professed service of godliness. Cleanliness was long ago ranked next to godliness; it is now regarded as a part of godliness, and what uncleanness can be more disgusting, or more distinctive, than filth in the air we breathe? Is it any wonder that congregations go to sleep, within sound of a voice that may have been inspired, when the mephitic surroundings have made the soul deaf to all reason and truth? Yet I have sat in places of worship, where the lights could scarcely burn for want of supporting oxygen. Architects who plan public structures are now generally capable men, understanding the requirements in the way of ventilation, and usually they make adequate provision; but the janitors, and others, in immediate charge of those buildings are prone to neglect every facility and to doom the audiences to a stifling and filthy atmosphere.

3. THE MEANS OF SECURING PROPER VENTILATION, constitutes the third, and perhaps the most practical of the divisions of our subject. We have to provide for the removal of foul air and the introduction of a fresh and pure supply. I speak only of ventilation in this sense, that is, ventilation proper; though attempts have been made to provide chemical means of decomposing the foul emanations, and of supplying oxygen to re-establish the purity; such methods, however, are now very generally abandoned except on the very small scale of divers' suits, etc. To ventilate a room we must arrange for the entrance of fresh air, for the egress of foul; while a means of moving these great masses of air must be provided. Most systems of ventilation depend upon changes of temperature to effect the moving of the air body, or upon some mechanical contrivance, such as fans, either to drive air into the rooms, thereby forcing out that already there, or by drawing air from the rooms, thereby tending to create a vacuum, in consequence of which other air will enter. Any source of heat in a room will cause a disturbance of the air, producing currents. In general the tendency of the warmer air will be to rise; then the cold air must fall in some other part of the room to restore the equilibrium. Air in contact with the cold walls or windows, becoming specifically heavier because of its contraction in bulk through cold, will sink, and the presence of such downward currents under these conditions may be shown by holding a lighted candle near the wall or window. An excellent method of producing an up-cast current whereby foul air may be removed from rooms, is by constructing a ventilating flue alongside the heating flue. The warmth from the latter will cause the ascent of the air in the ventilating flue; air from the rooms may then be made to enter, if openings from the rooms into the flues be properly arranged. Such openings should be provided with registers whereby the flow inward may be controlled. An objection to the use of such flues has been urged in the possibility of back currents, whereby smoke may be drawn downward from the top of the adjacent fire flue into the rooms. To obviate such difficulty, automatic valves should be used in connection with the registers. A simple form of such a valve is a sheet of oiled silk or of thin oil cloth, hung inside the flue, fastened at the top, covering the register opening. Such a sheet will yield to any pressure from the room toward the flue, but any current in the opposite direction will close the flap against the wall. The Arnott valve is constructed to work on the same principle; this consists of a sheet of metal hinged delicately so as to respond to very slight pressure.

The Gillis system of ventilation is based on one of the best methods for removing foul air from rooms. This requires a large central shaft running from the cellar to the top of the building; in each room adjoining openings are made into the shaft, both near the floor and near the ceiling; these are fitted with registers and valves. A steam pipe passes up the middle of the shaft; and the heat from this causes a violent up-cast current effectually aspirating air from the rooms.

An opposite application is seen in the Lyman ventilator, which consists of a box of coarse ice at the top of a large pipe; air in contact with the ice becomes cooled and consequently falls through the pipe and more air follows. In this way abundant currents of fresh air may be carried downward and distributed over the beds of the sick, about desks and in other small ways. [Note—These devices as also those that follow were all illustrated in the lecture by drawings or models.] Mechanical means of effecting the movement of air bodies are usually efficient but expensive. Fans, driven by steam or electric power, are now largely used; on a small scale they are set on tables, desks and the like for producing local cooling currents; in a larger way they are employed either for driving large volumes of air through the flues of a building or for aspirating air from the buildings so that more will enter.

In any system of ventilation ample care must be bestowed in providing both an inlet and an outlet for air; and in the neglect of one of these requirements lies the cause of failure in so so many attempts. With a roaring fire in the grate, conscious of a voluminous outrush of air, we are apt to be content, letting air find its way into the house in whatever way it may, perhaps through the cracks in the floor, from beneath the house, and from other unclean sources. Windows and transoms may be utilized as efficient channels of inlet and egress; but let it be remembered that double passages are needed. You will see that necessity illustrated in this experiment: Take a lamp chimney, provide a saucer in which water stands half an inch deep; place in the saucer a short candle, lighted; put the lamp chimney over the candle, so that all entrance into the chimney from below is cut off by the water; in a short time the candle is extinguished through lack of air to support the combustion. Now, divide the upper part of the chimney by inserting a thin strip of metal, wood or cardboard; two channels are now formed, and if the candle be again lighted it will continue to burn; a bit of smoking paper held at the top of the chimney reveals an up current in one passage, and a down current in the other. In a very wide space these opposite currents will usually establish themselves, as may thus be proved: Set an outer door ajar; by holding a burning candle alternately near the top and bottom of the door opening, opposite currents will be revealed—toward the room at the bottom, and outward at the top if the temperature of the room be higher than that of the outer atmosphere; in opposite directions if these conditions be reversed.

In admitting air to dwelling rooms care should be taken that it becomes diffused before reaching the floor; and this may be accomplished by deflecting the air upward, as may be done by hingeing the transoms at the bottom, and setting them at such an angle as to drive the air toward the ceiling. Windows opened at the top may be provided with a strip of wood set at such an angle. Slots properly inclined upward may take the place of panes of glass. Ordinary window sashes may be partly opened, the lower opening being stopped to prevent draft by a strip of board; air will then enter between the sashes, and by the upward deflection given the current, will tend toward thorough diffusion.

It is a popular error that good ventilation is only possible through the use of elaborate and expensive apparatus. With adjustable windows and transoms it is possible to keep the air of our rooms in a condition approximating purity, though the conditions of each dwelling may make the problem of ventilating somewhat special. The subject of house-heating is closely connected with that of ventilation, but the limits of our time forbid the treatment of that topic at present.

Manuel E. de Costa, who resides six miles south of Sacramento, has built and ingenious machine for irrigating his flower garden and his orange and lemon trees, says the Sacramento *Bee*. It consists of a wooden wheel ten feet in diameter and with a rim or tire about two feet wide. A dog is placed inside the wheel, which is turned by his weight as he gallops in treadmill fashion. The revolution of the axle turns a crank which operates the handle of a pump set in a dug well. After half an hour's exercise the dog is taken out and a fresh dog put in for another half hour. The dogs seem to enjoy the work, for they bark and wag their tails when they are brought to the wheel. They know that it means something good to eat at the end of the half hour's work.

N. D. Goldberg, of East Oakland, Cal., came very near losing his two children by the serious mistake of a drug clerk who failed to fill a prescription in a proper manner. The children had been sick, and they were under the care of a physician, who gave a prescription for medicine. Instructions were left as to how the medicine should be given, and then the doctor went away. When the drug clerk came to put up the prescription he substituted three grains of atripia sulphate, a deadly poison, for three grains of spartim sulphate, as ordered by the doctor. The children took the medicine, and in a short time they became very sick and a physician was summoned. He made an investigation at once, and found that the druggist had given the children poison. It was several hours before they were declared to be out of danger.