L. E. FAGAN.

ROTARY BLOWER.

APPLICATION FILED MAR. 12, 1908.

912,549.

Patented Feb. 16, 1909.

2 SHEETS—SHEET 1.

Fig 2

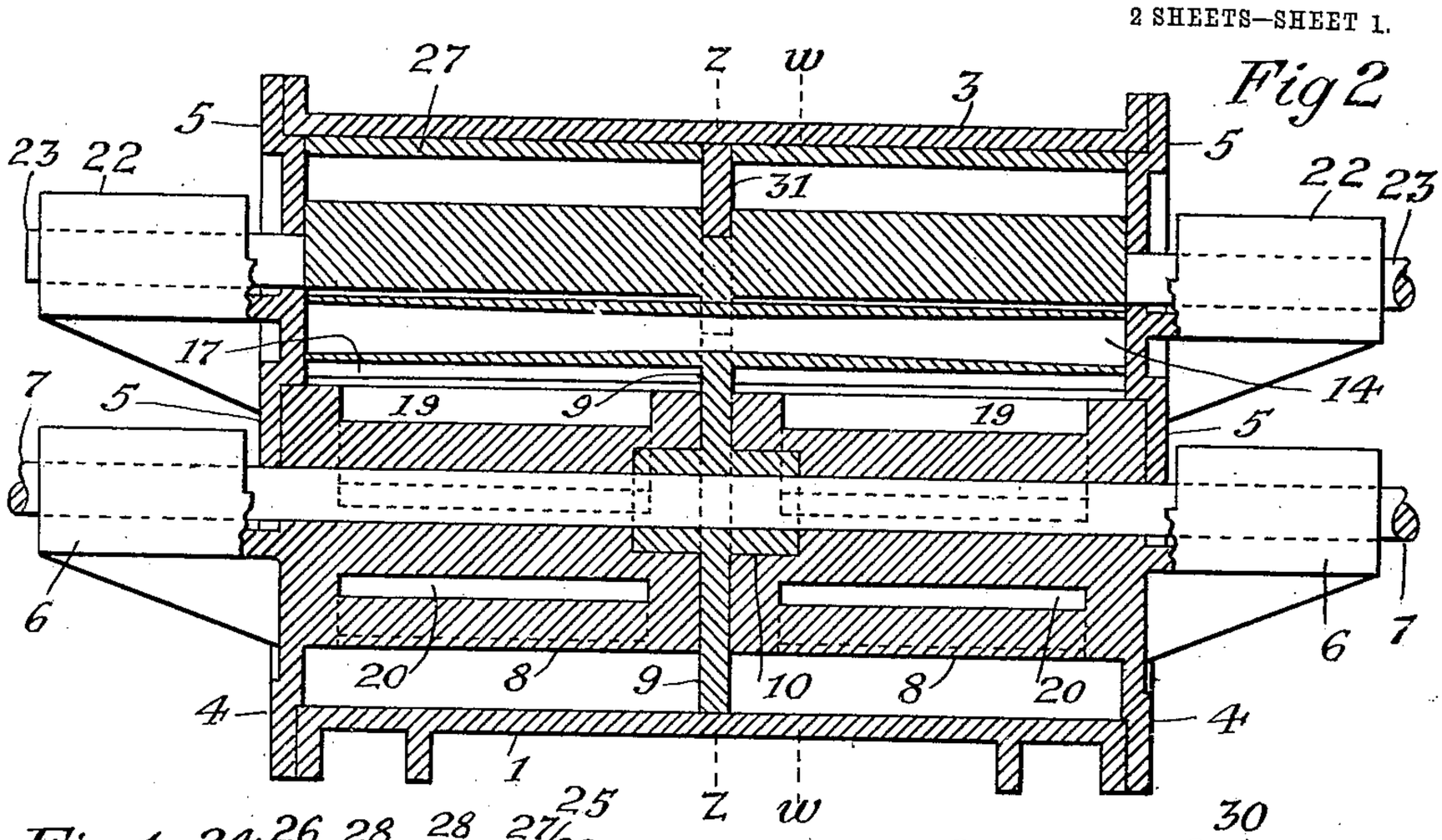


Fig 1

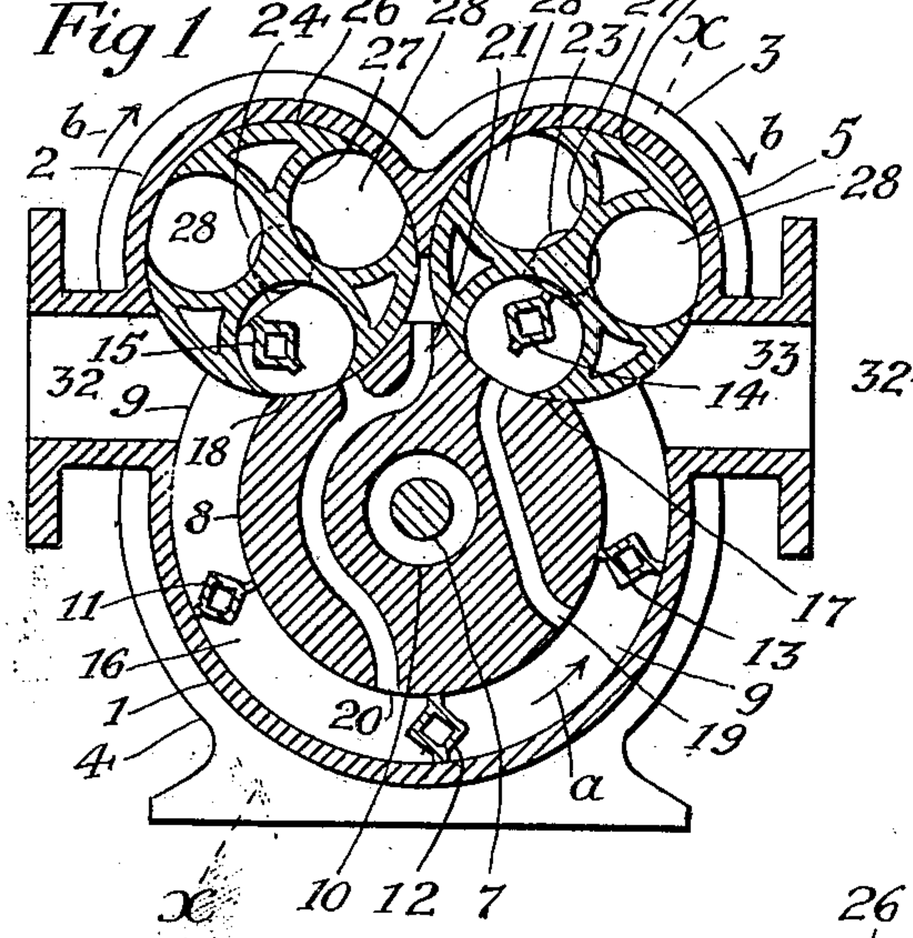
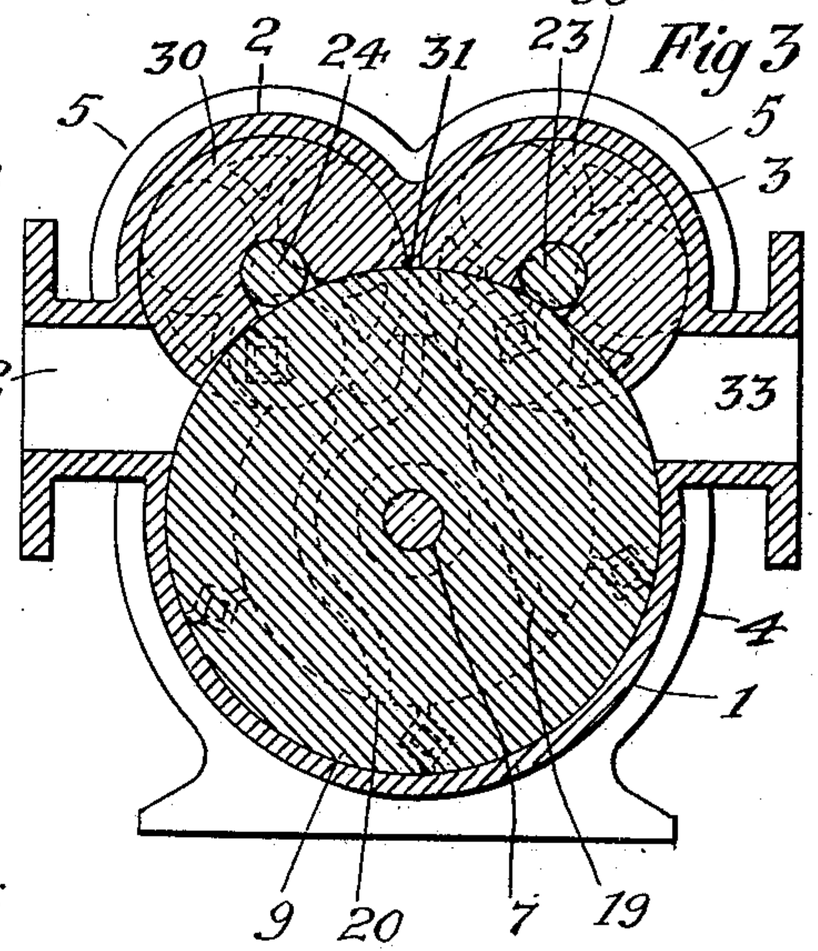


Fig 3



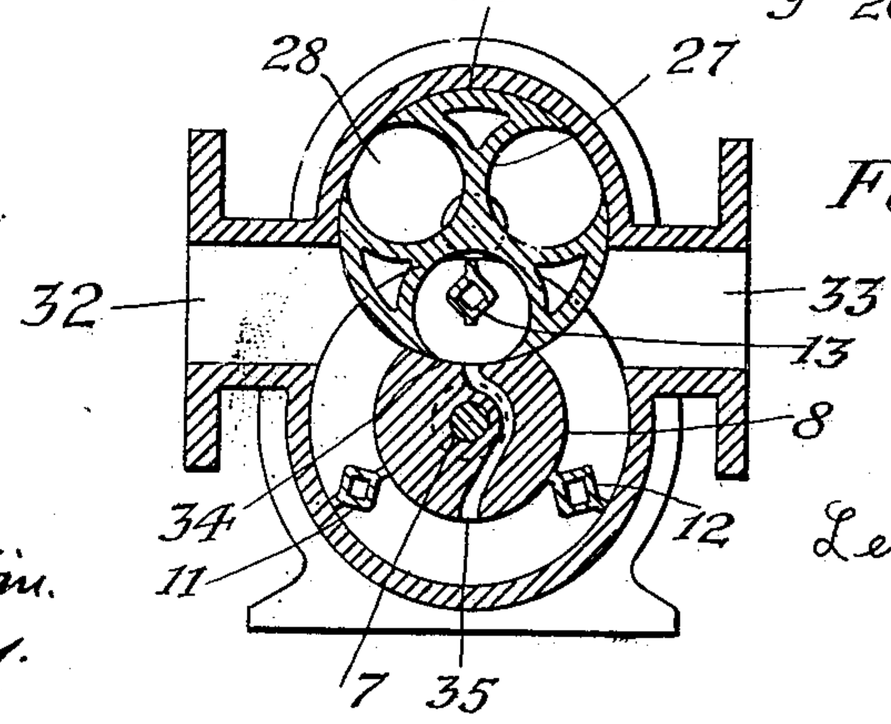


Fig. 4.

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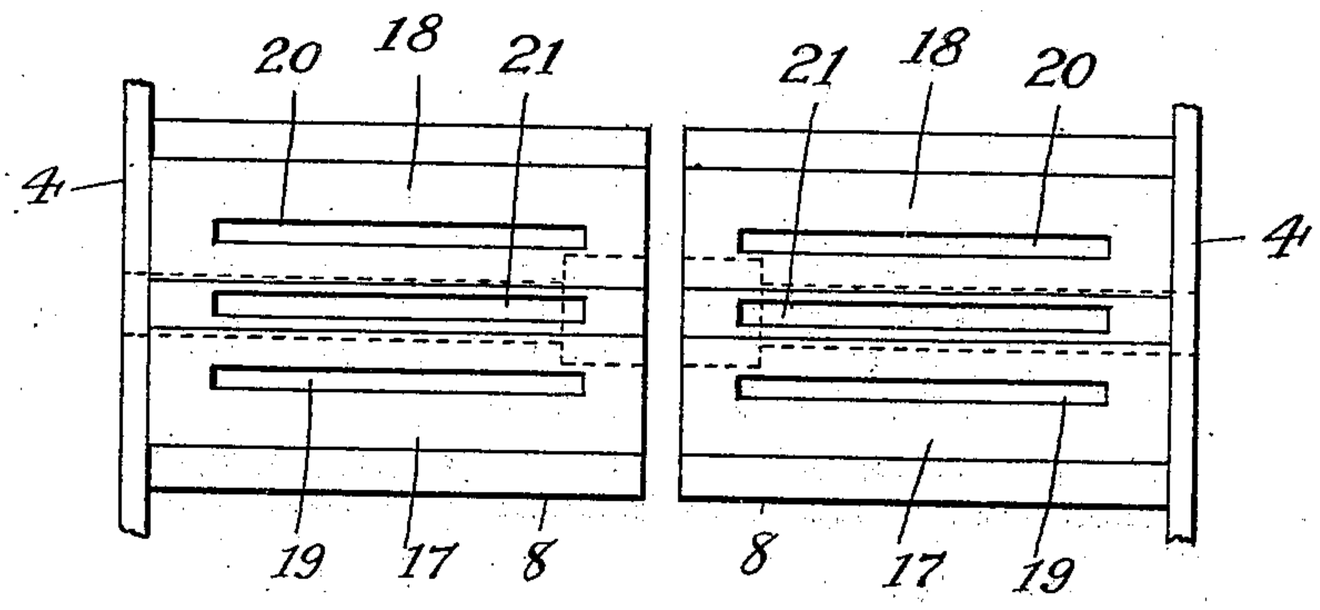
2 SHEETS—SHEET 2.

Fig 5



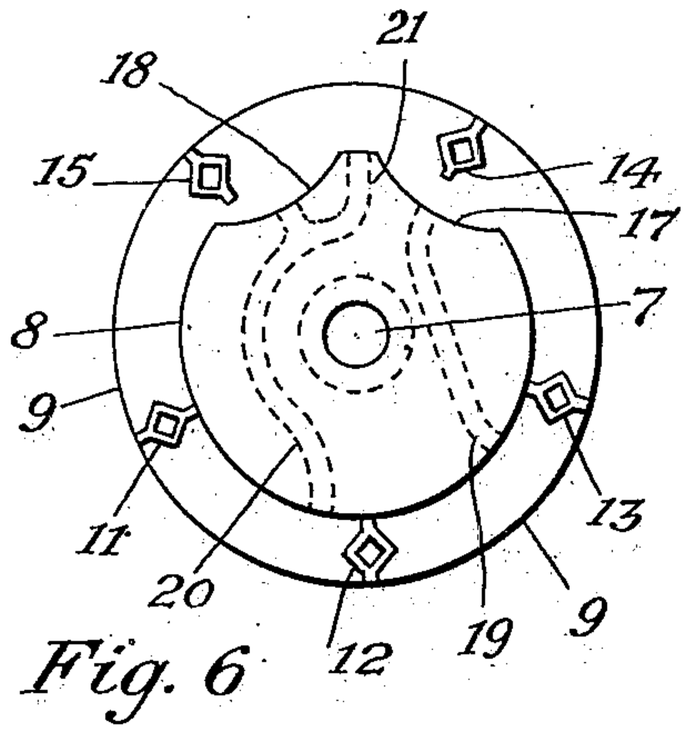


Fig. 6

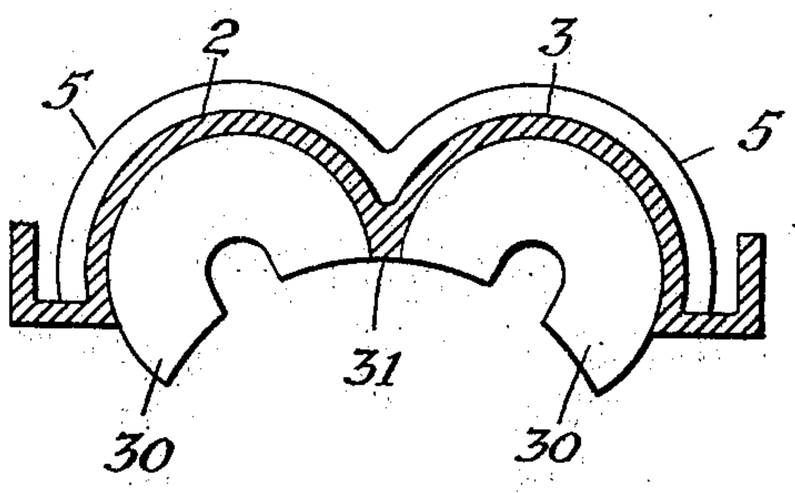


Fig 7

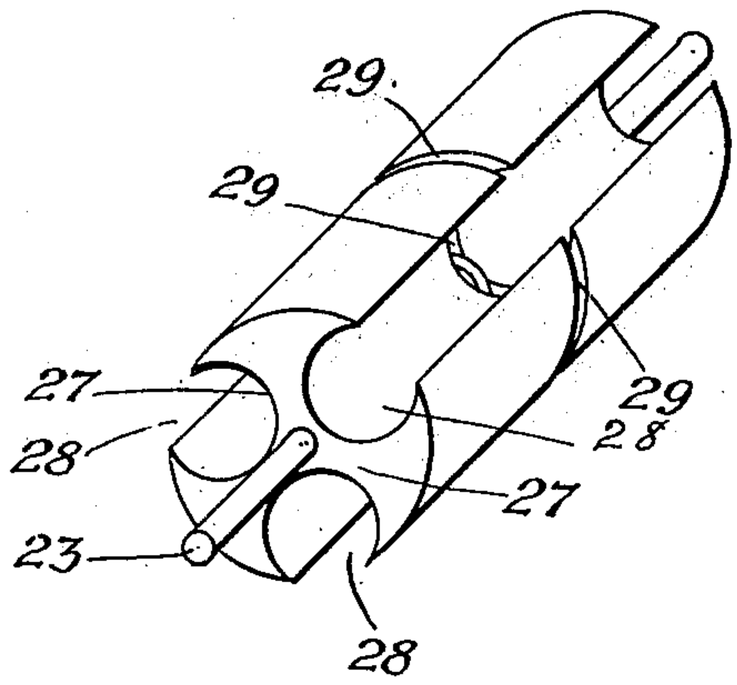


Fig. 8.

Witnesses:

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UNITED STATES PATENT OFFICE.

LEWIS E. FAGAN, OF MINNEAPOLIS, MINNESOTA.

ROTARY BLOWER.

No. 912,549. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed March 12, 1908. Serial No. 420,633.

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 or more 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 in approaching 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 as well as preventing the noise of its escape at the suction side.

My improvements are 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; 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 like section on the plane of the broken line *z*—*z* of Fig. 2; Fig. 4 is a transverse section, similar to Fig. 1, of a modified construction in which is employed a single idler instead of a plurality of idlers; Fig. 5 is a top view of the core detached; Fig. 6 shows an end view of the core and showing also the disk and impeller blades; Fig. 7 shows portions of the upper cylindrical segments and the plates and flange for filling the grooves in the idlers and the space between them; and Fig. 8 is a perspective view of one of the idlers.

In Figs. 1 to 3 the casing is shown as consisting of three intersecting cylindrical segments designated, respectively, 1, 2, and 3, which have their respective ends closed by heads 4 and 5, which are fixed in place and, in part, constitute the supports for the machine. The heads 4 of the lower and larger casing member 1 have outwardly extending projections 6 that provide the journal-boxes for a driving-shaft 7; and these heads are also provided with inwardly projecting cylindrical cores 8 having axial openings which furnish interior bearings for the shaft. Between the inner ends of the cores is a space sufficient to permit the free rotation of a disk 9 formed on a hub 10 that is secured to the shaft 7 at the center of the casing member 1.

The impeller blades, of which there may be five as shown in Figs. 1 to 3, or any other suitable number, are designated 11, 12, 13, 14, and 15, and are formed on or attached to the disk 9 and extend from its sides in directions parallel with the shaft 7; and the blades, being equally spaced, divide the annular space 16 between the cores and casing into a like number of equal spaces or pockets. The upper surfaces of the cores 8 are provided with grooves 17 and 18, curved in cross-section and extending longitudinally of the cores at opposite sides of the vertical plane of their common axis. From the groove 17 of each core a slot or passage-way 19 extends through the core to its lower surface at the same side of the vertical plane; and from the groove 18 of each core a slot or passage-way 20 extends through the core at that side of the axis to the lower surface, and in communication with the passage-way 20 is a port or opening 21 to the annular space intermediate the grooves 17 and 18.

The heads 5 of the casing members 2 and 3 are provided with journal-boxes 22 for the axles 23 and 24 of the idlers 25 and 26 that are rotated by gearing (not shown) connecting the axles with the driving-shaft 7. The two idlers are of like form and size and comprise three longitudinal hollow vanes or blades 27 the peripheries of which constitute arcs of a circle, and the recesses 28 of which are preferably nearly circular. These idlers may each be formed of two sections or be provided with a circular groove 29 extending from the axle to the periphery. They are geared to revolve in the same direction and, like the impeller, may be rotated either toward the right or left. For the purposes of illustration the impeller is assumed to revolve in the direction indicated by the arrow *a* and the idlers in that indicated by the arrow *b*.

The drums are placed to revolve respectively in the core grooves 17 and 18, and the

disk 9 is free to rotate in the lower portions of the circumferential grooves 29. The upper portions of the latter grooves are partially closed by plates 30 that are secured to the casings, and a downwardly extending flange 31 at the point of juncture of the casings 2 and 3 fills in the space of the grooves 29 intermediate that filled by the plates 30. The plates 30 and flange 31 serve to steady and guide the idlers in their rotary movements.

The casing has the usual inlet or suction opening 32 at one side and discharge opening 33 at the opposite side, and so located as to be in communication successively with the spaces between pairs of impeller blades and with the drum chambers 28.

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 11—12 and 12—13, while air is flowing in through the inlet 32 to the space between the blades 15 and 11, and air is being discharged from the space intervening the blades 13—14 against the pressure of the air in the outlet opening 33. Just before the parts have rotated to the positions shown in Fig. 1 the chamber 28 of the idler 25 in which the blade 14 appears, was in communication with the outlet port and hence received a charge of air under pressure which the idler carried along until the opening to the chamber 28 registered with the opening to the passage-way 19 which permitted a portion of the compressed air in the chamber 28 to flow through the core 8 to the space between the impeller blades 12 and 13. The rotation to the position shown in Fig. 1 also carried along air under pressure in the space between the blades 14 and 15 which, when the blade 15 had passed the port 21 leading to the passage-way 20, was permitted to flow through the core to the space between the blades 11 and 12. Just before the chamber 28 of the idler 26, in which appears the blade 15 in Fig. 1, reached the position shown, it was in communication with the space between the blades 14 and 15 and received a charge of air under pressure which, during the time the opening to the chamber registered with the passage-way 20, was permitted to flow through the core to the space between the blades 12 and 13. 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 16 to be again carried by the impeller to the discharge outlet.

In the construction illustrated by Fig. 4 only one idler is employed, and the other parts are varied only sufficiently to adapt them to such modification. The cores 8, instead of having each two longitudinal grooves, have each only one groove, 34, which is arranged centrally over the shaft 7; and each core has but one air passage-way 35 through its body. The impeller in this instance is shown as having but three blades, designated 11, 12, and 13, to correspond with the three-vaned idler. The parts in this construction that are like those heretofore described are indicated by like reference numerals. It is believed that the mode of operation will be apparent in the light of the description hereinbefore given.

For supplying air at the higher pressures the construction showing the larger number of impeller blades and a plurality of idlers is preferable; but for the lower pressures the modified construction, with fewer impeller blades and a single idler, is a desirable form of machine.

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

1. 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, substantially as set forth.

2. 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, and longitudinally recessed idler blades arranged to revolve in the core grooves, substantially as set forth.

3. 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, impeller blades carried by the disk and operating in the annular space, and 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, substantially as set forth.

4. 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, and longitudinally recessed idler blades arranged to revolve in the core grooves, for the purpose set forth.

5. 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 by the disk and operating in the annular space, and a plurality of idlers arranged to rotate in said grooves and having longitudinal recesses, substantially as set forth.

6. 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, and suitably chambered idlers arranged to rotate in said core grooves, 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 air ducts extending transversely through the core bodies from said grooves and from an intermediate point to the opposite annular space, rotating impeller blades, and idlers arranged to rotate in said grooves and having longitudinal recesses, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 10th day of March, 1908.

LEWIS E. FAGAN.

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