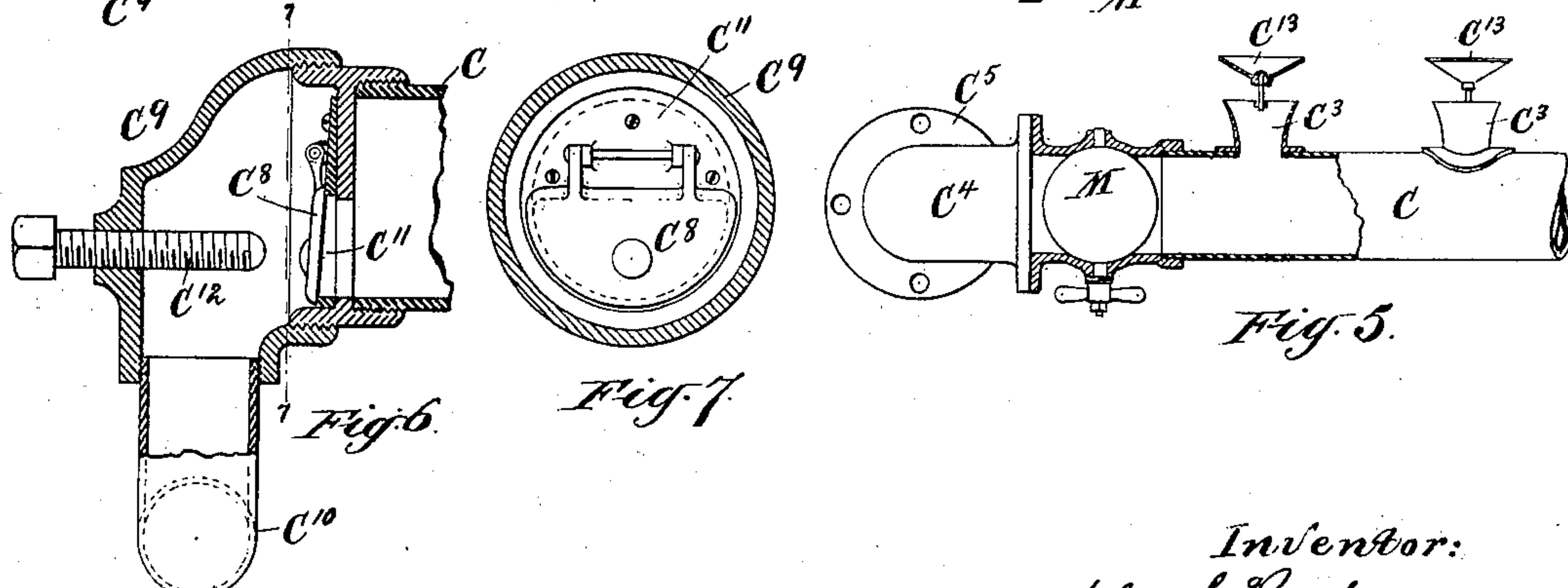
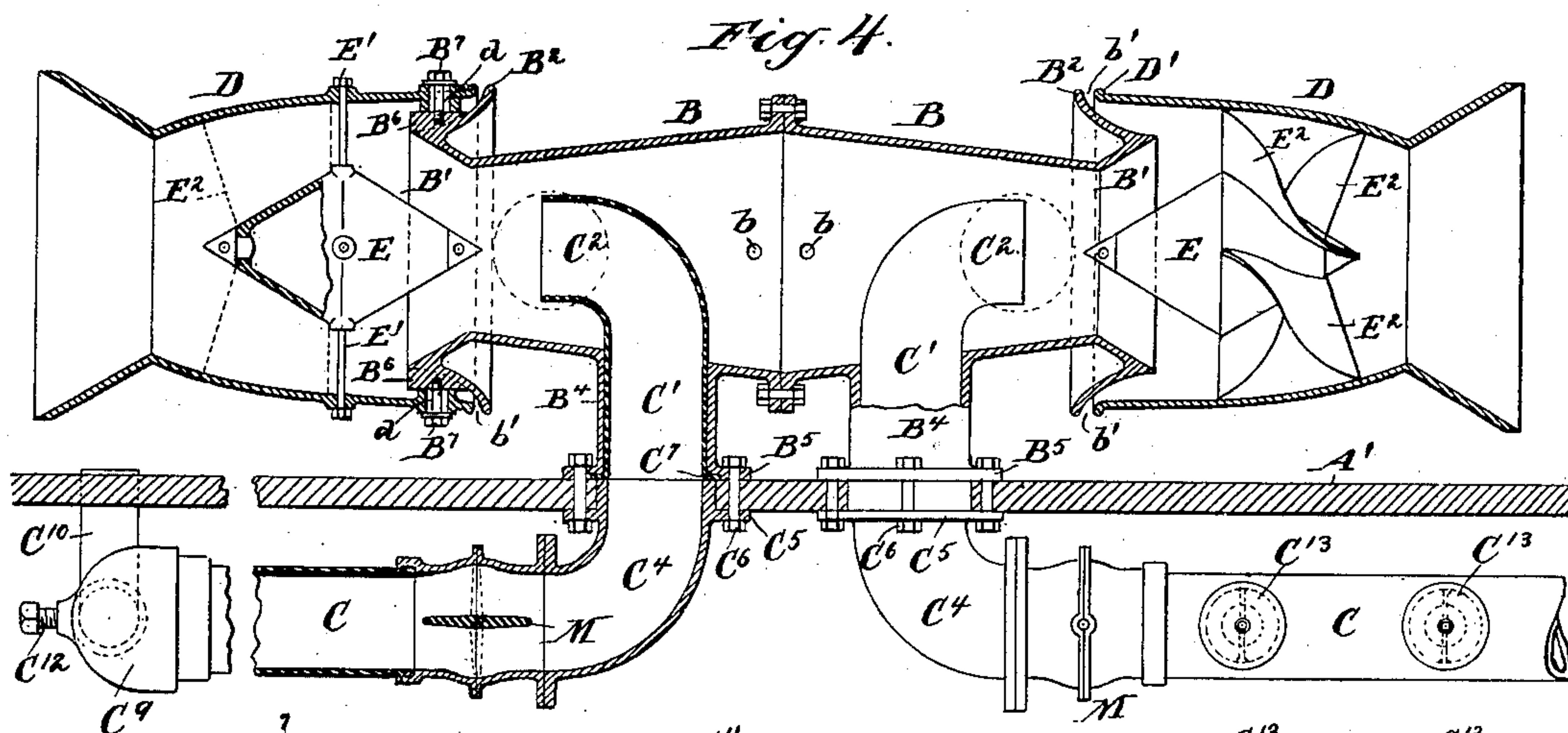
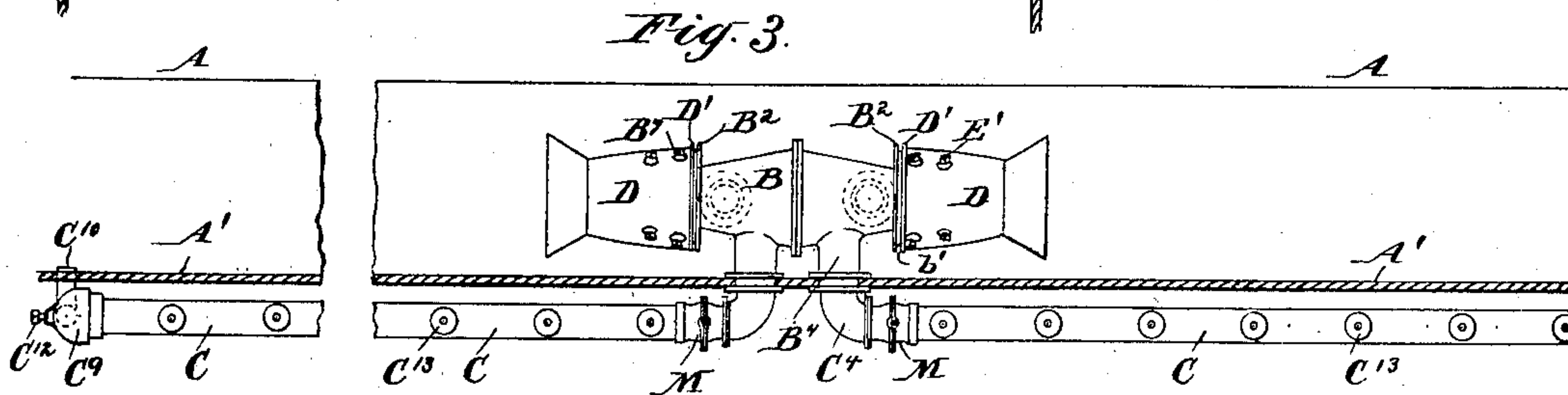
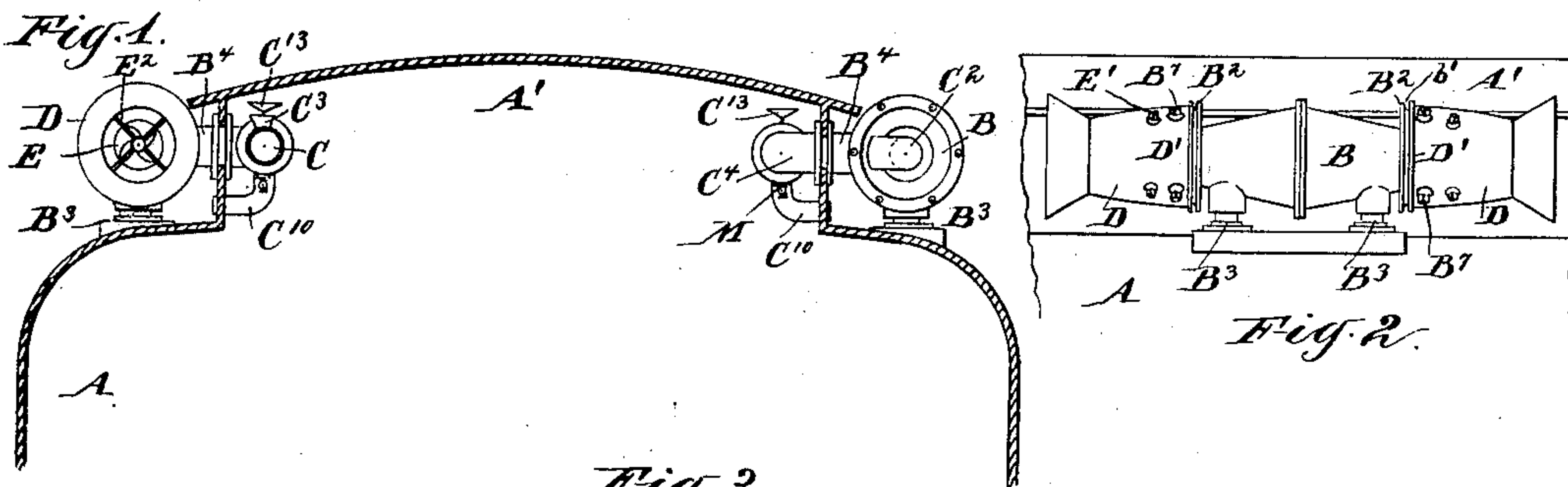


J. S. ROAKE.
VENTILATING APPARATUS.

APPLICATION FILED JULY 15, 1902.

NO MODEL.



Witnesses:
M. E. Grace
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UNITED STATES PATENT OFFICE.

JOHN S. ROAKE, OF BROOKLYN, NEW YORK.

VENTILATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 735,823, dated August 11, 1903.

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To all whom it may concern:

Be it known that I, JOHN S. ROAKE, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Ventilating Apparatus, of which the following is a specification.

The invention relates more particularly to means for introducing fresh air and removing vitiated air from railway-cars, and is in that class in which the air-currents are induced by the movement of the car.

The object of the invention is to provide means for supplying fresh outside air freed from dust and other extraneous matter to the interior of the railway-car or analogous vehicle and for removing the vitiated air without producing objectionable drafts, such as are caused by open windows and the usual ventilator-openings.

By the use of my invention a liberal supply of fresh air is forced into the car and distributed uniformly in the forward upper portion thereof, while the vitiated air is drawn out from the upper rear portion. The fresh cool air tends to descend by gravity and passes toward the rear, becoming gradually warmed and impure during the traverse until it reaches the rear end, where it ascends and is drawn out. The action is the same for both the forward and rearward movement of the car and continues automatically so long as the car is in motion in either direction.

I employ a peculiarly-formed casing carried upon the roof of the car at about the mid-length, having its open ends facing forward and rearward, so that the movement of the car causes a current of air to traverse the casing. A portion of the current is intercepted and delivered through a duct entering the car and extending longitudinally of the forward portion thereof and provided with suitable openings for the escape of air. A similar duct similarly disposed in the rear portion of the car enters the casing and is so acted upon by the air-current in the latter as to induce a partial vacuum at the exit end, which is felt throughout the duct and serves to draw in the air adjacent thereto and eject it through the casing. Means are provided for excluding cinders, dust, rain, or snow

and for controlling the flow through the ducts and also for permitting the escape of excessive pressure with any water of condensation or other matter in the ducts through automatic relief-valves.

The apparatus for both ends of the car are alike or counterparts, and the action is maintained by the movement of the car in either direction without requiring any change or attention.

The invention consists in certain novel features and arrangements of parts and in certain details of construction to be hereinafter described.

The accompanying drawings form a part of this specification and show the invention as I have carried it out.

Figure 1 is a transverse section through the upper part of a car equipped with my improved apparatus. Fig. 2 is a corresponding side elevation, and Fig. 3 is a plan view, of the apparatus on one side of the car, a portion of the latter being shown in horizontal section. Fig. 4 is a horizontal section, partly in plan view on a larger scale, and Fig. 5 is a corresponding elevation, partly in vertical section, of a portion as seen from the interior of the car. Fig. 6 is a vertical section, partly in elevation, showing the automatic relief-valve; and Fig. 7 is a corresponding sectional elevation, the plane of section being indicated by the line 7 7 in the preceding figure.

Similar letters of reference indicate the same parts in all the figures.

A indicates the body of a car, and A' the usual raised central portion of the roof.

B is a hollow shell or casing tapered in both directions from the center line, having the ends open and each provided with a flaring mouth B', having a reversed outwardly-curving flange B². The casing is located at about the mid-length of the car in the angle formed by the junction of the raised portion A' with the roof and is supported on the latter by feet B³ B³. The casing is for convenience in making formed in two halves bolted together, as shown, each half being provided with a foot B³ and also with a small opening b in the lower face through which any water entering the casing may escape. I prefer to employ two casings on each car and two complete sets of the apparatus, one on each side, as shown in

Fig. 1; but as both are alike a description of one will suffice.

B⁴ B⁴ are laterally-extending tubular arms, one on each half of the casing, each provided with a flange B⁵, adapted to apply against the adjacent wall of the roof portion A' and inclosing a pipe C', forming part of the ventilating-duct, and having an elbow C², reaching to the center of the casing with its open end on the axial line thereof. The elbows face outwardly oppositely to each other, as shown in Fig. 4.

C C are the ventilating-ducts extending longitudinally of the car in both directions from the points where they enter from the casing nearly the full length and are provided at intervals on the upper faces with flaring thimbles C³, communicating between the interior of the ducts and the interior of the car. The ducts are located, preferably, as high as practicable in the car. Each duct is connected to its pipe C' by an elbow C⁴, having a flange C⁵, lying against the vertical wall of the roof A', which is cut away to receive the end of the elbow, the latter being joined to the flange B⁵ by bolts C⁶, extending through both flanges and the wall and securing all firmly together and also bracing the casing B. The pipe C' is secured by the same connection, its flange C⁷ being clamped between the flange B⁵ and elbow C⁴, as shown. Each duct C is equipped at the opposite end with an outwardly-opening automatic valve C⁸ and a downwardly-projecting valve-casing C⁹ therefor, terminating in a curved outlet-pipe C¹⁰, opening exteriorly of the car. The valve C⁸ is shown as a swing-valve hinged above and tending to lie by gravity with gentle pressure against its slightly-inclined or angular seat C¹¹, but free to open by any excess of pressure within the duct. A screw C¹², tapped through the valve-casing C⁹, serves adjustably to limit the extent of opening.

M is a damper or butterfly-valve located in each duct C near the elbow C⁴ and serves to control the flow through the duct.

Each open mouth of the casing B projects into and is encircled by an annular skirt D' of a concentrically-arranged conical casing D, supported by the bosses B⁶ on the flange B² and secured by bolts or studs B⁷, extending through longitudinal slots d in the skirt, by which it is held in position and may be set nearer to or farther from the flange B² to adjust the area of the annular space b' between these parts. Inclosed in each conical casing is a double cone E, mounted axially thereof by means of the bolts E' or otherwise, with its inner end or apex projecting within the flaring mouth of the casing B. The outer end lies just within the flared open end of the casing D and is provided with a series of spiral wings or vanes E², reaching to the interior of the inclosing casing and serving incidentally to prevent the entrance of large obstructions, but more especially to impart a rapid whirling motion to the incoming air-

current. The arrangement of the casing B, conical casing D, and the pipes C' are such at each end as to serve either as an inspirator or as an aspirator, according as such end is presented in the direction of the motion or in the opposite direction.

Assuming the car to be moving in the direction from left to right in Fig. 4, air is received by the flared open end of the casing D and directed inward to the cone E. The latter deflects it annularly outward and by reason of the pitch of the vanes E² induces a rapid rotatory motion. The current is then deflected inwardly by the mouth of the casing B and the inner end of the cone E. The sudden change in direction, aided by the centrifugal action, tends to force outwardly any heavy matter carried by the air-current and project it through the annular discharge-opening b'. The current thus freed from dust or other material traverses the casing B, a portion being intercepted by the open end of the elbow C' and delivered to the duct C, whence it escapes through the openings C³, distributed along the upper face of the duct, and supplies fresh air at the outside temperature to the upper forward portion of the car. Any excess of pressure beyond the capacity of the openings C³ lifts the automatic valve C⁸ and passes to the exterior of the car, carrying with it any dust, water of condensation, or other heavy matter accumulated in the duct or not eliminated at the entrance to the casing B. The volume of air allowed to enter the duct may be controlled by the butterfly-valve or damper M as required to suit the conditions of temperature, speed of train, and direction and velocity of the wind. The portion of the air-current traversing the casing B and not diverted to supply fresh air to the car passes onward and by its escape past the slight constriction immediately beyond the second elbow C' creates a partial vacuum at the mouth of the elbow, and thus induces an outwardly-flowing current of air received through the second duct from the rear end of the car. The automatic valve at this end of the apparatus is held closed by gravity and the external pressure and prevents the entrance of air at this point. Thus conditioned a constant current of fresh air is sent into the car by that end of the casing acting as an inspirator, and a similar current of air which has traversed the car from front to rear and become vitiated is drawn out by the action at the aspirator end of the casing. It will be observed that the construction and arrangement is the same at both ends, the injecting and ejecting actions being determined by the direction of the air-current through the casing. The cool fresh air delivered through the many openings C³ is distributed uniformly in the forward upper portion of the car. It descends by gravity, mingling with the air in the car and becoming gradually warmed thereby, and is drawn toward the rear portion of the car by the

lower pressure at that end due to the education-current, aided by the general tendency of the air from front to rear due to the car motion, rises at that end, and is drawn through the openings into the duct at that end and ejected.

The openings C³ are preferably provided with spreaders or deflectors C¹³, serving to distribute the currents of air delivered there-
10 through.

The butterfly-valves may be closed in passing through tunnels or other situations in which it is desirable to exclude temporarily the external air.

15 Snow and rain are not likely to enter the ducts; but in case small quantities should pass the eliminator E at the entrance to the casing B and are received therein the resulting water will lie in the lower portion of the
20 ducts and be driven out past the relief-valves at their first opening. The relief-valves remain closed during periods when the car is not in motion and prevent the entrance of moisture.

25 Modifications may be made in the forms and proportions of the several parts of the apparatus, and portions may be used without the whole.

I have shown the car as provided with two
30 sets of apparatus, one on each side; but one alone may serve, and it may be centrally or otherwise located.

The openings in the ducts C may be simple holes without thimbles or deflectors.

35 Although I have described the invention as applied to a railway-car, it will be understood that it will serve in ventilating other moving structures.

I claim—

40 1. A casing mounted upon and exteriorly of a car and arranged to be traversed by a current of air induced by the movement of the car, a duct at each end of said casing and
45 extending within said car, cones mounted axially of said casing, one at each end thereof, in combination with means at each end of said casing adapted to deliver air through its
50 duct to said car or to draw air through its duct from said car according to the direction of motion of said car, and means located in said casing adapted to cause a sudden change
55 in direction of the incoming air-current whereby heavy matter carried in such current is deflected from the entrance to the duct leading said current to said car.

2. A casing mounted upon and exteriorly of a car and arranged to be traversed by a current of air induced by the movement of the car, a duct at each end of said casing extend-
60 ing to the forward and rearward portions respectively of the interior of said car, cones mounted axially of said casing, one at each end thereof, in combination with means at one end of said casing adapted to deliver air from
65 said casing through its duct to the forward portion of said car, and means at the opposite end of said casing for drawing air through

its duct from the rearward portion of said car, the said means and ducts arranged either to deliver or draw according to the direction
70 of motion of said car, and means located in said casing adapted to cause a sudden change in direction of the incoming air-current whereby heavy matter carried in such current is deflected from the entrance to the duct lead-
75 ing said current to said car.

3. A casing mounted upon and exteriorly of a car and arranged to be traversed by a current of air induced by the movement of the car, a duct extending from said casing into
80 said car and adapted to receive air from said current and deliver it within said car, cones mounted axially of said casing, one at each end thereof, an inclosing casing for each of said cones and an automatic valve in said
85 duct arranged to open to the exterior of said car and allow excess of pressure in said duct to escape.

4. A casing mounted upon and exteriorly of a car and arranged to be traversed by a current of air induced by the movement of the car, a duct at each end of said casing leading to the interior of said car, each having a series of outlet-orifices, means at one end of said casing adapted to deliver air from said
90 casing through its duct to the forward portion of said car, cones mounted axially of said casing, one at each end thereof, an inclosing casing for each of said cones and means at the opposite end of said casing for
95 drawing air through its duct from the rearward portion of said car, the said means and ducts arranged to deliver or draw according to the direction of movement of the car, and a relief-valve for each of said ducts adapted
100 automatically to open to the exterior of said car and allow excess of pressure in said ducts to escape and automatically to close when said pressure is relieved.

5. A casing mounted upon and exteriorly of
110 a car and arranged to be traversed by a current of air induced by the movement of the car, a duct at each end of said casing leading to the interior of said car, cones mounted axially of said casing, one at each end thereof,
115 means at one end of said casing adapted to deliver air through its duct to the forward end of said car, means at the opposite end of said casing for drawing air through its duct from the rear portion of said car, and means
120 for adjustably controlling the flow of air through said ducts, and means located in said casing adapted to cause a sudden change in direction of the incoming air-current whereby heavy matter carried in such current is
125 deflected from the entrance to the duct leading said current to said car.

6. A casing mounted upon and exteriorly of a car and arranged to be traversed by a current of air induced by the movement of the
130 car, a duct at each end of said casing leading to the interior of said car, cones mounted axially of said casing, one at each end thereof, means at one end of said casing adapted to

deliver air through its duct to the forward end of said car, means at the opposite end of said casing for drawing air through its duct from the rear portion of said car, means for adjustably controlling the flow of air through said ducts, and a relief-valve for each of said ducts adapted automatically to open to the exterior of said car and allow excess of pressure to escape and automatically to close when said pressure is relieved.

7. In a car-ventilating apparatus, a casing adapted to be traversed by an air-current induced by the movement of the car, and a duct arranged to receive a portion of said current and deliver it to the interior of said car, cones mounted axially of said casing, one at each end thereof, in combination with a valve-casing on the delivery end of said duct and connections from said valve-casing to the exterior of the car, and with a swinging valve and an inclined seat therefor, whereby the said valve is held lightly to its seat by gravity and free to open automatically to relieve slight excesses of pressure in said duct.

8. In a car-ventilating apparatus, the casing B carried on the car and having open flared ends B', a flange B² on each of said ends, cones E E mounted axially of said casing one at each of said ends, an inclosing cas-

ing for each of said cones, said inclosing casings having each a skirt encircling the said flange adjacent thereto and having the annular opening b' between them, a duct at each end of said casing B leading to the interior of said car, all combined and arranged to serve substantially as herein specified.

9. In a car-ventilating apparatus, the casing B carried on the car and having open flared ends B', a flange B² on each of said ends, cones E E mounted axially of said casing one at each of said ends, an inclosing casing for each of said cones, said inclosing casings having each a skirt encircling the said flange adjacent thereto and having the annular opening b' between them, a duct at each end of said casing B leading to the interior of said car, and a series of spirally-arranged vanes E² on each of said cones, all combined and arranged to serve substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

JOHN S. ROAKE.

Witnesses:

CHARLES R. SEARLE,
CHARLES LEE MEYERS.