

Aug. 23, 1927.

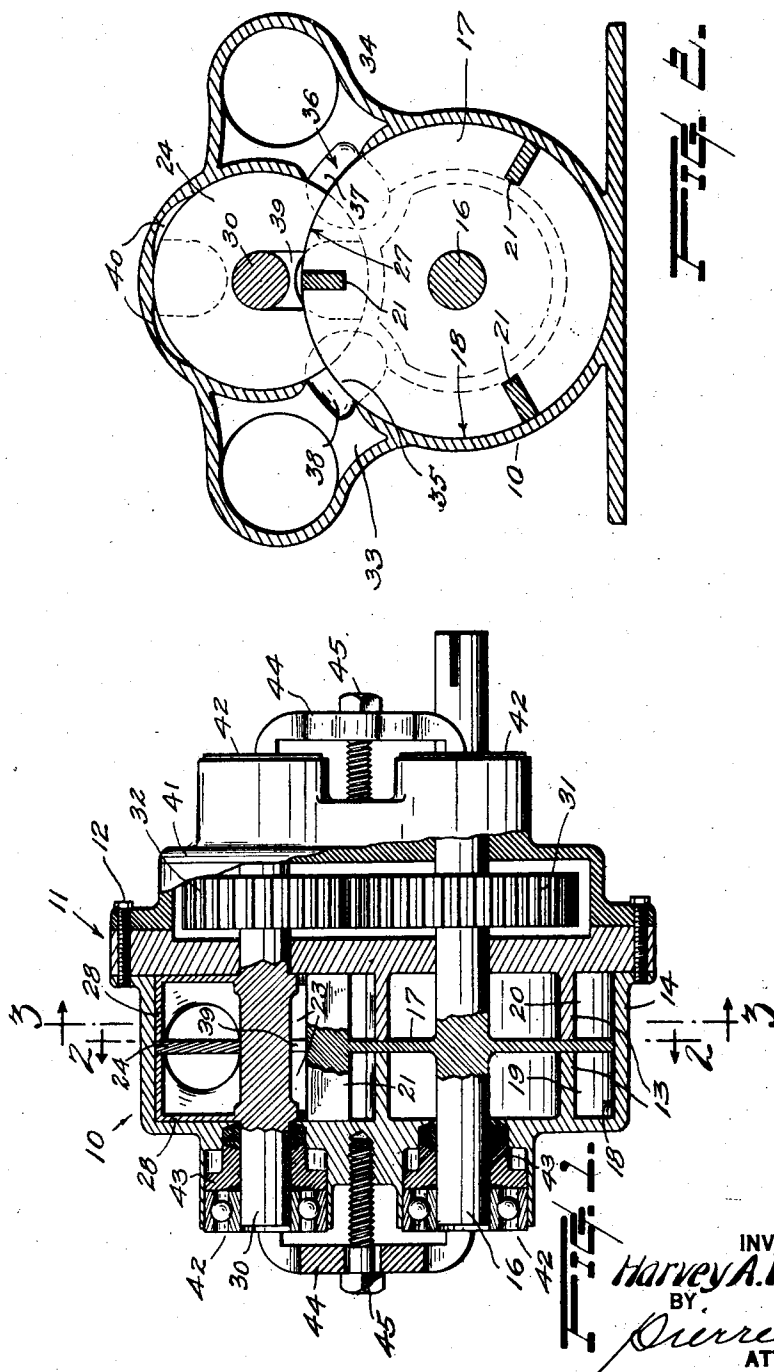
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ROTARY PUMP.

Filed Nov. 13, 1926

2 Sheets-Sheet 1



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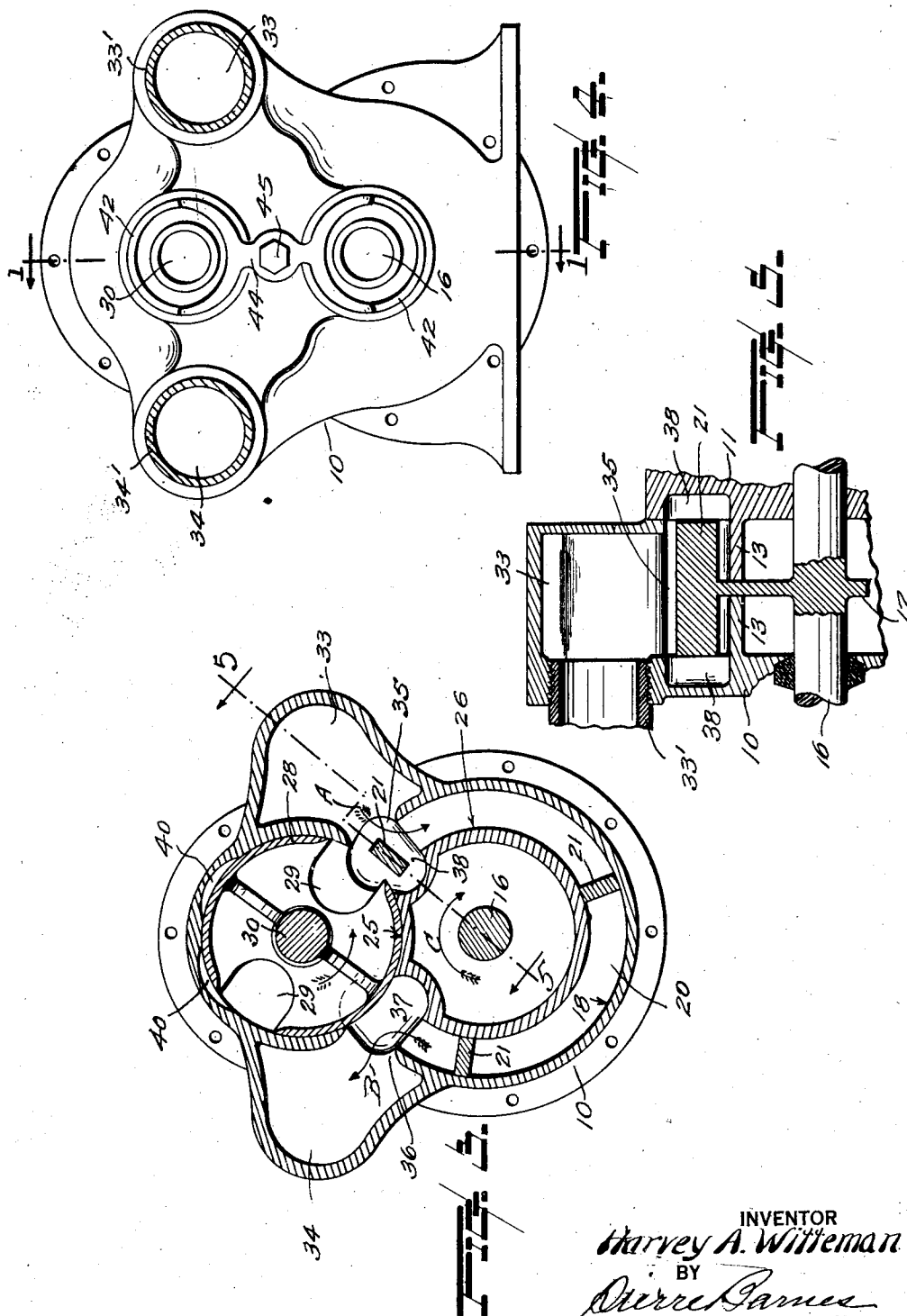
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2 Sheets-Sheet 2



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ROTARY PUMP.

Application filed November 13, 1926. Serial No. 148,127.

This invention relates to rotary pumps and is in the nature of an improvement on the pump illustrated and described in patent application Ser. No. 52,734 filed by me August 27, 1925.

The object of the present invention is the perfecting of a pump of this character to render the same more efficient and better adapted for heavy duty work.

More specific objects and advantages of the invention will appear in the following description.

The invention consists in certain novel features of construction and in the adaptation and combination of the same as will be hereinafter described and claimed.

In the accompanying drawings,—

Figure 1 is a view partly in side elevation and partly in longitudinal vertical section of a rotary pump embodying my improvement; Figs. 2 and 3 are transverse sectional views taken substantially on lines 2—2 and 3—3 of Fig. 1; Fig. 4 is an end elevation of the pump, including supply and exhaust pipe connections which are shown in transverse section; and Fig. 5 is a detail sectional view on broken lines 5—5 of Fig. 3.

In carrying out my invention I employ a casing composed of companion members 10 and 11 which are secured together as by means of bolts 12. Said casing is formed to provide between its end walls, outer and inner peripheral walls 14 and 13 to afford an annular space which is preferably rectangular in transverse section, and disposed concentrically of a shaft 16 which carries the rotor. The inner peripheral wall elements 13 of the respective members are separated a short distance apart to receive between them the disk element 17 of the rotor which is rigid upon the shaft 16. Said disk is circular with a diameter to have it contact circumferentially with the outer periphery 18 of said annular space, thereby separating the latter into two rectangular pumping chambers 19 and 20 of equal transverse sections.

Rigid to said disk and within the perimeter of the same are radially disposed pistons 21, three being shown in the drawings, said pistons being rectangular in outline and adapted to revolvably fit the respective pumping chambers.

Provided in said casing is a cylindrical

chamber which is divided into two abutment receiving chambers 23 by means of a partition 24 which is located in the plane of the rotor disk 17. The axis of the chambers 23 is arranged parallel with the axis of the shaft 16 and is spaced therefrom so that the chambers 23 will extend as a re-entrant cavity—denoted by 25 in Fig. 3—within the produced circle circumscribed by the inner periphery 26 of the pumping chambers 19 and 20.

The partition 24 is of a substantially lunar shape, see Fig. 2, having a diameter equal to the diameter of the chambers 23, the concave peripheral surface 27 of said partition being of a curvature and arranged to fit the periphery of the disk 17.

Positioned within each of the chambers 23, is a hollow cylindrical abutment 28 which is provided in its peripheral wall and in its side wall at diametrically opposite sides of its axis of rotation with openings 29 to accommodate the pump pistons 21 in their revoluble travel when traversing the abutment chambers.

Said abutments are rigid with a shaft 30 which is operatively connected to the rotor shaft 16 by means of spur gears 31 and 32 mounted upon the respective shafts; said gears being proportioned for transmitting suitable rotary motion from one shaft to the other to cause the abutment openings and pistons to register in proper sequence one with the other.

Water or other liquid which is to be pumped is admitted and discharged at opposite sides of the abutments into and from the pumping chambers 19 and 20, as indicated by arrows A and B when the rotor turns in the direction indicated by arrow C in Fig. 3. As illustrated, cavities 33 and 34 provided within the casing afford communication between inlet and discharge connections 33¹ and 34¹, respectively, and ports 35 and 36 which open into the pumping chambers 19 and 20 and also into the abutment chambers 23 at the intake and exhaust sides of the pump.

To facilitate the flow or circulation of water about the pistons 21 during their passage by the ports 36 and 35 into and from the piston receiving openings in the abutments, I provide recesses 37 and 38 in the end walls of the casing. These recesses, as

shown, include wall areas which extend into cavities 34 and 33, the pumping chambers 19-20 and the abutment chambers 23. The lengths of the wall recesses radially of the shaft 16 is somewhat greater than that of the pistons in the same direction.

The peripheral walls of the abutments and also the end walls thereof between the piston-receiving openings are so arranged that the abutments will serve as rotary valves to open and close communication between the interiors of the abutments and the respective ports 35 and 36 and recesses 37-38 to prevent any direct flow of water through the abutment chambers between said ports; the pistons as they successively enter the abutments displacing therefrom water which has been supplied from the pumping chambers in proximity to the discharge port 36. The water pressure between the interiors of the two abutments is equalized by the provision of a passage 39 in the partition 24 and also by the provision of recesses 40 in the peripheral wall of the abutment chambers, which recesses are communicatively connected through the medium of the piston receiving openings in the abutments twice in each rotation of the latter.

As illustrated in Fig. 1, a cover member 41 is advantageously secured to the casing member 11 to serve therewith as a housing for the gears 31 and 32.

The shafts 16 and 30, as shown, are extended through both the pump casing and the gear housing and are journaled in ball bearing assemblies, as 42, provided in the end wall of the casing member 10 and the housing cover member 41, respectively. These ball bearing assemblies are disposed upon the respective shafts against the glands 43 of stuffing boxes for the shafts and serve as media for setting the glands, from bridge bars 44 which are regulated by take-up screw bolts 45 engaging in threaded holes provided in the casing and gear housing ends.

In operation, power applied to the shaft 16 drives the rotor and also, through the medium of the gears 31 and 32, rotate the abutments 28.

When the rotor and abutments are thus driven the pistons 21 successively revolve in the respective abutment openings through the abutment chambers 23. After a piston has passed the abutments and the water intake 33 it creates a suction to its rear to draw the fluid into the pumping chambers, which water accompanies the piston until the latter has passed the pump's discharge opening 34, whereupon the water drawn by the referred to piston is forced by the following piston through the discharge opening 34. In each cycle of operation the abutments 28 are rotated to present the piston-receiving openings thereof in positions to re-

ceive the pistons. The outer peripheral portion of the disk 17 passes between the abutments which latter overlaps said disk.

While I have described the invention as pertaining to a pump it may also be advantageously used as a fluid pressure motor. For such use the rotor is rotated by the power medium to drive the shaft 16.

What I claim, is,—

1. In apparatus of the character described, annular pumping chambers having circumferentially spaced apart inlet and discharge ports, a rotor comprising a disk and a plurality of pistons revoluble in said chambers, hollow rotary members extending into said chambers to close the same at opposite sides of the rotor-disk between said ports, said members being provided at diametrically opposite sides with openings to successively receive the rotor pistons, said openings having communication with each other through the medium of the chambers within the respective hollow members, shafts for the rotor and said members, and operative driving connections between said shafts.

2. In apparatus as defined in claim 1, wherein the rotary members are disposed in spaced apart relation, a non-rotatable partition disposed in the plane of the rotor disk and between said rotary members, said partition being provided with a passage way to afford communication between all of the piston receiving openings of both rotary members.

3. In apparatus as defined in claims 1 wherein recesses are provided in the end walls of the pumping chamber and communicating with the respective ports to permit the circulation of waters about the pistons as they approach and leave the openings therefor in the rotary members.

4. A rotary pump, having a casing provided with two pumping chambers, and abutment chambers intersecting the pumping chambers, said casing being provided with spaced apart inlet and outlet openings, recesses provided in the casing walls and serving to communicatively connect the pumping chambers with the abutment chambers at their inlet and outlet sides, a rotor comprising a disk, pistons rigid with the disk and located within the perimeter thereof, said pistons being revoluble within the pumping chambers and a portion of the abutment chambers, abutments rotating within the respective abutment chambers and overlapping the rotor disk, a driving shaft carrying the rotor, a shaft carrying said abutments, and gear connections between said shafts.

5. A rotary pump, having pumping chambers, with recesses in the end walls thereof, a rotor having pistons revoluble in said pumping chambers, an abutment chamber communicatively connected by means of said

recesses with the respective pumping chambers, an abutment divided into two compartments by a partition and provided with openings or pockets diametrically opposite each other affording communication between the pumping chambers and the recesses at opposite sides of the abutment chamber, said

abutment having closed ends between said pockets thus affording a valve with respect to said recesses as the rotor pistons successively enter and emerge from the abutments. 10

Signed at Seattle, Washington, this 18th day of October, 1926.

HARVEY A. WITTEMAN.