of fan is practically obsolete for ventilation. Its use is largely confined to such applications as conveyors for material, or for gases containing foreign material, fumes and vapors. The open construction and the few large flat blades of these wheels render them resistant to corrosion and prevent material from collecting on the blades. This type of fan has a good efficiency, but the horsepower steadily increases as the static pressure falls off, which requires that the motor be selected with a moderate reserve in horsepower to take care of possible error in calculation of duct resistance.

The *forward curved multiblade fan* is the type most commonly used in heating and ventilating work, as it has a low peripheral speed, a large capacity and is quiet in operation. The point of maximum efficiency for this fan occurs near the point of maximum static pressure. The static

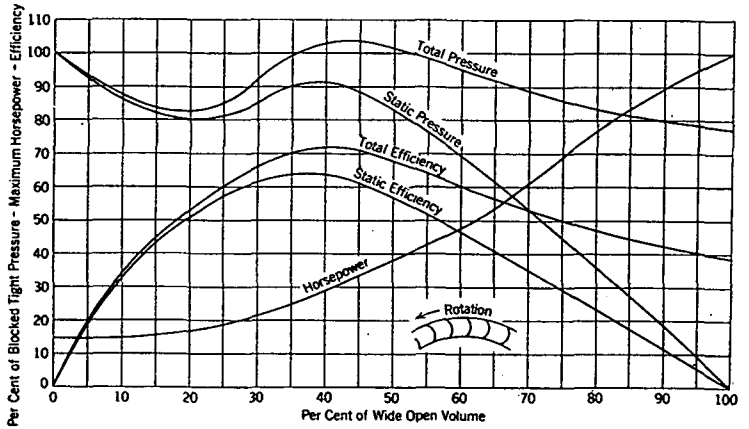

FIG. 3. OPERATING CHARACTERISTICS OF A FAN WITH BLADES CURVED FORWARD

pressure drops consistently from the point of maximum efficiency to full open operation. Fig. 3 shows that this type of fan will have a high and low delivery for a given static pressure at constant speed. The power curve rises continually from low to peak capacity, but if reasonable care is exercised in figuring resistance there is no danger of overloading the motor.

The outstanding characteristics of the *full backward curve multiblade type fan* are the steep pressure curves, the non-overloading power curve, and the high speed. (See Fig. 4). This fan operates at a peripheral speed of approximately 250 per cent of the forward curve multiblade type for like results. The pressure curves begin to drop at very low capacity and continue to fall rapidly to full outlet opening. The steep pressure curves tend to produce constant capacity under changing pressures. Where wide fluctuations occur, the use of this type of fan is desirable to prevent overloading of motors. The maximum power requirement occurs at about the maximum efficiency. Consequently a motor selected to carry the load at this point will be of sufficient capacity to drive the fan over its full range of capacities at a given speed. The high speed of this type makes it

adaptable for direct connected electric motor drives. The high speed necessitates heavier construction, and more operating attention and service is required than for the other type multiblade fans. The dimensional bulk for a given duty often is 150 to 200 per cent that of a forward curve multiblade type fan.

Between the extremes of the forward and the full backward curve blade type fans a number of modified designs exist, differing in the angularity or in the shape of the blades. Common among these designs are the straight radial blade type, the radial tip type, and the double curve blade fan with a forward angle at the heel and a slight backward angle at the tip of the blade. Characteristic curves of these types show varying degrees of

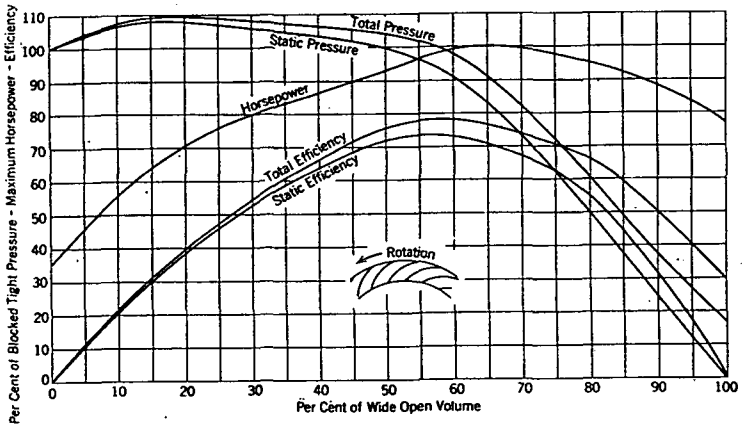

FIG. 4. OPERATING CHARACTERISTICS OF A FAN WITH BLADES CURVED BACKWARD

resemblance to the forward and the backward curve blade characteristics according to the degree of similarity to one or the other of these two designs.

SELECTION OF FANS

The following information is required to select the proper type of fan:

1. Cubic feet of air per minute to be moved.
2. Static pressure required to move the air through the system.
3. Type of motive power available.
4. Whether fans are to operate singly or in parallel on any one duct.
5. What degree of noise is permissible.
6. Nature of the load, such as variable air quantities or pressures.

Knowing the requirements of the system, the main points to be considered for fan selection are (1) efficiency, (2) reliability of operation, (3) size and weight, (4) speed, (5) noise, and (6) cost.

In order to facilitate the choice of apparatus, the various fan manufacturers supply fan tables or curves which usually show the following factors for each size of fan operating against a wide range of static pressures: