Dec. 13, 1927. 1,652,609

W. E. CLARKE

POSITIVE PRESSURE BLOWER AND VACUUM PUMP

Filed Oct. 4, 1926

Fig. 3.

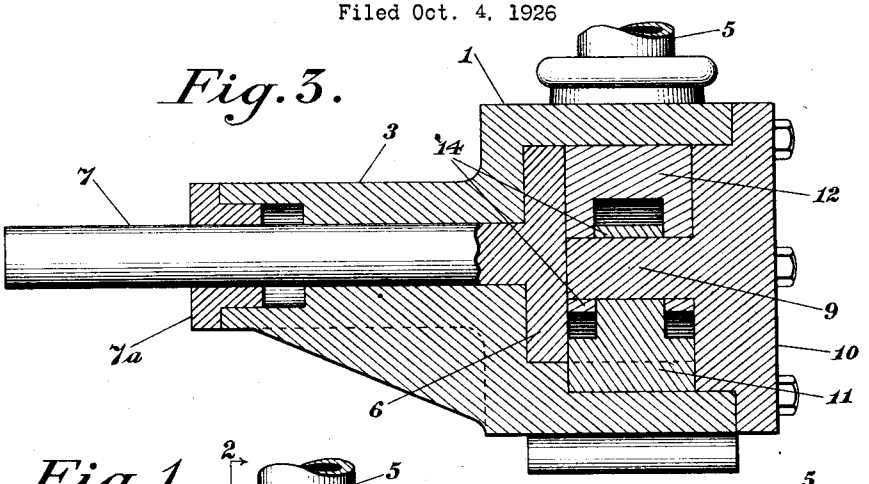


Fig. 1.

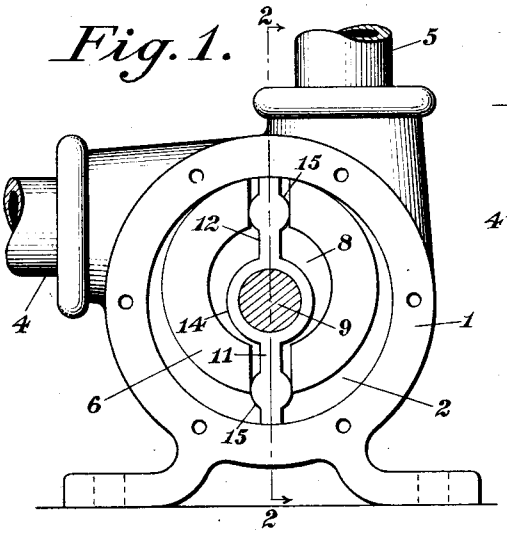


Fig. 2.

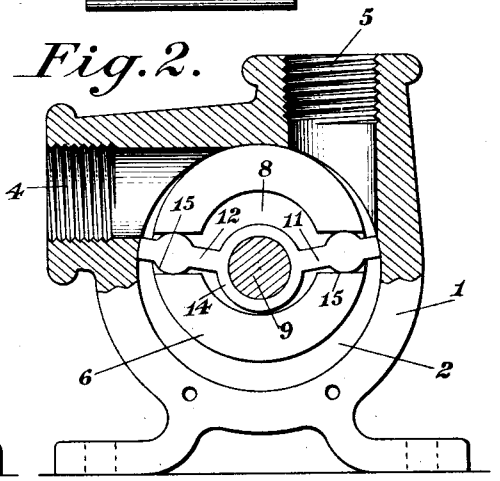


Fig. 5.

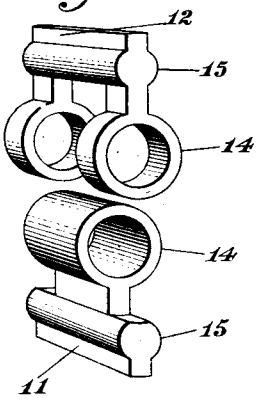
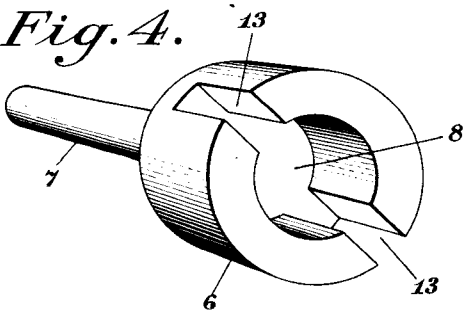


Fig. 4.



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By [signature] Atty.

Patented Dec. 13, 1927. 1,652,609

UNITED STATES PATENT OFFICE.

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POSITIVE PRESSURE BLOWER AND VACUUM PUMP.

Application filed October 4, 1926, Serial No. 139,531, and in Canada August 3, 1926.

The invention relates to improvements in positive pressure blowers and vacuum pumps as described in the present specification and shown in the accompanying drawings that form a part of the same.

The invention relates to that type of blower in which a plurality of blades rotating about a common axis are driven simultaneously at different speeds by means of a rotor having slots therethrough for the reception of said blades.

Heretofore, in this type of blower it has been impossible to preserve the centrifugal balance between the various blades throughout the complete revolution of the rotor owing to the angular relation of the blades to each other continually changing throughout each revolution, also it has been impossible to eliminate vibration owing to the fact that the slots in the rotor must be of sufficiently greater width than the thickness of the blades to permit of said blades moving freely in said slots regardless of their angular relation thereto.

The primary object of the present invention is to provide efficient means for compensating for this variance in the angular relations of the blades, thus equalizing the centrifugal forces of said blades, and in so doing eliminating all vibration, noise and wear.

A further object is to provide a blower which may be run at a higher rate of speed than has been possible heretofore with blowers of this type and thus give the maximum of efficiency in operation, without fear of distortion, and in which a true running contact is maintained at all times without friction between the blades and the casing in which they operate.

A still further object is to provide a positive pressure blower in which the element of friction is absent, thus tending to prolong the life of the blower and also reducing the cost of operation to a minimum.

The invention consists in the novel features of construction, arrangements and combinations hereinafter described and more particularly pointed out in the claims for novelty following.

In the drawings Figure 1 is an end elevation of a blower with the end plate removed and the shaft carried thereby in cross section.

Figure 2 is a view substantially similar to Figure 1 with the casing cut away in vertical section through the inlet and outlet ports.

Figure 3 is a longitudinal sectional view taken on the line 2—2 of Figure 1.

Figure 4 is a perspective view of the rotor.

Figure 5 is a perspective view of the blades.

Like numerals of reference indicate corresponding parts in the various figures.

Referring to the drawings the casing of the blower comprises a body portion 1, having a cylindrical chamber 2 accessible from one end of said body, and an integral extension 3 from the opposite end of said body having a horizontally disposed cylindrical opening therethrough leading outwardly from said chamber 2 and eccentric thereto, said casing being provided with inlet and outlet ports 4 and 5 respectively, positioned adjacent to each other and registering with the chamber 2.

6 is a rotor in the form of a cylinder eccentrically mounted for rotation within the chamber 2 and being supported and driven by means of a shaft 7 from one end thereof extending outwardly through the bearing in the extension 3, said shaft having suitable connection with the source of driving power, said rotor being so positioned within said chamber 2 as to provide a running fit against the portion of the inner periphery of said chamber between the inlet 4 and the outlet 5 and providing a crescent shaped compression chamber in communication at opposite ends thereof with the inlet and outlet ports 4 and 5 respectively.

The housing 3 is preferably cut away at its outer end for the insertion of a suitable plug 7^a fitting around the shaft 7 and secured to said extension.

The rotor 6 is provided with a central longitudinal opening 8 from the outer end thereof for the reception of a shaft, or axle, 9 carried by the end plate 10 and on which the blades 11 and 12 are rotatably mounted, the wall of said rotor being slotted longitudinally to provide diametrically opposed openings 13 through which said blades extend for running engagement with the wall of the chamber 2.

The blades 11 and 12 are each provided with one or more annular brackets, or hubs, 14 by means of which said blades are rotatably mounted on said axle, the hubs, or rings, from the respective blades being so ar-

ranged as to provide for interfitting engagement on said axle, that is to say, the hub from one blade will be positioned between two hubs from the other blade, thus preventing distortion of said blades in relation to each other and consequently eliminating vibration and noise and also preventing said blades from binding on said axle.

Owing to the axis of the rotor 6 and the axle 9 on which the blades are mounted being eccentric in relation to each other it will be apparent that the angular relation of the blades to each other will be constantly changing throughout each revolution of said rotor and as a consequent the slots 13 must be of sufficient transverse diameter to permit of said blades working freely therein but at the same time there must be no appreciable clearance, the presence of which would permit of vibration which would result in noise and wear and would also destroy the centrifugal balance of said blades.

In order to compensate for this variance in the angular relation between the blades said blades respectively are provided, at the points where they extend through the slots 13 in the rotor, with semi-circular protuberances, or bosses, 15 from opposite sides thereof, which, with said blades completely close said slots, thus effectually preventing any back flow of fluid, but owing to the fact that the surfaces of said bosses which are in continuous engagement with the opposing walls of said slots are rounded, or otherwise shaped to present a transverse surface of less diameter than the thickness of the walls of said slots, the eccentric movement of said blades is not interfered with and as a consequence there is absolutely no danger of said blades binding in said slots, nor can there possibly be any friction.

In the operation of this invention, the air, or other fluid, enters the compression chamber 2 through the inlet 4 and is forced therearound and outwardly through the reduced end thereof by the rapidly rotating blades 11 and 12, and as the angular relations of the blades change in relation to each other the rounded surfaces of the enlargements 15 simply rotate on the respective faces of the slots 13, allowing the same freedom of movement of said blades as would obtain if clearance was allowed between the blades and the walls of the slots, but absolutely preventing any back flow of liquid and also eliminating all vibrations, without friction.

What I claim is:—

1. In a positive pressure blower, the combination with a cylindrical casing, and a driven rotor rotatable within said casing on an axis eccentric to the axis of said casing, said rotor being provided with diametrically opposed blade slots, of blades rotatably mounted concentrically with said casing and extending through said slots respectively for running engagement with the interior periphery of said casing, said blades respectively being operated by the rotor and provided with opposed relatively fixed lateral offsets constituting bearings adapted for rotary engagement with the opposed faces of said slots respectively.

2. In a positive pressure blower, the combination with a casing and a centrifugally balanced power driven rotor mounted therein eccentric to the axis of said casing, said rotor having blade slots therein in equally spaced relation to each other, of blades rotatable on a common axis within said rotor and concentric to said casing, said blades respectively being provided with integral opposed lateral bosses constituting bearings adapted for rotary engagement with the interior faces of said slots respectively, said bosses being of lesser transverse diameter than the width of said faces at the respective points of contact therewith.

3. In a positive pressure blower, the combination with a cylindrical casing having inlet and outlet, and a power driven rotor eccentrically mounted for rotation within said casing and in running engagement with that portion of the inner periphery of said casing between said inlet and outlet, said rotor being provided with blade slots in equally spaced relation to each other, of separately rotatable blades rotatable on a common axis of said casing and having opposed lateral enlargements constituting bearings adapted for rotative and longitudinal engagement with the opposed faces of said slots respectively, said enlargements being semi-circular in cross section.

4. A positive pressure blower comprising a circular casing having inlet and outlet, a fixed shaft mounted in said casing and concentric to the axis thereof, a driven rotor mounted eccentrically within said casing and operating around said shaft, said rotor being provided with blade slots at regularly spaced intervals therearound, the walls of said slots being parallel to a line drawn transversely through the axis of said shaft, and separately rotatable blades mounted on said fixed shaft in interfitting engagement with each other and extending through said slots respectively and having running engagement with the inner periphery of said casing, said blades serving to close said blade slots against fluid passage and being mounted for longitudinal and rotative bearing with respect to the walls of the slots.

5. A positive pressure blower comprising a cylindrical casing having access from end thereof, a closure adapted to be secured over said end and carrying a fixed shaft projecting into said casing and concentric to the axis thereof, a cylindrical slotted driven rotor supported in bearings in the opposite

end of said casing and rotating around said shaft in eccentric relation to the axis of said casing, and separately rotatable blades having hub extensions mounted for free rotation on said fixed shaft, said blades extending through the slots in said rotor and being provided with opposed lateral relatively fixed offsets adapted to close the space in said slots at each side of said blades respectively and permitting of angular movement of said blades within said slots.

Signed at Toronto, Ont. this 28th day of August 1926.

WILLIAM E. CLARKE.