the type; some of the stationary ventilators have smaller, and others have larger outlet area than some cowl ventilators of the same nominal size. Regarding the second item, the swiveling cowl ventilators offer less resistance than the stationary type, in that the direction of air flow is changed as little as possible.

Unless swiveling ventilators move very freely, the opening, at times, faces towards the wind so that ventilation produced by temperature difference is much reduced, or wholly counteracted. In that case, snow and rain may blow in. The rumbling or creaking noise caused by hard turning swivel ventilator is also very unpleasant. These troubles are, of course, eliminated in well designed ventilators, but must be kept in mind.

In Fig. 93, is shown a rotary or air-turbine ventilator, which rotates continously under the action of the wind, the motion being produced by the difference of wind pressure on the convex and concave sides of the vanes. The air-exhausting action is due to centrifugal force. This type of ventilator must be very carefully designed if it is to be leak-proof, and if the noises and impact forces, due to ice accumulating on the vanes in the winter are to be eliminated.

CAPACITIES

The variety of factors affecting capacity makes it essential for the user of ventilators to exercise great care in respect to this item of capacity.

The draft in a ventilator head, due to the velocity of the wind, is primarily caused by the low pressure area or partial vacuum on the leeward side of the ventilator head. A draft in certain designs may also be caused by the siphoning action of the wind passing through the ventilator head, but any air which is allowed to enter the head to create a siphoning action must get out and in so doing will diminish the effective area of the head for exhausting air, and it is also very likely to reduce the effectiveness of the low pressure area.

Naturally the ventilator which makes the best use of the available forces for creating a draft and which at the same time provides the freest path for the flow of exhaust through the ventilators should be the best ventilator. It does not follow, however, that a ventilator of one class is better or poorer than one of any other class. It may be good or poor not because it belongs to a certain class, but depending upon whether the proper basic principles have been observed in its design.

The theoretical velocity of the gases due to temperature difference may be obtained from the following well-known formula:

$$V = \sqrt{2\,gH} = \sqrt{2\,gH\left(\frac{T^1}{T^0} - 1\right)}$$

in which

V = Velocity in feet per second
g = Gravity 32.2
H = Effective height of ventilator
T^1 = Temperature absolute of air in ventilator
T^0 = Temperature absolute of air outside

This gives the theoretical velocity which will be reduced in the practical case by the resistance in the pipe and the ventilator head. It is impossible to state an exact ratio between the velocity obtainable and the theoretical as every case will be different, but a reasonable assumption would be 50 per cent providing there is free admission of fresh air into the room or space ventilated.

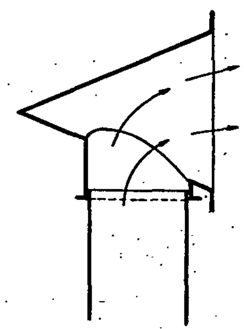

FIG. 91

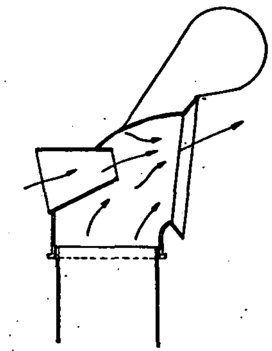

FIG. 92

ROTARY VENTILATORS

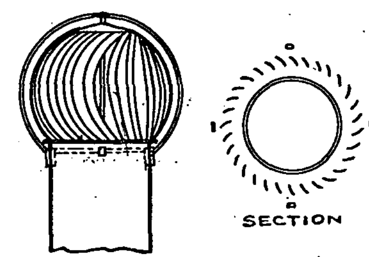

FIG. 93

AIR-TURBINE VENTILATOR

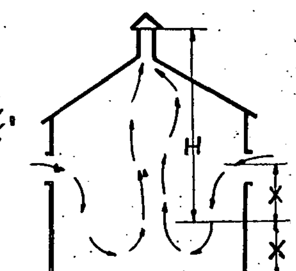

FIG. 94

DETERMINING THE EFFECTIVE HEIGHT

Many exaggerated claims have been made in the marketing of ventilators and it was only recently that very careful tests were made by the U. S. Bureau of Standards (TRANS. A. S. H. V. E., Vol. 27, 1921, p. 67. See also TRANS., Vol. 28, 1922, p. 189 and Vol. 29, 1923, p. 39) and by other reliable investigators, with the result that ventilator capacities are now quite accurately known.

Conservative figures for the best types of ventilators now on the market,