(No Model.)

3 Sheets—Sheet 1.

W. E. ANDREW.

CAR VENTILATOR.

No. 426,750.

Patented Apr. 29, 1890.

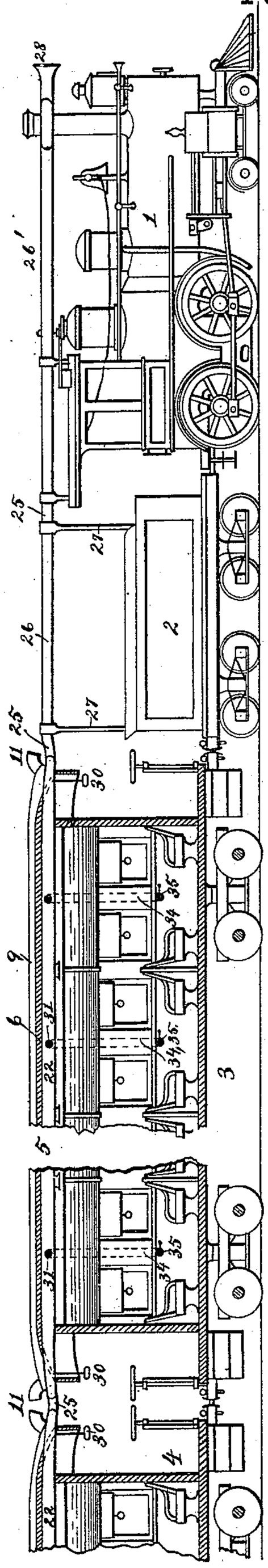

Fig. 1.

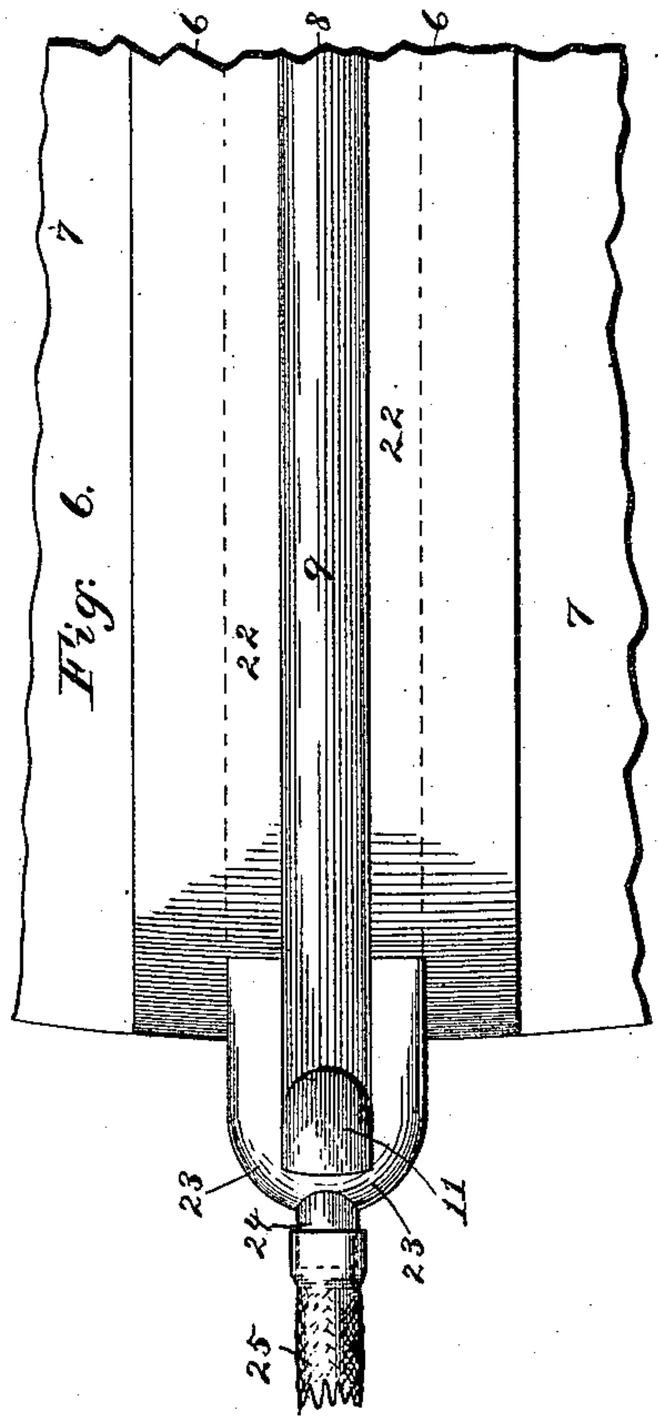

Fig. 6.

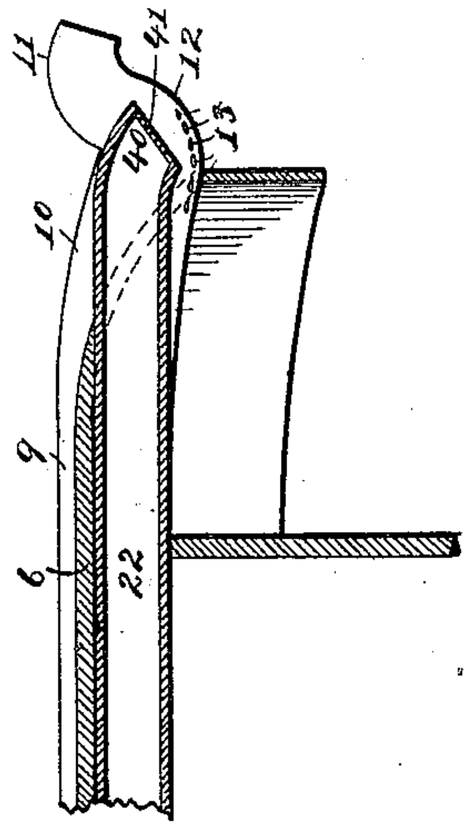

Fig. 8.

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(No Model.) 3 Sheets—Sheet 2.

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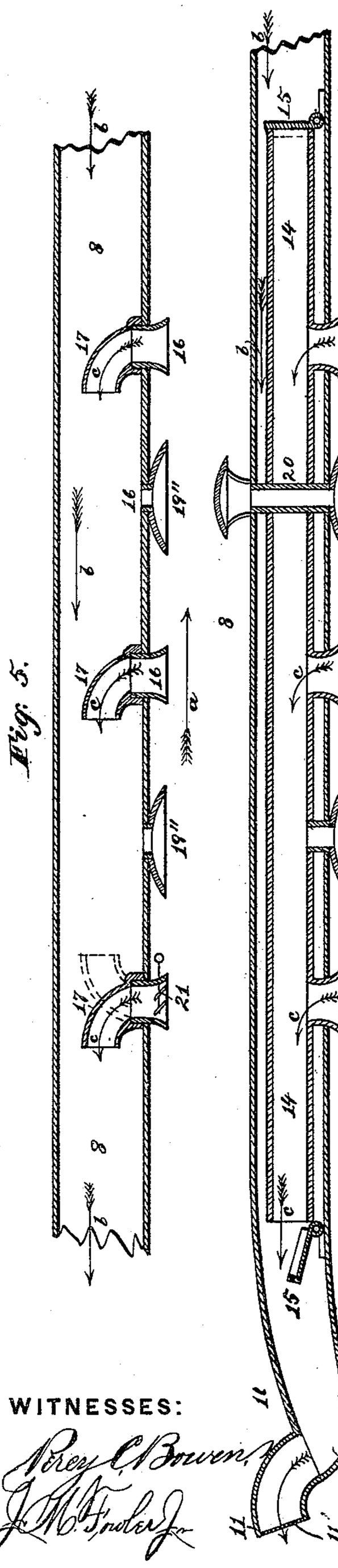

Fig. 5.

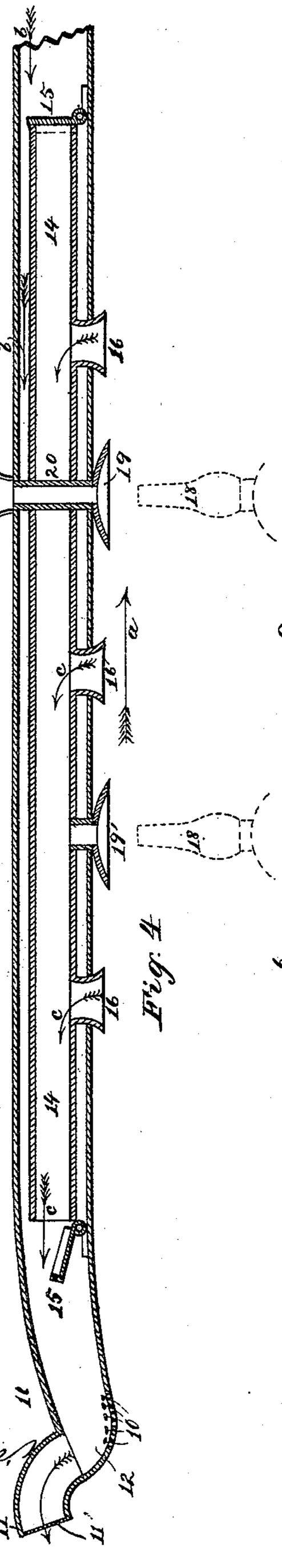

Fig. 4

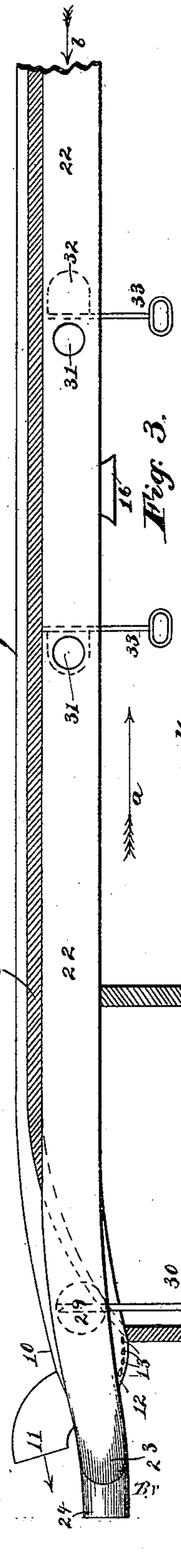

Fig. 3.

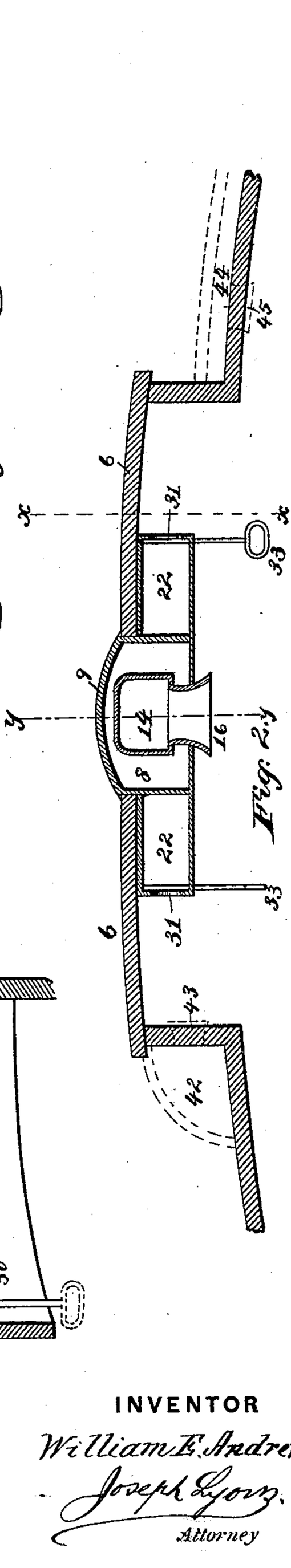

Fig. 2.

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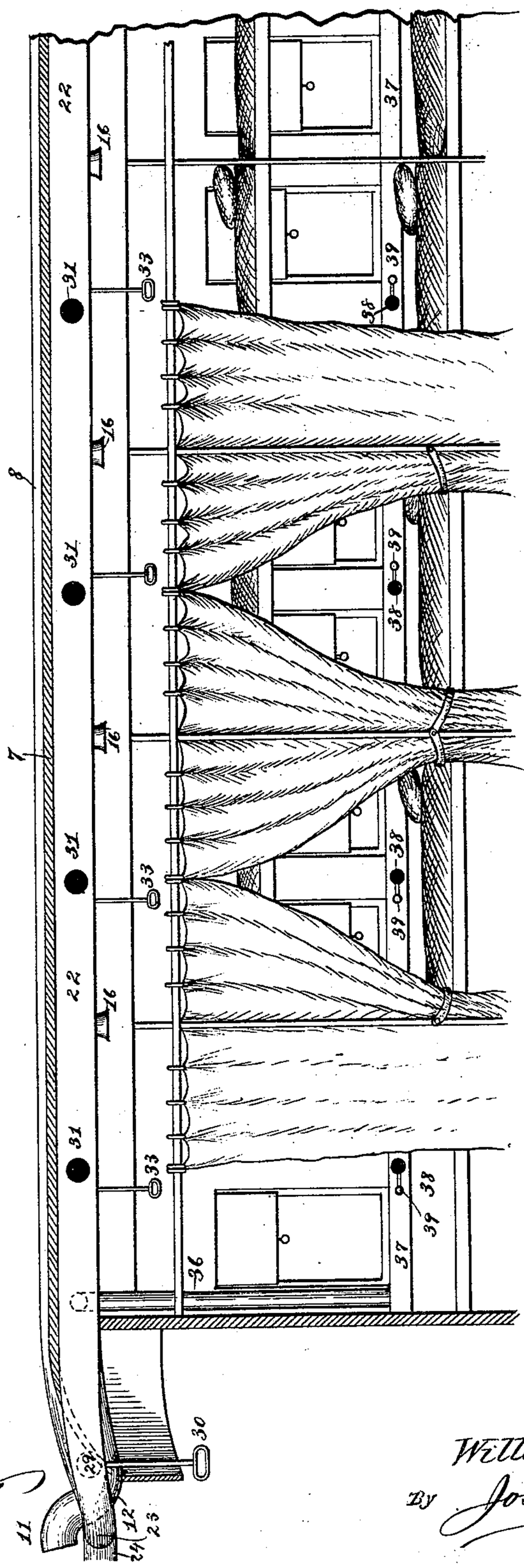

Fig. 1.

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UNITED STATES PATENT OFFICE.

WILLIAM E. ANDREW, OF ATLANTIC HIGHLANDS, NEW JERSEY.

CAR-VENTILATOR.

SPECIFICATION forming part of Letters Patent No. 426,750, dated April 29, 1890.

Application filed January 7, 1889. Serial No. 295,660. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. ANDREW, a citizen of the United States, residing at Atlantic Highlands, Monmouth county, in the State of New Jersey, have invented certain new and useful Improvements in Car-Ventilators, of which the following is a specification.

My invention relates to improvements in ventilators for railroad-cars; and it has for its object to provide means by which sleeping or other cars may be supplied with pure air, to the exclusion of smoke and cinders, while the train is in motion, and at the same time to draw from the car the foul air automatically. These objects I obtain by providing a channel extending throughout the whole length of the car, which opens at both ends to the atmosphere, and through which, when the train is in motion, a rapid current of air passes. This channel, to which I have given the name "exhaust-chamber," is in communication at different points within the car with ventilators, from which the foul air passes by suction created by a vacuum into and through the exhaust-channel. In addition to this exhaust-channel I provide one or more supply-channels, which extend through the whole length of each car and which may be connected from car to car by flexible couplings with one or more similar channels or pipes extending over the tender and locomotive near or beyond the smoke-stack of the latter, so that as the train moves the fresh air in front of the locomotive will rush into the supply-channels, which latter are tapped at different points within each car to carry the fresh air to the vicinity of the seats of the passengers or to the vicinity of the berths in sleeping-cars. All this will more fully appear from the following detailed description with reference to the accompanying drawings, in which I have shown several forms of my invention; but I desire it to be understood that I am not limited to the specific arrangements herein shown and described, since the same may be changed in a variety of ways without departing from the spirit of my invention.

Figure 1 is a side elevation of a railway-train with the cars in longitudinal section and with my invention applied thereto. Fig. 2 is a transverse sectional view of my ventilator in proper position under the roof of a car. Fig. 3 is a longitudinal sectional view taken on the line *x x* of Fig. 2. Fig. 4 is a similar view taken on line *y y* of Fig. 2. Fig. 5 is a like view showing a modified form of my invention. Fig. 6 is a plan view, upon a reduced scale, of my invention as seen by looking down upon the top of a car, only one end thereof being shown. Fig. 7 is an interior view of a sleeping-car, showing a modification of the means for distributing the fresh air to the lower berths; and Fig. 8 is a sectional view of one end of the top of the car, showing a modified form of the air-inlets to the supply-chambers.

Like numerals of reference indicate like parts in all the figures of the drawings.

In Fig. 1 a railway-train is shown consisting of the locomotive 1, the tender 2, and the sleeping-cars 3 and 4.

My improved ventilator is carried under the roofs of the cars, as indicated at 5, and is extended from car to car and over the tender and locomotive, as will hereainfter more fully appear.

As railway-cars are now constructed the central portion 6 of the roof is ordinarily elevated over the side portions 7 thereof, as shown in Fig. 2, and in accordance with my invention I form a central chamber 8, extending longitudinally through the car under the middle of the roof and slightly projecting through the same, so as to form a dome-shaped protuberance 9 on said roof and practically a part of the latter. The chamber 8 I call the "exhaust" chamber or channel, and, as seen in Figs. 3, 4, 7, and 8 of the drawings, it is curved downwardly at each end of the car, as indicated at 10, and is there provided with an upwardly-curved mouth-piece 11, which is open to the atmosphere, but may be provided with a screen 11′ for excluding as much as possible snow and rain, smoke and cinders, and other impurities. It is clear that these impurities cannot be entirely excluded; but their presence in the exhaust-channel can do no harm, as will hereinafter more fully appear. In order, however, to remove snow and rain which has entered the exhaust-chamber, a pocket 12 is formed at each end of the same, and a number of perforations 13 formed in

said pocket will permit the rain-water and the snow, which will melt within the chamber, to run off. This is clearly illustrated in Figs. 3, 4, 7, and 8.

In one form of my invention, as shown in Figs. 2 and 4, a secondary exhaust-chamber 14 is arranged within the exhaust-chamber 8, extending longitudinally through a portion of the latter and provided at each end with a hinged valve 15, which, when the car is at rest, are both open, as indicated at the left-hand end of Fig. 4, the center of gravity of the valves being so arranged that they will open automatically; but when the car moves in the direction of the arrow *a*, Fig. 4, the air-current, which passes through the exhaust-chamber 8 in the direction of the arrow *b*, forces the valve 15 at the right-hand end of the secondary exhaust-channel 14 to its seat and closes this secondary exhaust-channel at this end, while at the other end the valve 15 remains open. A number of ventilator-openings 16 16 16 in the form of short flaring tubes communicate with the secondary exhaust-channel, pass through walls of the primary exhaust-channel 8, and open into the car. It will now be seen that when the car moves in the direction of arrow *a* and an air-current is produced in the primary exhaust-channel 8 in the direction of the arrows *b b*, closing the valve 15 at one end of the secondary exhaust-channel and opening the like valve at the other end, a partial vacuum will be produced at the open end of the secondary exhaust-channel and the air in the same will be drawn into the primary channel to join the air-current in the latter. A partial vacuum is thereby produced at the ventilator-openings 16 16, and the air from the cars will be drawn into the secondary exhaust-channel to likewise join the air-current in the primary exhaust-channel, as indicated by the arrows *c c c*. In this manner the foul air is drawn from the cars when the train is in motion, and it is of no consequence in what direction the train moves, for when it moves in the opposite direction from that indicated by arrow *a* the valve 15 (shown at the right-hand end of Fig. 4) will open, while the like valve shown at the other end of this figure of the drawings will be closed by the air-current in the primary exhaust-channel, which air-current will now be opposed to the direction indicated by arrows *b*. In Fig. 5 a modified form of this arrangement is shown, in which the secondary exhaust-channel is dispensed with, and in place of the same an elbow-shaped turn-cap 17 is placed within the primary exhaust-channel 8 over each ventilator-opening 16, the short tube of which, which flares into the car, is for this purpose slightly extended into the chamber 8. The turn-caps loosely fit over the extended tubes of the ventilator-openings, so that they may turn with ease in any direction, in the same manner as the turn-caps on chimney ventilator-tops. When the car moves in the direction of the arrow *a*, the turn-caps will be turned by the air-current in the primary exhaust-channel to the positions shown in solid lines, and when the motion of the car is reversed they will be turned to the position indicated in dotted lines.

The turn caps or cowls being located in wide air-channels, and the whole being mounted upon a traveling vehicle, swaying and jolting continuously while in motion, the turn-caps will practically behave as if they were mounted upon the top of a chimney—that is to say, they will turn with their flaring mouths in the direction of the air-current.

It will be readily understood that by this modified construction, in which each ventilator-opening has a separate secondary exhaust-channel formed by the turn-caps, the foul air will be withdrawn from the car in substantially the same manner as by the construction in which a single secondary exhaust-channel, common to all ventilator-openings, is employed.

In the ordinary or sleeping cars, in connection with which my improvement is designed to be used, the lamps for lighting the car are ordinarily hung in the center, with their glass chimneys pointing upwardly toward the ceiling of the car, as indicated in Fig. 4, and in order to prevent the soiling of the ceiling the latter and the roof are perforated and have a lamp-ventilator or chimney-top inserted, substantially as shown at 19 in Fig. 4. The same construction may be employed in connection with my improvement, in which case the ventilator-tube 20 will have to pass through the exhaust-channels, as shown. By preference, however, these lamp-ventilators will not pass through the roof, but will only open either into the secondary exhaust-chamber, as shown at 19′ in Fig. 4, or into the primary exhaust-chamber, as shown at 19″ in Fig. 5.

When the train is moving very fast, the upward draft of air to the exhaust-openings may become too strong and may be reduced by closing more or less the shutter-valve 21, placed within the flaring exhaust-opening, as indicated in Fig. 5. Of course a regulating-valve of a different construction may be employed.

Fresh air is carried to the cars by one or more supply-channels 22 22, which are preferably arranged on the ceiling. In Fig. 2 two such supply-channels are shown, one on each side of the exhaust-channel 8. They are there shown as rectangular boxes or tubes; but any other convenient form may be used. These supply-channels extend throughout the length of the car, pass through the ends of the same, as shown in Figs. 1, 3, 6, 7, and 8, and are either connected from car to car by flexible couplings or remain unconnected, as will presently appear.

In Figs. 1, 3, 6, and 7 the supply-channels are shown constructed for connection from

car to car. The outer ends of the supply-channels are in this case curved toward each other, as indicated at 23, and are joined together and to a common neck 24. These curved ends are clearly shown in Fig. 6 in plan view and in Figs. 3 and 7 by appropriate shading.

It will now be understood that the supply-channels for each car terminate beyond each end of the latter in the neck 24, and when the train is made up these necks are connected by flexible tubing 25.

The flexible tubing at the front end of the first car of the train is connected with a supply-tube 26, which passes over the tender 2, being supported by rods 27 27, suitably secured to the frame of the tender. A similar supply-tube 26′ also passes over the locomotive, and is also connected by flexible tubing with the supply-tube 26.

The supply-tube 26′ passes around and in front of the smoke-stack and terminates in a bell-mouth 28, into which the fresh air, free of smoke and cinders, passes when the train moves forward. It will thus be seen that the fresh air rushing into the bell-mouth 28 will pass from car to car, and it now remains to be shown how this air is let into the cars and is distributed in the same.

At each end of each car each supply-chamber is provided with a main supply-valve 29, which may be actuated by a suitable rod and handle 30, (shown in Figs. 1, 3, and 7,) and when the train has been made up all these valves are opened with the exception of the valve at the rear end of the rear car. Thus a free passage for the fresh air is provided from the bell-mouth 28 in front of the smoke-stack to the rear end of the last car of the train.

Each supply-channel is provided with openings 31, one corresponding to each set of seats or to each upper berth of the car, and these fresh-air-supply openings may be closed by flap-valves 32, operated by rods and handles 33, which latter are within convenient reach of the occupants of the upper berths. Thus each occupant of an upper berth can control the admission of fresh air in the vicinity of his berth. The lower berths or the immediate vicinity of the seats proper are provided with fresh air, either by branch tubes 34 34, by which the supply-channels are tapped, and which open at 35 35 about midway between two opposing seats, (which correspond to the middle of a lower berth,) as shown in Fig. 1, or by the construction shown in Fig. 7. In this latter form of my invention each supply-chamber is tapped at one end only by a pipe 36, which extends down to within a short distance below the lower line of the windows, where it communicates with a secondary supply-channel 37, extending from one end of the car to the other. This secondary supply-channel is tapped at points 38 corresponding to the similar points 35 in Fig. 1, and the admission of fresh air at these points is controlled by the occupants of the lower berths by valves operated by handles 39, which are conventionally indicated.

Instead of connecting the supply-channels from car to car, as hereinbefore described, each such channel may terminate at each end in a downwardly-curved mouth 40, which is closed by a screen or air-filter 41, as shown in Fig. 8. Such screen or air-filter will in many cases be sufficient to exclude smoke and dirt from the supply-chambers, and by this construction the making up of the train is facilitated, since each car is thereby ventilated independently of all others. With this construction the supply-pipes 26 26′ on the tender and locomotive are dispensed with.

While I have shown the exhaust and supply channels mounted in the middle of the car under the ceiling of the same, these chambers may be differently arranged. So, for instance, the exhaust-chamber may be mounted on the roof in the angle formed between the rising walls of the dome and the roof 7 proper, as indicated in dotted lines at 42 in Fig. 2. The exhaust-openings may then be conveniently placed in the rising walls of the dome, as indicated at 43. The supply-channel may also be placed upon the roof, with the supply-openings in the same. This is indicatced at 44 45 in Fig. 2 in dotted lines.

Numerous other modifications of location and structure will suggest themselves to those skilled in the art without the exercise of invention.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. In a car-ventilator, the combination of an exhaust-channel extending through the top of the car in the direction of the line of travel and at each end curved downward and then upward and there open to the atmosphere, with a perforated pocket or pockets formed in the exhaust-channel by the downwardly-curved portion of the said ends to allow rain or snow entering the channel to settle and flow off, and exhaust-openings within the car communicating with the exhaust-channel, substantially as described.

2. In a car-ventilator, the combination of an exhaust-channel extending through the car in the direction of the line of travel and open at each end to the atmosphere, so that an air-current is produced in the channel when the car moves in either direction, with a secondary exhaust-channel located within the first and open at both ends, a valve for each end of the secondary exhaust-channel arranged to open by gravity and to be closed by the air-current in the primary exhaust-channel, whereby suction is produced in the secondary channel when the car moves in either direction, and exhaust-openings within the car communicating with the secondary exhaust-channel, substantially as described.

3. A car-ventilator comprising an exhaust-channel extending in the dome of the car and open at each end to the atmosphere, a secondary exhaust-channel located within the first provided with valves at each end constructed to open by gravity and to close by the air-current, supply-channels also extending in the dome, and suitable exhaust and supply openings, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM E. ANDREW.

Witnesses:
V. K. REYNOLDS,
JOHN H. HAVILAND.