(No Model.) 2 Sheets—Sheet 1.

E. P. PHELPS.

VENTILATING APPARATUS FOR VEHICLES, &c.

No. 572,444. Patented Dec. 1, 1896.

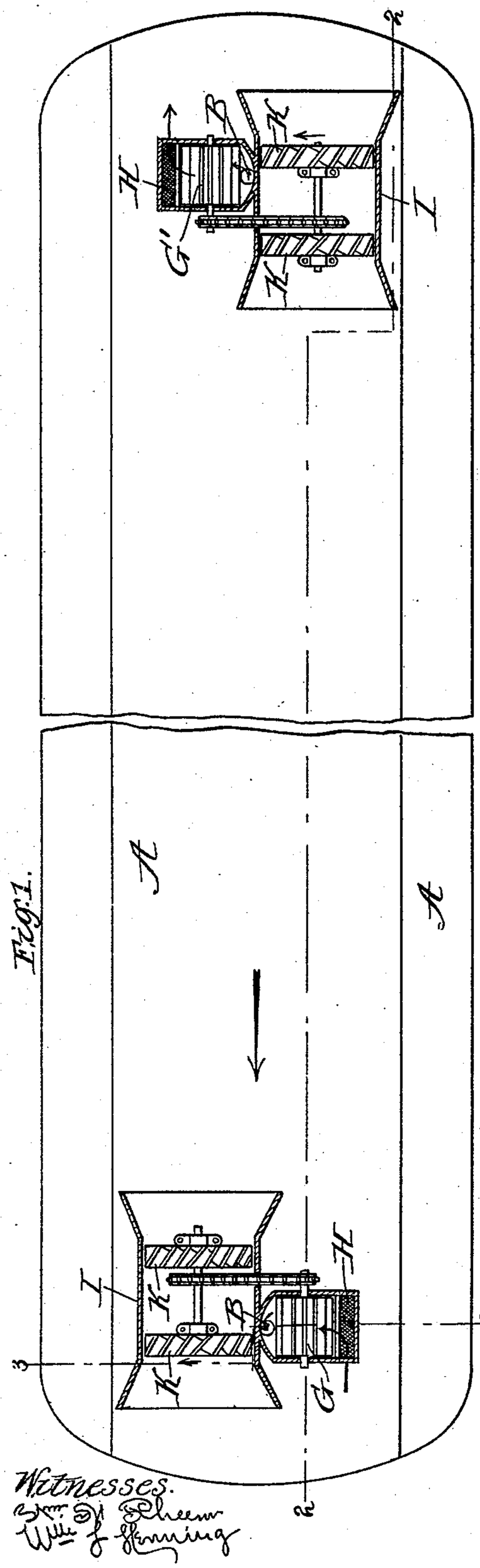

Fig. 1.

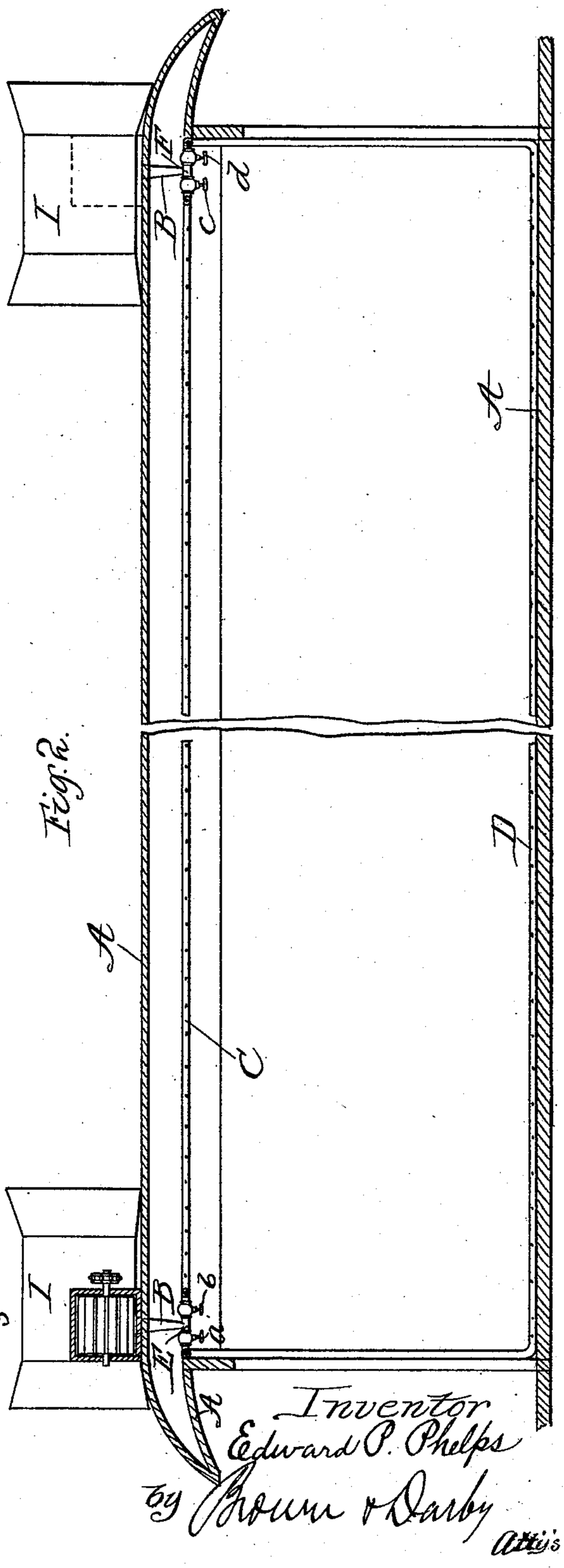

Fig. 2.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

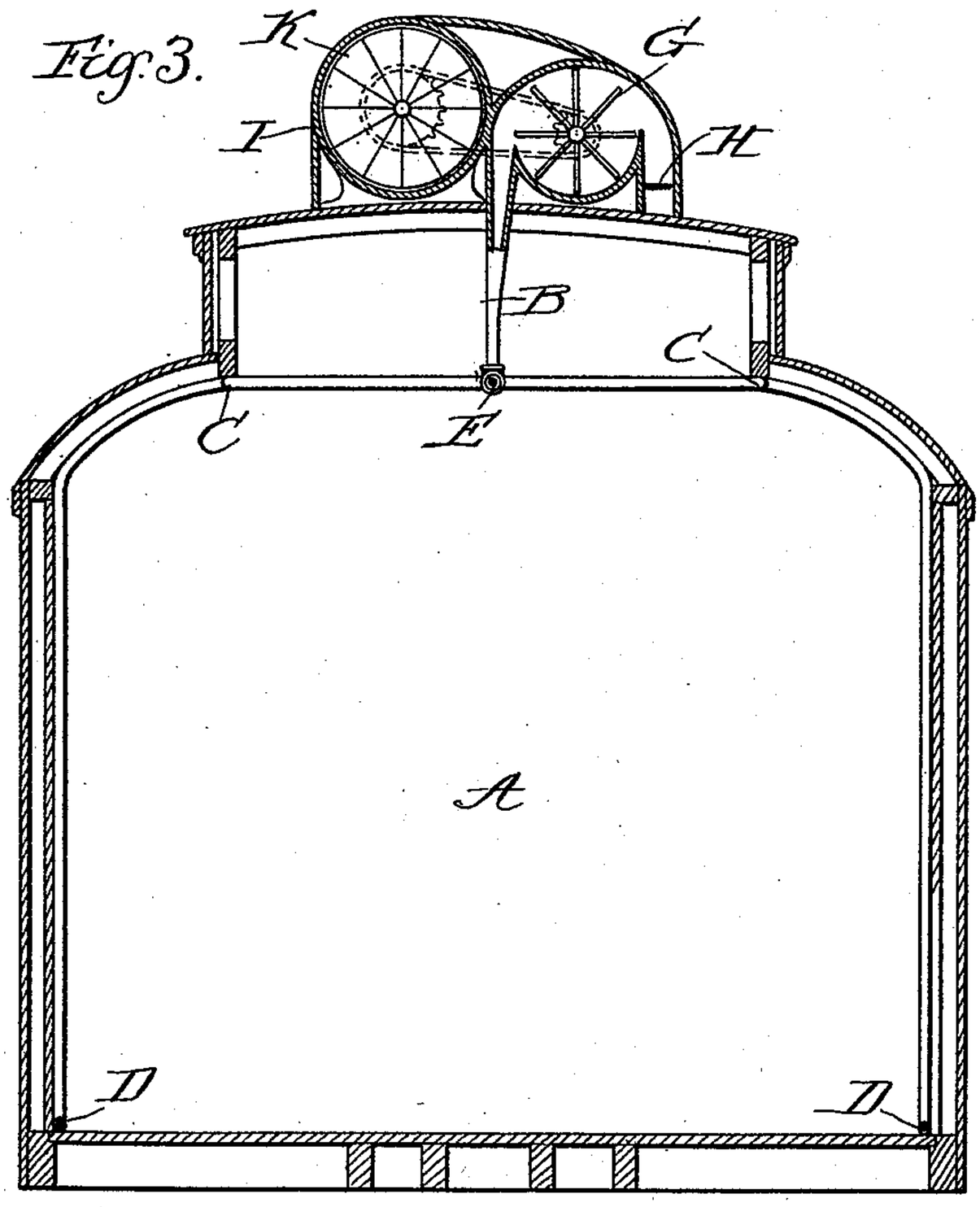
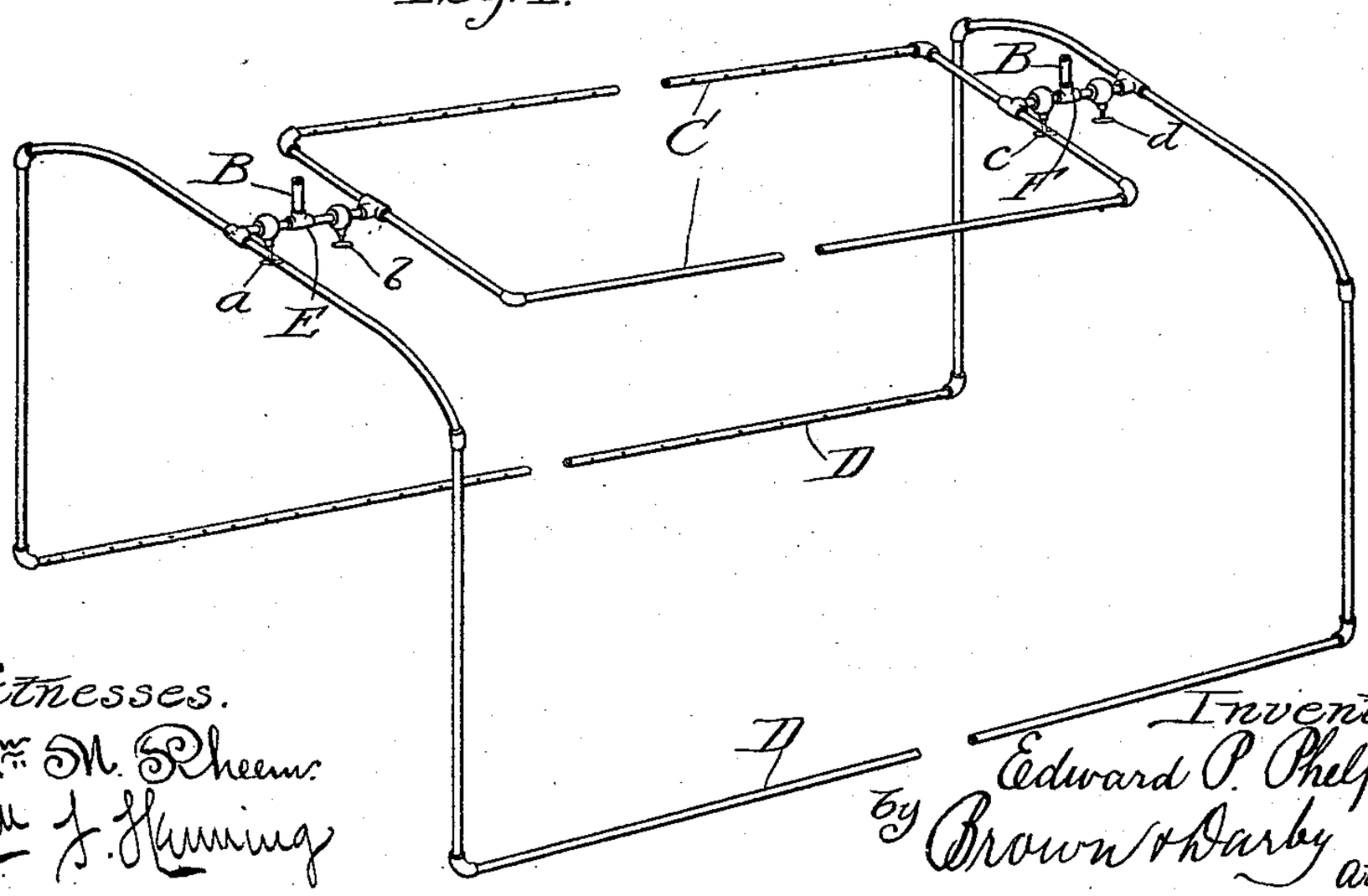


Fig. 4.



Witnesses.
Wm. M. Sheems.
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Inventor
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UNITED STATES PATENT OFFICE.

EDWARD P. PHELPS, OF CHICAGO, ILLINOIS.

VENTILATING APPARATUS FOR VEHICLES, &c.

SPECIFICATION forming part of Letters Patent No. 572,444, dated December 1, 1896.

Application filed February 13, 1896. Serial No. 579,177. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. PHELPS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Ventilating Apparatus for Vehicles, &c., of which the following is a specification.

This invention relates to improvements in ventilating apparatus for vehicles, and is especially designed for cars.

The invention consists in substantially the construction shown and described, and more particularly pointed out in the claims.

Like letters refer to the same parts in the several figures of the drawings, in which—

Figure 1 illustrates a plan view of a car, with a horizontal section of a portion of a ventilating apparatus arranged on the top of such car. Fig. 2 illustrates a vertical longitudinal section on the line 2 2, Fig. 1. Fig. 3 illustrates a vertical cross-section on the line 3 3, Fig. 1. Fig. 4 illustrates a perspective view of the frame of the ventilating-pipes.

According to ancient practice in ventilating vehicles or buildings it was esteemed best to introduce the supply of fresh air near the floor and exhaust the foul air through the top of the structure; but modern experience has caused a reversal of this method of procedure, wherefore the present approved plan is to supply the fresh air near the top of the structure and exhaust near the floor of the same.

The present invention proceeds after the plan approved by modern experience.

The main features of the present invention are applicable to all kinds of normally-closed vehicles, and, in fact, to houses as well; but by way of illustration the system is shown in the drawings as applied to railway-cars, because it will probably be most frequently used in that connection.

In carrying out the invention a passage is provided between the outer air and the top of the structure to be ventilated, and this passage when used in connection with the railway-car may be formed of a pipe B, which at its upper end is in connection with the driving side of a suitable fan and at its lower end with the system of ventilating-pipes. These ventilating-pipes comprise upper pipes C, which are arranged near the top and upon the inside of the structure to be ventilated and have suitable perforations or other openings to provide an exit for the fresh air, and a lower set of pipes D, arranged near the floor and inside the structure to be ventilated, and preferably along the walls thereof, and suitably perforated for the admission of air. The upper set of pipes and the lower set of pipes should be connected by suitable branch pipes, and an advantageous form or arrangement of pipes for cars is shown very clearly in Fig. 4 of the drawings, in which the upper pipes are arranged as a parallelogram, the ends of which are connected by cross-pipes E F to a frame of pipes of the form of a common iron bedstead, that is, with longitudinal lower pipes having vertical pipes projecting from each end and curved cross-pipes connecting the upper end of the vertical pipes. This arrangement of pipes will be found convenient in railway-cars.

It is deemed advantageous when the invention is applied to vehicles, and especially to railway-cars, to provide fans at each end, as shown at G G′, Fig. 1 of the drawings. When these fans are thus provided at each end, one may be used as the forcing-fan and the other as the exhaust-fan, and their functions alternated as the ends of the cars are reversed, that is to say, when the car is moving in the direction of the arrow shown in Fig. 1 of the drawings G is the force-fan and G′ the exhaust-fan; but when the direction of the car is reversed G′ becomes the force-fan and G the exhaust-fan. In order to accommodate the pipe system to this reversal in the action of the fans, hand or other valves should be provided to control the direction of the flow of air. In the drawings four hand-valves are shown in Figs 2 and 4, *a* and *b* being the end valves on opposite sides of the entrance-pipe at one end, and *c* and *d* being the valves on opposite sides of the pipe B at the other end.

When the fan G is acting as a force-fan, the valve *a* should be closed and the valve *b* opened, so as to admit the fresh air through such valve *b* into the pipes C, and the valve *c* should be closed and the valve *d* opened, so

as to permit the foul air to be exhausted from the lower pipes through the valve *d*, cross-pipe F, and exhaust-fan G′ with connecting-passage. On the other hand, when the fan G′ is employed as the force-fan the valve *d* should be closed and the valve *c* opened and the valve *b* closed and the valve *a* opened, which manipulation will result in the air being forced through the valve *c* into the upper pipe C and exhausted from the lower part of the room through pipes D, the valve *a*, passage-way, and the fan G.

It is regarded as advantageous to have the fan tightly inclosed except for an opening at the end to admit the inflow or outflow of the air. In case the apparatus is applied to railway-cars the inlet and outlet passage to the fan may be conveniently arranged, as shown in Figs. 1 and 3 of the drawings, in which the passage is provided with a screen H, so as to prevent the entrance of cinders or other solid matter. The inlet and outlet fans may be operated by any suitable power connection, but an economical and efficient motor for use with railway-trains, steamboats, and the like is illustrated in Figs. 1, 2, and 3 of the accompanying drawings, which consists of wind-wheels suitably arranged and connected to the fans, as will be now particularly described. At each end of the car is arranged a tube I with its opposite ends flared, as shown, and in this tube is fitted and supported a shaft carrying at each end wind-wheels K and intermediate of these wheels suitable gearing connecting such shaft to the shafts of the fans. In the drawings sprocket-wheels and chains are shown as forming the connection. At one end of the car the wind-wheels may be placed at the right of the fan and at the other end of the car the wind-wheels at the left of the fan. A motion of the car will create a draft or current through the tubes I, and will thereby cause the wind-wheels to turn and operate the fan. If the car is moved in the direction of the arrow in Fig. 1 of the drawings, the wind-wheels at the forward end will cause the fan to draw in air and force it into the car, and the wind-wheels at the other end will be revolved in such a manner as to cause the fan to exhaust air from the bottom of the car, and when the car is moving in the opposite direction this operation of the wheels and fans will be reversed.

Of course many variations and modifications may be made in the details of the apparatus above described by persons skilled in the art without departing from the spirit of the invention, and I therefore do not desire it to be understood as limited to the exact construction shown and described.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a ventilating apparatus, comprising an upper set of pipes and a lower set of pipes, connected together, with a forcing-fan and an exhaust-fan connected to such system of pipes; substantially as and for the purpose set forth.

2. In a ventilating apparatus, the combination with a system of pipes, comprising an upper and a lower set connected together, and a forcing-fan and exhaust-fan connected to such pipes, and suitable valves controlling the direction of flow; as and for the purpose set forth.

3. In a ventilating apparatus, the combination with a system of pipes, comprising an upper set of pipes and a lower set of pipes connected together, two fans connected with the system of pipes, and a pair of valves arranged adjacent to each connection with a fan, the individual valves of the pair being on opposite sides of such connection, whereby the fans may be alternated as force and exhaust fans; as and for the purpose set forth.

4. In a ventilating apparatus for vehicles the combination with a system of pipes comprising an upper and a lower connected together, and a forcing and exhaust fan connected to such pipes, of wind-motors arranged on the outside of the vehicle and connected to the fans to operate the same; as and for the purpose set forth.

5. In a ventilating apparatus for vehicles, the combination with a system of pipes located in such vehicle, two fans connected with such pipes, each fan having a pair of valves, the individuals of which are respectively arranged on opposite sides of such connection, and wind-wheels respectively arranged at opposite ends of the vehicle and on the outside of the same and connected to operate such fans; as and for the purpose set forth.

6. In a ventilating apparatus for vehicles, the combination with a system of pipes located within the vehicle, comprising a lower set of pipes and an upper set of pipes, connected together, of two fans, one near each end of the vehicle and each connected with the pipes, valves on each side of the connections last mentioned, wind-wheels on the outside of the vehicle, adjacent to and connected to operate the fans; substantially as and for the purpose set forth.

7. In a ventilating apparatus for vehicles the combination with a system of pipes comprising an upper and a lower connected together, a forcing and an exhaust fan communicating with the pipes, and wind-wheels arranged in open-ended tubes outside the vehicle, and connections between the wind-wheels and fans; substantially as and for the purpose set forth.

8. In a ventilating apparatus for vehicles, the combination with a system of pipes located within such vehicle, two fans arranged respectively near opposite ends of the vehicle and connected to the pipes, and valves arranged on opposite sides of each connection, open-ended tubes on the outside of the vehicle, adjacent to the fans, and a pair of wind-

wheels in each tube, and connections between the same and the fans; as and for the purpose set forth.

9. In a ventilating apparatus for vehicles, the combination with a system of pipes arranged within the vehicle, of wind-wheels arranged in pairs at opposite sides of the vehicle, and with fans on opposite sides of the wheels at the respective ends of such vehicle; as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 11th day of February, 1896.

EDWARD P. PHELPS.

Attest:

FRANK T. BROWN,

M. I. CAVANAGH.