Nov. 5, 1929. C. H. SMITH 1,734,449

VENTILATING APPARATUS

Filed Aug. 4, 1924

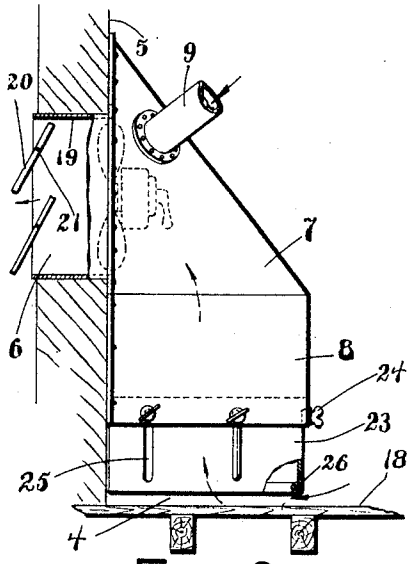


Fig. 2.

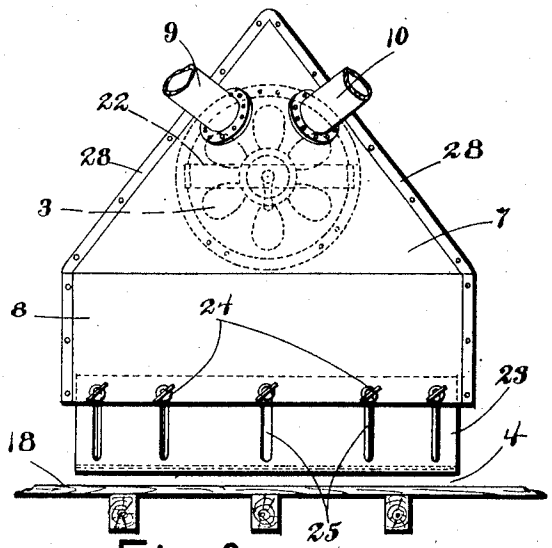


Fig. 3.

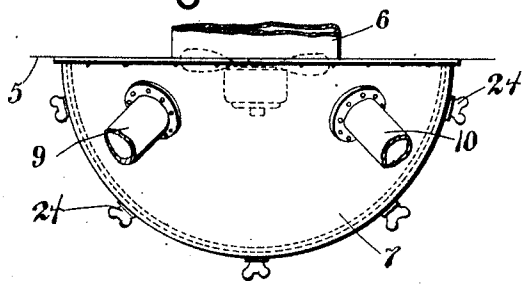
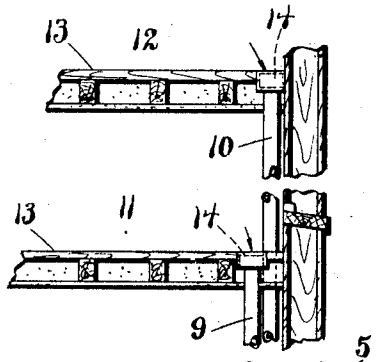


Fig. 4.



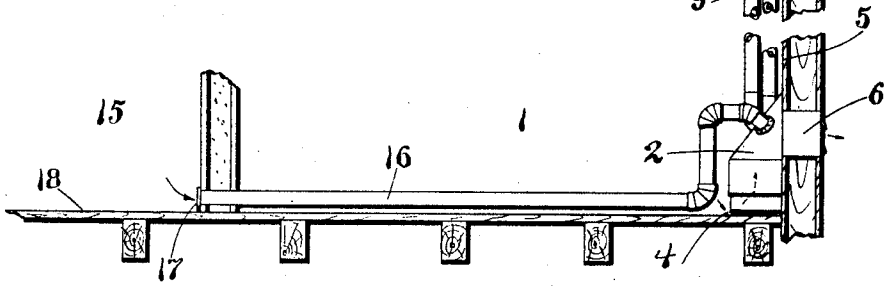


Fig. 1.

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UNITED STATES PATENT OFFICE

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VENTILATING APPARATUS

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This invention relates to the ventilation of compartments, and while the invention is applicable to the ventilation of any chamber or compartment used for any purpose whatever, the apparatus is intended especially for use in the ventilating of halls, auditoriums and living rooms. In the ventilation of large halls or auditoriums, according to the usual methods, large exhaust fans are employed and such fans are of sufficient capacity and operated in such a way that the entire volume of air in the auditorium or hall is completely changed in a relatively short period of time. This involves the exertion of a relatively large amount of energy and in some ventilating plants the expense of operation becomes relatively very high, for example, in the ventilation of a large department store the ventilating system may require a plant in which the horsepower may amount to 150 horsepower or more. The general object of this invention is to provide a simple apparatus for ventilating a compartment of any kind which will operate in such a way as to keep the atmosphere of the compartment pure to meet the requirements, and at the same time to avoid the necessity for exerting the relatively large amount of energy which is now necessarily used with the usual methods of ventilation now employed; also to provide a simple apparatus whereby the regulation at the ventilating apparatus in one compartment or room may control the ventilating effect taking place in other compartments or rooms which are being ventilated by the same ventilating system and apparatus.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient ventilating apparatus.

In the drawings:

Figure 1 is a vertical section illustrating my apparatus as applied to several compartments, all of which are ventilated by the same ventilating system.

Fig. 2 is an elevation of a suction device, partially broken away, and showing part of a floor and wall in section to further illustrate details of the apparatus.

Fig. 3 is a front elevation of the apparatus shown in Figure 2, as viewed from within the compartment, and further illustrating details of the same.

Fig. 4 is a plan of the suction device shown in Figures 2 and 3.

In a room or compartment the atmosphere of which is being vitiated by occupants or gas heaters, or both, for example, in a school room in which the atmosphere is being vitiated by persons breathing the atmosphere, the expired air or carbon dioxide, naturally descends to the floor, and it is a fact that the purity of the air for breathing purposes in such a compartment depends to a great extent upon the height of the air above the floor. In employing my apparatus, I exhaust the air from the compartment at a point on the floor, but I withdraw only a sufficient quantity of the air to carry off the vitiated air. In other words, I do not completely remove all the air in such a compartment and replace the same with fresh air, as I have found that this is not necessary. In this way, I bring about effective ventilation of a compartment by a continual withdrawal of the vitiated air or gas. In other words, I withdraw the vitiated air, or the atmosphere in its immediate vicinity, where it collects, in sufficient quantity to maintain the whole volume of air within the compartment of sufficient purity to meet the requirements, for example, in a living room I withdraw a sufficient quantity of air near the floor to carry off the carbonic acid gas as it accumulates and thereby maintain the air pure and fit for breathing purposes. In this way I avoid the expenditure of the large amount of horsepower usually necessary to operate fans to withdraw and replace the entire volume of air in the compartment. In employing my apparatus I permit the air which is withdrawn to be replaced by free air flowing into the room over the heating means as set forth in my patents, No. 868,299, dated Oct. 15, 1907, and No. 1,024,035 dated April 23, 1912. In this way I am enabled to ventilate relatively large compartments at the expen-

diture of a surprisingly small amount of energy for driving air exhausting apparatus.

When my apparatus is applied to a ventilating system for ventliating several compartments, I provide a suction device in one compartment which is common to all the compartments, that is to say, it operates to withdraw the air through a suction inlet or main intake at a point on the floor of that compartment and with the same suction device I withdraw air with another intake from any point of the same room or another room or compartment which is to be ventilated; that is to say, I provide intakes corresponding to the compartments; I then regulate the quantity of air admitted at the main intake; with the present apparatus I accomplish this by regulating the area of the suction inlet in the first named compartment as may be required, and I thereby control the suction effect in the withdrawal of air at the other intakes in the other compartments.

The apparatus which I prefer to use is illustrated in Figure 1, in which 1 represents one of the rooms or compartments provided with a suction device 2; this suction device 2 is provided with means such as an ordinary electric fan 3, see Figures 2 and 3, which, when driven, operates to withdraw the air from the room only at a point near the floor and at a suction inlet 4.

The suction device is preferably placed against a wall 5 of the building, and is provided with an outlet 6 through which the exhaust air is driven to the outside. The suction device 2 is in the form of a hood 7, the lower portion of which is in the form of a semi-cylindrical shell 8. The fan 3 is located in the upper portion of the hood 7 which, in the present instance, is in the form of a half-cone. This hood is connected by ventilating duct or ducts 9 and 10 with another point, for example, points in other compartments 11 and 12 above upper floors 13 which are provided with floor plates in the form of registers 14, which may be of any common form enabling them to be closed or partially closed, as may be desired. If another compartment, such as the compartment 15, on the same level, is to be ventilated, this may be accomplished by providing the horizontal air duct 16 which also connects to the hood, and preferably to the cone of the hood, similar to the ducts 9 and 10. This air duct 16 has an inlet 17 near the common floor 18 of the compartment 1 and the compartment 15. If desired, a register may be provided at the inlet 17. The ducts 9 and 10 are independent of each other and connected to the hood at different points.

The outlet 6 for the exhaust device 2 is in the form of a sleeve 19, which extends through the vertical wall 5 and if desired the outer end of this sleeve may be provided with louvers 20. Each of these louvers is mounted on a horizontal pivot or shaft 21 which is disposed about two-thirds of the distance from the lower edge of the louvers so that the upper portions of the louvers nearly counterbalance the lower portions of them. In this way these louvers will naturally hang in the closed position and will prevent the wind on the outside from blowing in through the exhaust device when it is not in operation.

However, when the fan is operating, the current of air from the fan blows these louvers open, as illustrated in Figure 2, so as to permit the exhausted air to pass out.

The fan 3 may be mounted in the suction device 2 in any suitable manner, for example, the motor of the fan may be mounted on a horizontal cross-bar 22 extending diametrically across the inner end of the sleeve 19 where it leads off from the interior of the hood.

In order to provide means for regulating the area of the inlet 4, I prefer to provide the hood 7 with an apron 23 in the form of a semi-cylindrical shell and connected to the semi-cylindrical part 8 of the hood so that its distance from the floor can be regulated. This may be accomplished by providing clamping thumb screws 24 in the lower part of the semi-cylindrical shell 8, which pass through vertical slots 25 in the apron 23. In practice, these slots would be relatively small, probably three-sixteenths inch in width, so that their presence does not very substantially affect the area of opening into the suction device in the room 1. This area is between the lower edge of the apron 23 and the floor. It will be evident that by reason of lowering this apron 23, the amount of inlet area can be regulated as desired. The smaller the area of this inlet becomes, the greater the suction effect will be produced in the air ducts, 9, 10 and 16. In other words, when the area of the inlet 4 is greatly reduced an increased amount of air will be withdrawn from the other compartments.

At the same time, the amount of air withdrawn from the other compartments can be regulated as desired by controlling the floor registers.

The hood 7 may be constructed of very light sheet metal and, if desired, the apron 23 may be stiffened by means of a wire 26 about which the lower edge 4 of the apron is crimped, see Figure 2. The hood may be secured to the side wall 5 by means of a flange 28 extending along the inner edge of the hood.

The power of the motor of the fan 3 will be relatively low so that in operation the amount of air drawn off from the compartments is merely sufficient to remove the accumulating carbon dioxide gas; that is to say, the fan would not have sufficient capacity to withdraw the entire volume of air from the compartments in a short period of time. The fan simply removes the vitiated portion of the atmosphere as it accumulates. In this

way compartments of relatively great volume may be effectively ventilated by the expenditure of a very small amount of energy.

The motor of the fan will have the usual three-speed switch so that if desired any degree of service can be obtained within the limits of the fan's capacity.

It is to be understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claim, to the particular embodiment set forth.

What I claim is:—

In a ventilating apparatus for ventilating a room and other rooms, the combination of a suction-device having a hood with an outlet sleeve passing through the wall, said hood having a suction inlet within the same room as the hood, and near the floor, and independent suction pipes connecting with the hood at different points and leading to said other rooms to be ventilated.

Signed at Yucaipa, California this 24th day of July 1924.

CHARLES H. SMITH.