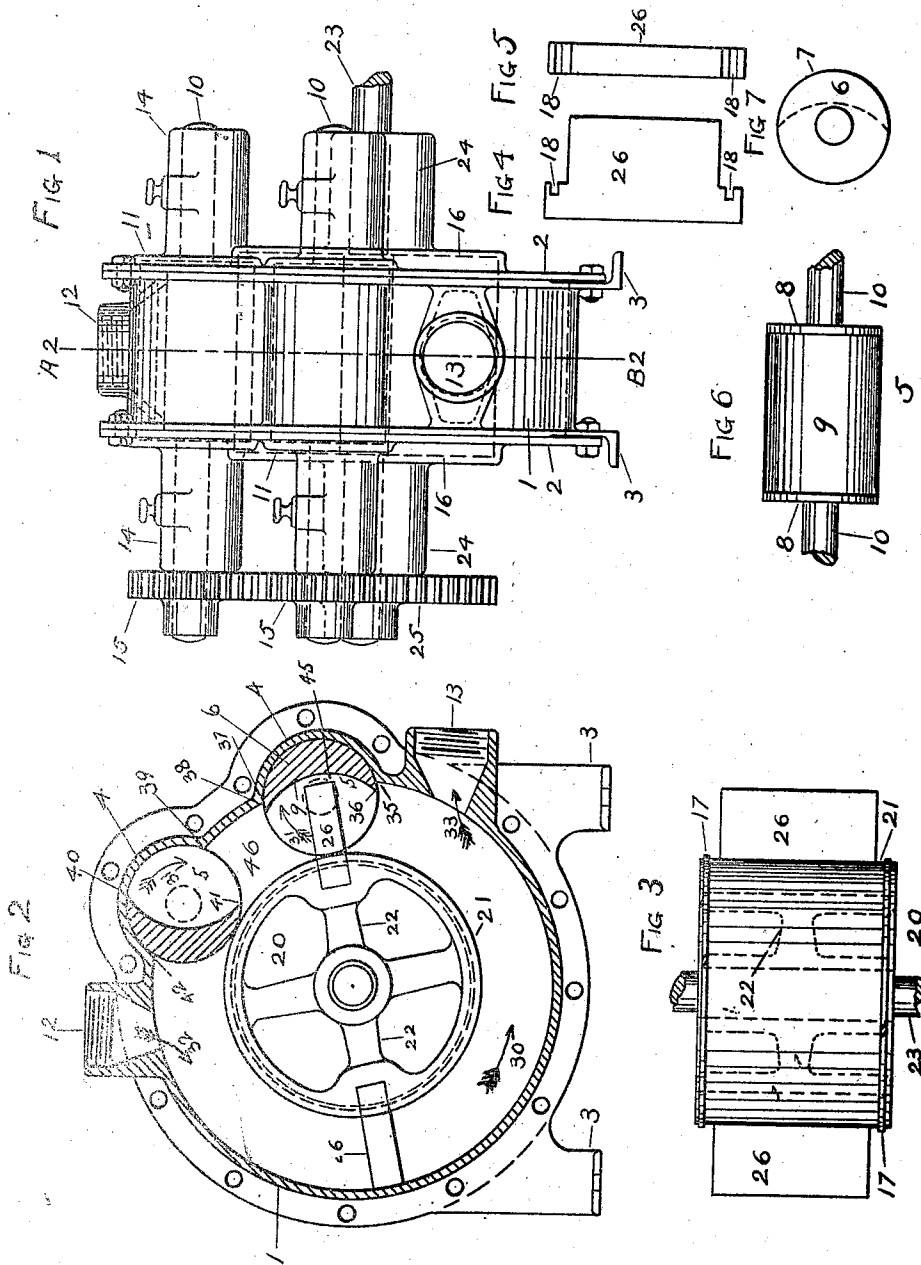


N. E. FUNK.
BLOWER.
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Patented May 20, 1913.



Witnesses
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UNITED STATES PATENT OFFICE.

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BLOWER.

1,062,149.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, NELSON E. FUNK, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Blowers, of which the following is a full, clear, and exact specification.

This invention relates to blowers and gas-exhausters.

An object of this invention is to provide a device whereby the volume of air or other fluid delivered therefrom will be increased and an even and steady flow maintained during the operation of the device.

A feature of the device is the comparatively small number of parts constituting the same, and the simplicity of construction and the arrangement of said parts.

The parts of my device can be made and assembled at a low cost, and can be readily dis-membered for the purpose of repairs or cleaning.

According to my invention, two valves are employed to serve as locking means at all times between the intake and outlet of my device. These valves are disposed in the casing adjacent each other and between the intake and outlet so that the distance between the intake and outlet is a minimum, and thus the path of effective work done by the impeller blades is made a maximum.

Other features of my invention will be more fully understood from the following description and the accompanying drawings, in which—

Figure 1 is an end elevation of a blower embodying my invention; Fig. 2 is a vertical section on the line A—B of Fig. 1; Fig. 3 is a plan of the impeller shown in Fig. 2; Fig. 4, a detail plan, and Fig. 5 a detail end elevation of a blade of the impeller shown in Fig. 3; and Fig. 6 and Fig. 7, a detail plan and a detail end elevation, respectively, of the valve shown in Fig. 2.

The shell or casing of my device comprises the cylindrical member 1 of circular cross-section, and the heads 2, 2 secured on opposite ends of said member 1, as by bolting or clamping the same thereto. The heads 2, 2 are flat in general, but have outwardly expanded portions to receive the impeller drum and the valves, as will be further described hereinafter. The member 1 is pro-

vided with feet 3, 3 for supporting the device. The offsets 4, 4 of the sides of the member 1 are preferably circular in cross-section and disposed adjacent each other, a valve 5 being located in each offset 4, 4. Each valve 5 comprises a crescent-shaped portion 6, whose outer surface 7 is of the same curvature as the offsets 4, 4 and of the same curvature as the heads 8, 8 of each valve 5. The inner surface 9 of each valve 5 is of greater curvature than the outer surface 7. This crescent-shaped portion 6 may be either hollow or solid. Each valve 5 is provided with axially disposed journals 10, 10 secured to each head 8. I usually cast the crescent-shaped portion 6, the heads 8, 8 and the journals 10, 10 as integral parts; however, it will be obvious that said parts may be formed separately and afterward secured together in any suitable manner. The width of the valves 5, 5 is slightly greater than the width of the annular passage of the device, such extra width of the valves being accommodated by suitable expanded portions 11, 11. The valves 5, 5 are located between the intake 12 and outlet 13, the disposition of said parts being such as to decrease the angular distance between the intake and the outlet to a minimum, and thereby increase the path of the effective stroke of the impeller blades to a maximum. The heads 2, 2 are provided with openings through which the journals 10, 10 pass, and there are further provided bearings 14, 14 secured to said heads 2, 2 to receive the journals 10, 10. Said bearings 14, 14 are provided with oiling means, as will be readily understood. On one of the journals 10 of each of the valves 5 is a suitable gear wheel 15, adapted to mesh with a gear wheel 25 on the main driving shaft for the purpose of giving rotation to each valve 5, as will be explained more fully hereinafter. The valves are arranged relative to each other and geared to occupy the relative positions indicated in Fig. 2 of the drawings.

The impeller 20 comprises a cylindrical or drum member 21 which is slightly wider than the cylindrical member 1 of the casing, the heads 2, 2 being extended at the portions 16, 16 to accommodate the extra width of said member 21, a washer ring 17 being positioned in a groove on the drum 21 toward the outer edge thereof to prevent leakage of

gas between the drum 21 and the expanded portion 16. Said ring 17 assists also in retaining the blades 26 in position by being entered in the grooves 18, 18 in said blades 26. The impeller drum 21 may be solid or hollow, and in the latter case is provided with webs 22. The drum 21 has a central opening for receiving the main shaft 23, to which it is fixed. The bearings 24 for said main shaft 23 are secured in any suitable manner to the heads 2, 2. On one end of said main shaft 23 is fixed a gear wheel 25 adapted to mesh with the gear wheels 15, 15, and thus drive the same.

As shown in the form of my invention illustrated in the drawings, the drum 21 of the impeller is provided with two blades 26, 26, disposed preferably diametrically opposite to each other. The width of the blades is slightly less than the width of the cylindrical casing member 1, the height of each blade 26 being slightly less than the difference in radius between the cylindrical impeller member 21 and the cylindrical casing member 1. The blades 26 may be formed integral with the cylindrical member 21, or as shown in the drawings, the member 21 and blades 26 may be separate and secured together by tongue and groove, or similar arrangement.

The operation of my device is as follows: The main shaft 23 is driven by any suitable means, thus driving the main gear 25, and thereby the gears 15, 15 meshing with the main gear 25. Assuming the impeller blades 26, 26 to be driven in the direction indicated by the arrow 30, the valves 5, 5 are rotated in a direction indicated by the arrows 31, 31. The movement of each valve 5 is alike with respect to each impeller blade 26. The crescent-shaped portions 6 of the two valves move so that a lock between the inlet and outlet openings of the device is effected at all times of the operation. The lower valve 5 is geared so as to permit blade 26 as it reaches the point 35 to pass the edge 36 and said valve 5 rotates correspondingly to allow blade 26 to sweep its inner curved surface 9, the edge 37 being moved to be in line with the point 38 of the casing 1 when blade 26 reaches said point 38. When blade 26 reaches the point 39 the edge 40 of the upper valve 5 is moved to be at the same instant in line with casing 1 at the point 39, and said upper valve 5 continues to rotate to allow the blade 26 to sweep past its inner curved surface 9, the edge 41 of said upper valve 5 moving to be in line with the casing 1 at the point 42 when blade 26 reaches said point 42. During the interval which elapses after blade 26 passes by the outlet opening 13 until it passes the lower valve, the crescent-shaped portion 6 of the upper valve extends across the annular space between the impeller drum and the casing 1; in a similar

manner when blade 26 sweeps through the upper valve the crescent-shaped portion of the lower valve extends across the annular passage of the device and serves as a lock between the intake and outlet passages. The path taken by the air, or other fluid, is that indicated by the arrow 32 at the intake 12, and arrow 33 at the outlet 13.

By reference to Fig. 2, it will be seen that, after each blade 26 has passed by the outlet 13 and enters the first valve 6, as in the position of the right-hand blade 26 in said figure, the other valve has moved to such position as to lock the flow of air or other fluid from the outlet 13 to the inlet 12, and forms a compression chamber with the blade 26 and inter-valve space 46, the clearance 45 between the outer edge of the right hand blade 26 and the inner surface of the lower valve 6 permitting the compressed air, or other fluid, to flow to and out of the outlet 13, thus augmenting the flow of air, or other fluid, impelled by the other blade. During the travel of each blade through the inter-valve portion 46, of the annular passage, the lower valve in the interim has moved from open position to closed position and the upper valve from closed position to open position. Thus in my blower the compression of the air or other fluid is effected at substantially all times by the coacting forces exerted by the plurality of impelling blades, and by the avoidance of shocks at all points, there is secured a substantially uniform pressure throughout each complete revolution of the impelling means.

The device herein shown embodies my invention in its simplest form. It will be clear that the valves may be disposed more closely to each other and the intake and outlet brought in still closer position than that indicated in the drawing; in such case the valve gears 15, 15 and main gear 25 are designed to secure the locking action between the intake outlet, and of course, to permit the blades 26 to sweep by the inner curved portions of the valves.

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

1. The combination of an exterior substantially cylindrical wall of a complete circumference, an inner concentric drum forming with said wall an annular passage extending a complete circumference and provided with an inlet and an outlet and being otherwise continuously sealed against passage of fluid, means carried by said drum for impelling a fluid under compression through said annular passage, and means for maintaining a continuous fluid seal between said inlet and said outlet on one side of said annular passage, said means comprising a plurality of valves disposed in said annular passage on said one side between said inlet

and said outlet, said valves being housed in uninterrupted portions of said substantially cylindrical wall.

2. The combination of an exterior substantially cylindrical wall of a complete circumference having two spaced offsets, the peripheries of which are continuous with the remainder of said wall, said wall being further provided with an inlet and an outlet and being otherwise continuously sealed against passage of fluid laterally into and from said annular passage, said two spaced offsets being disposed on one side between said inlet and said outlet, an inner concentric drum forming with said wall an annular passage of a complete circumference, two valves respectively housed in said spaced offsets, said valves alternately cooperating with said drum and the inner surfaces of their respective offsets to seal against the longitudinal passage of fluid from said inlet to said outlet through said one side of said annular passage, two arms carried by said drum for impelling fluid from said inlet to said outlet through the other side of said annular passage, means for rotating said drum, and means for synchronously rotating said valves at a greater angular speed than said drum.

3. The combination of an exterior substantially cylindrical wall of a complete cir-

cumference having two openings serving respectively as an inlet and an outlet, said wall being otherwise continuously sealed against the passage of gas, said wall further having two spaced offsets disposed on one side between said inlet and said outlet, an inner concentric rotatable drum forming with said exterior wall an annular passage of a complete circumference, two crescent-shaped valves disposed respectively in said two offsets, means for rotating said valves to alternately effect a continuous seal against passage of gas through the annular passage on said one side between said inlet and said outlet, two arms fixed to said rotatable drum for impelling gas under compression through the annular passage on the other side from said inlet to said outlet, means for rotating said drum, and gears driven by said drum rotating means for rotating said valves at a greater angular speed, the solid portions of said crescent-shaped valves being disposed with relation to each arm as the latter passes through each valve to provide a clearance for the passage of gas.

In testimony whereof I affix my signature, in presence of two witnesses.

NELSON E. FUNK

Witnesses:

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GEO. N. KERR.