(No Model.)

V. F. CARPENTER.

ROTARY PUMP.

No. 436,399. Patented Sept. 16, 1890.

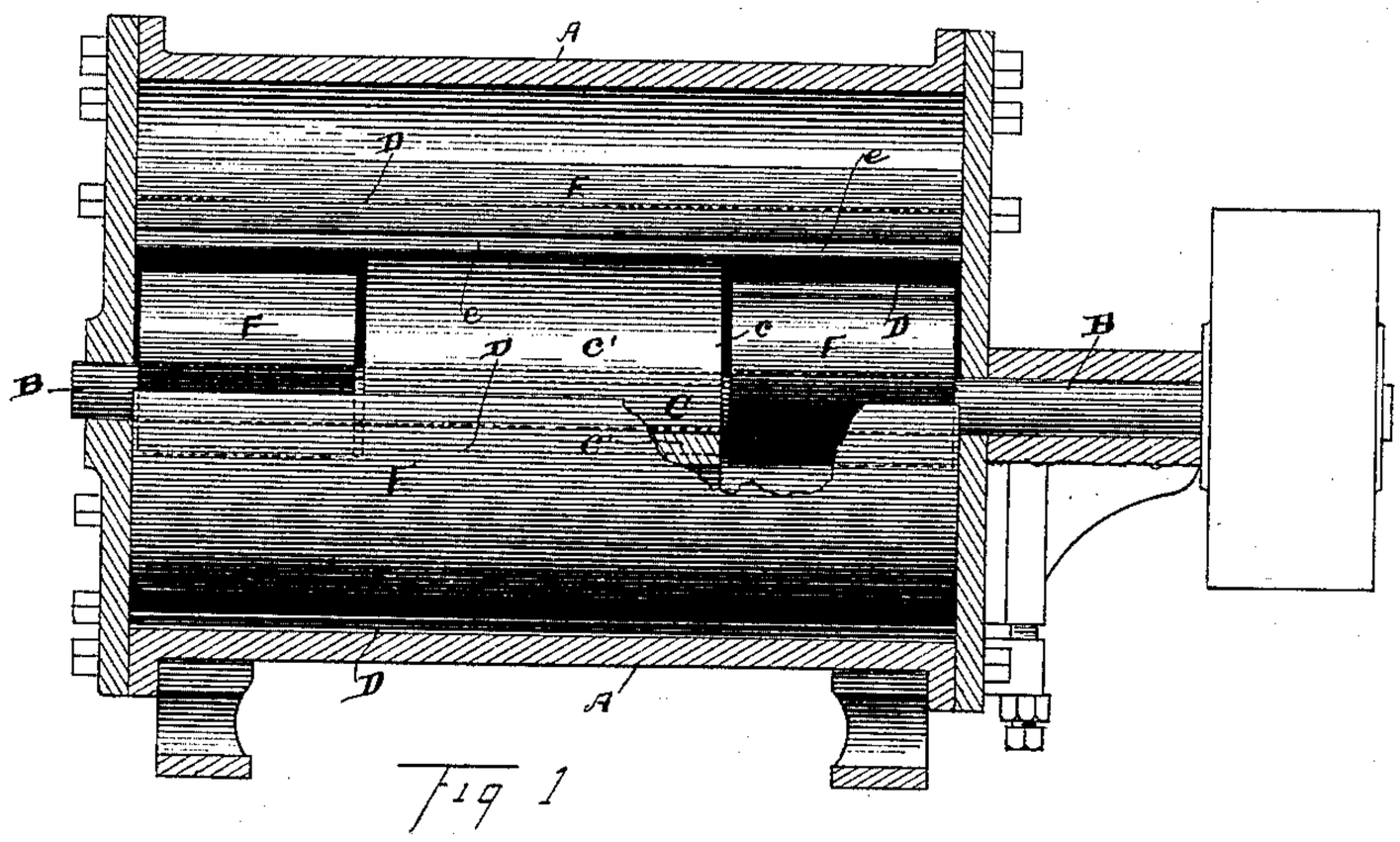

Fig 1

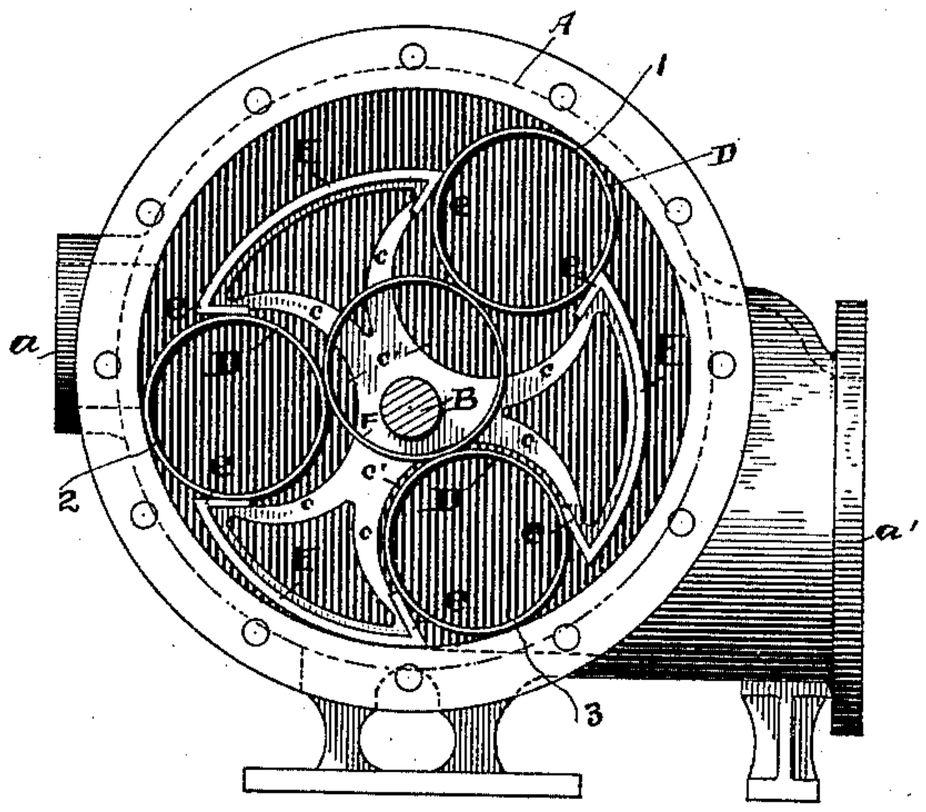

Fig 2

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ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 436,399, dated September 16, 1890.

Application filed October 24, 1889. Serial No. 328,092. (No model.)

To all whom it may concern:

Be it known that I, VARNUM F. CARPENTER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rotary Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to rotary blowers; and the invention consists in a rotary machine in which revolving cylinders perform the function in the usual rotary blades or pistons, all substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of the machine with the first top roller, seen in Fig. 2, and the central bearing cylinder or roller removed, the view being in the direction of arrow in Fig. 2. Fig. 2 is a cross-section of the machine, disclosing the relative positions of the parts as in action.

A is the casing or shell of the machine, having induction-port *a* and eduction-port *a'* at opposite sides. This casing has no special features or novelty alone, and has a plain cylindrical interior and heads or ends provided with bearings for the shaft and bolted or otherwise secured to the body part in any well-known way. The inner surface of the cylinder is turned off so as to be perfectly true and smooth.

B is the shaft which extends longitudinally through the cylinder and openings in the heads thereof at one side of the axial center of the cylinder, so as to give the eccentric bearing to the piston-carrier C necessary to make the invention operative. The line of the shaft, as here shown, is below the center of a horizontal line traversing the axis of the cylinder, so as to bring the carrier down in the lower portion of the cylinder and make the upper the operative part of the cylinder. The carrier C is fixed rigidly upon the shaft B, and has its periphery concentric with this shaft as its axial center. In cross-section the carrier is sufficiently smaller than the interior diameter of the cylinder to give the requisite space intermediate to carry forward the volume of air which any given size of machine is best adapted to convey, the difference in space of course differing in different sizes of machines. Ordinarily the difference will be something like one sixth or seventh of the interior diameter of the cylinder. This, however, is only an approximate estimate.

The carrier consists, primarily, of spider-like supports or ends *c*, fastened to the shaft—say, about one-fourth the length of the cylinder from its ends—as seen in Fig. 1, and in these supports are three corresponding substantially semicircular bearings *c'*, arranged at equal distances apart around the carrier and opening at the periphery to give outward and inward play to the cylindrical pistons D. The pistons D are plain smooth cylinders extending the full length of the inside of the piston and adapted to fit and occupy the semicircular bearings in the carrier. Intermediate of the said pistons D on the periphery of the carrier and concentric with its axis are segmental plates E, which are fastened to the ends *c* by overreaching flanges *e* along the edges of the said plates bearing against the inner sides of the semicircular bearing *c'* at the outer extremities thereof. The sides of the bearings *c'*, with the flanges *e* at either side, are just far enough apart to give the necessary freedom of in-and-out movement to the pistons D to operate as designed, yet making the lines of contact, whether the piston be in or out, practically air-tight. The flanges *e* extend far or deep enough into the bearings *c'* to lie against the sides of the cylinders D when said cylinders rest in the bottom of the bearings *c'*, as seen in the lower cylinder, Fig. 2, thus preventing air from escaping by said cylinders to their rear and confining it to its proper channel. The periphery of the carrier when the cylindrical pistons are in position is in this way a practically-continuous air-tight surface, notwithstanding that the pistons work back and forth therein. The plates E of course extend the full length of the cylinder, like the pistons to which they are adapted, thus overreaching the ends *c* to about the extent shown in Fig. 1.

With the usual speed at which a machine of this special character can be driven advantageously the pistons D would probably keep their working positions without other means to effect this end, the centrifugal tendency being sufficient to hold them against the cylinder and roll them along over its smooth surface. However, to avoid any possible defect in this particular, I introduce pressure-rollers F into the cylinder over the axle and between the ends of the carrier and the heads of the cylinder. These rollers or tubes are like cross-sections of the pistons D, and of a size which will bear equally against each of the said pistons and keep them constantly against the side of the cylinder. Hence when the carrier is revolved the pistons bearing upon the side of the cylinder are caused to rotate, and this rotates the idler-roller F, and all the rolling parts move together.

The cylinders for convenience of description may be numbered 1 2 3. In Fig. 2 cylinder 1 is just approaching the induction-port, and 2 is sweeping around in front and sucking air into the deep air-space behind it. As soon as 1 passes the induction-port it is in position to force forward the air in this space to the eduction-port, and the space behind it will be filled with air in turn. By that time piston 3 will have come up into working position, and so on continuously. In Fig. 2 piston 3 has passed the active point and retired into the bearing by reason of its position in the system, and this forces roller F against the two other pistons and holds them out, as shown. In like positions in rotation the same thing occurs with each successive piston, and meantime the roller F holds its place in the center of the cylinder.

Obviously the machine herein shown and described is not limited in use to an air-blower or to compress air, but may be used as a rotary engine or a rotary pump for water or other fluid, gas, or the like. The position of the cylinder is not material; but for convenience of description certain parts have been denominated "upper" and "lower." Ordinarily the machine will occupy the position as shown in the drawings.

A machine constructed on this principle has the advantage of easy movement with high efficiency, the pistons working practically without friction and rolling along over the surface of the cylinder while they move gradually back and forth in their bearings. The pistons are described as being of metal; but they may be made of wood or any other suitable material.

It will be observed that the pistons and the rollers are of exactly the same size in cross-section, so that they revolve together, while at the same time the pistons bear against and turn on the side of the cylinder. Thus the pistons have two rolling contacts.

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

1. The main casing, a piston-carrier set eccentrically to the axis of said casing and having circular bearings for the pistons, in combination with circular pistons in said bearings, and a free cylindrical roller between said pistons and forming a revolving bearing by which the pistons are kept out in contact with the casing, substantially as described.

2. A cylindrical casing, a shaft at one side of the axis of the casing, and a piston-carrier with circular bearings on said axle, in combination with cylindrical pistons supported in said carrier and inflexible rollers bearing said pistons outward against the casing, substantially as described.

3. The cylindrical main casing and a piston-carrier eccentric to the axis of the casing and extending from end to end thereof, in combination with cylindrical pistons supported in said carrier, and two stiff or inflexible rollers, one at each end of the said carrier and arranged between the said pistons and bearing against the same, substantially as described.

4. The main casing having a cylindrical interior and a carrier for the pistons having ends C set in away from the ends of the casing, and segmental plates E on said ends extending the full length of the interior of the casing, in combination with cylindrical pistons, and rollers F for the pistons between the ends of the casing and the ends C of the carrier, substantially as described.

5. The cylindrical casing and the carrier set eccentrically in the casing, in combination with the cylindrical pistons, and rollers of the same dimensions as said pistons in cross-section and bearing against said pistons, substantially as described.

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