The selection of a proper size fan or exhauster is at times governed by the future requirements of the plant. In many instances, additional future capacity is anticipated and should be provided for.

Having determined the necessary volume of air and maintained resistance or static pressure required, the proper size fan is selected from the fan manufacturers' performance chart or capacity table. If the fan is to be pulley driven, its selection is a simple matter. The fan chosen is the size that will provide the required ultimate quantities with the minimum power consumption.

In selecting fans to be direct connected to alternating current constant speed motors, it is necessary to choose one that will operate at a speed

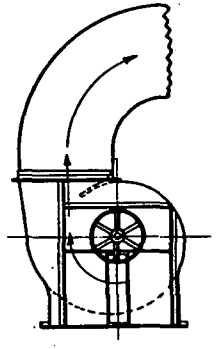

FIG. 6. CORRECT ROTATION

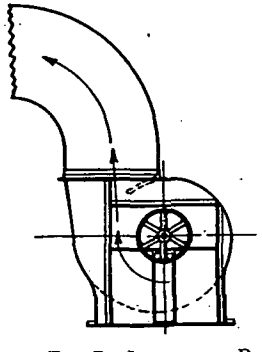

FIG. 7. INCORRECT ROTATION

to accommodate standard motor speeds which on alternate currents are as follows:

60 cycle 425, 490, 570, 680, 860, 1150, 1740 and 3400 r.p.m.
50 cycle 360, 410, 475, 570, 715, 965, 1450 and 2800 r.p.m.
25 cycle 180, 205, 240, 285, 360, 480, 1440 and 1720 r.p.m.

Either belt driven fans or direct connected fans are commonly used. Both types have their advantages and disadvantages. While a fan driven by a belt requires more space, more upkeep and more loss in power due to belt slippage, the belted fan is suitable in a plant where fans are changed from time to time to operate on different systems. It is well known that alternating current motors of higher standard speeds have better efficiencies than the low speed motors. Therefore, the overall efficiency of a belt driven fan and motor will usually exceed that of a fan direct connected to a less efficient motor. Low speeds A. C. motors, although sometimes used, are not to be recommended as they are less efficient and higher in cost than high speed motors. (See Chapter XXVII on Motive Power and Controls for Fans.)

Direct connected units require a minimum of space, no loss in power transmission and less attention. The speed, however, is fixed. Variable speed motors with controllers may be used, but are expensive in first cost and maintenance, and inefficient at the reduced speed.

GENERAL SUGGESTIONS

Single inlet, single width fans should be selected wherever possible. If double width, double inlet fans are selected, care must be taken that both inlets have the same free area. If one inlet is obstructed more than the other, the fan will not operate properly, as one half of the wheel will deliver more air than the other half.

Where duct connections are made on double width fans, static pressure on both inlets must be carefully balanced; otherwise, the fans may be over or under capacity. Inlet connections on double width fans necessitate the driving arrangement on the outside with extended shafts and outboard pedestals. It is not considered good practice to drive the belt through duct connections.

In selecting the discharge and rotation of the fan, the design of the duct should be continuous with the fan scroll, as in Figs. 6 and 7 which show the proper and improper rotation for connecting fan to duct work.

DESIGNATION OF FANS[1]

This method of designation will apply to all centrifugal fans, single or double width, and single or double inlet. Do not use the word "hand," but specify "clockwise" or "counter-clockwise."

Facing the driving side of the fan, blower or blast wheel, if the proper direction of rotation is clockwise, the fan, blower or blast wheel will be designated as *clockwise*. If the proper direction of rotation is counter-clockwise, the designation will be *counter-clockwise*. (The driving side of a single inlet fan is considered to be the side opposite the inlet regardless of the actual location of the drive.)

The discharge of a fan will be determined by the direction of the line of air discharge and its relation to the fan shaft, as follows:

Bottom horizontal.—If the line of air discharge is horizontal and below the shaft.

Top horizontal.—If the line of air discharge is horizontal and above the shaft.

Up blast.—If the line of air discharge is vertically up.

Down blast.—If the line of air discharge is vertically down.

All intermediate discharges will be indicated as angular discharge as follows:

Either top or bottom angular up discharge or top or bottom angular down discharge, the smallest angle made by the line of air discharge with the horizontal being specified.

ARRANGEMENT OF DRIVE

For the convenience of fan users, and to prevent misunderstandings which cause delays and losses the following suggestions are made for such arrangements of drive which are most often used. Reference to Arrangement 3 will be understood by all members of the Association as referring to accompanying Fig. 8 and description.

Arr. 1. For Belt Drive.

Single fan. Wheel overhung. Includes housing, wheel, shaft, two bearings, pedestal and pulley.

Arr. 3. For Belt Drive.

Single fan. Pulley overhung. Includes housing, wheel, shaft, two bearings and pulley.

Arr. 4. For Direct Connection.

Single fan. Includes housing, wheel and base. Wheel is overhung on engine or motor shaft.

[1]Recommendations adopted by the *National Association of Fan Manufacturers.*