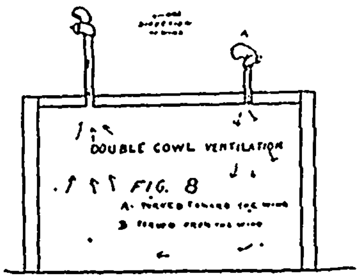
the warm room would increase in temperature so much that very little heat would be lost by changing the atmosphere of the room twice an hour (see fig. 6). By this method the extractor would have to be so arranged that it would have a keen draught.

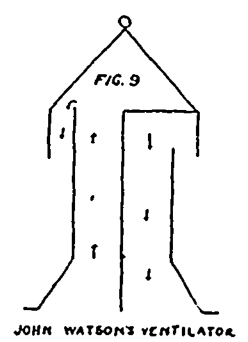
Potts describes a similar system of ventilation to this by having a hollow cornice round the room, with a double row of holes, one row connected to the outside air and the other row connected with a heated flue of a chimney, and the system worked well.

Seventy years ago Sylvester used a hot air furnace of a far superior type, and more economical with fuel than any of those made at the present day to force ventilation and warm houses. His stove had plenty of wing plates that increased the radiating power. He placed a large pipe finishing with a cowl a little distance from the building, where it could face the wind in which ever direction it happened to blow, at a height of about six feet from the ground. The wind entering the cowl continued on through an underground channel to the basement of the house, where it entered a chamber containing a stove which heated the air and conveyed it through pipes to each room.

McKennell ventilated by placing two cylinders in the ceiling, one inside the other, the inner one terminating about 3 inches higher than the outside one. The space between the two tubes was equal to the area of the inside cylinder. By this method he caused an in and out draft by one machine. (See Fig. 7).

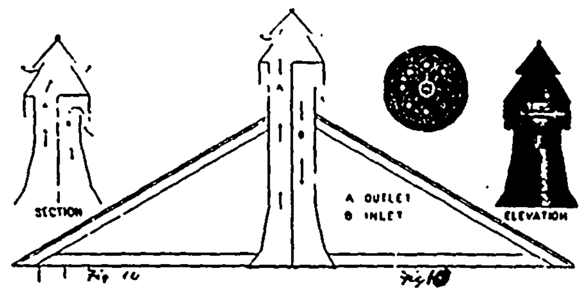
Arnott took advantage of the unequal density of the masses of air at different elevations. He ventilated by placing two moving cowls on the roof, one arranged to face the wind and the other to face the way it was blowing. The one that faced the wind was set several feet lower than the other and formed the inlet; the high one that faced the way the wind was going made a good extractor. The machine was valuable for large meeting rooms. (See Fig. 8).





JOHN WATSON'S VENTILATOR

The late John Watson crystallized some ideas and built a double current ventilator having a compact and graceful form. It had a perfectly air tight division vertically through the centre, the half moon shaped tube on one side terminating about 6 inches higher than the other side. (See Fig. 9.) This little difference in the height of the half tubes caused an inlet and outlet action. These ventilators are at present purifying the air of many of the English public buildings. The first time I fixed this class of ventilator I considered Mr. Watson did not get all the work out of his design that he might, and I afterwards designed one that gave a space of 30 inches between the inlet and outlet, by so doing increasing its extracting power. (See Fig. 10). I made a small one with an 8-inch body to test with, and fixed it on an air-tight glass show case containing 8 cubic feet of air space. Inside at the bottom of the case were placed four lighted gas burners, burning 5 feet per hour each. I fixed wires with feathers attached all over inside the case to indicate the way the air moved. The case was outside for a week during one of the coldest spells in winter. The test proved that the air dropped to the floor level, penetrating every corner of the case; then,



after making a circular tour, it again passed to the outside up through the other half of the ventilator. The whole of the glass of the case and the down draught half of the ventilator kept cool all the time, while the upcast side was hot. And if passage of air stopped the lights would at once die out.

None of the systems of ventilating that I have here described are covered by patents, and if the reader fancies any of them he can use the ideas freely, and I hope improve them, and then give publicity to his ideas.

For The Canadian Engineer.

THE OTTAWA VALLEY CANAL.

BY ANDREW BELL, C.E.

When referring to the scheme—now exciting so much interest—to construct a deep-water canal via the Ottawa River to Georgian Bay, it is now well recognized that the most difficult engineering problem to be solved is how to get deep water on what is generally called the Lower Ottawa—say between Lachine and Arnprior. That part of the river flows over flat limestone rock, consequently the still water reaches are wide and shallow—the shallowest parts often extending some distance up and down stream—and this difficulty seems to be greatest towards the lower end, namely, from a short distance above Lachine to above St. Ann's—due, but only partly, to the river dividing above the latter place, and the larger part going north of the Island of Montreal. At present not more than 8 feet depth for navigation can be depended upon between Lachine and Ottawa city in low water.

The rapids between Lachine and Arnprior are St. Ann's, 3 ft. fall; Carillon, 16 ft.; Long Sault, 44 ft.; Chaudiere and Des Chenes, 60 ft. (about); and Chatts, 40 ft.

Deep water can be made by raising the surface, or by lowering the bottom, or by both.

As the banks of the lower river are generally low and thickly settled, raising the surface permanently, even a few feet, seems to me to be totally out of the question. The dams would be extremely expensive to construct and expensive to keep in repair; the raising of the water would be resisted to such an extent as to almost cause a rebellion, besides destroying the appearance and value of a large area of country. Where it is possible to widen the channel for high water by excavating the banks above low water marks, low dams could be put in at head of rapids to such an extent as can be compensated for by that widening for high water; thus raising low water but keeping down high water to its original height. Two or three feet might be gained in that way for low water, and the low dams would enable the water to be "laid hold of" for power purposes.

To get the required depth, over the part of river referred to, lowering the bottom where necessary must be generally resorted to in some manner. Where the shal-