maximum intensity of pressure at point C is approximately given by the following equation:

$$P_w = 0.00048M^2 \tag{1}$$

where P_w is pressure in inches of water, and M is velocity of wind in miles per hour. The mean pressure over the windward face is somewhat less, being, perhaps, 75 per cent of the maximum.

The maximum suction occurs at point B at roof and sides, and in magnitude is about three-quarters of the maximum pressure as given by

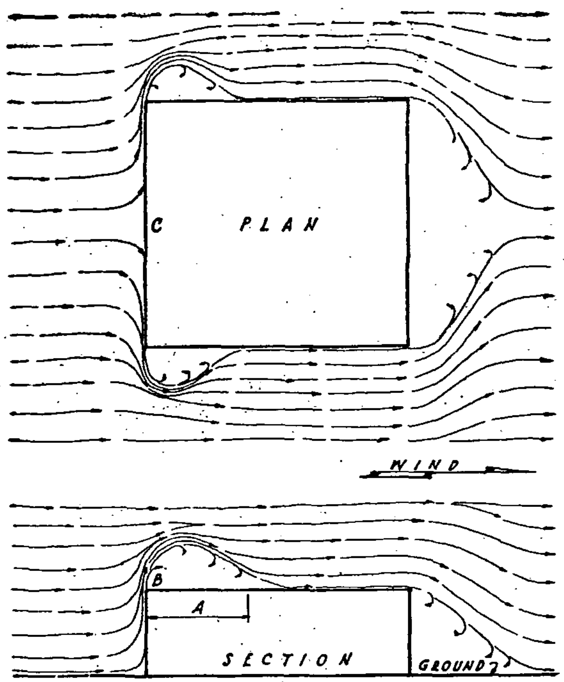

FIG. 1. THE JUMP OF WIND FROM WINDWARD FACE OF BUILDING. (A—LENGTH OF SUCTION AREA; B—POINT OF MAXIMUM INTENSITY OF SUCTION; C—POINT OF MAXIMUM PRESSURE)

equation 1. The distance A, measuring the extent of the suction regions on sidewalls and roof, caused by the leap, or splash, of the wind from the windward face, seems to be determined by the height and width of the windward face, and is independent of the wind velocity. The intensity of the suction diminishes from the maximum at B to zero at the point where the stream lines again flow parallel to the surfaces of the building.

Maximum effect of the wind in producing ventilation can be obtained by providing openings in the windward face for ingress of air and in the leeward face, or in sidewalls and roof near the leeward face, for egress of air, in which case the air moves through the building in the same general direction as the wind; or, with no openings in the windward face, but with openings provided in the suction regions in sidewalls and roof near the windward face for egress of air, and openings in the leeward end, or in sidewalls near the leeward end for ingress of air, in which case the air movement within the building is in a direction opposite to that of the wind. A knowledge of these facts and their application will often result in a better layout of operations and processes, and even in a more favorable orientation of a building with respect to the prevailing direction of the wind, so that heat and objectionable fumes may be removed more advantageously from an industrial building.

Where the wind comes at an angle to the building, the same general rules apply. The mean pressure of the wind on the oblique faces may be considered as being approximately equivalent to the normal component of the wind, except that when the wind's direction is within 15 or 20 deg of parallelism, the splash from the corner begins to appear, and there will then be suction near the windward corner.

Temperature Difference

Excess temperature inside a building over that outside tends to produce flow as in a chimney. The total head or force arising from this cause is given approximately by equation 2.

$$p_t = 0.000028mD \tag{2}$$

where p_t is the total force or head in inches of water; m is the vertical distance between inlet openings below and outlet openings above; and D is the temperature difference.

The total force or head is consumed in forcing the air in at inlet openings, through the building, and out at the outlet openings. The force required to move the air through the building is usually negligible, so that the total head may be considered as being consumed at inlet and outlet openings. The part of the total head consumed in forcing the air to flow through the lower or inlet opening will be manifested as an excess of outside pressure over inside pressure at that level; while at the upper or outlet opening, the part of the total head consumed in forcing the air out will be manifested as a pressure inside, greater than outside. Thus the lower part of the building inside will be in a state of partial vacuum with respect to the outside, while the upper part will be in a state of pressure. At some point between the levels of the two openings, the pressure state is neutral, and no flow will take place through an opening at that level. This level is called the *neutral zone*.[2]

Relation between Head and Flow

The relation between head or pressure difference on the two sides of an opening, and the velocity that will be created thereby, is given approximately by equation 3.

$$V = 4{,}000\sqrt{p} \tag{3}$$

where V = velocity in feet per minute through an opening, and p is the

[2]See *The Neutral Zone in Ventilation*, by J. E. Emswiler (A.S.H.V.E. TRANSACTIONS, Vol. 32, 1926; also p. 77, Chapter 4).