May 9, 1933. S. A. JOHNSON 1,908,612

REVOLVING PLUNGER PUMP AND COMPRESSOR

Filed April 7, 1932

Fig. 1.

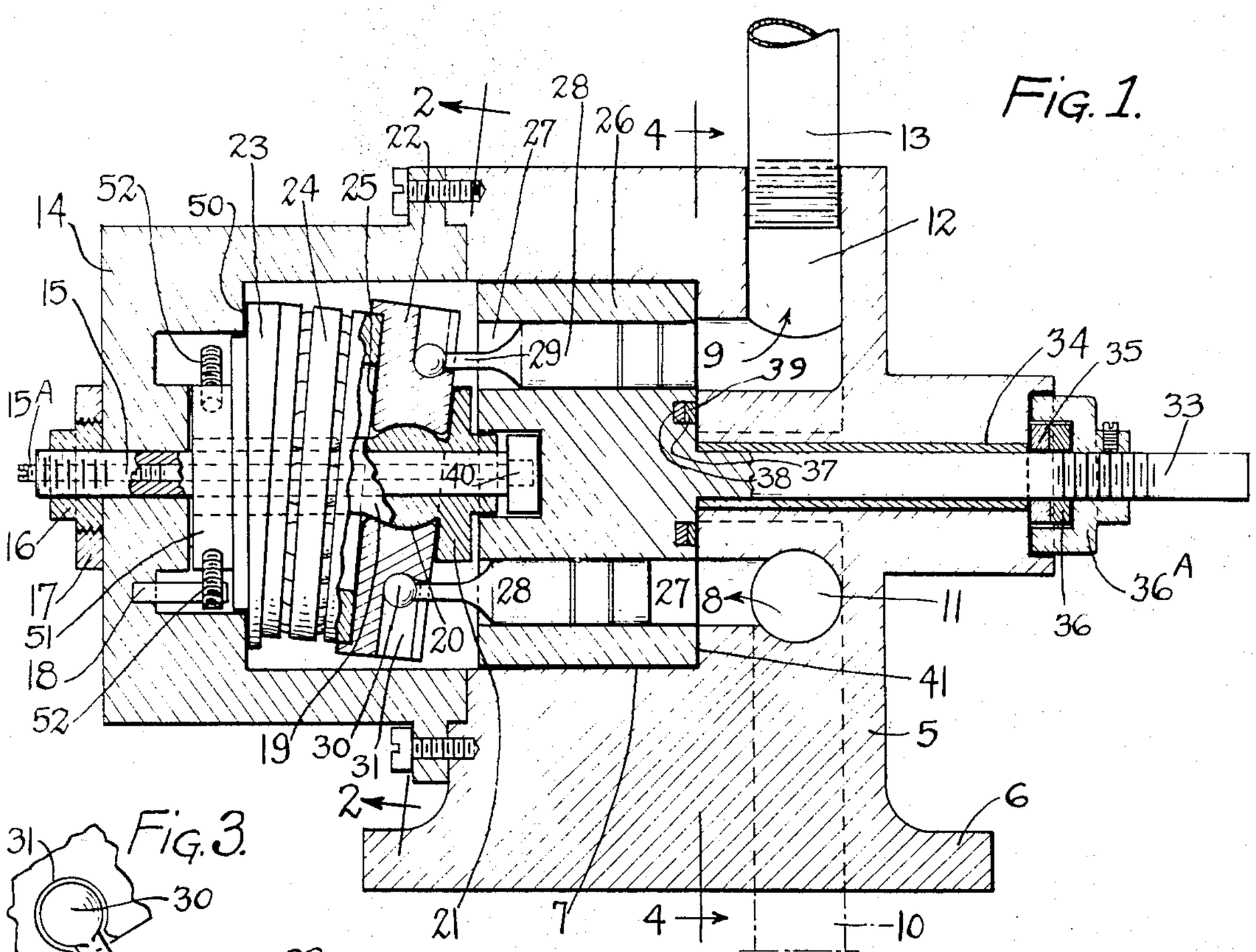


Fig. 3.

Fig. 2.

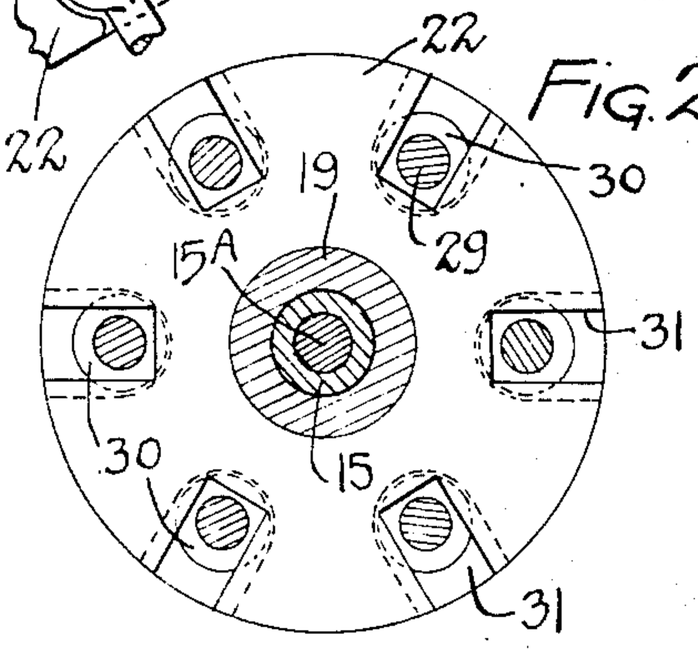


Fig. 4.

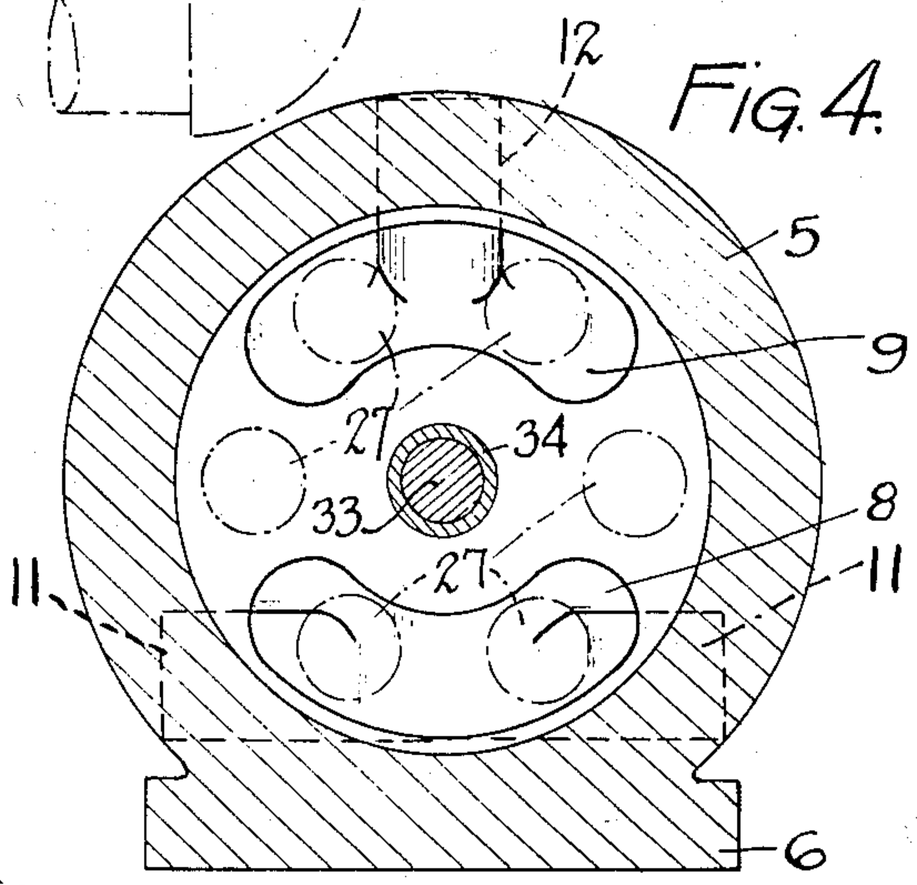
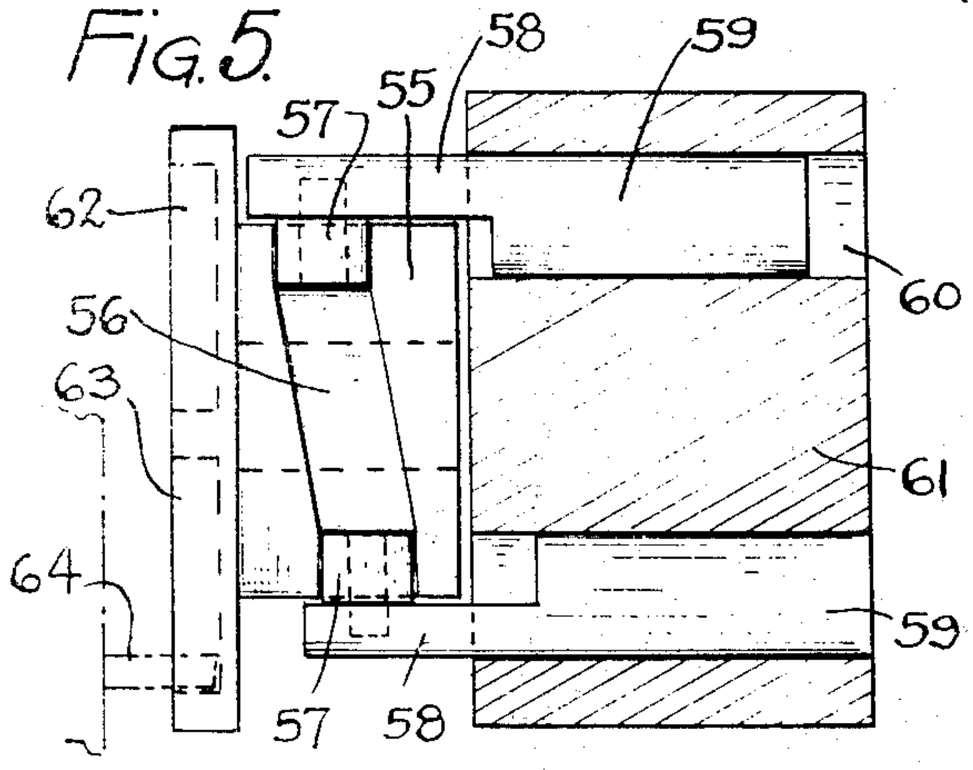


Fig. 5.



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UNITED STATES PATENT OFFICE

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REVOLVING PLUNGER PUMP AND COMPRESSOR

Application filed April 7, 1932. Serial No. 603,810.

This invention relates to a revolving plunger pump and compressor and in particular to a type arranged to operate at high speed and provide a constant flow.

A particular object of my invention is to provide a device of the character described in which the parts operating at high speed may be automatically reversed in the direction of their operation without changing the direction of suction or discharge. Also, no matter in what position the operating cylinder comes to rest, there will be no passage of fluid between the suction and discharge ports.

It is also an object of my invention to eliminate the use of packing and substitute therefor sealing rings which not only operate to maintain the parts in proper spaced relation but also effectively prevent leakage of the fluid exteriorly of the pump.

A still further object of my invention is to provide in a device of the character referred to, a construction which is simple, permits take-up for wear on the cylinder rotor and a device which may be driven from any source of power to effectively suck in and continuously discharge at high speed and under high pressure, a fluid to be operated upon.

Changes and variations may be made in the construction shown and described without departing from the principles of the invention or sacrificing its chief advantages; hence such invention is not to be confined to the structures shown in the accompanying drawing; in which;

Figure 1 is a view in sectional elevation of a high speed plunger pump constructed in accordance with my invention.

Figure 2 is a section taken on the line 2—2 of Figure 1, illustrating only the revolving plunger carrier through the medium of which the plungers are reciprocated.

Figure 3 is a fragmentary detail showing the connection of one of the plunger ends to the plunger carrier.

Figure 4 is a section taken on the line 4—4 of Figure 1 showing the inlet and outlet openings and their relation to the cylinders of the rotor and,

Figure 5 is a view in elevation, parts thereof being shown in section, of a modified form of plunger operating device, which may be substituted if desired for the construction illustrated in Figure 1.

Referring to the drawing in detail, 5 indicates a housing having a base portion 6 and an interior chamber 7 into which opens the inlet segmental opening 8 and the outlet segmental opening 9. The inlet is supplied through the pipe 10 indicated in outline in Figure 1 and arranged to be connected to the inlet 11 preferably cast in the housing 5, while the segmental opening 9 connects with the outlet 12 also cast in the housing 5 and arranged to have connected thereto the outlet pipe 13. There are two inlet openings and one outlet opening, the outlet being at the top while the inlet openings are at the bottom. The chamber 7 is arranged to be closed through the medium of the housing cap 14 in which is disposed some of the operating parts of the mechanism. The cap 14 is arranged to support the stud 15 which is secured therein through the medium of the lock nuts 16 and 17, the end of the cap 14 also carrying an interiorly projecting pin 18, the purpose of which will be hereinafter described.

The stud 15 has mounted thereon a sleeve 19 having a spherical bearing portion 20 and an end disk 21, the latter of which increases in thickness from a minimum to a maximum in one-half its circumference to provide a bearing at one side of a revolving plunger carrier 22 which is arranged to rotate on the spherical portion 20 referred to. The sleeve 19 also carries a base ring 23 which is thicker at one side than at the other so that the median line of a ball thrust bearing 24 separating the revolving plunger carrier 22 from the base ring 23, as well as the revolving plunger carrier itself, is at an angle to the horizontal, and consequently rotation of the revolving plunger carrier 22 will always position the upper portion thereof further away from the base ring 23 than the lower portion. The revolving plunger carrier 22 is also provided with a seat 25 for one of the ball bearing thrust rings, the other ring being mounted flat on the base ring 23. The cylinder rotor 26 is of substantial thickness and is provided with the spaced bores 27 in which

operate the plungers 28. These plungers are each provided with an extended portion 29 in the nature of a neck terminating in a ball end 30, each of the ball ends being disposed in a radial slot 31 provided in the revolving plunger carrier 22, the bottom of said slots constituting seats for the ball ends 30 of said plungers. As indicated in Figure 3, the outer edges of the flap 31 provide a constricted opening so that the ball end of the plunger cannot get out of the slot.

It is evident that rotation of the plunger carrier 22 will reciprocate all of the plungers 28, the rotation of the plunger carrier being caused by the plungers themselves forming a connection between the cylinder rotor 26, which is operated by the drive shaft 33 extending through a suitable bushing 34 disposed in a bore in the housing 5, and said carrier 22. The end of the drive shaft exterior of the housing 5 may be connected with any suitable source of power such, for instance, as a bolt, wheel or motor, and leakage of fluid along the drive shaft 33 is prevented by the use of the sealing rings 35 and 36, the former made of composition metal and the latter of rubber, so that while the metal ring 35 provides an effective seal, it is maintained in close contact with the sealing surface by the yieldable rubber ring 36. This same arrangement is provided on the face of the cylinder rotor 26 where a suitable groove 37 is provided in which are disposed, the rubber sealing ring 38 and the metal sealing ring 39, the latter of which engages the end face 41 to prevent leakage of the fluid into and around the shaft 33. A pin 15—A passes through the stud 15 and is threaded therein to provide adjustment. The end of the pin supports the thrust bearing 40, and is slightly larger in diameter in its bearing supporting portion. The thrust bearing 40 is positioned in a suitable seat formed in the rotor 26. In this connection, it will be noted that constant rotation of the member 26 will cause wear of the face thereof that engages the face 41 of the housing 5 in which are provided the inlet and outlet opening, and to take up this wear it is simply necessary to adjust the pin 15—A longitudinally through the stud 15 due to its threaded connection thereto. The rings 35 and 36 are secured in position by the cap 36—A which is threaded to the shaft 33.

The base ring 23 bears against a suitable shoulder 50 provided in the housing cap 14, and, in its collared portion 51, is provided with the diametrically opposite stud 52, either one of which is arranged to engage the stud 18 to prevent rotation of the base ring 23, no matter in which direction the rotor revolves. Regardless of the direction in which the rotor revolves, the plungers or pistons 28 will operate in the same manner.

In the modified form of my invention illustrated in Figure 5, use is made of a cam 55 having the cam groove 56 in which operates the rollers 57 secured to the ends 58 of the plungers 59 which operate in suitable cylinders 60 in a cylinder rotor 61 driven in the same manner as that illustrated in Figure 1 to do the same work. The cam 55 is provided with a cam plate 62 which may be slotted as at 63 to engage a pin 64 to permit reversal of the direction of rotation of the rotor 61 without changing the direction of intake and discharge of the contents of the pump. This construction illustrated in Figure 5 may be used on the slower speed type of pump as its use in high speed work is objectionable due to the terrific wear on the cam wheels and grooves 56.

It is evident that in the construction described in connection with Figures 1 to 4, that high speed is obtainable without the fast wear on moving parts that would be present in the use of cam rollers and cam grooves and at the same time the pump is reversible in its direction of rotation without changing the direction of flow of the fluid. Also, my construction provides for the elimination of packing and guards against anti-siphon effect, and also no matter what position the rotor comes to rest in, there is no passage provided between the suction and the discharge ports.

My invention is not to be restricted to the precise details of construction shown since various changes and modifications may be made therein without departing from the scope of the invention or sacrificing the advantages derived from its use.

What I claim is:—

1. In a pump of the character described, a revolvable rotor, plungers for drawing a liquid into the rotor and discharging the same therefrom, a revolvable plunger carrier, means for mounting the carrier whereby a rocking motion is provided during rotation thereof to reciprocate the plungers, and said plungers being arranged to communicate the revolving movement of the rotor to said carrier, a stud on which the carrier is mounted, and means for adjusting the stud to take up wear of the rotor.

2. In a pump of the character described, a rotor, plungers for drawing fluid into the rotor and discharging it therefrom, a carrier to which the plungers are connected, said plungers providing a driving connection between the rotor and the carrier, a stud on which the carrier is mounted, a thrust bearing carried by the stud and engaging the rotor, and means for adjusting the stud to take up wear of said rotor.

3. In a pump of the character described, a housing, a rotor having bores therein, plungers reciprocable in the bores for drawing fluid into the rotor and discharge the same therefrom, a carrier, means connecting the plungers and the carrier, a revolvable base

ring having an inclined face, means for mounting the carrier on said base whereby a rotary motion of the carrier causes reciprocation of said plungers, said plungers providing a driving connection between the rotor and the carrier, a shaft on the rotor extending through the housing, a plurality of cushion rings on said shaft abutting said housing, and a sealing ring cap secured to said shaft and holding said rings against said housing.

4. In a pump of the character described, a housing, a rotor in the housing, plungers for drawing fluid into the rotor and discharging it therefrom, a carrier to which the plungers are connected, said plungers providing a driving connection between the rotor and the carrier, a stud on which the carrier is mounted, a thrust bearing carried by the stud and engaging the rotor, means for adjusting the stud to take up wear of said rotor, a sleeve on the stud, and yieldable rings disposed between the end of said sleeve and said rotor.

In testimony whereof I affix my signature.

SVEN A. JOHNSON.