Mar. 13, 1923. 1,448,149.

J. K. PENNINGTON.

VENTILATION SYSTEM.

FILED MAY 29, 1920.

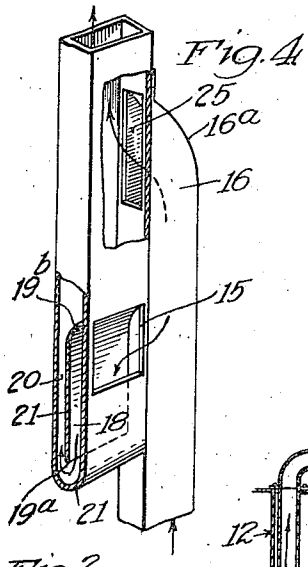



Fig. 4.

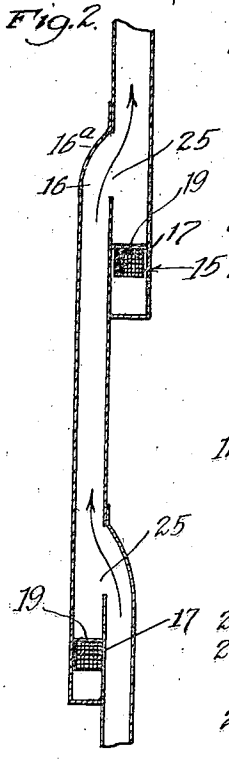



Fig. 2.

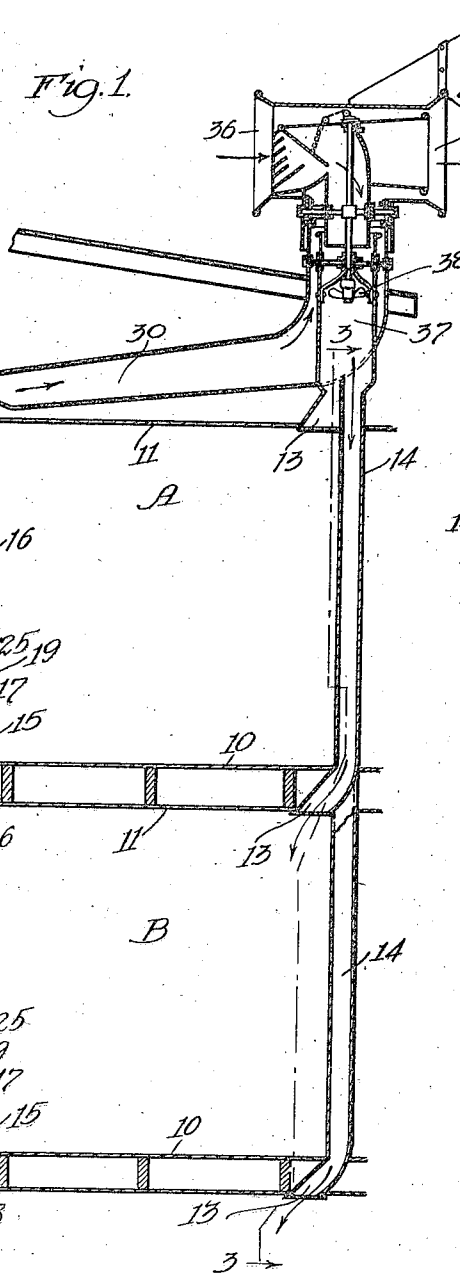



Fig. 1.

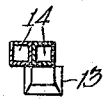



Fig. 5.

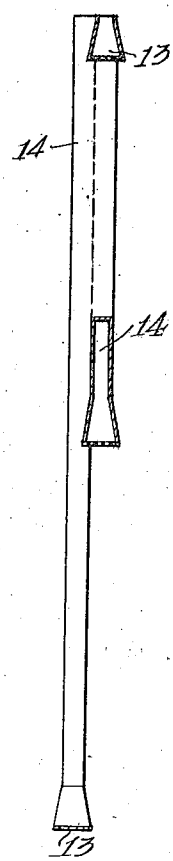



Fig. 3.

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# UNITED STATES PATENT OFFICE.

JOHN K. PENNINGTON, OF LOS ANGELES, CALIFORNIA.

## VENTILATION SYSTEM.

Application filed May 29, 1920. Serial No. 385,213.

*To all whom it may concern:*

Be it known that I, JOHN K. PENNINGTON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Ventilation Systems, of which the following is a specification.

This invention relates to ventilating systems for buildings; the invention applying generally to all classes of buildings or similar structures where it is desired to ventilate more than one room or compartment. It is a primary object of the invention to provide a ventilating system that will effectively and efficiently ventilate a plurality of rooms or compartments in a single system; with a single main vent flue for a plurality of rooms or compartments; and that will ventilate different rooms or compartments regardless of differences in temperature or differences in the heaviness of air within those rooms or compartments, (whether, for instance, heavily laden with moisture or carbon-dioxide, or in a light and pure condition); and a system that will take the relatively heavy and colder air off the floor of the room or compartment.

I illustrate my invention as it may be applied to several rooms one above the other in a storied building; but it will be readily understood that my invention is not necessarily limited to such application. However, a detailed description of the invention in a preferred and specific form as applied to such a situation will render the invention itself clear to those skilled in the art; and accordingly, and for this purpose, I refer to the accompanying drawings in which Fig. 1 is a sectional elevation showing the application of my ventilating system to a plurality of rooms in a storied building; Fig. 2 is a section taken as indicated by line 2—2 on Fig. 1; Fig. 3 is a section taken as indicated by line 3—3 on Fig. 1; Fig. 4 is a detail perspective showing the construction of an outlet and its connection to the outlet flue; and Fig. 5 is a section of the inlet flue.

In the drawings the numeral 10 may designate the floors of super-imposed rooms A and B and the numerals 11 may designate the ceilings of those rooms; while the numeral 12 designates the wall structure of the rooms. Although my invention relates more specifically to the means for exhausting air from the rooms, the ventilation system is not complete without some means for introducing or allowing access of air into the rooms; accordingly I illustrate a complete ventilating system in which I supply air intakes at 13 which intakes are supplied with fresh air from air intake fluse 14, constructed of a size to suit the quantity of ventilation required and the number of rooms served from this single intake flue, and located in any suitable position. The outstanding feature of the intakes is that, for the purpose of my system, they preferably discharge air in or near the ceiling of the room and preferably at a point on that side of the room opposite the air outlet. They also discharge air independently to each room, the inlet of air to one room does not in any degree depend on the introduction of air to any other room, nor does it interfere therewith. This is an important feature in connection with the outlet of air, as will be hereinafter set out.

The air outlets are located at 15, at the floor, and preferably in a side wall of the room. I locate the outlets in a side wall of the room for the reason that I wish to place the exhaust flue 16 in the wall structure 12; and for the further reason that the wall structure affords a convenient space (between the opposite wall faces) for containing the construction which I am now about to describe. Each of the outlets may be covered by any suitable kind of register plate as indicated at 17. Each of the outlets 15 leads into a downwardly extending passage 18 where the outgoing air passes downwardly for a distance of about, say, twelve to twenty-four inches below the outlet 15, and then passes under the lower edge of a downwardly extending wall or division $19^a$ in said flue and then upwardly through the upwardly extending passage 20 behind that wall. The passages 18 and 20 are formed in a duct 21 by the expedient of placing the wall 19 across that duct from side to side, placing the lower edge $19^a$ of the wall 19 at a slight distance above the lower closed end 21 of the duct to allow the passage of air under the lower edge $19^a$, and closing the upper end of the downwardly extending passage 18 by curving the wall 19 over at its top as illustrated $19^b$ to meet the side wall of the duct 21 at the upper edge of outlet 15. This will all be understood clearly by reference to the drawings. At a point somewhat above the outlet open-

ing 15, say a distance of twenty-four inches or so, the upper end of the duct 21 joins with the main outlet flue 16. In the specific form of my invention shown in the drawings I show the duct 21 as being, structurally, the downward continuation of that portion of the outlet flue 16 which is above the duct 21 (see Fig. 2); and that portion of the outlet flue 16 which comes up from below joins the first mentioned portion of the outlet flue 16 by an opening at 25 in the side of the flue. However. this particular arrangement is simply a matter of construction.

At its upper end the outlet flue 16 joins an exhaust pipe 30 (which may be an exhaust means in common for a number of outlet flues 16). This exhaust pipe 30 leads to a ventilator cap illustrated at C. The exhaust air passes out through the ventilator cap in the direction indicated by the arrows. I have shown a revolving cap which is kept in proper position with reference to the wind by means of the vane 35. This ventilator cap may be of any of the well known kind; but I have shown one which serves both as an exhaust cap and an intake cap; the intake being at 36 through louvres, and the incoming air passing downwardly through a central pipe 37. A motor driven fan may be provided at 38 for drawing in the fresh air and driving the fresh air into the intake flue 14.

It will of course be understood that any of the usual heating means may be used in or for rooms which are provided with my ventilating system; and that the air in those rooms may be warmed or heated before introduction or may be warmed or heated after introduction to the room. Furthermore it will be understood that the air in different rooms may be at different temperatures; and may be of different qualities or characteristics. For instance, the air in one room, in addition to being warmer or colder than that in another room, may be more or less loaded with water vapor or carbon dioxide or other impurities; and may therefore be heavier or lighter than the air in another room. It is conditions such as here indicated that have made it difficult in the past to properly and effectively ventilate each room in a common ventilation system, and have made it necessary to provide independent ventilation system for each room in order to avoid the emptying of foul air from one room into another. It is a feature of operation of my invention that it overcomes these difficulties. And it is also a feature of my invention that it takes air out of the room at the level at which the outlets 15 are placed. The outlets 15 are placed at the floor (which is the preferred placement for ventilation of living apartments where it is desired to take out the colder air; but which may of course not be the desired position in refrigeration compartments where it is desired to take out the warmer upper strata of air) so that the colder air is taken out immediately over the floor. Now this colder air flowing through the outlet 15 has a tendency to fall in the atmosphere of the room. I may express the matter by saying that, in any one room or compartment, the heavier colder air is pressed downwardly by a lighter air above. Consequently this heavier colder air flows downwardly through the downwardly extended passage 18 and is thus effectively removed from the room. As soon as this heavier colder air has reached the lower end of the wall 19, it passes under the lower end of that wall and then it can flow in no direction except upwardly and into the main exhaust flue 16. By some means or other a constant upward draft, or suction, may be maintained by the means herein described, or it may be maintained by the fact that the air in the rooms is, as a whole, warmer than the exterior atmosphere, and consequently the air in the exhaust flue tends to flow upwardly. This upward flow or suction of air in the exhaust flue 16 tends, by suction action, at all times to draw the air upwardly through the upwardly extending passage 20; so that once the heavier colder air from the room has reached the lower end of the wall 19, it cannot then return to the room, but must automatically move upwardly and into the exhaust flue and then out to the exterior atmosphere. It will be noted that the communication of the exhaust flue 16 with the duct 18—20 (which is the individual duct for each ventilation outlet 15) is at the opening 25 at a short distance above the outlet opening 15; and is also above the lower end $19^a$ of the wall 19. I preferably make this arrangement, as described, to prevent all possibility of any air which has come up through the lower part of exhaust flue 16 dropping down under the lower edge of wall 19 and passing into an upper room and also to prevent the connection at 25 from breaking the siphon that is formed at 18—20. The fact that the downwardly extending duct 21 is of such a length as herein suggested, and the fact that there is a constant upward draft or upward suction of air in the flue 16, and the fact that the flue 16 is so curved, as illustrated at $16^a$, where it comes to the opening 25, as to keep the air in the flue flowing upwardly; all of these things make it impossible for any upwardly flowing air in the exhaust flue 16 to pass downwardly through the duct 21 and into an upper room. And this is true regardless of differences in temperature of the air coming from the several rooms, or differences in lightness or heaviness of the air. One room cannot have any effect on another, as the intakes are all independent and the outlets all independent. If the air in any room be-

comes warmer it tends to flow out faster through the outlet, and thus draws in more fresh cool air from its independent inlet. If the air in a room is cooler and fresher, the opposite takes place. And all this takes place automatically for each room with complete independence of all other rooms.

Having described a preferred form of my invention, I claim:

1. In a ventilating system for a compartment, a vent flue leading upwardly, and an outlet communication from the compartment to the flue embodying an outlet passage open at one end from the compartment near its floor and extending then downwardly and then immediately upwardly with the upward leg longer than the downward leg and each unbroken; whereby the heavier air is allowed to flow from the compartment and downwardly through the communication and is then drawn upwardly by upward movement of the air in the upwardly extending leg of said communication.

2. In a ventilating system for a plurality of compartments, a common upwardly extending vent flue for the several compartments, and an outlet communication between each compartment and the flue embodying an outlet passage open at one end from the compartment near its floor and extending then downwardly and then immediately upwardly, and unbroken, and joining the common vent flue at a level above the level of the opening to the compartment; whereby the heavier air is allowed to flow from the compartment and downwardly through the communication and is then drawn upwardly by upward movement of the air in the flue and in the upwardly extending leg of said communication.

3. In a ventilating system for a plurality of compartments, a common upwardly extending vent flue for the several compartments, and an outlet communication between each compartment and the flue embodying an outlet passage open at one end from the compartment near its floor and extending then downwardly and then immediately upwardly, and unbroken, and joining the common vent flue at a level above the level of the opening from the compartment; whereby the heavier air is allowed to flow from the compartment and downwardly through the communication and is then drawn upwardly by upward movement of the air in the flue and in the upwardly extending leg of said communication; and the common vent flue and communications being projected upwardly at their junctures so that the two air currents are both flowing upwardly at the junctures.

In witness that I claim the foregoing I have hereunto subscribed my name this 17th day of May, 1920.

JOHN K. PENNINGTON.

Witness:
VIRGINIA BERINGER.