

been found possible to produce satisfactory results without serious expenditure.

The function of ventilation is to get rid of the products of respiration. These products, as we have seen, are carbonic acid ($C O_2$), water and organic particles. In a lesser degree it is also concerned with the removal of the products of the combustion of gas, lamps, etc., and also of the dust and the exhalations from bodies and clothes not spotlessly clean.

The great problem of ventilation is to secure a sufficient interchange of air without perceptible currents or draughts. Wherever the temperature of the air is subject to changes, movements are constantly occurring. As draughts are objectionable for persons who are obliged to stand or sit in them, it is necessary to supply fresh air at a rate at which it will not be perceptible.

When a current of air at a temperature of 50 to 60 degrees Fahr. is moving at a rate of one mile per hour it produces no draught. Air passes more rapidly through a small than a large aperture, and windows or doors left an inch or two apart produce far more draught than if they had been wide open.

The amount of pure air that will be required to pass through a room in order that each person in it may have sufficient to remove waste and provide for renewal of the body has been determined by many careful experiments upon the air of prisons, barracks, etc., where the amount of fresh air supplied per hour is exactly known.

The amount of carbonic acid in

air is fairly proportionate to that of other respiratory products and may therefore be made a standard. Outside air should not contain more than 4 parts in 10,000; at sea and in high altitudes the amount is far less than in cities. Drs. Parkes and De Chaumont, after many careful experiments, found that when the $C O_2$ was in the proportion of .06 per cent. (6 parts in 10,000) the air became perceptibly stuffy. To keep the $C O_2$ at this limit they found that at least 3000 cub. ft. of pure air per head per hour were necessary. Sick people and children require more than this. In St. Thomas's Hospital, London, the space allowed to each ordinary patient is 1800 cub. ft. and for fever patients, 2500. Thus by changing the air in the wards twice an hour a maximum of purity is maintained. By allowing each individual 1000 cub. ft. of space the air can be kept pure if changed three times an hour. In relation to space it is important that sufficient floor space be allowed. A lofty room does not make up for deficiencies of that kind. There is nothing gained by having a room more than 12 ft. high and in reckoning cubic dimensions for the purpose of ventilation, a room, however lofty, should not be counted as more than that height. The expired air from human beings does not tend to rise above that height and the organic matter accumulates about the persons of those who exhale it.

In rooms and halls lighted by gas, a large amount of hot impure air collects about the ceilings. The tendency of air vitiated by human breath to rise is of course due