No. 662,879. Patented Nov. 27, 1900.

A. ROSS.

CAR VENTILATOR.

(Application filed Jan. 8, 1900.)

(No Model.) 4 Sheets—Sheet 1.

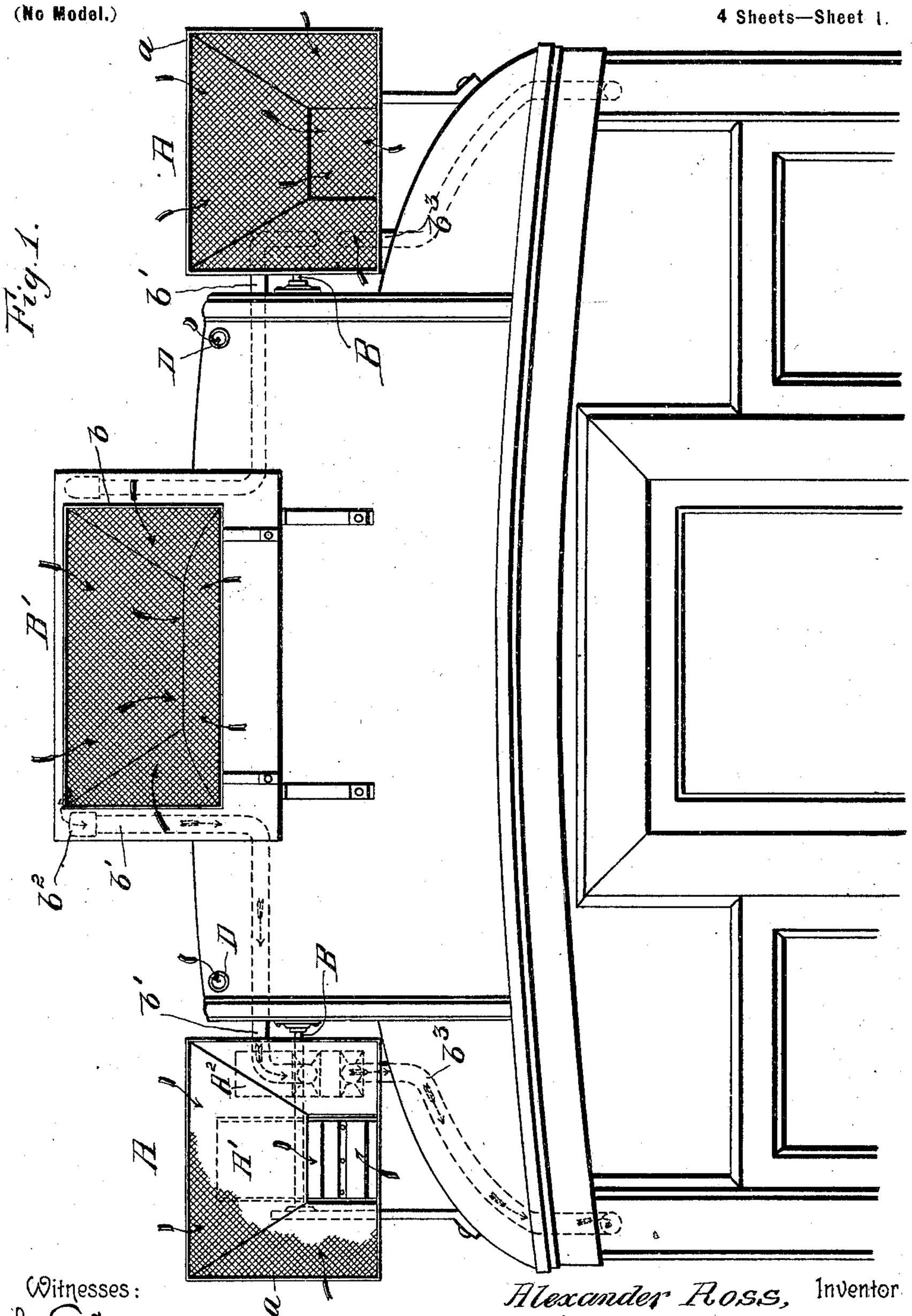

Fig. 1.

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Fig. 2.

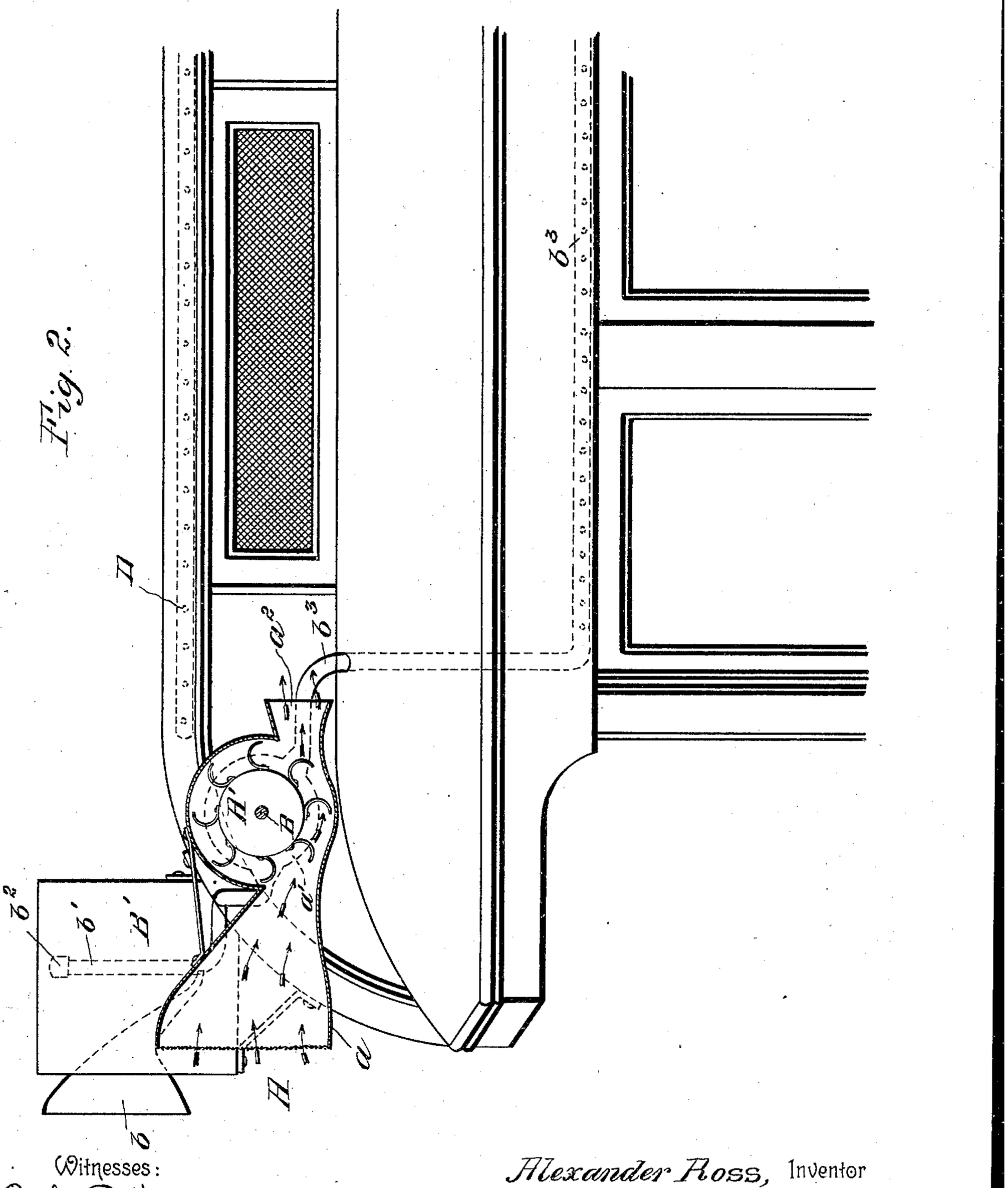

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Fig. 5.

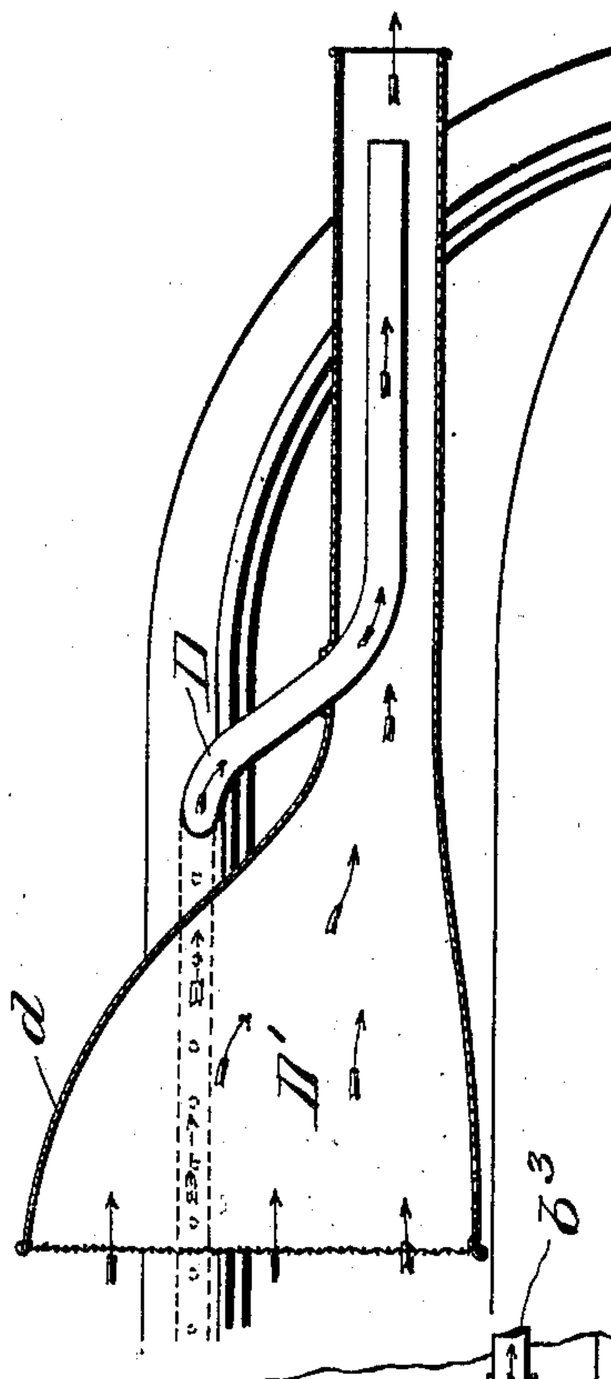


Fig. 3.

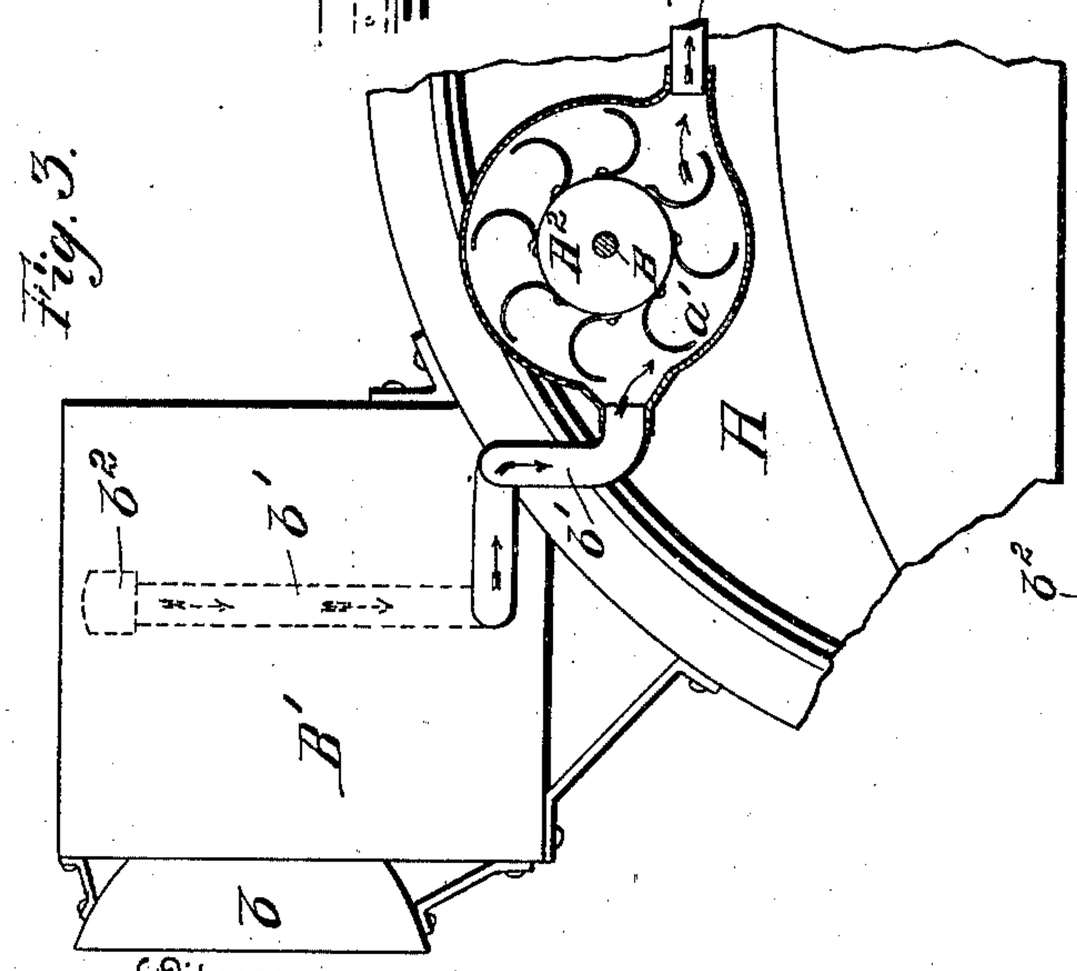
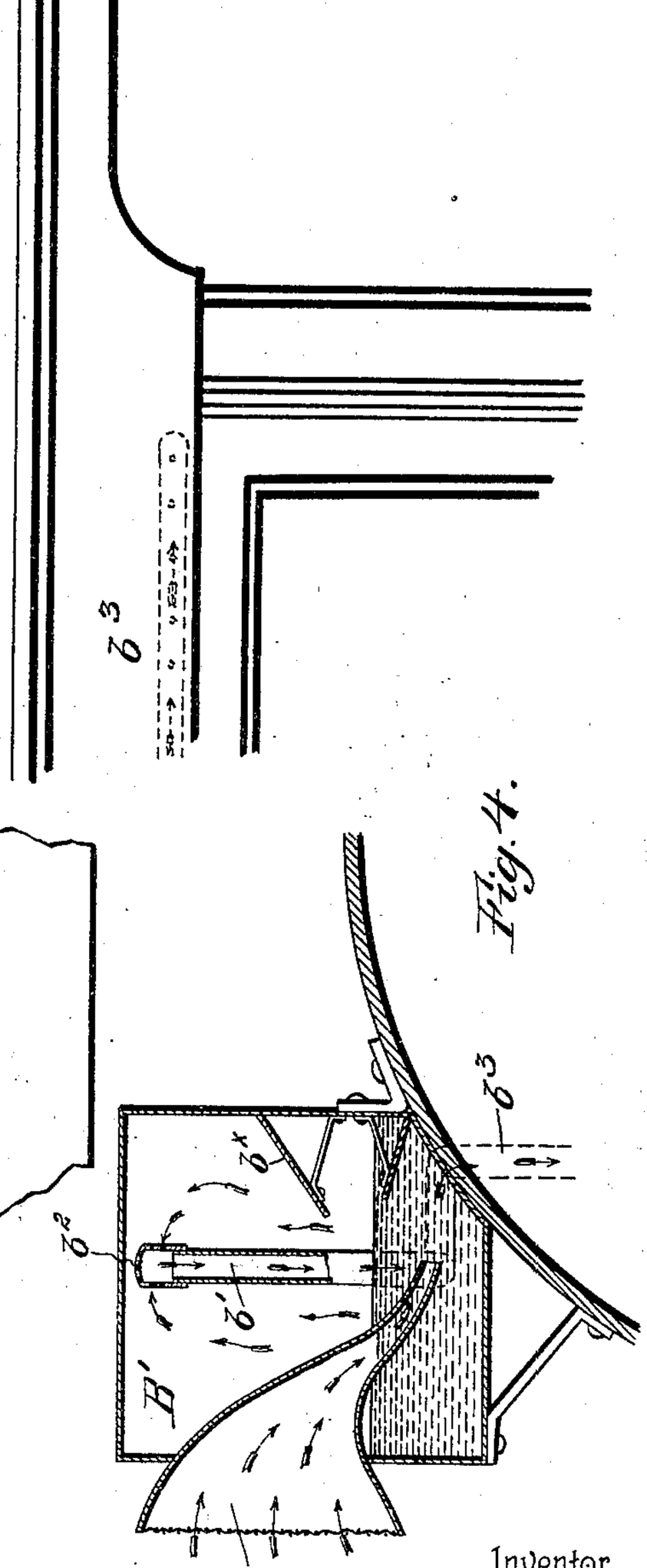


Fig. 4.



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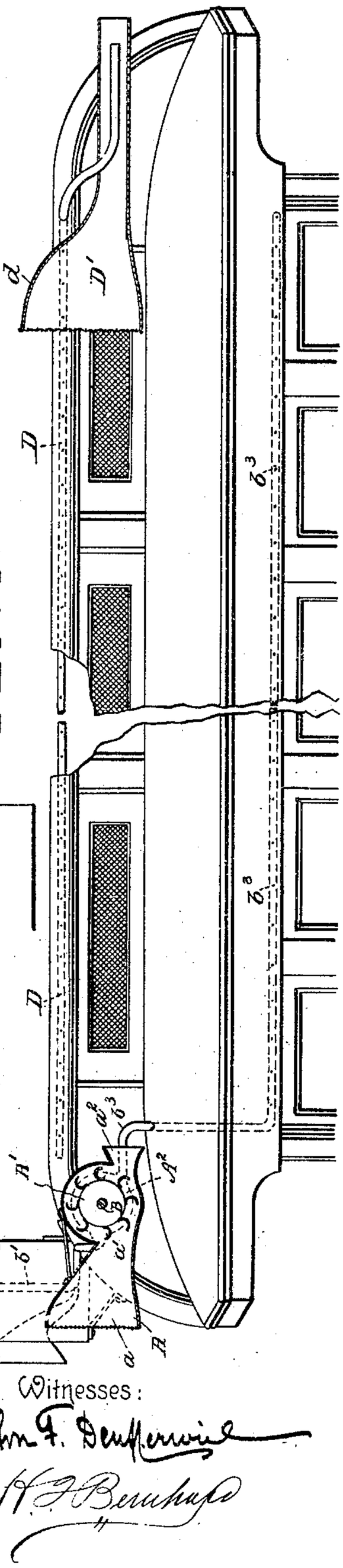

FIG. 7.

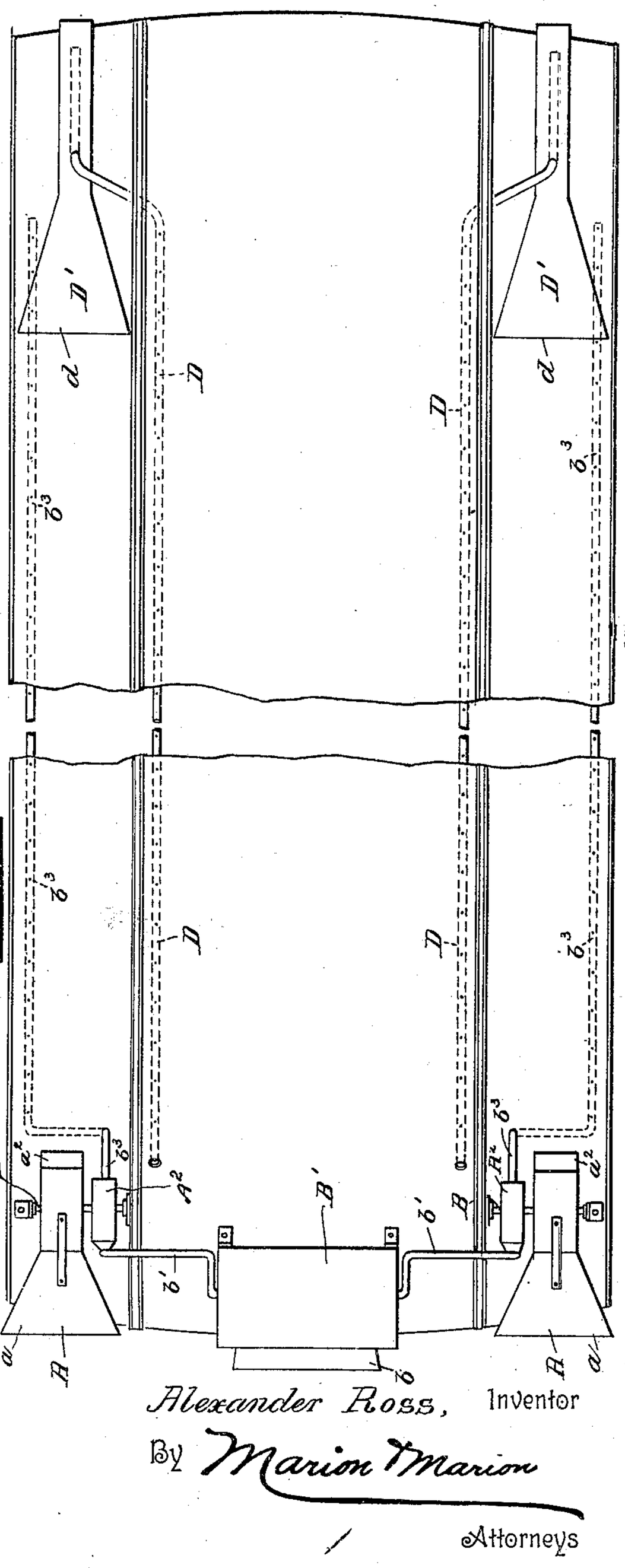

FIG. 6.

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UNITED STATES PATENT OFFICE.

ALEXANDER ROSS, OF MONTREAL, CANADA, ASSIGNOR OF ONE-HALF TO ALEXANDER WALKER, OF SAME PLACE.

CAR-VENTILATOR.

SPECIFICATION forming part of Letters Patent No. 662,879, dated November 27, 1900.

Application filed January 8, 1900. Serial No. 689. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER ROSS, a subject of Her Majesty the Queen of Great Britain, residing at the city and district of Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Ventilators; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in ventilators of that class which are especially adapted for ventilating railroad-cars; and its object is to provide a ventilating apparatus of this character which is simple in construction, reliable and effective in operation, and which can be manufactured at a moderate cost.

To these ends the invention consists in a car-ventilating apparatus constructed substantially as hereinafter illustrated and described, and defined in the appended claims.

Referring to the drawings, in which similar letters of reference indicate similar parts, Figure 1 is a view in elevation of a front end of a car provided with a ventilating apparatus constructed in accordance with this invention. Fig. 2 is a side elevation thereof, the casing of the power-fan being shown in section. Fig. 3 is a similar view, the section being taken through the suction or ventilating fan. Fig. 4 is a vertical central section through the air-chamber. Fig. 5 is a view in elevation of the rear end of the car, showing in section the device for drawing the foul air from the car. Fig. 6 is a plan view of an ordinary railway-car equipped with a ventilating system constructed in accordance with my invention. Fig. 7 is a sectional elevation of the car and the ventilating system illustrated by Fig. 6.

In the drawings, A represents a fan-casing constructed of any suitable material and of a form and size best adapted for the intended purpose. There are two of these casings, as shown in Fig. 1, but as they are duplicates in construction and operation for the sake of brevity only one will be particularly described. These fan-casings are arranged one on each side of the car and at either or both ends, as preferred, it being only necessary to the successful operation of the apparatus to have the opening of the fan-casing face in the direction of the car.

The fan-casing A is provided with an extension a, having an enlarged funnel-shaped opening leading into the fan-chamber a' for directing the air against the fan-vanes, said opening being protected by a wire gauze or netting having a mesh suitable for the intended purpose. Upon the opposite side of the fan-casing A is an extension a^2 of any suitable size and shape for the exit of the air from the fan-chamber and which may, if desired, be provided with a suitable hinged cover (not shown) to prevent back drafts.

Journaled in the sides of the fan-casing and extending transversely therethrough is a shaft B, upon which is fixed the motor or power fan A′ and the suction or ventilating fan A^2. These two fans A′ and A^2 are arranged side by side, as shown at the left of Fig. 1, the fan A′ being located in the path of the opening of the extension a, while fan A^2 is entirely closed by said fan-casing. The fans A′ A^2 may be of any usual or preferred construction best suited for the intended purpose.

It will be apparent from the construction above described that the motion of the car will cause the air to rush into the fan-casing and rotate the fan A′ with a power proportionate to the speed of the car and that the rotation of the fan A′ will likewise rotate the ventilating-fan A^2, both being fixed upon the same shaft.

At a point preferably central between the fan-casings A is fixed an air-chamber B′, which is preferably rectangular in form and of dimensions suitable for the intended purpose. In the front of said air-chamber is fixed a funnel-shaped extension b, having its inner end downwardly curved and extending into the air-chamber to a point near the bottom thereof, as best shown in Fig. 4. The opening of the funnel b is also protected by means of suitable wire-gauze. The interior of the air-chamber B′ is partly filled with water to any desired depth, in which the inner end of the funnel b is submerged, whereby the air is cleansed and purified as it passes

to the upper portion of the chamber. A series of shelves or partitions $b^{\times}$ are formed along the sides of the interior of the air-chamber B′ for preventing the violent splashing of the water under the movement of the car.

Communicating with the interior of the fan-casing A^2 is the air-inlet pipe b', which enters the air-chamber B′ near the bottom thereof and passes upwardly through the water to a point near the top thereof, where it terminates in a perforated cap b^2. Upon the opposite side of the fan-casing A^2 is the air-outlet b^3, which leads downwardly into the interior of the car and diffuses the fresh air through suitable perforations formed in the pipe at any desired point or points. The ventilating-fan A^2 is located in the path of the pipes b' and b^3, thus drawing the air from the air-chamber B′ through the pipe b' and forcing it down into the car through the pipe b^3, as will be readily understood. It will be understood that each fan-casing A is provided with the pipes b' and b^3, arranged and operating as above described.

The fan-casing employed in my improved ventilating system is divided into two compartments, one of which is adapted to contain the motor-fan and the other compartment incloses the suction and forcing fan of the system. With the compartment which contains the motor-fan is associated the collecting-hood a and the discharge-mouth a^2, said parts being situated on opposite sides of the vertical plane of the motor-fan A′ and arranged to secure through the compartment a circulation of air when the car is in motion sufficient to propel the motor-fan at a rate of speed proper for the operation of the suction and forcing fan. The shaft B extends through both compartments of the fan-casing, as heretofore described, and on this shaft is secured the suction and forcing fan, whereby the latter is driven by the power of the motor-fan transmitted through the shaft B. By reference to Figs. 2 and 3 of the drawings it will be noted that the blades or wings of the motor-fan A′ and the suction and forcing fan A^2 are curved so as to secure large working surfaces, which promote the efficiency of the fans; but a peculiarity of my invention consists in arranging the curved blades of the motor-fan A′ to face in one direction, as shown by Fig. 2, while the curved blades of the suction and forcing fan A^2 face in the reverse or opposite direction to that of the blades on the motor-fan, this reversal of the blades on the two fans being readily apparent by a comparison of Fig. 2 with Fig. 3. This novelty in the arrangement of the fan-blades brings about an advantageous result in a car-ventilating system in which the rotary elements are driven by a current of air which exerts its energy on one rotary element when the car is in motion. The motor-fan, which constitutes one rotary element, operates to drive the suction and forcing fan in a direction to force the air through the pipes b^3 in the opposite direction to that in which the car is running, whereby the air is distributed or diffused properly throughout the length of the car.

I attach special importance to the arrangement of the collecting-funnel b with relation to the purifying water-tank B′. As shown by Fig. 4 of the drawings, this collecting-funnel is extended to form a contracted and downwardly-curved spout which extends into the tank B′ to terminate some distance below the normal water-line therein, and this spout is normally submerged in the bath of water with which the tank is supplied, whereby the air-current which flows into and through the collecting-funnel when the car is in motion is discharged into the water for the purpose of thoroughly eliminating from the air all particles of dust, cinders, and other refuse which otherwise would be distributed into the car or have a tendency to lodge in the pipes and the fan A^2.

It will be observed that in the practical operation of the ventilating system the air which is supplied through the purifying-tank B^2 to the suction and forcing fan A^2 loses its energy by reason of passing through the bath in the tank B′—in other words, the passage of the air-current from the funnel b through the purifying-bath neutralizes to some extent the flow or strength of the air-current, and hence the air from the funnel b bubbles or rises through the bath into the compartment or chamber within the tank B′ above the normal water-line therein. The employment of the suction and forcing fan A^2 is therefore possessed of special utility in my improved system, because said fan operates to draw the purified air in the required volume through the pipe b' and to mechanically force the air through the distributing-pipe b^3.

Owing to the fact that the motor-fan is driven solely by air-currents received through an intake located in the "wind-path," said motor will be driven according to the wind velocity of the air passing through said intake. This is of positive advantage when taken in connection with the air-chamber, the air-inlet to which or its "intake" is subjected to the same wind velocity. This will be readily understood when consideration is given to the fact that if the car is traveling in a direction opposite that of the normal air-currents the wind velocity in the intake to the air-chamber is increased, the velocity being the normal velocity plus that of the formed velocity due to the speed of the car. This increased velocity not only creates an increased pressure, but causes the introduction of a greater amount of air into said chamber. If, therefore, dependence is placed on a mechanically-operating motor, driven, for instance, from the car-axle, for driving a device for discharging the air from said chamber, this increased velocity and amount of air cannot be absorbed, inasmuch as the speed of the motor is not increased, and hence there

must be a consequent derangement of the parts of the apparatus with a positive detrimental effect. By the construction herein shown, however, such increase is automatically absorbed by reason of the intake for the motor-fan being located in the same wind-path as the intake for the air-chamber, so that the motor-fan will be driven at a greater speed, and thus driving the ventilating or exhaust fan at a greater speed, so that there is an equilibrium maintained between the velocity and amount of air introduced into the air-chamber and the speed capacity of the device which discharges this air from said chamber, due to the fact that both intakes are located in the same wind-path and subjected to the same conditions.

The improved ventilating system which I have devised has its elements combined and organized to supply the required volume of purified air to a car and to diffuse the air throughout the car without creating a draft therein, notwithstanding that the suction and forcing fan blows the air with considerable energy through the distributing-pipe b^3. At the same time the rotary elements of the ventilating system are driven solely by the energy of the air-current created through one compartment of the fan-casing solely by the motion of the car, and hence said rotary elements do not require the expenditure of power from a motor nor the employment of mechanical devices for driving the same, thus making the system economical for its maintenance.

Along the upper portion of the car is arranged a ventilating-pipe D, communicating with the interior of the car, preferably by means of perforations. The pipe extends through the car at a point near its rear end and projects into the interior of a funnel-shaped casing D′, mounted upon the upper portion of the car. The enlarged end d of the casing D′ opens in the direction of the movement of the car and may be protected by a wire-gauze. The end of the pipe D terminates near the rear end of the casing D′, which is of much larger diameter than that of the pipe D, and is concentrically arranged within the casing D′, as clearly shown in Fig. 5. The motion of the car causes a stroug current of air to be forced through the contracted end of the funnel-shaped casing D′ and draws the vitiated air from the interior of the car through the pipe D in the same manner as an ejector operates, as will be readily understood. The use of the ventilating-pipe D for withdrawing the foul air from the car, in connection with the ventilating-fans forcing purified fresh air into the car, insures perfect ventilation at all times.

By reference to Figs. 2 and 6 of the drawings it will be noted that the perforated air-supply and distributing pipe b^3 is arranged longitudinally of the car in a horizontal plane about on line with the upper ends of the car-windows in an ordinary passenger-coach and in a sleeping-car just above the upper berths, whereas the perforated suction-pipe D is arranged close to the roof of the car. An essential feature of this system resides in the arrangement of the perforated distributing-pipe in a plane below the perforated suction or exhaust pipe, and this arrangement insures the proper ventilation of and the establishment of the circulation in the interior of a car at the upper portion thereof. It is well known to those skilled in the art that some of the foul air accumulates in the upper portion of the car, particularly when the latter is heated or the lighting system is in operation. The installation of my ventilating system not only carries off the foul air which is confined in the upper portion of the car, but fresh pure air is supplied to the interior thereof to render the air wholesome.

If desired, ice may be placed in the air-chamber B′ for cooling the air in hot weather.

While I have herein shown a preferred form of carrying my invention into effect, yet I do not desire to limit myself to such preferred details of construction, but claim the right to use any and all modifications thereof which will serve to carry into effect the objects to be attained by this invention in so far as such modifications and changes may fall within the spirit and scope of my said invention.

I claim—

1. A car-ventilating apparatus comprising an air-purifying chamber having an external-air intake; mechanism for discharging the air from said chamber into the car; an independent intake extending in the same direction as said chamber-intake; and an air-motor in said independent intake coupled to and operating the discharge mechanism.

2. A ventilating apparatus for cars, comprising a wind-driven or air motor; a ventilating-fan actuated solely by said motor; an air-chamber partially filled with water; an air-inlet therefor, said inlet being open in the direction of movement of the car, the other end of said inlet being below the surface of the water; a pipe leading from said chamber to said fan; and a pipe leading from the fan to the interior of the car, whereby the air-inflow into said chamber will be positively discharged proportionately to its ingress regardless of the wind velocity and car speed.

3. A ventilating apparatus for cars, comprising a wind-driven or air motor; a ventilating-fan actuated solely by said motor; an air-chamber partially filled with water; an air-inlet therefor, said inlet being open in the direction of movement of the car, the other end of said inlet being below the surface of the water; a pipe leading from said chamber to said fan, the inlet end of said pipe being above the surface of the water; and a pipe leading from the fan to the interior of the car, whereby the air-inflow into said chamber

will be positively discharged proportionately to its ingress regardless of the wind velocity and car speed.

4. In a car-ventilating system, an elevated tank adapted to be partly filled with water, and an external-air-collecting funnel disposed in front of the tank and provided with a spout which terminates in said tank below the normal water-line therein and is thereby adapted to be submerged in the water of the tank, combined with a wind-driven motor-fan having its intake open in the same direction as the intake of the collecting-funnel, a suction and forcing fan driven thereby, and an air-pipe connecting the tank above its water-line with a casing of said suction and forcing fan, and a distributing-pipe leading from the suction and forcing fan, substantially as described.

5. In a car-ventilating system, the double fan-casing having two compartments, one of which has a normally open outlet at one side thereof and a collecting-hood on its other side and opening in the direction of movement of the car, a single fan-shaft extending through both compartments of said fan-casing, a motor-fan mounted on the shaft, within one compartment, and provided with curved blades facing in one direction, and a suction and forcing fan fast with said fan-shaft, within the other compartment, and having curved blades which face in a reverse direction to the blades on the motor-fan, combined with an air-purifying tank having its air-intake opening in the same direction as the motor-fan intake, a pipe connecting said tank with the suction and forcing fan, and a distributing-pipe leading from the suction and forcing fan, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ALEXANDER ROSS.

Witnesses:
WILLIAM B. ROBERTS,
R. A. DE ALLOQUI.