No. 836,285. PATENTED NOV. 20, 1906.

E. R. SWAN.

VENTILATOR FOR CARS OR THE LIKE.

APPLICATION FILED AUG. 6, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

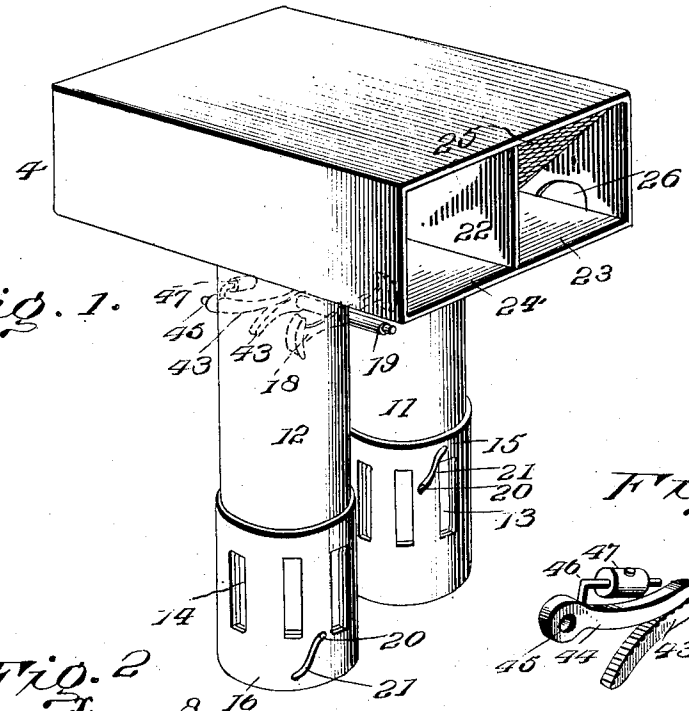


Fig. 6.

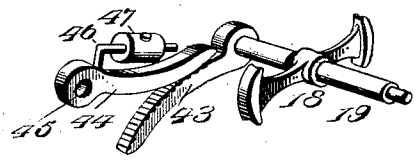


Fig. 2

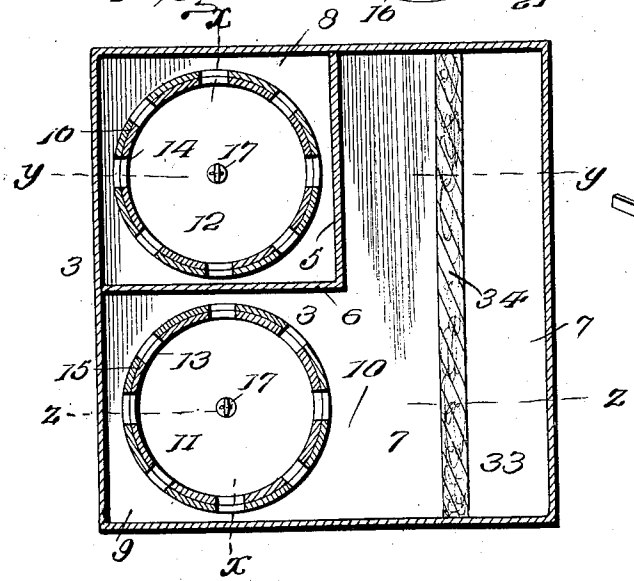
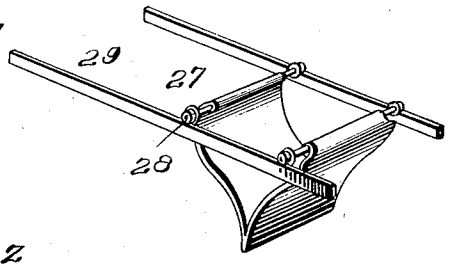


Fig. 7.



Witnesses

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2 SHEETS—SHEET 2.

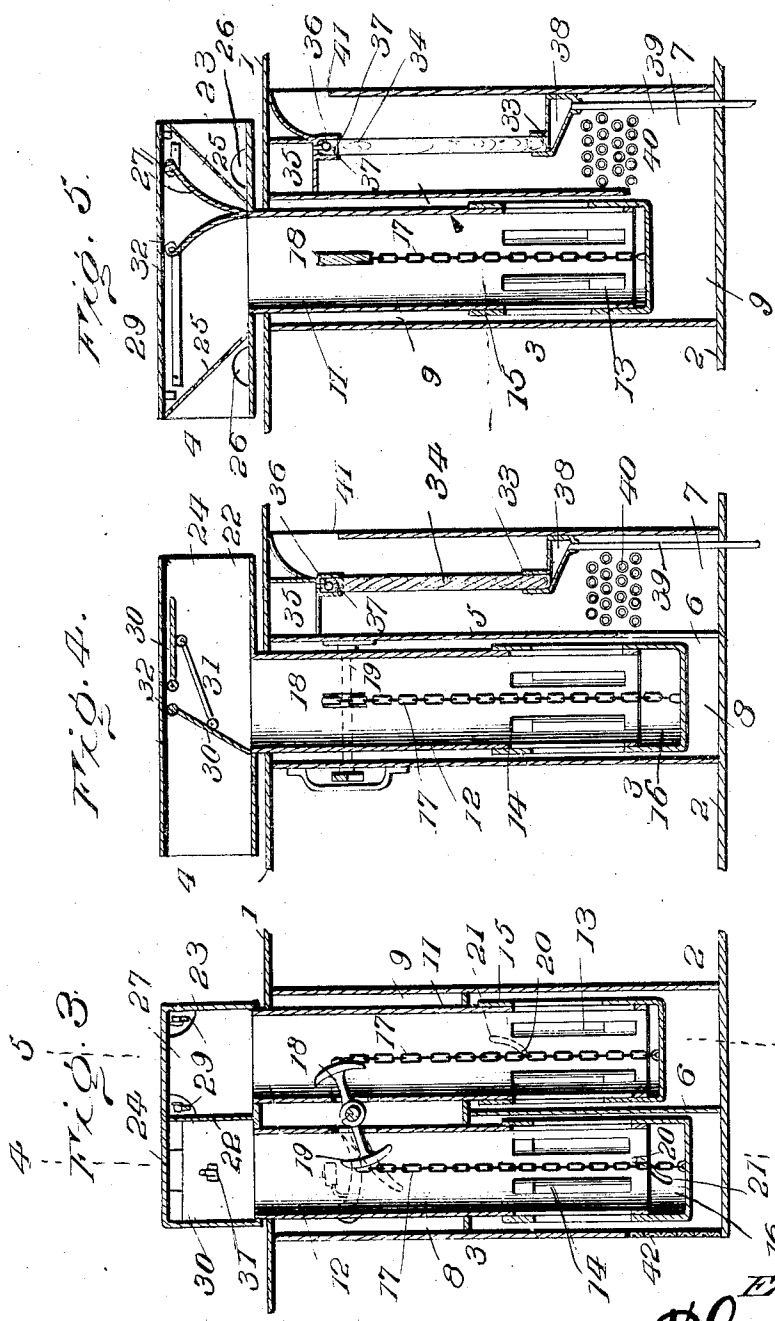

Fig. 5.

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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VENTILATOR FOR CARS OR THE LIKE.

No. 836,285. Specification of Letters Patent. Patented Nov. 20, 1906.

Application filed August 6, 1906. Serial No. 329,426.

To all whom it may concern:

Be it known that I, EUGENE R. SWAN, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Ventilators for Cars or the Like, of which the following is a specification.

The object of this invention is to provide novel means for effecting thorough ventilation of cars, ships, buildings, or the like, the invention being particularly designed for application to railway-cars.

The apparatus comprising the invention includes peculiar means for supplying fresh air to the car or compartment to be ventilated and for effecting a positive discharge of the foul air in said compartment.

Furthermore, it is contemplated by the invention to secure an apparatus in which the means for supplying fresh air is such that the inflow of the air is constant and does not vary or fluctuate according to the velocity or variance in the speed of the car to which the invention is applied.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings, in which—

Figure 1 is a perspective view showing the ventilating apparatus alone, the vertical casing thereof being removed, however, to bring out more clearly the construction of flues and valves thereon. Fig. 2 is a horizontal sectional view. Fig. 3 is a vertical sectional view on the line X X of Fig. 2. Fig. 4 is a vertical sectional view on the line Y Y of Fig. 2 and 4 4 of Fig. 3. Fig. 5 is a vertical sectional view on the line Z Z of Fig. 2 and 5 5 of Fig. 3. Fig. 6 is a detail perspective view of the regulating means coöperating with the valves mounted on the flues. Fig. 7 is a perspective view of the valve mounted in the passage supplying the fresh-air flue.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Specifically describing the invention and referring to the drawings, the numeral 1 designates the top of a car to which the invention may be applied, and the numeral 2 the floor thereof. The ventilating apparatus is arranged between the top and floor of the car and embodies a vertical casing 3, arranged vertically at a convenient and suitable point in the length of the car, a horizontal casing 4 being connected with the vertical casing 3, but being located exterior to and preferably above the top 1 of the car. The casing 3 is divided into several compartments by partitions 5 and 6. The partition 5 separates the casing 3 into the compartment 7, and another compartment which itself is divided into two compartments 8 and 9 by the partition 6, before mentioned. The compartment 8 does not communicate with the compartment 7 whatever; but the compartment 9 communicates with the compartment 7 at the lower portions of said compartments, as shown at 10, this communication being established by cutting away the lower end portion of the partition 5 adjacent to the compartment 9.

A fresh-air flue or pipe 11 is arranged in the compartment 9, and a similar foul-air flue 12 is arranged in the compartment 8. The flues 11 and 12 are provided near the lower end portions thereof with a plurality of openings 13 and 14, respectively, which are preferably formed by vertical slots in the length of said flues. The passage of air, fresh and foul, through the openings 13 and 14, respectively, is governed by valves 15 and 16, which are mounted for movement longitudinally of and which receive the lower end portions of flues or pipes 11 and 12, respectively. The valves 15 and 16 are of somewhat cylindrical form and are closed at one end, said closed end being connected by a suitable flexible connection 17 or the like with the end of a lever 18, carried by a shaft 19, mounted in suitable bearings in the partition 5 and one of the sides of the casing 3. The lever 18 is pivoted between its ends, as apparent from the drawings, and the valves 15 and 16 being connected with opposite ends of the lever virtually balance one another. The valves 15 and 16 are provided with openings similar to the openings 13 and 14 of the flues 11 and 12 and adapted to register therewith, the openings in the valves, however, being somewhat shorter than those of the flues. In opening and closing the openings 13 and 14 of the flues 11 and 12, respectively, the valves 15 and 16 are adapted to have a certain amount of rotary movement effected automatically in the ascent and descent thereof. For this purpose pins 20 project outwardly from the flues 11 and 12 and operate in spiral slots 21

in the valves 15 and 16. Thus in the vertical movement of the valves 15 and 16 said valves will have a rotative movement whereby to vary the operative area of the openings 13 and 14 in the flues.

The horizontal casing 4 at the upper end of the vertical casing 3 is divided by a longitudinal partition 22 into two passages 23 and 24. The passage 23 communicates with the flue 11, while the passage 24 communicates with the flue 12, said passages being adapted to form the inlet and outlet of the ventilator which lead to the fresh-air flue or pipe 11 and to the foul-air or discharge flue or pipe 12, respectively. To prevent cinders or other foreign matter from entering the passages 23, it is preferred to provide inclined screens or foraminous partitions 25, one of which is located adjacent to the opposite end portions of such passage 23. To facilitate removal of such cinders or foreign matter as may accumulate beneath the partitions 25, the opposite ends of the casing 4 are provided with openings 26, admitting of ready accomplishment of the above operation. Operating longitudinally in the passage 23 and movable by the pressure of air entering an end of the passage 23 is a valve 27, opposite sides of which converge toward the lower extremity of said valve. The upper portion of the valve 27 has small wheels or rollers 28 applied thereto at opposite sides and adapted to travel lengthwise of a track 29, formed by spaced rods secured to one side of the casing 4 and the adjacent side of the partition 22. The rollers of the valve 27 are adapted to limit the movement thereof by engagement with stops at the end portions of the track 29 of the flue 11.

Similarly to the flue 11, valve mechanism is located at the upper end of the flue 12 to govern the exhaust or outflow of foul air from the flue 11 through the passage 24. This valve mechanism consists, preferably, of two leaf or flap valves 30, connected together intermediate of their ends by a rod 31. Each of the valves 30 is pivoted or hingedly connected at its upper edge portion, as shown at 32, to the top of the casing 4, and said valves 30 are adapted to rest at the lower edge portions thereof upon the bottom of said casing. When one of the valves 30 is open or in a horizontal position, the other of said valves is closed or in a diagonal position, with its lower edge resting on the bottom of the casing 4.

Arranged in the compartment 7 of the casing 3 is a vertical frame 33, which may be of any substantial form and which embodies spaced sides between which is located a quantity of filtering material 34—such as excelsior, hair, or the like—said filtering material being kept in moistened condition by being supplied with a quantity of water absorbed thereby. The water or moistening liquid used to keep the filtering material 34 moist may be supplied from a tank 35 at the upper end of the compartment 7 or by any other suitable means. The tank 35 will of course be filled with the water or moistening liquid and will supply water to a pipe 36, arranged transversely of the upper portion of the frame 33, a suitable valve or valves being utilized to govern the quantity of water passing from the tank 35 to the filtering material 34. It is preferred that cotton or a similar spreading absorbent substance (indicated at 37) be located at the upper portion of the filtering material 34 just below the pipe 36, said cotton or material effectively spreading the moistening fluid over the material 34. A drip-pan 38 is connected to the lower end of the frame 37, receiving the filtering material 34, and an outlet-pipe 39 is suitably connected with the drip-pan 38 and may lead through the floor 2 of the car. The fresh air admitted to the compartment 9 by the fresh-air flue 11 passes from the compartment 9 through the opening formed by cutting away the partition 5 at 10 and thence upwardly through a number of pipe-coils 40, thence upwardly through the filtering material 34, escaping from the compartment 7, in which said material 34 is located, through an opening 41 at the upper portion of said compartment 7, and in a side of the casing 3. The opening 41 is located adjacent to the top of the car, while the foul-air-escape opening 42 is arranged at the lower portion of the casing 3 and in communication with the lower end of the compartment 8, in which the foul-air flue 12 is disposed.

Generally describing the operation of the invention, it will be obvious that as the car to which the ventilating apparatus is applied is in motion air will pass into the end of the passage 23 nearer the direction in which the car is traveling. The inrush of this air will exert a pressure against the valve 27 and effect longitudinal movement of said valve in the passage 23 until the valve opens the upper end of the fresh-air flue 11 to the end of the passage 23, in which the air is being received. The converging formation or arrangement of the sides of the valve 27 makes said valve constitute virtually a deflector, and the air entering the passage 23 is deflected downwardly into the upper end of the fresh-air flue 11 and exerts a pressure against the bottom of the valve 15, causing said valve to move downwardly until it opens the openings 13 of the flue 11 to a predetermined extent. The fresh air passes through the openings 13 of flue 11, through the opening 10 of partition 5, upwardly past the coils 40, and through the filtering material 34 into the upper portion of the car or compartment in which the ventilator is located by means of the opening 41, near the upper portion of the casing 3. The coils 40 may be heated in the cooler seasons

of the year to heat the fresh air to a certain degree as it is admitted to the compartment ventilated by the apparatus in the actual use of the invention. Said fresh air might be readily cooled by using the coils 40 as a cooling means, if such be desired, within the scope of the invention. An auxiliary use or function of the coils 40, furthermore, is to prevent the cooling liquid which keeps the filtering material 34 moist from freezing in cold weather. While the fresh air is admitted to the compartment ventilated by the apparatus in the manner above described the foul air is being discharged or removed from such compartment at the same time, the discharge of this foul or impure air being effected in the following manner: As soon as the motion of the car causes air to pass into the passage 24 it will be obvious that the pressure of this air will cause one of the valves 30 in the passage 24 to close downwardly and will hold said valve 30 in such position. The downward movement of the forward valve 30 in closing, as above described, opens the rearward valve 30 to establish communication between the rear end of the passage 24 with reference to the direction of travel of the car or movement of the atmosphere, so that air entering the passage 24 does not pass into the foul-air flue 12, but is prevented from so doing by the forward valve 30. However, a considerable suction is necessarily exerted at the rear end of the passage 24 by the tendency of the movement of the car to create a vacuity in the rear end of said passage 24, and this suction exerted in the flue 12 draws the foul air into this flue through the foul-air-outlet opening 42 of the casing 3 through the openings 14 in the flue 12 and upwardly through said flue and out of the passage 24. From the foregoing it will be observed that a thorough and constant circulation is maintained in supplying fresh air to a compartment ventilated by the apparatus comprising the invention and in discharging the foul air from said compartment.

An important feature of the present invention resides in the special means utilized in order that the quantity of air admitted to the compartment ventilated by the apparatus may be constant and not subject to variation due to the variation in the speed of the rolling-stock. To accomplish the above, peculiar regulating mechanism for governing the movement of the valves 15 and 16 is employed. This regulating mechanism includes an arm 43, attached to one end of the shaft 19 for movement therewith and curving outwardly and downwardly from said shaft. Arranged to contact with the upper surface of the arm 43 is a weighted lever 44, which lever is pivoted at one end, as shown at 45, being formed with a horizontal arm 46, upon which is mounted the adjustably-slidable weight 47, the position of which may be fixed by a suitable set-screw. The coöperation of the elements 43 and 44 is as follows: Normally the outer end portion of the lever 44 bears against the arm 43 near the point of connection of the latter with the shaft 19. When the car carrying the ventilator begins to move, necessarily the amount of fresh air passing down the fresh-air flue 11 increases in direct ratio to the increase in speed of the car by reason of the increased velocity of the air received in the said flue 11. Ordinarily if the valve 15 occupied the same position with regard to the openings 13, both when the car is stationary and when it is in motion, a greater quantity of air would be admitted to the car through the opening 41 as soon as the car begins to travel than would be admitted when the same is stationary. By the provision of the regulating means comprising the members 43 and 44, however, as the car carrying the ventilating apparatus begins to travel and increases its speed of movement the pressure of the air passing into the fresh-air flue 11 against the bottom of the valve 15 begins to force said valve downward gradually, thus gradually closing the openings 13 of the flue 11. The movement of the valve 15 on the increase of pressure of the air thereagainst is resisted in a ratio proportionate to the ratio of increase in the velocity of the air received in the said flue 11. In other words, on the increase of the velocity of the air passing into the flue 11 the increased pressure due to the increased velocity of such air with regard to the valve 15 is resisted by the regulating means, for the reason that the connection 17 between the valve 15 and the lever 18 begins to pull downwardly on said lever, thereby gradually raising the arm 43 and gradually causing the outer end of the lever 44 to approach the outer end portion of said arm 43. As the point of contact of the lever 44 gradually approaches the outer end of the arm 43, it will be obvious that said lever 44 obtains a greater leverage with respect to the arm 43 and the weight brought to bear on said arm 43 gradually increases in this way due to the increased velocity of air passing into the flue 11. As before premised, the increase in the velocity of the air passing into the flue 11 causes a gradual downward movement of the valve 15, which movement is retarded and is resisted by a gradual increasing weight connected with the valve for this purpose. As the area of the openings 13 decreases when the velocity of air received in the flue 11 increases, it will be observed that the quantity of fresh air passing into the compartment ventilated by the invention will be constant, giving rise to no likelihood of undue drafts or currents of air, the advantages of which will be obvious to those versed in the art to which the present invention appertains. The quantity of foul air withdrawn from the ventilated compartment

through the foul-air flue 12 is also proportionate with the velocity of air passing into the flue 11, as the amount of suction on the passage 24 depends and is proportionate with the velocity of air. It is to be understood that the mounting of the valves 27 and 30 is designed to admit of automatic movement and operation of these valves when the car is traveling in either direction. Of course, as the velocity of the air entering the ventilator, because of slowing down of speed of car—for instance, the pressure of air on the bottom of the valve 15 decreases and the same moves upwardly under the influence of the weighted member 44, the force exerted by the lever or member 44 on the arm 43 decreasing as the point of contact of these parts approaches the shaft 19.

Having thus described the invention, what is claimed as new is—

1. In ventilating apparatus of the class described, the combination of a foul-air flue, a fresh-air flue, valves governing the passage of air through the said flues, the aforesaid valve of the fresh-air flue being pressure-operable, and other valves governing the admission to and egress of air from the fresh and foul air flues respectively.

2. In ventilating apparatus of the class described, the combination of a foul-air flue, a fresh-air flue, valves governing the passage of air through the said flues, the aforesaid valve of the fresh-air flue being pressure-operable, other valves governing the admission to and egress of air from the fresh and foul air flues respectively, and means connecting the first-mentioned valves of the two flues together.

3. In ventilating apparatus of the class described, the combination of a compartment, fresh and foul air flues leading thereto, valves governing the admission of fresh air through the fresh-air flue to said compartment and the discharge of foul air through the foul-air flue from said compartment, and means for varying the opening and closing movement of the valves aforesaid in accordance with the velocity of the air admitted to the fresh-air flue.

4. In ventilating apparatus of the class described, the combination of a compartment, a fresh-air flue leading thereto, means governing admission of fresh air through said fresh-air flue to said compartment, and means governing the operation of the aforesaid means to effect actuation thereof in accordance with the velocity of the air passing through the fresh-air flue.

5. In ventilating apparatus of the class described, the combination of a compartment, a fresh-air flue leading to said compartment, a valve governing the passage of fresh air through said flue to said compartment and operable by air-pressure, and means connected with said valve and operable thereby for governing the opening and closing movement of the valve in accordance with variation in the velocity of the air passing through the fresh-air flue.

6. In ventilating apparatus of the class described, the combination of a compartment, foul and fresh air flues leading thereto, valves governing the passage of air through the fresh and foul air flues to and from the compartment respectively, and regulating means connected with said valves and operable thereby to vary the movement of the valves proportionate with the variation in the velocity of the air passing through one of the said flues.

7. In ventilating apparatus of the class described, the combination of fresh and foul air flues, simultaneously-operating valves governing the passage of air through the said flues, passages connected with the flues to supply air thereto, and valves governing the admission of air to the passages above mentioned.

8. In ventilating apparatus of the class described, the combination of fresh and foul air flues, simultaneously-operating valves governing the passage of air through the said flues, passages connected with the flues to supply air thereto, valves governing the admission of air to the passages above mentioned, and means admitting of reversal of the position of the valves.

9. In ventilating apparatus of the class described, the combination of fresh and foul air flues, simultaneously-operating valves governing the passage of air through the said flues, passages connected with the flues to supply air thereto, valves governing the admission of air to the passages above mentioned, and means connected with the simultaneously-operating valves to vary the degree of movement thereof in accordance with the variation in the velocity of the air passing through the flues above mentioned.

10. In ventilating apparatus of the class described, the combination of fresh and foul air flues, valves governing the admission of air to the foul-air flue and the discharge of air from the fresh-air flue, means connecting the aforesaid valves for simultaneous operation, independent passages communicating with the fresh and foul air flues, and valve mechanisms governing the passage of air through said passage, one of said valve mechanisms embodying a valve adapted to supply air to the fresh-air flue, the other of the valve mechanisms including a valve adapted to effect a suction on the foul-air flue as specified.

11. In ventilating apparatus of the class described, the combination of fresh and foul air flues, valves governing the admission of air to the foul-air flue and the discharge of air from the fresh-air flue, independent passages communicating with the fresh and foul air

flues, and valve mechanisms governing the passage of air through said passages, one of said valve mechanisms embodying a valve adapted to supply air to the fresh-air flue, the other of the valve mechanisms including a valve adapted to effect a suction on the foul-air flue as specified.

12. In ventilating apparatus of the class described, the combination of fresh and foul air flues, valves governing the passage of air through said flues, a casing communicating with the fresh-air flue and having a fresh-air outlet, and a filter interposed between the fresh-air outlet and the point of communication between the fresh-air flue and the casing.

13. In ventilating apparatus of the class described, the combination of fresh and foul air flues, valves governing the passage of air through the flues, a casing communicating with the fresh-air flue and having a fresh-air outlet, a filter interposed between the fresh-air outlet and the point of communication between the fresh-air flue and the casing, and heating-coils in the path of air passing from the fresh-air flue to the outlet of the casing.

14. In ventilating apparatus of the class described, the combination of fresh and foul air flues, valves governing the passage of air through said flues, a casing communicating with the fresh-air flue and having a fresh-air outlet, a filter interposed between the fresh-air outlet and the point of communication between the fresh-air flue and the casing, the filter above mentioned including moistened material, means for moistening said material, and heating-coils located proximate to the filter as specified.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE R. SWAN. [L. S.]

Witnesses:

ROBERT T. LUBBOCK,

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