(No Model.) 3 Sheets—Sheet 1.

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ROTARY PUMP.

No. 582,696. Patented May 18, 1897.

Fig. 1.

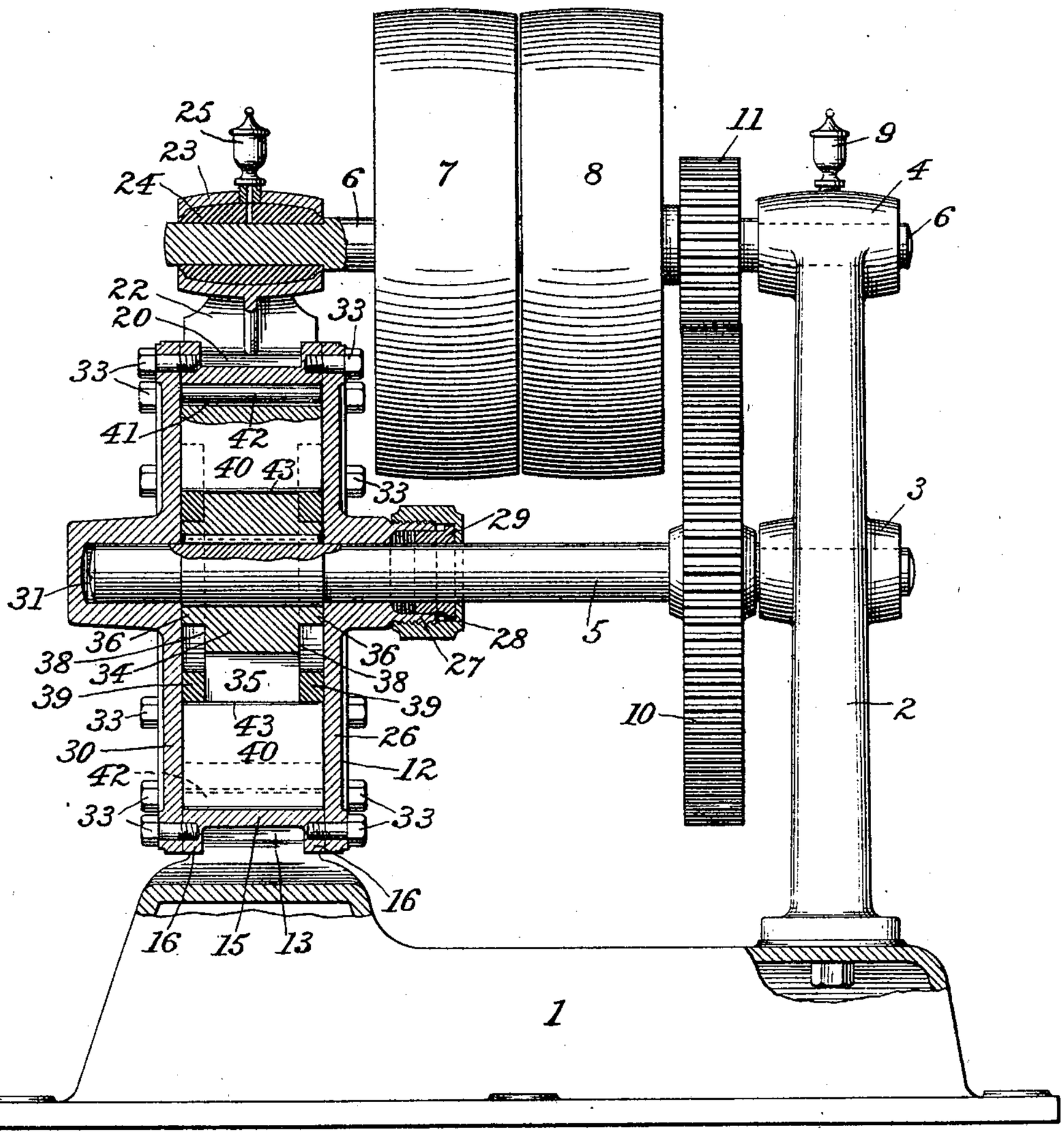

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Fig. 2.

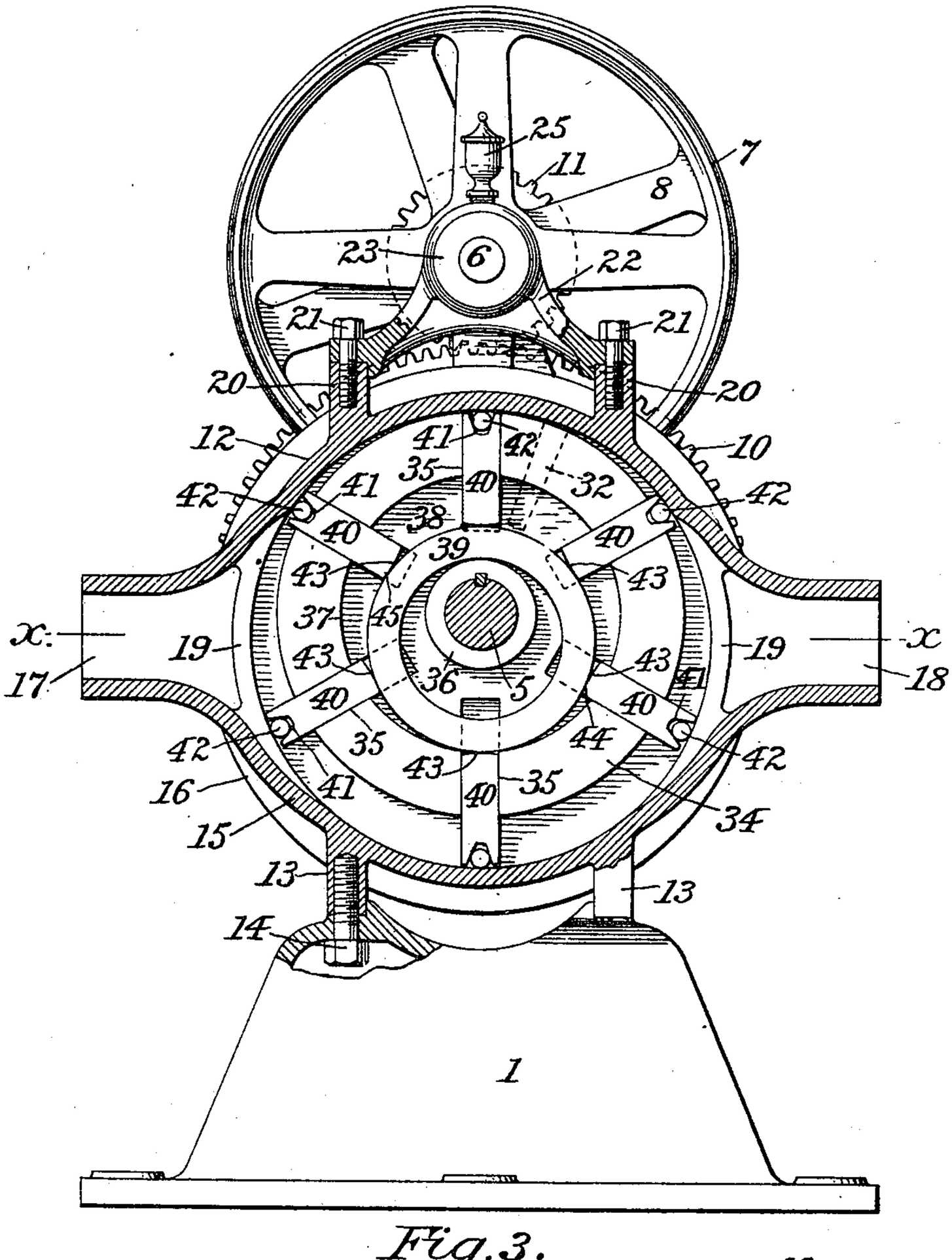
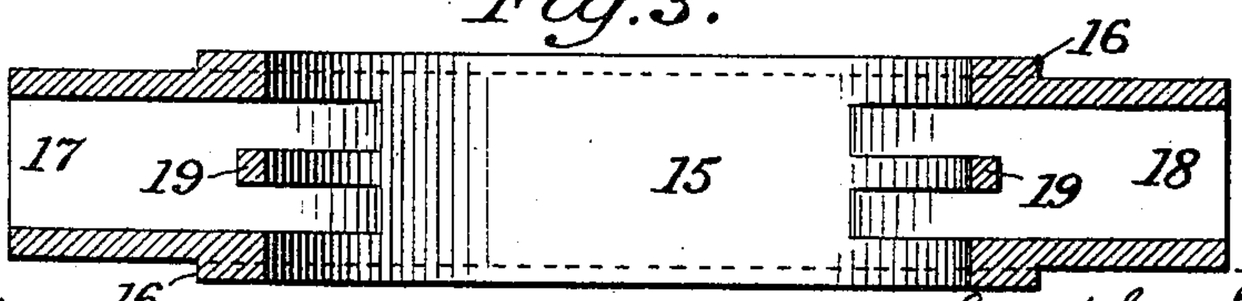


Fig. 3.



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ROTARY PUMP.

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Fig. 4.

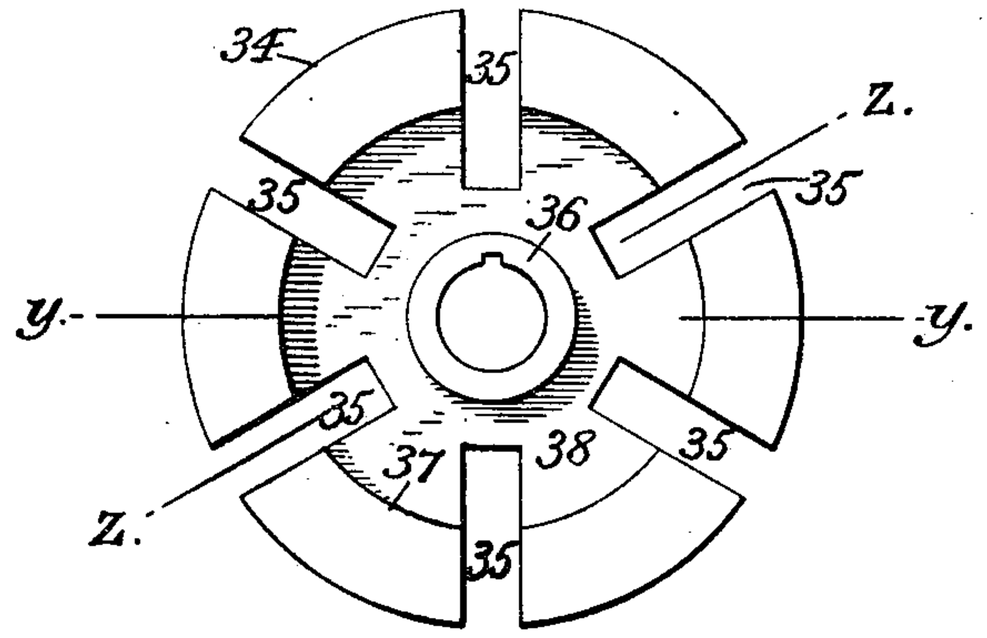


Fig. 5.

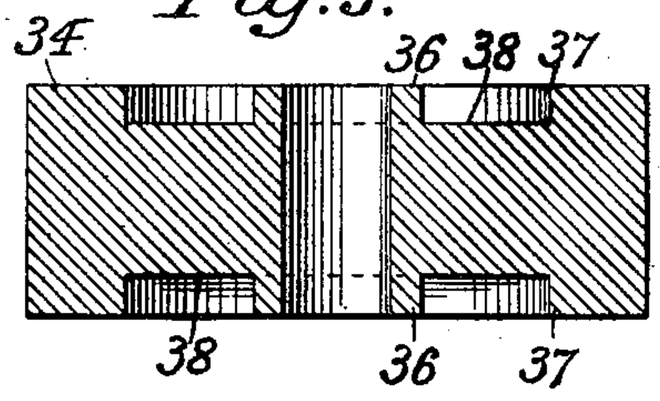


Fig. 6.

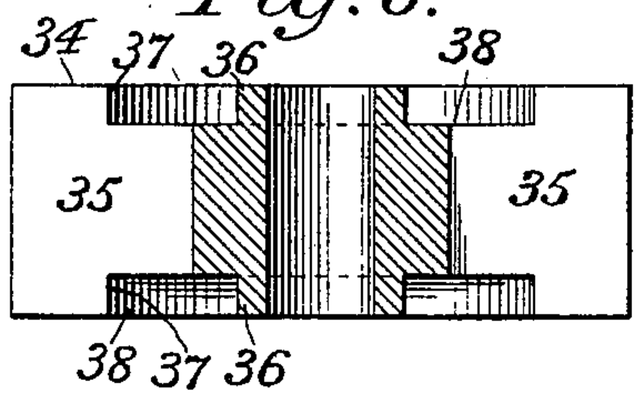


Fig. 7.

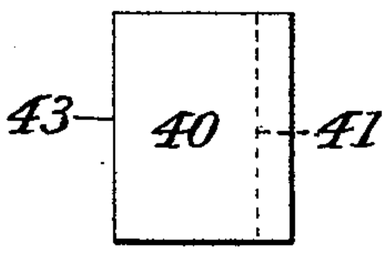


Fig. 8.

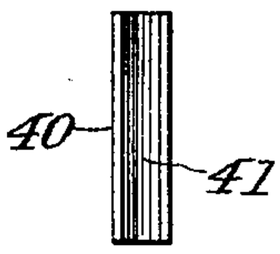


Fig. 9.

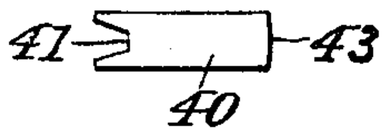


Fig. 10.

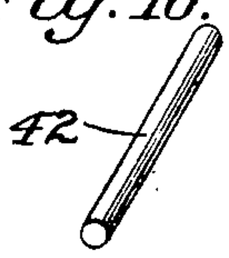


Fig. 11.

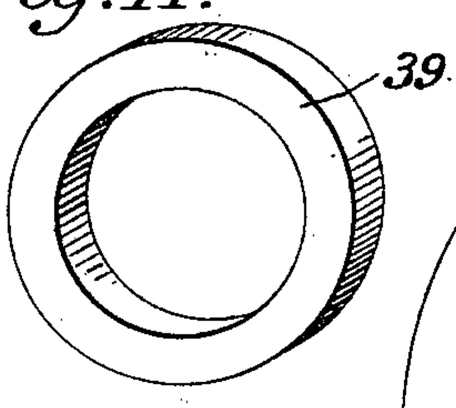
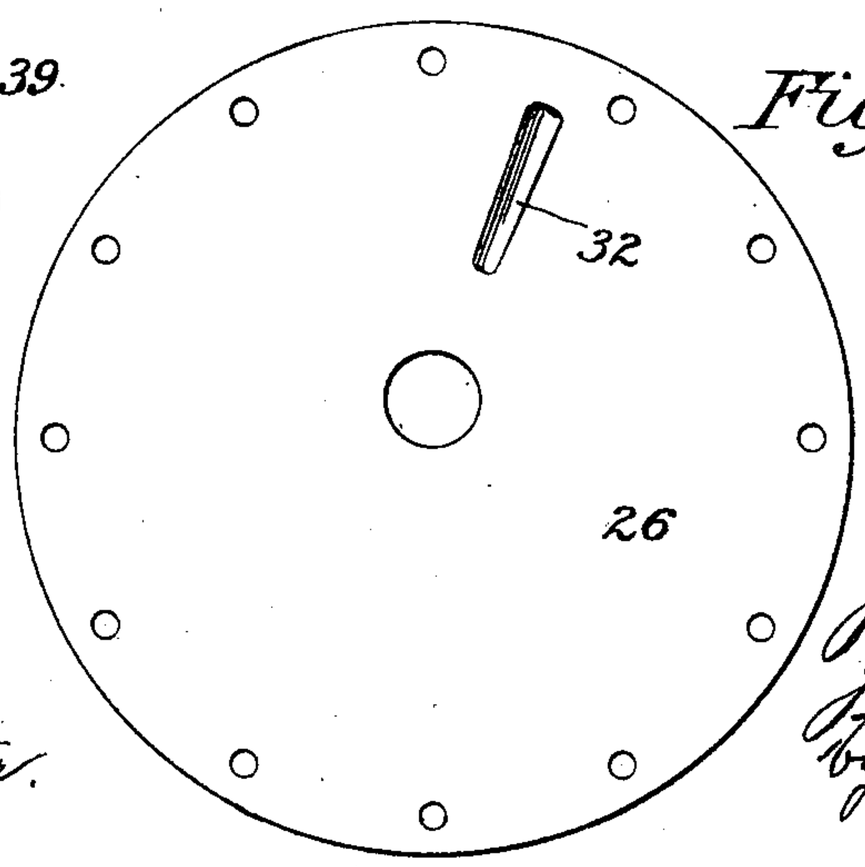


Fig. 12.



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UNITED STATES PATENT OFFICE.

JOSEPH SCHNEIBLE AND JOHN F. FITCH, OF NEW YORK, N. Y.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 582,696, dated May 18, 1897.

Application filed August 7, 1895. Serial No. 558,511. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH SCHNEIBLE and JOHN F. FITCH, citizens of the United States, and residents of the city, county, and State of New York, have invented certain new and useful Improvements in Rotary Pumps; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to rotary pumps or engines which comprise as features of construction a cylinder or chamber having inlet and outlet ports, a carrier mounted to rotate in said chamber or cylinder, and gates or pistons supported by said carrier in contact with the walls of the chamber or cylinder. Usually in pumps or engines of this description the carrier is mounted eccentrically with respect to the cylinder, and the gates or pistons slide in slots in the carrier and rest upon a centrally-disposed cam or its equivalent, which holds the gates outwardly in contact with the wall of the cylinder, while the gates themselves are made in two parts with interposed springs, or the cam or the loose ring which takes its place is made elastic for the purpose of permitting the bearing parts of the gates to yield somewhat and prevent binding of the parts and unnecessary wear. These expedients complicate the structure and increase the cost, while decreasing the durability and the proportion of work performed to the power consumed in moving the parts. Furthermore, the efficiency of pumps of this description is very largely reduced by the leakage occasioned by the looseness of fit of the working parts necessary to enable such parts to be driven easily. In the present invention we have sought to overcome these difficulties by so constructing the parts as to permit rigid or one-piece gates to be employed, and by utilizing the final portion of the compression stroke or movement of each gate, where the actual volume of fluid that might be delivered by such portion of the movement would be very small, to maintain within the central portion of the pump a volume of fluid under pressure, which fluid finds its way out between the working parts, and thereby constitutes not only a lubricant, but a fluid packing, which practically prevents leakage and thereby increases the efficiency of the pump. At the same time we are enabled to prevent hammering altogether without unduly extending the outlet-port. In addition to these features of improvement we have sought also to improve generally the construction and operation of the pump or engine to the end that we may produce a pump or engine which shall be as nearly perfect in operation as it is possible for a machine of its character to be.

We have illustrated an embodiment of our invention in the accompanying drawings and will describe the construction there shown in detail.

In the drawings, Figure 1 is a vertical central section of the pump in the plane of the axis of the cylinder with the driving-gear and supporting-standard and bed-plate in elevation. Fig. 2 is an end elevation of the same with the casing in section. Fig. 3 is a horizontal central section of the casing or cylinder on the plane indicated by the line $x\,x$ of Fig. 2. Fig. 4 is an elevation of the carrier. Fig. 5 is a section of the carrier on the line indicated by the line $y\,y$ of Fig. 4. Fig. 6 is a similar section on the plane indicated by the line $z\,z$ of Fig. 4. Figs. 7, 8, and 9 are respectively side, edge, and end views of one of the sliding gates. Fig. 10 is a perspective view of one of the bushings or bearing-rods. Fig. 11 is a perspective view of one of the supporting-rings. Fig. 12 is a view of the inner face of one of the heads of the cylinder.

In the particular embodiment of the invention illustrated in the drawings the bed-plate 1 is represented as supporting at one side a standard 2, which is formed with a boss 3, located at about its middle, and a second boss 4 near its top. These bosses support, respectively, one end of the main shaft 5 of the pump and one end of the counter-shaft 6, the bearings for the shafts being of usual construction and provided with oil-cups, as at 9. The counter-shaft 6 bears an idler-pulley 7 and a fast pulley 8.

To the shaft 5 is keyed or otherwise secured a gear 10, which meshes with a driving-gear 11 on the shaft 6. The relative sizes of these gears will depend upon the speed desired for the pump, and as the standard 2 is easily re-

movable a change of gears can be effected readily.

The other ends of both shafts 5 and 6 are supported in or upon the body 12 of the pump, which, as shown in Fig. 2, may be readily secured to the bed-plate 1 by means of the downwardly-projecting lugs 13 and the bolts or screws 14.

The body comprises a cylindrical part 15, forming a chamber with a smooth inner periphery, an outer rib 16 to afford strength, an inlet 17 and outlet 18, and a rib or ribs 19, crossing each port or opening. The cylinder may be cast with two lugs 20 on its upper portion for the reception of screw-bolts 21, which secure in place a bracket 22 for the other bearing 23 of the counter-shaft 6, the usual babbitt 24 and oiler 25 being added. The heads of the cylinder are circular, with smooth inner faces, the one, 26, next to the gear-wheel 10 being provided with an eccentric perforated boss having a threaded end 17 for the reception of a cap 28 and turned out for a packing 29 to form a stuffing-box. The other head 30 of the cylinder is formed practically the same, except that the eccentric boss is not perforated, but provides a socket 31, in which the end of the shaft 5 may be journaled. Both the front and rear heads are provided with channels 32, (see Figs. 2 and 12,) which are located between the outlet 19 and the highest point of the cylinder, or rather that point which is nearest the axis of the eccentric bosses just referred to. The heads may be secured to the body of the cylinder by means of bolts 33.

The gate-carrier 34 is keyed or otherwise secured to the main shaft 5, has near its periphery a close working fit between the heads 26 and 30, and is formed with radial slots 35, a convenient number of which is shown in the drawings. Between the hub 36 of the carrier and the ring 37 at each end of the carrier is formed an annular recess 38, as shown in Figs. 5 and 6, the radial slots 35 extending into said recesses through the rim 37 and the return-channels 32 in the heads 26 and 30 establishing communication between said recesses and the extremity of the lune formed between the eccentrically-mounted carrier and the cylinder. In the recesses 38 are placed the supporting-rings 39, which should be of such thickness as to move easily in said recesses.

The sliding gates 40 are rigid or unyielding plates, formed each in one piece, of the same width as the face of the carrier, so that when the parts are secured together the carrier and the gates shall have a close working fit between the heads 26 and 30 in the cylinder. The depth of the gates is such that when properly supported by the rings 39 their outer edges, or rather the rod or bushing 42, which forms the bearing edge of each gate, shall have a snug sliding fit against the inner periphery of the cylinder. To receive the rod or bushing 42, the edge of each gate is formed with a groove 41, running from end to end, the lips of the groove being keepers or guides whose function it is to hold the bushing 42 in place and against the inner periphery of the cylinder.

It will be noted that the rod or bushing 42 makes contact with the wall of the cylinder only in a line, notwithstanding the rocking of the gate with respect to the wall of the cylinder as it revolves with the eccentric carrier, and that friction is thus reduced to a minimum. The heel of each gate, where it rests upon the rings 39, is curved in the arc of a circle whose radius is the distance of the contact-line of the gate or bushing with the wall of the cylinder from the bearing on the ring, so that notwithstanding the changes of position due to the eccentricity of the carrier and the rocking of the gate on said line of contact there can never be any binding of the gates between the rings and the wall of the cylinder, although the gates themselves are rigid and unyielding plates, and the rings 39 are also unyielding.

It will be observed also from an inspection of Fig. 2 that the axis of the cylinder itself, the line of bearing of each gate upon the ring, and the line of contact of each gate with the wall of the cylinder are in the same or a radial plane and that as each gate travels about the axis of the cylinder the line of contact of its heel with each ring is constantly changing, yet as the distance between the contacts of each gate remains always the same there can be no binding and no excessive friction, although the proper contact is always maintained.

It will also be observed by an examination of Fig. 2 that the inner end of the outlet-port 18 does not extend to the extremity of the lune-shaped space formed between the carrier and the cylinder, but that it stops short of that point, terminating at a point between the middle line of the port and the point where the sliding gate is fully retracted and the periphery of the carrier touches or approaches most nearly the wall of the cylinder, the point being indicated by the position of the upper right-hand gate. Obviously there is effected a further compression by the movement of each gate beyond the end of the port, and in pumps of this general character as ordinarily constructed this would occasion hammering. The return-channels 32 on each side, however, permit the fluid which has been entrapped by each gate 40 as it passes beyond the outlet-port to be forced into the chamber at the end of the carrier, from which it finds its way under the pressure developed outward at each end of the carrier, thereby not only lubricating the parts, but forming the fluid packing, which effectually resists any tendency to leakage past the ends of the carrier.

In other respects than those just noted the pump operates in substantially the same manner as other pumps of the same general character, and it is therefore unnecessary to de-

scribe such operation more in detail herein. It will be evident that the novel features which we have herein explained are applicable to engines of a similar type as well as to pumps, and it is therefore to be understood that we do not intend to restrict our invention to the particular use referred to herein, nor do we intend to restrict it to the precise construction and relation of the parts shown herein, as it is evident that the details may be varied without departing from the spirit of our invention.

What we claim is—

1. The combination of a cylinder having inlet and outlet ports, a carrier mounted to rotate eccentrically in said cylinder and fitting closely between its ends, said carrier being slotted radially and recessed at its ends, sliding gates mounted in the slots of said carrier to make contact with the wall of the cylinder, means to press said gates outwardly into contact with the cylinder and heads for said cylinder, said heads having a return-channel to establish communication between the space at the ends of the carrier and the lune-shaped space formed between the carrier and the cylinder, the return-channels opening into said lune-shaped space between the end of the outlet-port and the end of said lune-shaped space, substantially as shown and described.

2. The combination of a cylinder having inlet and outlet ports, a carrier mounted to rotate eccentrically in said cylinder and fitting closely between its ends, said carrier being slotted radially and recessed at its ends, sliding gates mounted in the slots of said carrier to make contact with the wall of the cylinder, supporting-rings for said gates placed in the end recesses of said carrier and heads for said cylinder, said heads having a return-channel to establish communication between the space at the ends of the carrier and the lune-shaped space formed between the carrier and the cylinder, the return-channels opening into said lune-shaped space between the end of the outlet-port and the end of said lune-shaped space, substantially as shown and described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOSEPH SCHNEIBLE.
JOHN F. FITCH.

Witnesses:
H. G. ROGERS,
NEAL EWING.