

loss of past opportunity, but regrets can serve no useful purpose beyond that of stimulating to further effort. The Association should profit by the example of the American Institute of Architects, which, in annual convention at Pittsburg the present month, decided to give greater attention than in the past to the subject of professional education; to endeavor to bring into affiliation with the Institute the students and draughtsmen, and after 1905 to make the passing of an examination a condition of membership in the Institute. We commend to the careful consideration of Canadian architects, both within and without the O.A.A., the thoughtful address of the retiring president of the American Institute, to be found on another page. His suggestions with regard to the necessity of enlisting the sympathy and assistance of the young men of the profession are especially noteworthy and valuable. Future success must depend upon the young men, hence the wisdom of securing their co-operation. A strong effort should be made by the O.A.A. to provide means of educating students, of encouraging them, and, where necessary, of compelling them to pass a qualifying examination. For this purpose there should be a fixed term of studentship, and no student should be accepted who is not willing to pursue the prescribed course of study and pass the required examinations.

It is desirable that a number of the younger men comprising the Toronto Architectural Club, who are not now members of the O. A. A., should be induced to join. Any obstacles which may at present stand in the way of their admission could no doubt be removed. Their adhesion should strengthen the organization. In order that the Association might receive the benefit of their enthusiasm, ideas and energy, they should be given something to do, and a fair share of the responsibility and honors. The social spirit should be cultivated to a greater extent than heretofore. For this object it would seem desirable that the Association should, if possible, have suitable and easily accessible rooms in the heart of the city, which would serve as a rendezvous for its members, and to which access should be afforded at stated times to students for study and recreation. The Association library should be placed there, and as fast as possible should be enlarged until it should become one of the most valued adjuncts of the society. As a means of promoting acquaintanceship and good fellowship among the members, and of bringing the Association, its purposes and work before public attention, means should, if possible, be devised to revive the annual dinner, which in former years was a prominent and enjoyable feature of the annual gatherings. The suggestion which has been made that the conventions should sometimes be held outside of Toronto, is also deserving of consideration. The American Institute of Architects at its last meeting decided that in future every alternate meeting should be held outside of Washington which is the headquarters of the society. It is by no means improbable that if conventions of the O. A. A. were occasionally to be held in Ottawa, Kingston, Hamilton and London, it would be the means of widening interest in the organization and its work, and of increasing and maintaining the membership.

The announcement is made that the manual training system in the public schools, provided for by the munificence of Sir W. C. McDonald, of Montreal, will be inaugurated about the February 1st.

WARM VENTILATION OF HOUSES.*

In the previous article upon this subject we found that in order to keep the air of an occupied room sufficiently pure for wholesome respiration it is necessary to introduce into it one cubic foot of fresh air per second per head, or 3600 cubic feet per hour. In the case of houses we can only treat the house as one compartment and see that it is supplied with fresh air in this quantity, that is to say, at the rate of 3600 cubic feet an hour for each inmate. The question is how to arrange that the supply shall be of about the quantity required.

To make a fair start in our calculations it is necessary to consider what we really mean when we say that heated air rises. The expression suggests independence of gravitation. To be perfectly accurate we should say that heated air is raised. It is the greater gravity of cold air that does the work. Being denser bulk for bulk than the warmer air, it is more forcibly attracted to the earth and flows in under the warmer air and shoves it up. In order to make warm air rise it is necessary to provide for the inflow of cold air under it; and if we have made this provision we have a system of ventilation. The ordinary furnace with a cold air duct supplying air from outside, which, when warmed, is driven by fresh supplies of cold air up into the house and out by the fire-place flues, is a system of ventilation. The complaint is often made that it is more a system of ventilation than it is of heating; and the householder gives up the attempt to warm fresh air, and tries only to make the air circulate by drawing the cool air supply to the furnace chamber from corners of the house. By thus containing as far as possible the movement of air within the house it is perhaps easier to regulate the circulation to all parts so that they may be warmed; but, as material for breathing, the air is apt to be hardly worth circulating. It is as possible to procure the proper circulation of warmed air when the supply to the heating chamber is drawn from outside the house; but this is a matter of planning. The present question is of the supply.

Air in its movements is very like water, and the law which governs the supply of cold air to a furnace is the law of spouting liquids. This law is that fluids pass through an opening in a partition at a rate equal to that with which a body would reach the earth after falling a height equal to the difference in height of the liquids on each side of the partition. Where there is also a difference in the temperature of the liquids, the pressure of density in the cooler liquid also represents height—a height equal to the difference in the volume of the liquid at its own temperature and at the temperature of the warmer liquid on the other side of the partition. The difference in temperature between the outside air and the warmed air in the house is therefore the measure of the speed with which cold air will pass through the cold air duct into the heating chamber of the furnace. Air expands $\frac{1}{491}$ of its volume for each degree Fahrenheit of heat; the difference in pressure of the column of air outside the house and the column of air inside the house, is therefore the same as if the outside column stood at a height greater than that of the inner column by as many times $\frac{1}{491}$ of its volume as there are degrees of temperature; or to state the matter generally, the difference in pressure is equal to $\frac{1}{491}$ of the height of the house multiplied by the difference

*Conclusion of article upon this subject in the September number.