difference in temperature between the air in the room to be ventilated and the air outside, or by draughts caused by heated flues, or by the force of the wind applied either to forcing air into or exhausting it from the place to be ventilated.

Under Artificial Ventilation we may class all the appliances which depend upon mechanical contrivances for furnishing the force required for causing movements in the air, and also the many kinds of furnaces or heaters, where such movement is caused by the rarefication of air passing over heated surfaces.

I think it will be admitted that while Natural methods of Ventilation may be tolerated for ordinary dwellings, or for other buildings where there are but few occupants, that for buildings occupied by large numbers of persons, such as schools, halls, churches, theatres, hospitals, etc., where a large supply of fresh air is a necessity, that they are utterly inadequate and not to be depended upon, and that for such buildings some artificial method of ventilation is a necessity.

During our winter season, where there is a difference between the temperature of the air in inhabited rooms and that outside of from forty to one hundred degrees, it is evident that any method of Natural Ventilation will be insufficient where the admission of fresh cold air direct from the outside into a room has to depend upon the opening of doors and windows, or upon Tobin tubes, or any other means by which it is admitted direct without heating, and I think that it will be admitted that where the extraction of vitiated air has to depend upon the draught of flues, or upon the force of the wind acting upon the ejectors or cowls, of whatever form they may be, that they are not in all cases to be relied upon.

For any building to which a large volume of fresh air has to be supplied and then extracted after it has served its purpose, it is evident that some method must be adopted that will be independent of the wind or other natural forces, and that combined with that method must be some means of heating the air to such a degree as will not cause discomfort to the occupants. The many different appliances devised for effecting this twofold object may be divided into three classes.

First. The Plenum System, by which air is forced into the room to be ventilated by the means of a fan operated by steam or other power, the air so forced being warmed by coming into contact with steam-heated pipes or other heated surfaces.

Second. The Exhaust System, by which the air of the room to be ventilated is exhausted or sucked out by the aid of a fan, and fresh air which has been previously warmed is drawn into the room.

Third. Those in which the air is warmed by passing over heated furnaces and then flowing naturally into the room.

I do not here intend to enter upon a discussion of the merits of the different methods I have mentioned as the adoption of either will depend upon the character of the building to be ventilated and the uses to which it is to be applied. It may, however, be of interest to you to explain as briefly as possible the practical application of one of these methods to a building which I was commissioned to erect during the past year, and in which the method adopted has I believe been applied for the first time in the city. The buildings to which I refer are the new Surgical Pavilions of the Montreal General Hospital. (The system of ventilation here referred to is illustrated elsewhere in this number of the CANADIAN ARCHITECT AND BUILDER). These buildings consist of a group of three distinct buildings, an amphitheatre and two pavilions connected together by corridors. The amphitheatre building is about 84 feet by 43 feet and two stories high above the basement; this building contains on the ground floor a number of waiting, reception and examination rooms, and in the second story a large operating theatre with a number of small rooms in connection therewith. Each pavilion is about 155 feet by 34 feet and two stories high above the basement, and contains besides nurses' rooms, kitchens, lavatories, etc., two large wards for 24 beds each and four small wards for 2 beds each, or a total of 112 beds in the two pavilions. The wards and rooms in these buildings that require special ventilation contain in all about 300,000 cubic feet of air, and the problem that presented itself in arranging a system of ventilation was how to provide a supply of air as pure as could be obtained outside of the building to the wards at the rate of not less than 3000 cubic feet per hour for each patient, without causing draughts, and at the same time warming the air to such a degree as would maintain the temperature in the building at not less than 65 degrees during the coldest weather. After careful consideration of the merits of the Plenum and Exhaust methods of ventilation, the former was adopted as being best adapted to perform the work required. For forcing the requisite volumes of air into the buildings a pair of fans, each about six feet in diameter by three feet wide, made by the B. F. Sturtevant Company, of Boston, were installed in the basement of the amphitheatre building and operated by a 28 horse power, high speed, automatic cut off engine, the revolutions of the fan being arranged for 210 per minute. From the fans, ducts made in brick work are carried along below the basement floor of each pavilion and amphitheatre building to vertical shafts leading to the several wards and rooms to be ventilated. In each of the large wards there are six of these vertical shafts, while in the smaller wards and rooms there is only one each; the air is in every case discharged from these shafts into the rooms close to the ceilings. As it was considered of importance that the air discharged into the large wards should be dispersed throughout the upper part of the room before it descended towards the beds, the shafts which are built in the external walls were arranged so as not to be opposite each other, by this arrangement a thorough mixing of the air is secured. The air supplied to the fans is taken through two windows, each 7′ 0″ x 4′ 0″ and to procure the air as free from dust as possible, these windows open into a court between the two pavilions where there is little danger from dust from the streets reaching them.

With the fans in operation at a speed of 210 revolutions per minute a large volume of air is forced into every room, a measurement made with an air meter showing the actual quantity to be about 1,182,000 cubic feet per hour. At this rate the air in each room would be changed about four times every hour, while the supply to each patient in the wards would be at the rate of between 4500 and 5000 cubic feet per hour. Any one who has had experience in conveying warm air through pipes or ducts will readily understand the difficulty that is often met with in sending an equal volume of air through two pipes or ducts of equal dimensions and similarly placed.

In arranging the ducts and flues it was anticipated that this difficulty would be met, and that some shafts would convey a greater volume of air into the rooms than others, even though they were of the same size and and placed in the same position in relation to the main duct. A test with the air meter proved this to be the case, and it was found that some openings gave double the volume of air supplied by others.

To regulate the flow of air in each shaft and make them as nearly as possible uniform in operation, a regulating valve was placed at the base of each vertical shaft and arranged so that the engineer could control the flow.

The fresh air as before described is supplied to each room near the ceiling, from whence it descends towards the floor and is thence carried away through gratings placed in the skirtings into ducts below the floors to the extracting shafts, which are three in number, one in each pavilion and one in the amphitheatre. These shafts have each an area of one square foot, to about each 5000 cubic feet in the building with which they are connected, and are carried up in brick work to about ten feet above the roofs. Each shaft contains a coil of steam pipes which may be used for rarefying the air and causing a draught at any time when the fans may not be in operation.

Wishing to avoid the placing of heating coils or radiators in the wards it became necessary to heat the air supplied to the fans to such a degree before it entered the wards as would keep them comfortable in the coldest weather.

To effect this object indirect steam radiators are employed, and the air is heated before it passes through the fans by a hot blast apparatus made by the B. F. Sturtevant Company. This apparatus consists of 7000 feet of 1 inch pipe arranged in a great number of sections, each section composed of two upright pipes fixed in a cast-iron base and connected together at the top by a cross pipe. The length of pipe in the sections varies, but in the longest it is not over 23 feet, so that however rapid the condensation of steam in a section when the air is rapidly passing over it, at a temperature of 20 degrees below zero, there is no danger of freezing. These heating pipes are placed directly in front of the fans, and opposite the windows by which air is admitted to the building, so that no air can find its way into the ducts until it has come in contact with the steam pipes and been heated. The manufacturers of the apparatus considered that 7000 feet of pipe arranged in this manner would be sufficient to heat all the air supplied to the wards and rooms, but as I was afraid that in seasons when the temperature remains at from 10 to 20 degrees below zero for three or four days at a time, it would not be equal to the work, I arranged a reinforcing or supplementary heating chamber in the basement, at the bottom of each vertical shaft, and in these chambers placed cast-iron radiators, over which the air could be forced to flow when it was found necessary to heat it to a greater degree than was possible with the fan alone. The radiators placed in these chambers were equal, in the whole of the buildings, to about 11000 feet of 1 inch pipe, thus giving a total heating surface, including the piping in the hot blast apparatus, of 5666 superficial feet, or equal to 17000 feet lineal of 1 inch pipe.

The flow of air into the wards, either direct from the fan, or after it has passed over the radiator in the reinforcing chamber, is entirely under the control of the nurse in each ward, who can regulate it by means of a valve operated in the ward. By thus having two means of heating the air, first by the hot blast apparatus, and second, by the radiators in the reinforcing chamber, it is expected that economy in the use of coal can be exercised and an equal temperature maintained in the wards during the winter months.

The Steel Clad Bath and Metal Co. of Toronto, have issued a pocket memorandum book, handsomely bound in red morocco, with the company's advertisement embossed thereon in gold.

A new building, 60x40 feet in size, has recently been erected for, and is now occupied by Messrs. R. Dennis & Son, wire and iron manufacturers, London, Ont.

The Bostwick Metal Lath Co., of 116 St. Peter street, Montreal, have issued a pamphlet containing the testimonials of a number of Canadian and American architects, to the satisfactory character of this style of lath. A sample of the material is attached to the book.

The Standard Drain Pipe Co., of St. Johns. Que., are applying to Parliament for increase of capital from $150,000 to $500,000. This company has been in existence 8 years and has already increased to 18 times the original capacity. The building covers 46,000 square feet, with 10 large down draft kilns, some of which are 28 feet inside diameter, and hold 70 tons of pipes each. They will probably double the capacity of the factory.