to the angle of bend. Losses[8] for

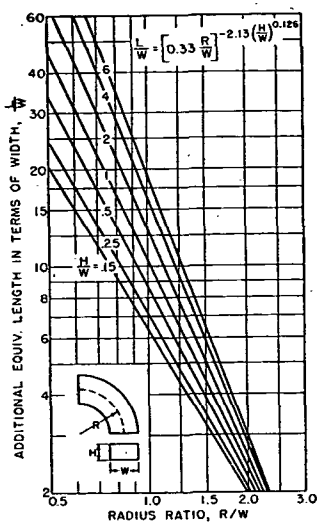

FIG. 8. LOSS IN 90-DEG ELBOWS OF RECTANGULAR CROSS SECTION

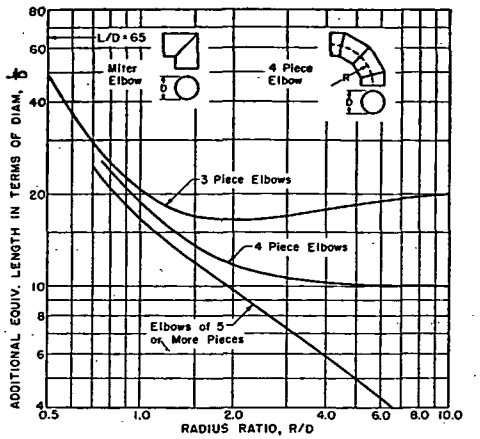

FIG. 9. LOSS IN 90-DEG ELBOWS OF ROUND CROSS SECTION

elbows discharging air directly into a large space are higher than those given for elbows within duct systems.

Turning vanes may be advantageously employed in elbows, both to reduce the pressure loss and to provide a more uniform velocity distribution downstream from the bend[9, 10]. Vanes and concentric splitters are particularly recommended where miter elbows are used, because even the simplest vane forms will produce a substantial saving in pressure loss.

PRESSURE LOSSES IN DIVIDED-FLOW FITTINGS

Analysis[11] of available data for losses at branch take-offs indicates that the loss in the straight-through section is about 35 percent of that for abrupt enlargement (see next section, Losses Due to Area Changes) involving the same ratios of velocities; that the loss in the diverted-flow section depends on the ratio of the velocity of diverted flow to total flow and on the angle the take-off makes with the main, and is at a minimum for a natural relation that exists between these two variables. That is, there is a natural angle of efflux corresponding to the velocity ratio. Some representative branch losses are given in Table 5.

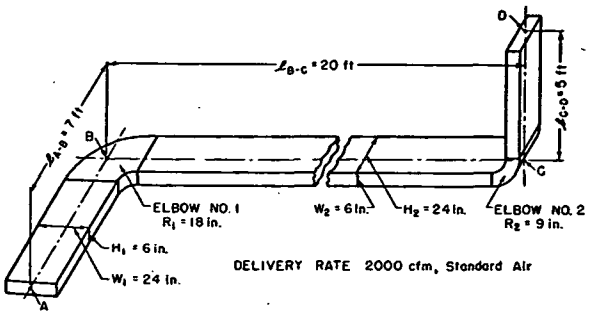

FIG. 10. PORTION OF DUCT SYSTEM FOR *Example 5*