L. E. FAGAN.

ROTARY BLOWER.

APPLICATION FILED FEB. 16, 1909.

940,587.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

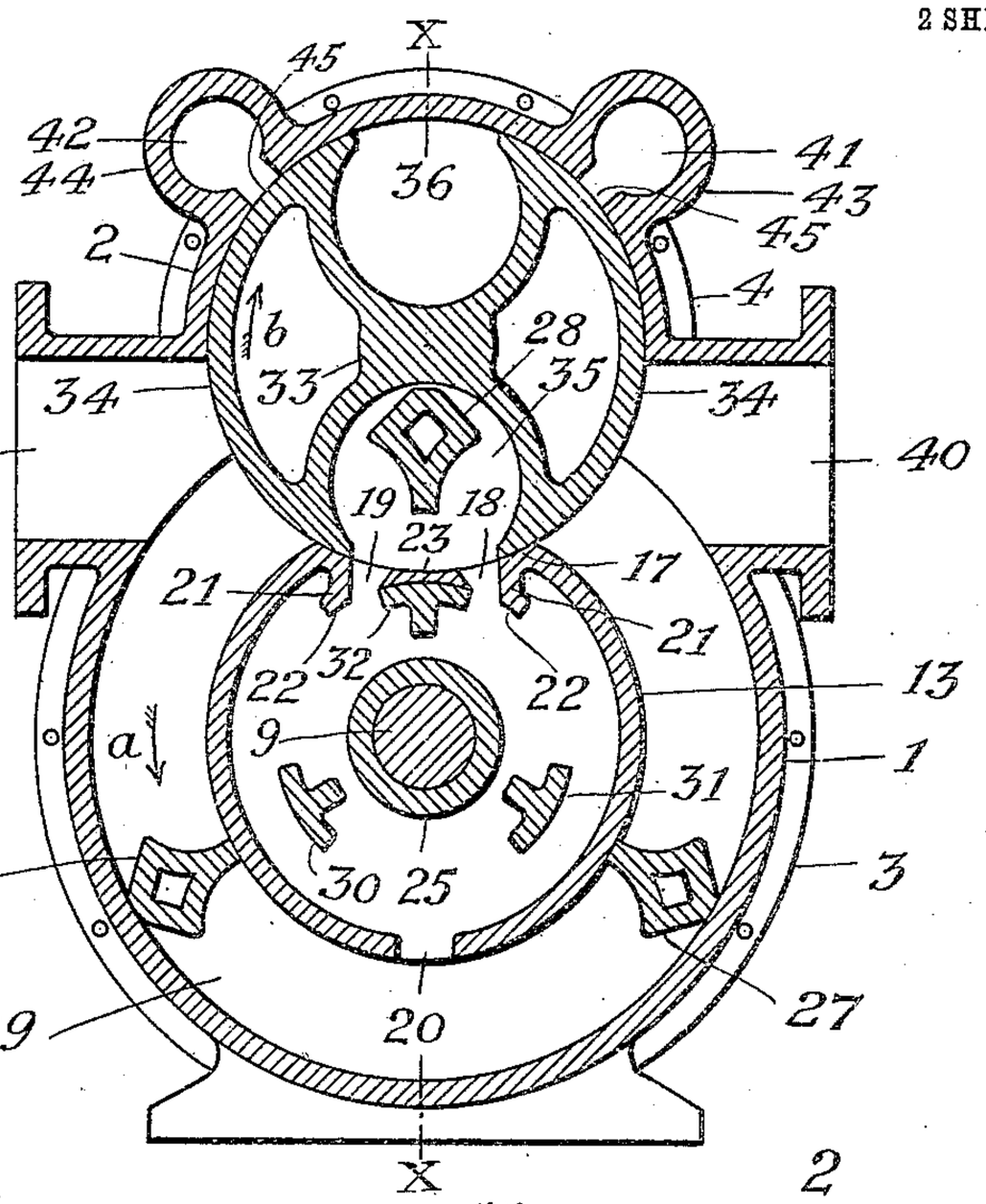
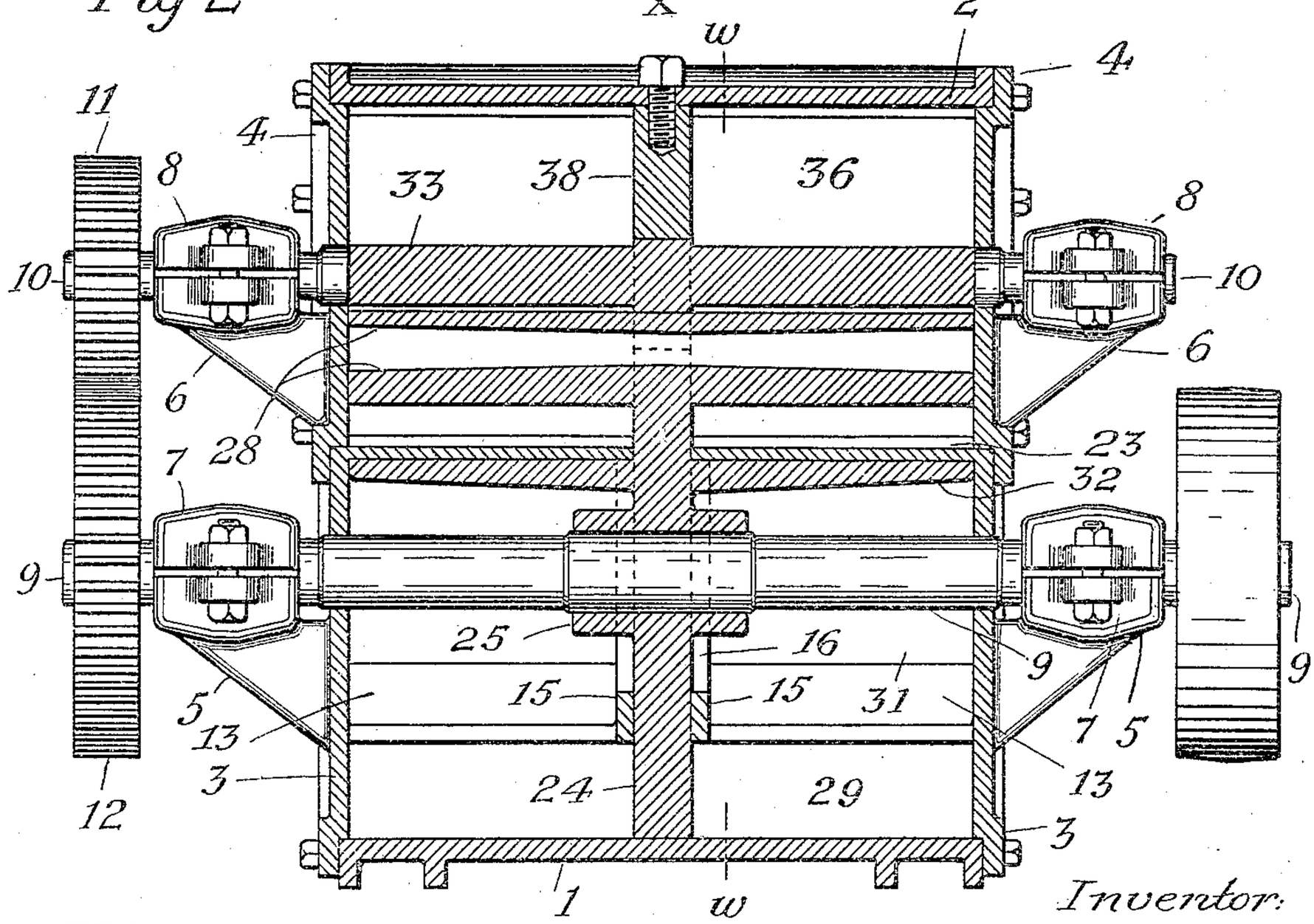


Fig 2



Witnesses
Thos. Lagaard.
H. C. Bowman.

Inventor:
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2 SHEETS—SHEET 2.

Fig. 6.

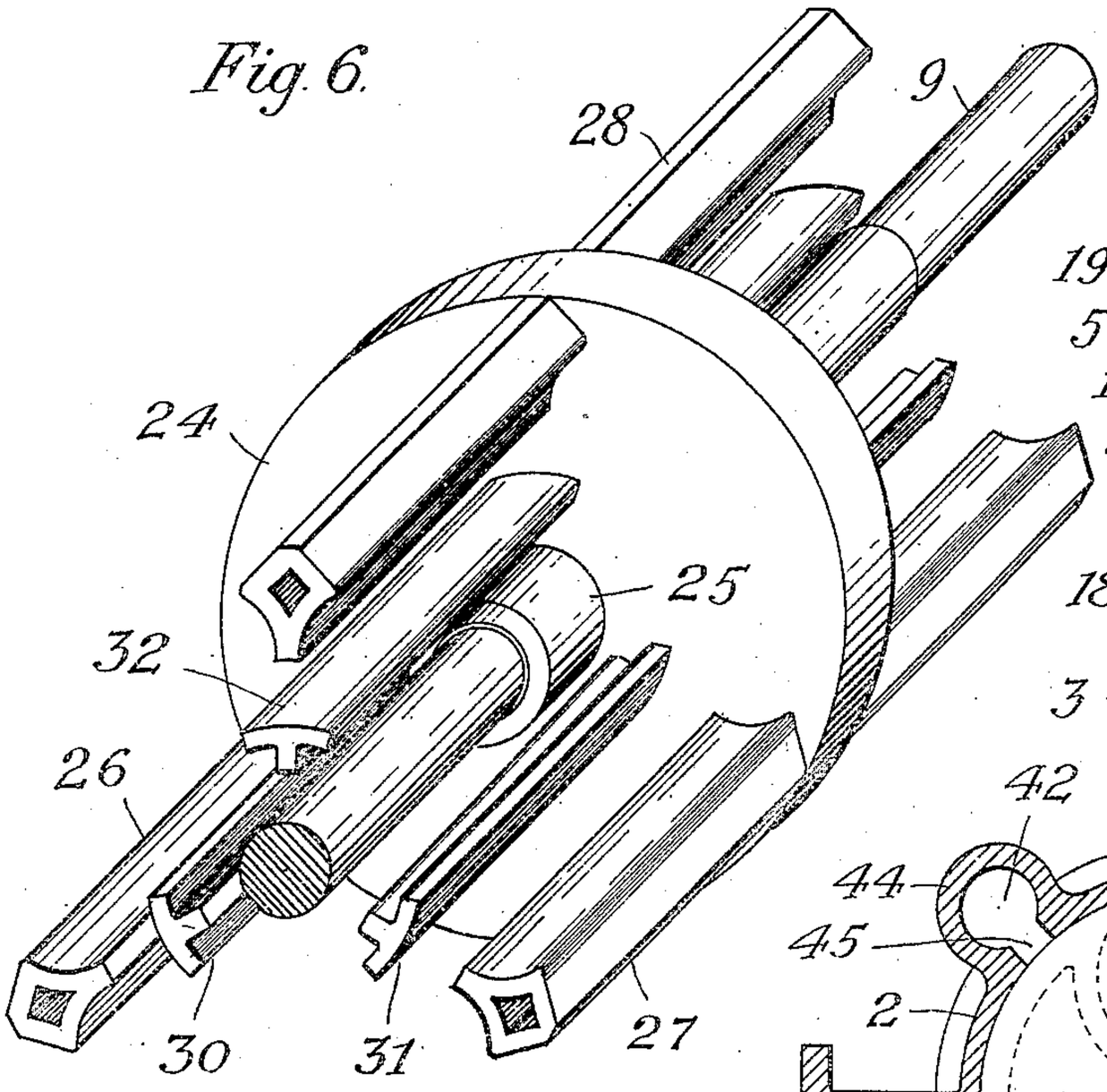
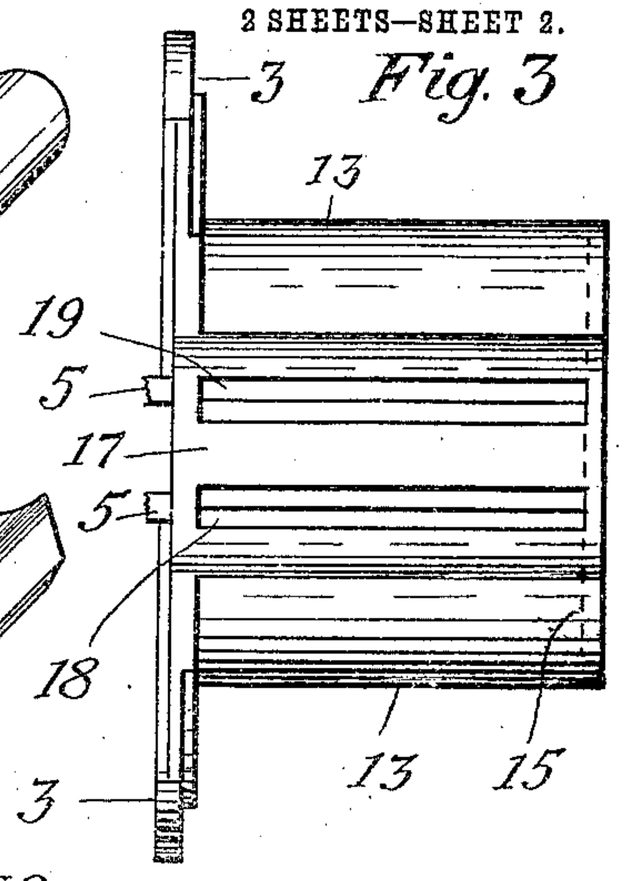


Fig. 3



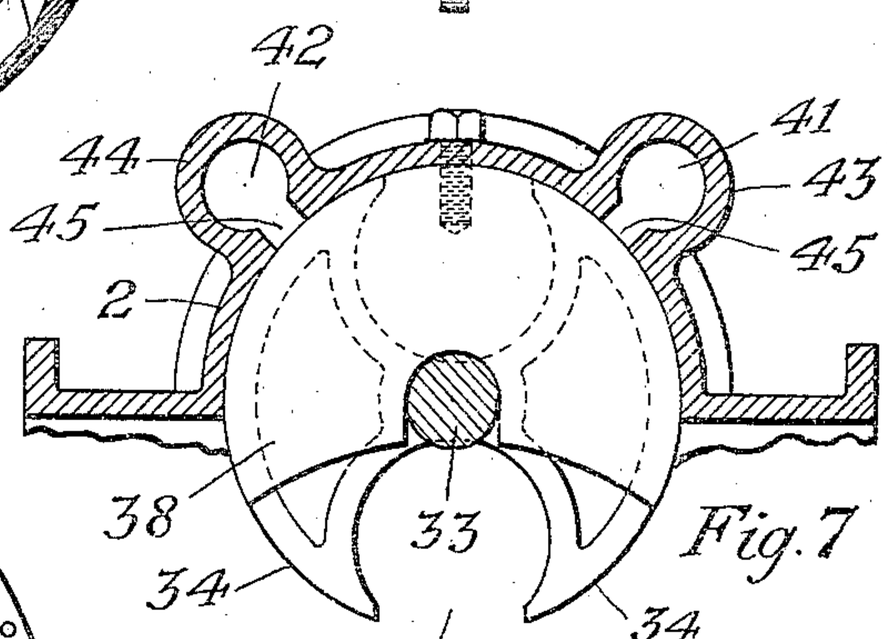


Fig. 7

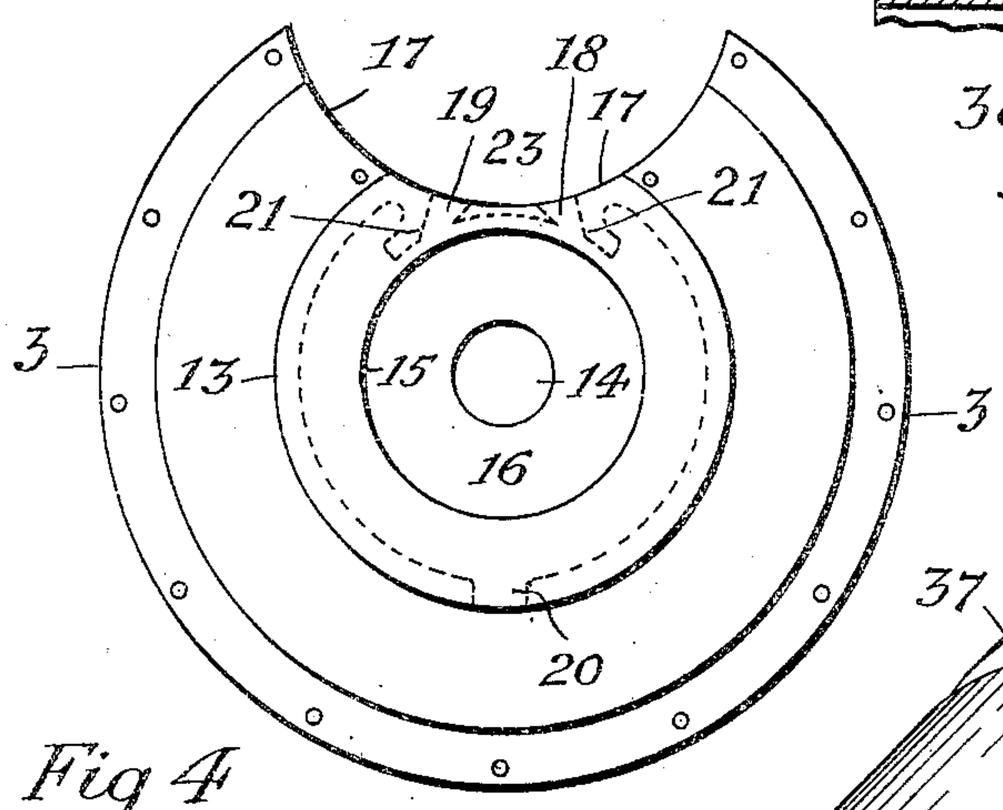


Fig 4

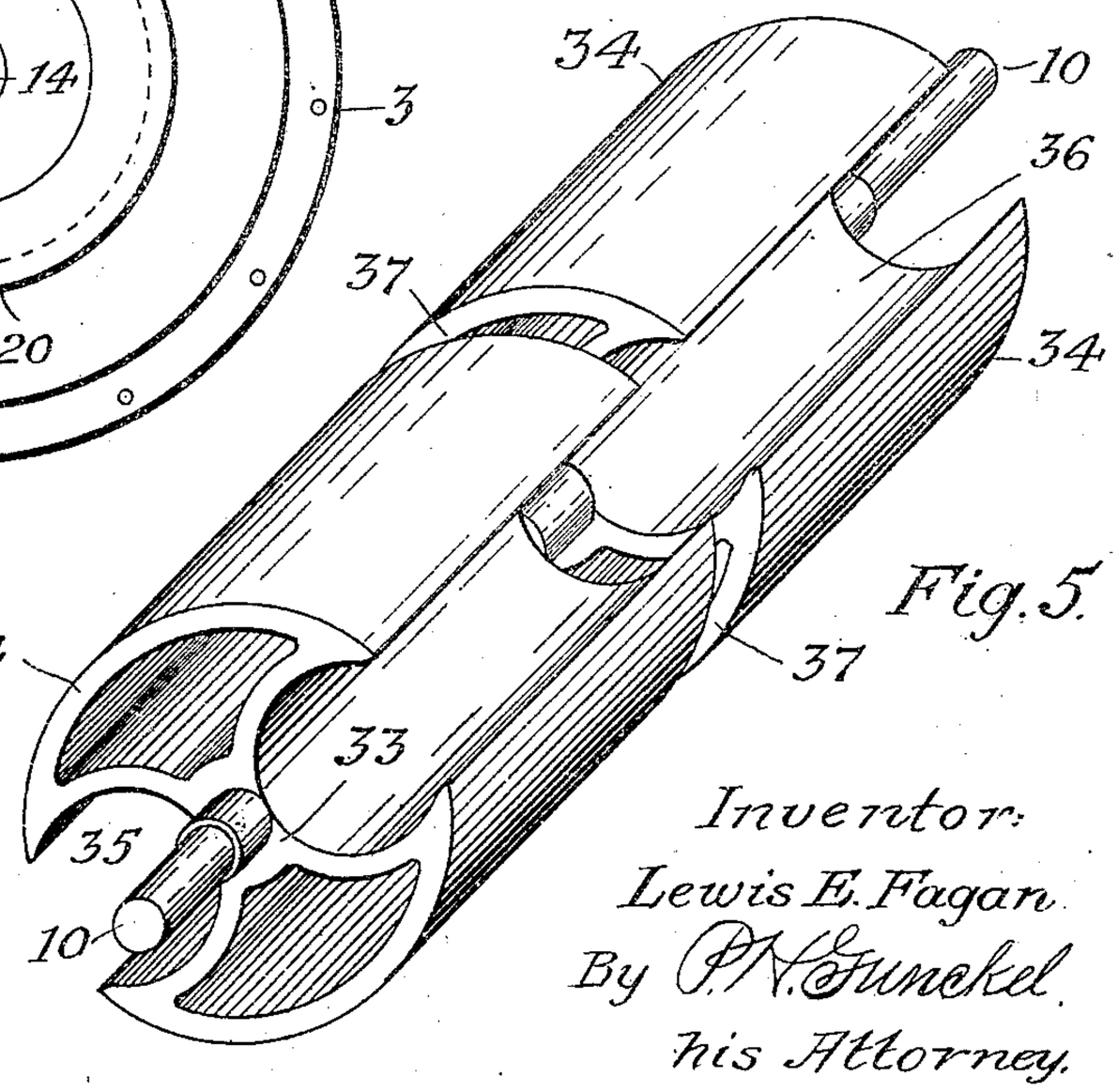


Fig. 5.

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UNITED STATES PATENT OFFICE.

LEWIS E. FAGAN, OF MINNEAPOLIS, MINNESOTA.

ROTARY BLOWER.

940,587. Specification of Letters Patent. **Patented Nov. 16, 1909.**

Application filed February 16, 1909. Serial No. 478,186.

To all whom it may concern:

Be it known, that I, LEWIS E. FAGAN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Rotary Blowers, of which the following is a specification.

My invention relates to rotary blowers, and particularly to such as embody two intersecting cylindrical casing members one of which contains a fixed core and a driving-shaft carrying impellers which revolve in an annular space between the core and casing, and the other of which contains a rotating cylindrical drum or idler provided with longitudinal recesses for receiving the revolving impeller blades during their return movements to the suction side of the casing.

My improvement relates to the provision of means whereby at the proper times the air under pressure carried in the idler recesses as it approaches the suction side of the blower is enabled to flow through passage-ways in the core of the first named casing member to the spaces between the impeller blades at the working side, instead of being carried to the suction port, thereby effecting a saving of air under pressure and also preventing the noise of its escape at the suction side.

I attain the objects referred to by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a transverse section of the preferred construction of my improved rotary blower taken on the plane of the broken line *w—w* of Fig. 2 viewed toward the right; Fig. 2 is a longitudinal section of the machine on the plane of the broken line *x—x* of Fig. 1; Fig. 3 is a top view and Fig. 4 shows an end view of one of the cores detached; Fig. 5 is a perspective view of the idler; Fig. 6 is a perspective view of the impeller devices detached from the apparatus; and Fig. 7 shows a portion of the upper casing segment and the plate for filling the groove in the idler vanes.

In the drawings the casing is shown as consisting of two cylindrical segments designated respectively 1 and 2, which have their ends closed by heads 3 and 4, and these heads are fixed in place and constitute the main supports for the machine. These casing heads 3 and 4 have outward extensions 5 and 6, respectively, on which are provided the journal-boxes 7 and 8 for the driving-shaft 9 and the trunnions 10 of the idler. The idler is driven by gear-wheels 11 and 12 connecting one of its trunnions with the driving-shaft.

The heads 3 of the lower casing member are provided with stationary inwardly extending cylindrical hollow cores 13; and axial openings 14 are provided in the heads for the driving shaft. The inner ends of the cores are suitably spaced for the operation of the impeller disk, and inward flanges 15 at the core ends provide an ample space 16 to receive the disk hub. Each of the cores has in its upper surface a groove 17, curved in cross-section and extending longitudinally the length of the core; and in each of these grooves are two longitudinal slots, 18 and 19, respectively, and in the lower side of each core is also a longitudinal slot 20. The walls at the outer sides of the slots 18 and 19 are extended somewhat within the cores, as shown at 21, and the inner surfaces of these walls or abutments 21 are beveled, as shown at 22. The under surface of the portion 23 of the core body intermediate the slots 18 and 19 is made concave.

In the space between the core ends is arranged the disk 24 which is attached to the driving-shaft by means of its hub 25. To the disk are secured the impeller blades 26, 27, and 28, extending parallel with the shaft and equally spaced, to operate in the annular space 29 between the casing and the cores. And the disk also has formed on or secured to it three valves, 30, 31, and 32, respectively, arranged in radial alinement with the impeller blades to operate in the chambers of the cores and alternately close and open the slots or ports 18 and 19.

The idler comprises an axial body portion 33 on which are formed two longitudinal hollow vanes 34, the peripheries of which constitute arcs of a circle, and they are separated by recesses 35 and 36 which are preferably nearly circular; and it may be formed of two separate sections or be provided with a circumferential groove 37 extending from the faces of the vanes to the body or axis 33. The upper portion of the groove 37 is partially closed by a segmental plate 38 secured to the casing and having its portion below the axis cut away to permit the impeller blades to be revolved. This plate serves to steady and guide the idler in its rotary movements.

The idler is arranged to rotate in the grooves 17 of the cores 13, and the impeller disk 24 rotates freely in the lower portion of the idler groove 37. The impeller may be assumed to revolve in the direction indicated by the arrow *a* and the idler in that indicated by the arrow *b*. The casing is provided with the usual inlet or suction opening 39 at one side, and discharge opening 40 at the opposite side, so located as to be in communication successively with the spaces between pairs of the impeller blades and with the idler recesses.

The upper casing member is provided with supplemental chambers or pockets 41 and 42 formed by hollow ribs 43 and 44 on the exterior of the casing and connected by throats 45 with the chamber within the casing. These pockets serve as an additional means for saving and returning air under pressure.

In operation, when the impeller is rotated in the direction indicated by the arrow *a*, and the several devices are in the positions indicated in Fig. 1, air is being carried along between the pairs of blades 26 and 27, while air is flowing in through the inlet 39 to the space between the blades 26 and 28, and air is being discharged from the space intervening the blades 27 and 28 against the pressure of the air in the outlet opening 40. Just before the parts of the machine had rotated to the positions shown in Fig. 1, the chamber 35 of the idler was in communication with the outlet port and hence received a charge of air under pressure which was carried along with the idler until the latter had reached the position shown and the valve 32 had been moved beyond the slot 18, when both ports or slots 18 and 19 were opened to the idler chamber and the air under pressure therein was free to flow therefrom into the core chamber and thence through the opening 20 to the space between the impeller blades 26 and 27. Slight further rotation from the positions shown in Fig. 1 would cause the face of the idler vane 34 to close the port 18, and the valve 32 carried by the propeller to close the port 19. By this arrangement of devices nearly all of the air under pressure that is not discharged at the outlet is prevented from being carried back to the suction side and is saved by being permitted to return to the annular space 29 to be again carried by the impeller to the discharge outlet.

The means for saving and returning air under pressure thus far described is supplemented by the chambers or pockets 41 and 42. In constructing such machines it is usual to have the idlers fit somewhat loosely in their casing, to avoid the necessity of lubrication, and when so constructed air under pressure is allowed to enter the intervening space at the discharge side and pass around the idlers toward the suction side. The pockets 41 and 42 are provided to receive the air that thus escapes and store it until the idler makes a partial rotation and presents one of its recesses 35 or 36 to the throat 43 of the pocket 41 or 42 which permits the compressed air stored in such pocket to flow into the idler recess, in which the air pressure is lower owing to the fact that such recess was previously in communication with the suction opening 39, and allows the air so received to be conducted to or toward the discharge opening.

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

1. In a rotary blower, a casing, longitudinally grooved hollow cores therein having ports at opposite sides, impeller blades arranged to revolve in the space between the cores and casing, and valves operated by the impeller for opening and closing core inlet ports, for the purpose set forth.

2. In a rotary blower, a casing, longitudinally grooved hollow cores therein having ports at opposite sides, impeller blades arranged to revolve in the space between the cores and casing, valves for opening and closing the core inlet ports, and a rotating disk for carrying the impeller blades and said valves, substantially as set forth.

3. In a rotary blower, a casing, stationary cores therein providing an intermediate annular space and having longitudinal grooves in their surfaces, impeller blades arranged to revolve in such annular space, longitudinally recessed idler blades arranged to revolve in said core grooves, the cores being provided with air ducts extending transversely through the core bodies and connecting said surface grooves at the one side with the annular space at the opposite side, and valves carried by the impeller for controlling the inlets to said air ducts, substantially as set forth.

4. In a rotary blower, a casing, stationary cores therein providing an intermediate annular space and having longitudinal surface grooves and transverse air ducts connecting such grooves with the annular air space at the opposite side of the cores, impeller blades arranged to revolve in said annular space, longitudinally recessed idler blades arranged to revolve in the core grooves, valves for controlling the inlets to said air ducts, and a rotating disk for operating said impeller blades and valves, substantially as set forth.

5. In a rotary blower, a casing, stationary cores therein providing an intermediate annular space and having longitudinal surface grooves and transverse air ducts connecting such grooves with the annular air space at the opposite side of the cores, a disk arranged to rotate between the core ends, im-

peller blades carried by the disk and operating in the annular space, longitudinally recessed idler blades arranged to revolve in the core grooves, the said air ducts being arranged to permit the passage of air under pressure from the core grooves to the space between impeller blades at the opposite side, and valves controlled by the impeller rotations for opening and closing the inlets to said air ducts, substantially as set forth.

6. A rotary blower, comprising a casing, stationary cores therein having longitudinal surface grooves and transverse air ducts connecting such grooves with the annular air space at the opposite side of the cores, a disk arranged to rotate between the core ends, impeller blades carried thereon, longitudinally recessed idler blades arranged to revolve in the core grooves, and valves carried by said disk for controlling the inlets to the air ducts, substantially as set forth.

7. A rotary blower comprising a casing formed by intersecting cylindrical segments and heads, cores supported by the heads of one of the cylinders and provided with longitudinal grooves along their surfaces and transverse air ducts connecting such grooves with the annular air space at the opposite side of the cores, a disk arranged to rotate between the adjacent ends of the cores, impeller blades carried thereon, suitably chambered idlers arranged to rotate in said core grooves, and valves carried by said disk for controlling the inlets to the air ducts, substantially as set forth.

8. In a rotary blower, a casing, stationary cores therein providing an intermediate annular space and having longitudinal grooves in their surfaces, impeller blades arranged to revolve in such annular space, and longitudinally recessed idler blades arranged to revolve in said core grooves, the cores being provided with air ducts extending transversely through the core bodies and connecting said surface grooves at the one side with the annular space at the opposite side, and the idler casing being provided with pockets arranged to communicate periodically with the recesses in the idler blades, for the purpose set forth.

9. In a rotary blower, a casing, stationary cores therein providing an intermediate annular space and having longitudinal surface grooves and transverse air ducts connecting such grooves with the annular air space at the opposite side of the cores, impeller blades arranged to revolve in said annular space, longitudinally recessed idler blades arranged to revolve in the core grooves, and hollow ribs formed on the idler casing for providing storage pockets arranged to communicate periodically with the recesses in the idler blades, for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 11th day of February, 1909.

LEWIS E. FAGAN.

Witnesses:
P. H. GUNCKEL,
H. A. BOWMAN.