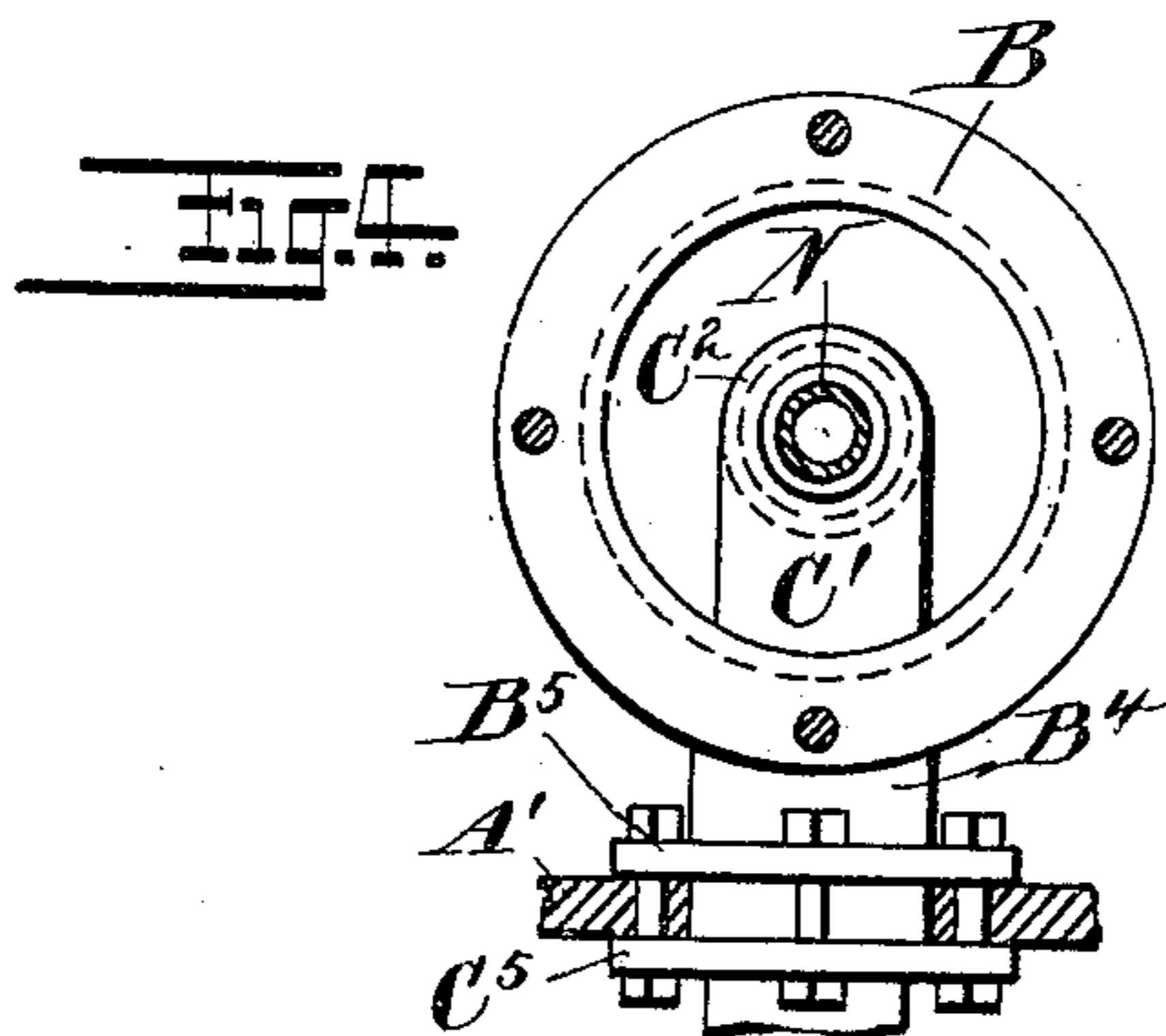
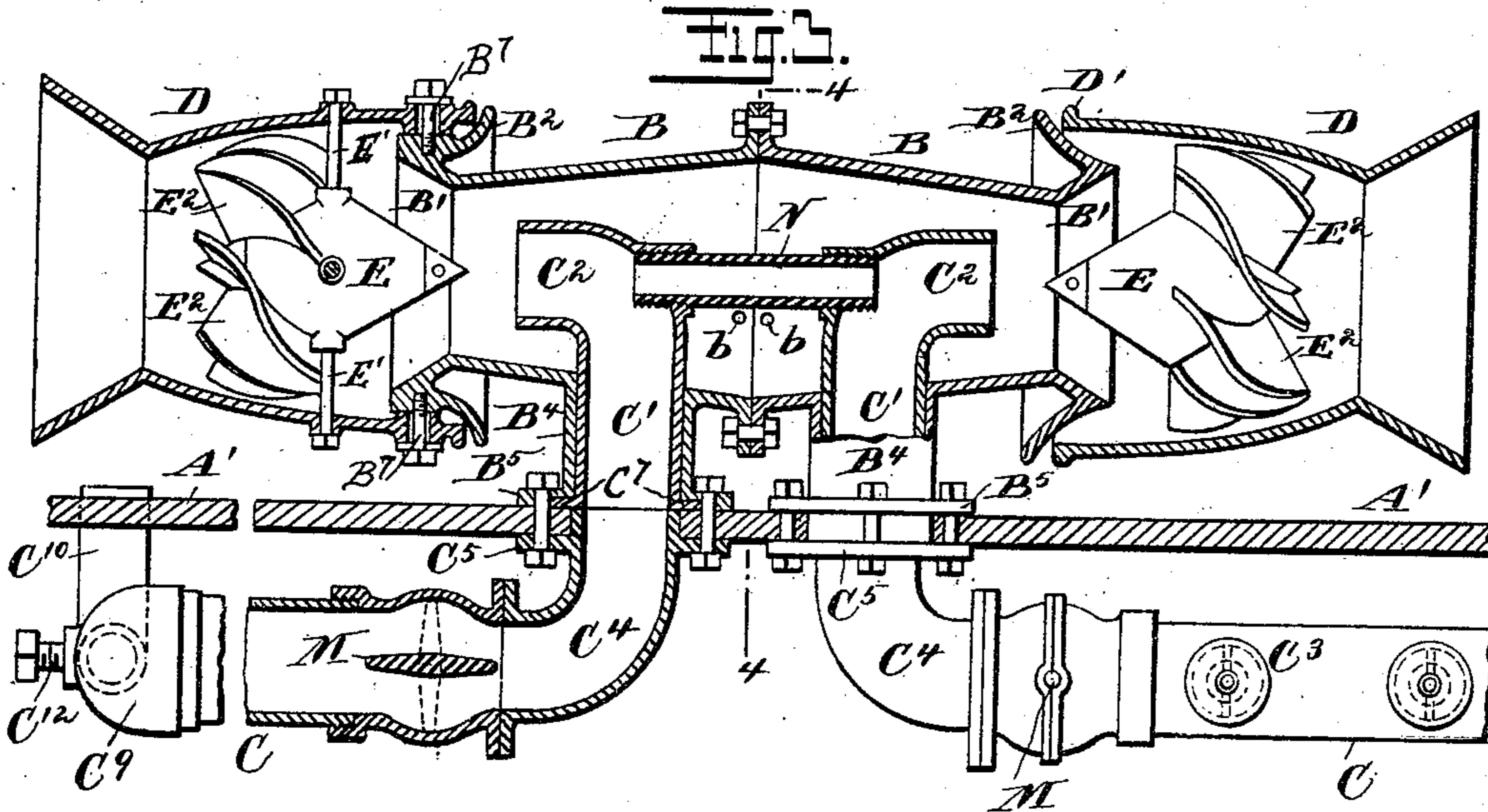
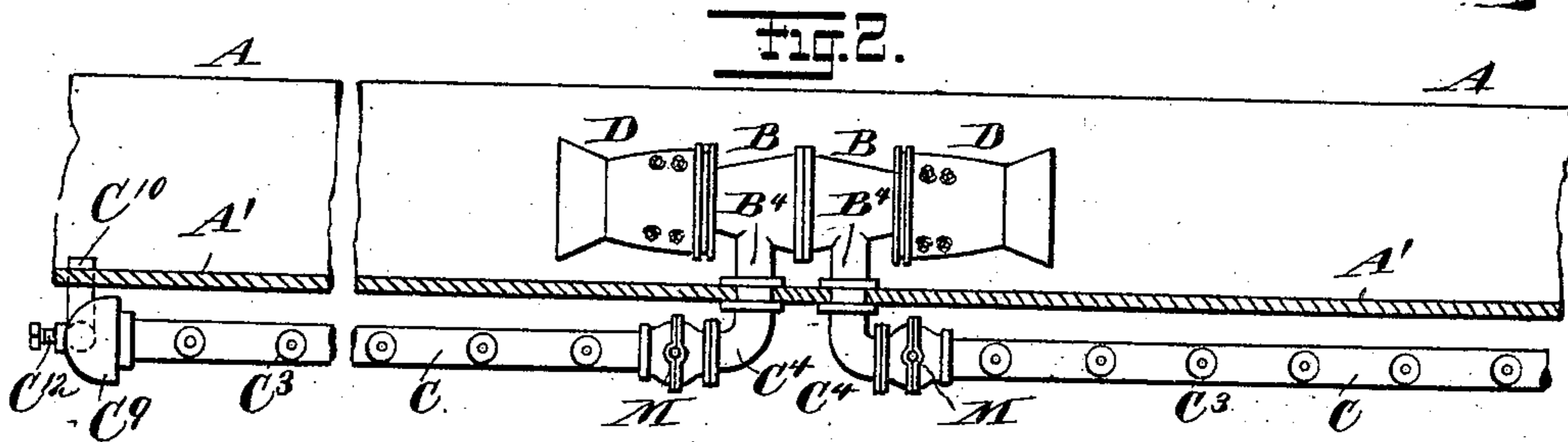
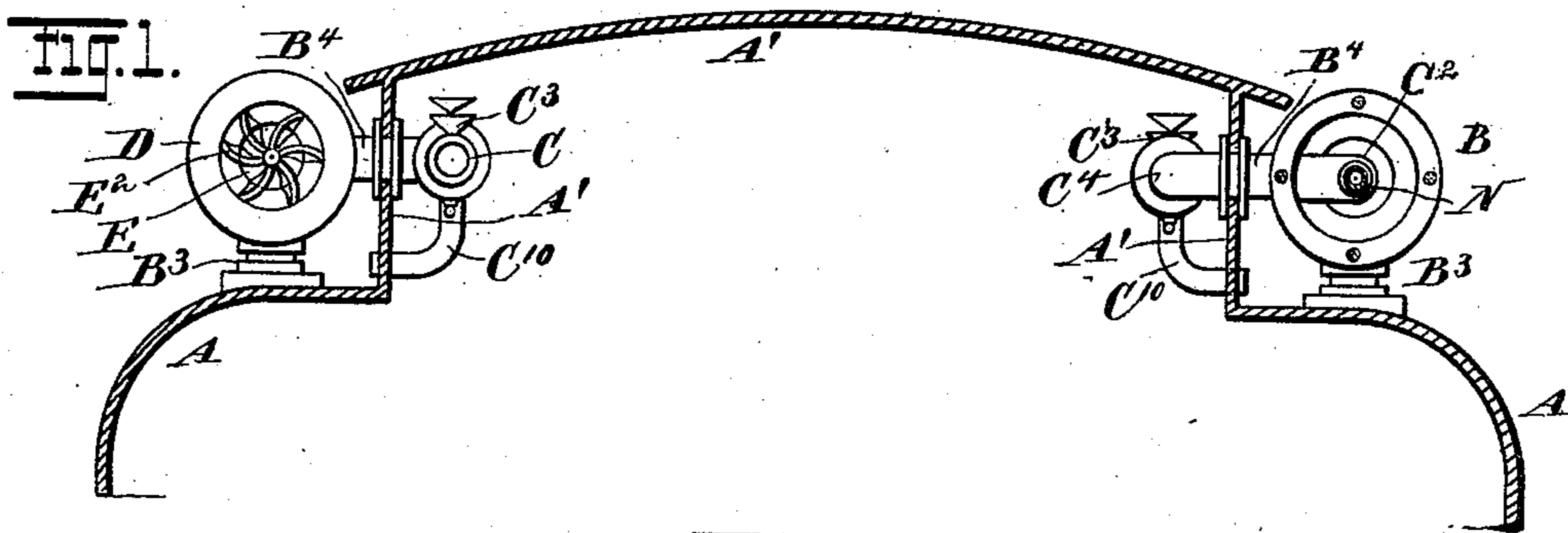


No. 841,049.

PATENTED JAN. 8, 1907.

J. S. ROAKE.
VENTILATING APPARATUS.
APPLICATION FILED OCT. 14, 1905.



WITNESSES:

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VENTILATING APPARATUS.

No. 841,049.

Specification of Letters Patent.

Patented Jan. 8, 1907.

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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 borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Ventilating Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact specification.

My present invention has special relation to means for introducing fresh air and removing vitiated air from railway-cars, particularly means in which the air-currents are induced by the movement of the vehicle, being an improvement on the device shown in the Letters Patent of the United States granted to me August 11, 1903, No. 735,823.

The principal object of this invention is, as in my above-named patent, to provide or produce means for supplying outside fresh air freed from dust and other deleterious matter to the interior of the railway-car or analogous vehicle and for removing the vitiated air without producing objectionable drafts or interior currents, such as are caused by open windows and the ordinary ventilator-openings.

Subordinate objects are to improve the combined injecting and ejecting apparatus so as to make its automatic action more sensitive and reliable under varying conditions of speed or movement of the vehicle, producing a more uniform and thorough ventilation throughout the car under all conditions, and insuring a more perfect purifying of the ingoing air, as well as a more perfect ejection of the heavier particles of the outgoing vitiated air.

To accomplish the foregoing objects and to secure other and further advantages in the matters of construction, operation, and use, my present invention involves the application between the downtake and uptake tubes of an open tube or passage axially located with respect to the casing or shell of the apparatus and calculated to carry the central portion of the incoming current through to the outlet end of the apparatus without compelling this portion to pass through the car, and minor details of construction, as will be herein first fully described, and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a transverse section through the upper part of a car

equipped with my improved form of apparatus. Fig. 2 is a plan view of the apparatus on one side of the car, a portion of the car being shown in horizontal section. Fig. 3 is a horizontal section and partial plan view, but on a scale larger than previous figures. Fig. 4 is a sectional elevation on a plane through line 4 4 of Fig. 3.

In all the figures like letters of reference, wherever they occur, indicate corresponding parts.

The apparatus for both ends of the car are alike or counterparts, and the action is maintained by the movement of the vehicle in either direction without requiring any change or attention. By the use of my improved apparatus 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 and at about midway of the length of the car, the casing 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 this 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 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 from the end of the casing. Means are provided for excluding cinders, dust, rain, or snow and for controlling the flow of air through the ducts and also for permitting the escape of excessive pressure with any water of condensation or other matter in the ducts through suitable relief-openings.

In the drawings, 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 parts 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', which forms part of the ventilating-duct and has an elbow C², reaching to the center of the casing, with its open end on the axial line thereof. The elbows face outward and opposite each other, as shown in Fig. 3.

C C are the ventilating-ducts, extending longitudinally of the car in both directions from the points where they enter from the casing and for nearly the full length of the car, and these are provided at intervals on their upper parts 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 out to receive the end of the elbow, the latter being joined to the flange B⁵ by suitable bolts 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 a downwardly-projecting casing C⁹, terminating in a curved outlet-pipe C¹⁰, opening exteriorly of the car. The casing C⁹ serves to contain any suitable form of valve. (Not shown.) The screw C¹² enters the casing C⁹, its purpose being to limit or control the position of the valve, which may be employed therein.

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 bosses on the flange and secured by bolts or studs B⁷, extending

through longitudinal slots in the skirt, by which it is held in position and may be set nearer to or farther from the flange B² to regulate the area of the annular space 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 parts is such at each end as to serve 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 from left to right in Fig. 3, 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 rotary motion. The current is then deflected inwardly by the mouth of the casing B and the inner end of the cone E. The rapid rotary movement of the ingoing air-current tends to force outwardly any heavy matter carried thereby and project it through the discharge-opening between the parts B² and D'. The current thus acted upon 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 passes to the exterior of the car through the tube C¹⁰, 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 outward and by its escape past or through the other end of the apparatus is relied upon to induce an outwardly-flowing current of air received through the second duct from the rear part of the car. The incoming current is somewhat retarded in the casing B and outside the elbows C² by reason of the presence of those elbows, and the effect of this retardation is to reduce the capacity of the apparatus for exhausting the

vitiated air, and I find also that the incoming air can be better freed of foreign matters or particles if the central part of the current can be carried through to the exhaust end without being deflected into the car.

Thus far the construction and operation are practically the same as in the device of my above-named Letters Patent No. 735,823, of August 11, 1903.

For perfecting the automatic operation of the apparatus in accordance with the objects of my invention I employ an axially-located open-ended tube N to connect the two elbows $C^2 C^2$, the diameter of this tube being small in comparison with that of the elbows. The tube N receives the central portion of the incoming air-current, which is projected through the opposite elbow and adds materially to the power of the current for exhausting from that elbow. This axial cross-current also carries with it the particles of foreign matter which find their way to the central part of the fresh-air current and thus further purifies the air before it is delivered into the car.

The ends of the tube N terminate close to the bends of the elbows, so that the cross-tube may receive the heavier particles, which are projected against the inner upper curved surfaces of the elbows, and these particles be then carried out by the current through the cross-tube.

Aside from the improvement in purifying the air and increasing the power of exhaustion the central tube N operates to equalize the power of injection and exhaustion, whereby the apparatus is rendered more sensitive under slow movements of the vehicle and more uniformly effective under high movements or extraordinary wind-currents, so that it is better adapted for operation under all circumstances.

The butterfly-valves may be closed while passing through tunnels or during other times when it is desirable to temporarily exclude the exterior air, and when they are opened again the matters which may have collected in the casing and in the elbows are carried out by the current on principles already explained.

I have shown the car as provided with two sets of the improved apparatus, one on each side; but obviously one such apparatus may

be used, and it may be centrally or otherwise located.

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

Having now fully described my invention, what I claim as new herein, and desire to secure by Letters Patent, is—

1. In a ventilating apparatus of the character herein set forth, the combination with the casing, of the ducts leading to and from the vehicle, elbows on said ducts located within the casing, and an open tube connecting the said elbows and cones in line with the open ends of said tube beyond the open ends of the elbows, substantially as and for the purposes set forth.

2. In a ventilating apparatus of the character herein set forth, the combination with the casing, of the end casings applied thereon, deflecting-cones mounted axially in said end casings, ducts leading to and from the vehicle, elbows on said ducts located within the central casing, and an open tube connecting the said elbows and located axially of the central casing, substantially as and for the purposes set forth.

3. The combination with the casing, of the ducts leading to and from the vehicle, elbows on said ducts located within the casing, and an open tube connecting the said elbows, the tube terminating within the bends of the elbows with the upper inner surfaces of said elbows merging into the ends of said tube to receive the particles deflected from said surfaces, as explained.

4. The herein-described ventilating apparatus comprising a central casing, end casings, deflecting-cones having vanes, ducts leading to and from the vehicle, elbows on said ducts, and an axially-located open tube connecting the elbows, the parts being arranged and combined for operation, substantially as and for the purposes specified.

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

JOHN S. ROAKE.

Witnesses:

CHAS. A. HAUCK,
CHARLES R. SEARLE.