June 5, 1934. I. M. PHILLIPS ET AL 1,961,451

PUMP CONSTRUCTION AND LUBRICATION THEREOF

Filed Jan. 15, 1932 2 Sheets-Sheet 1

Fig. 1

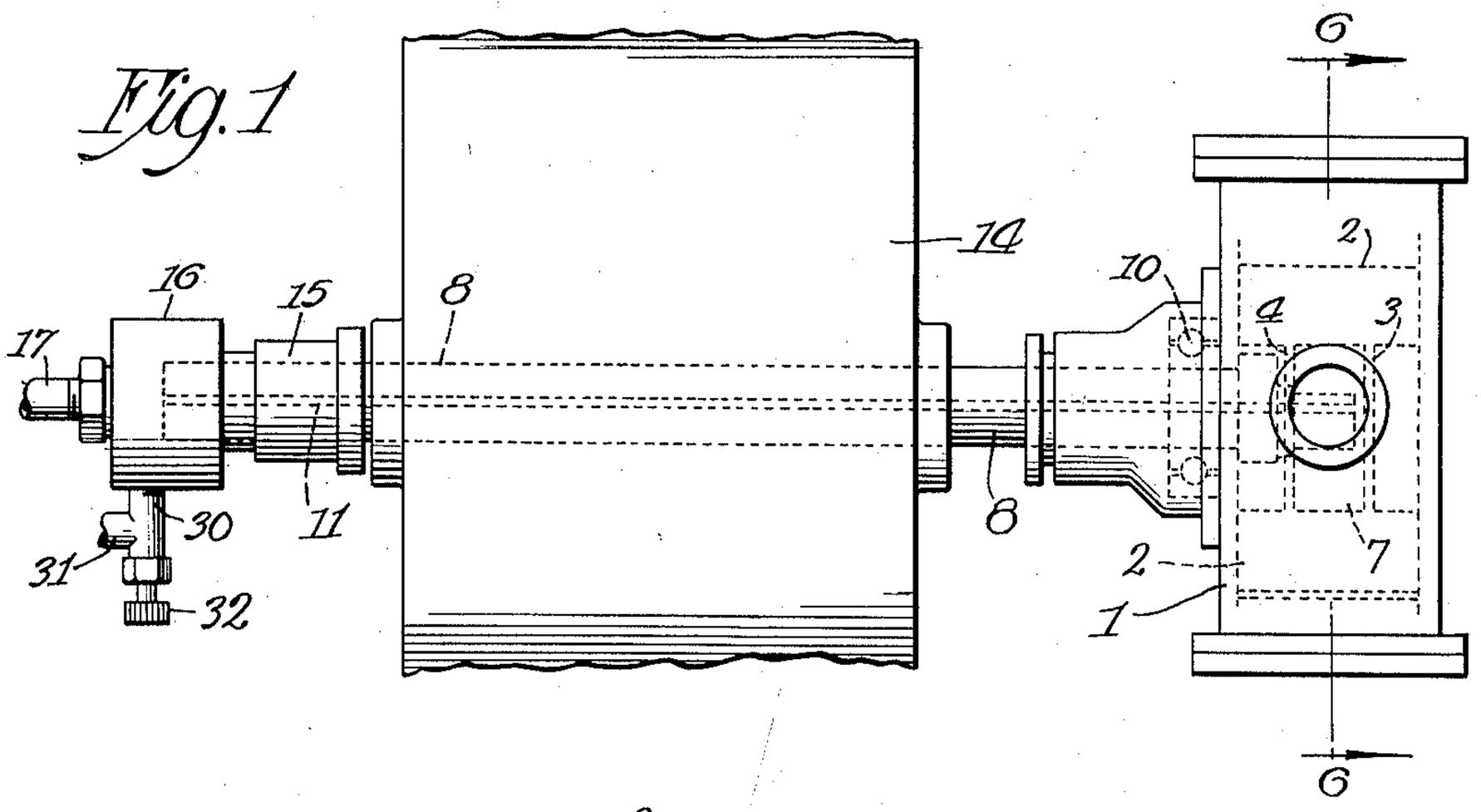

Fig. 2

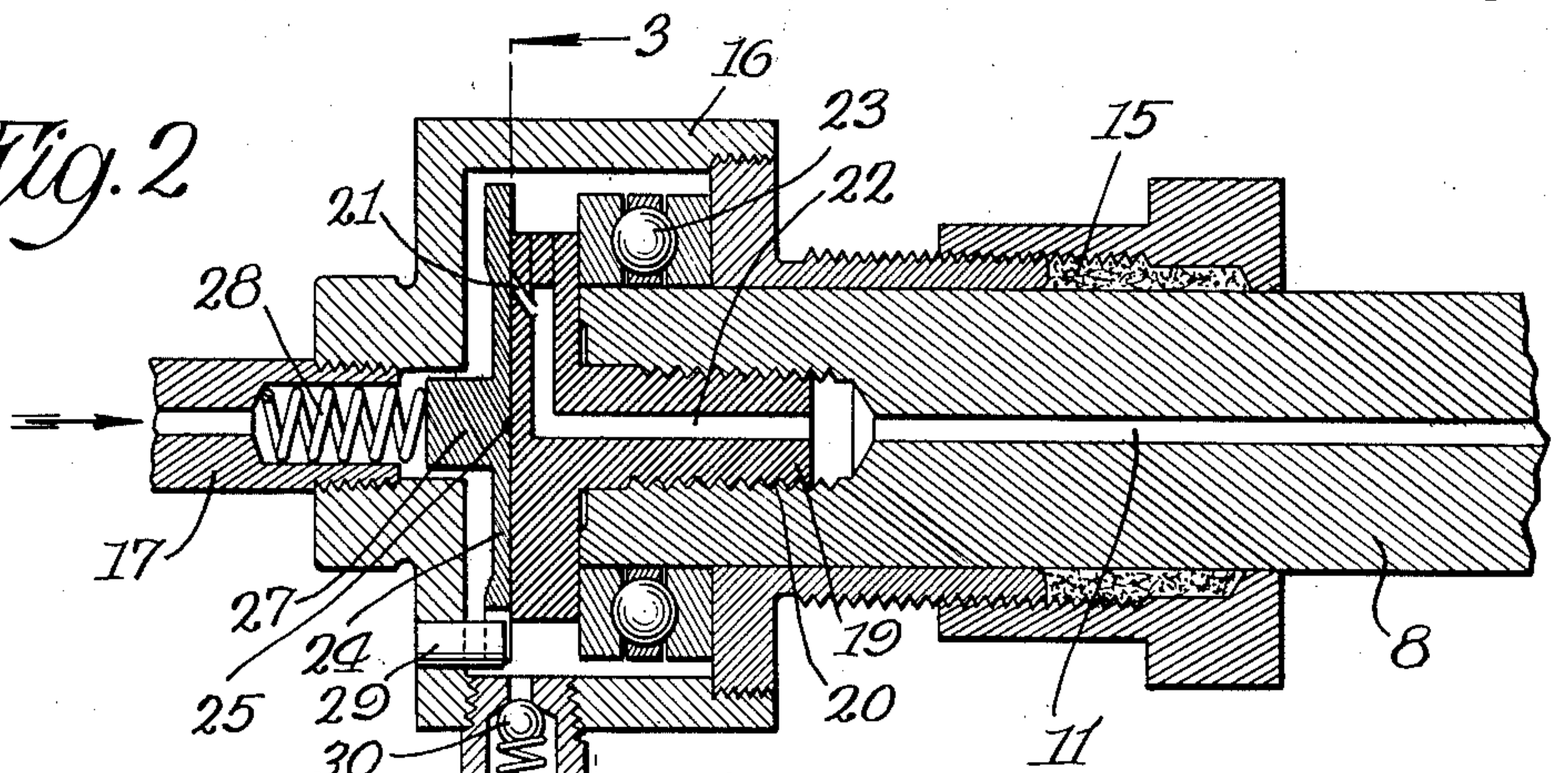

Fig. 3

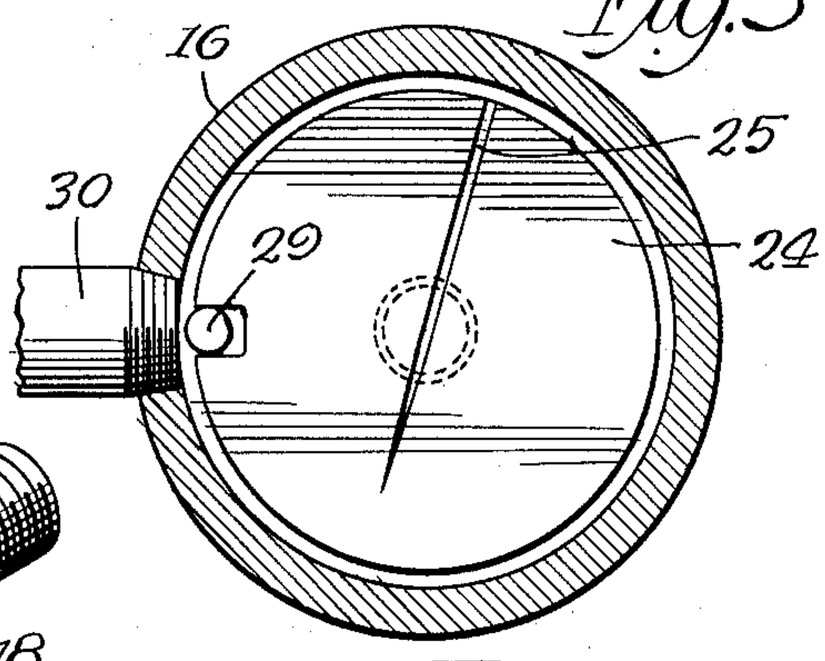

Fig. 4

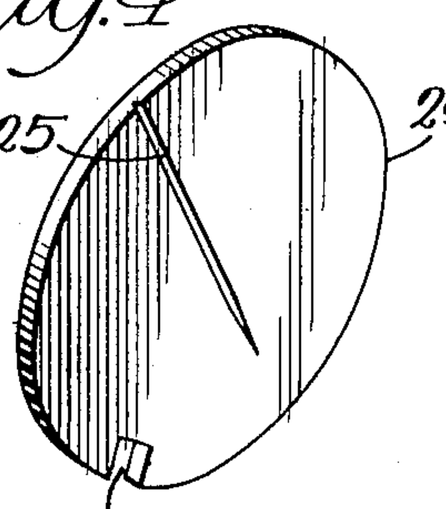

Fig. 5

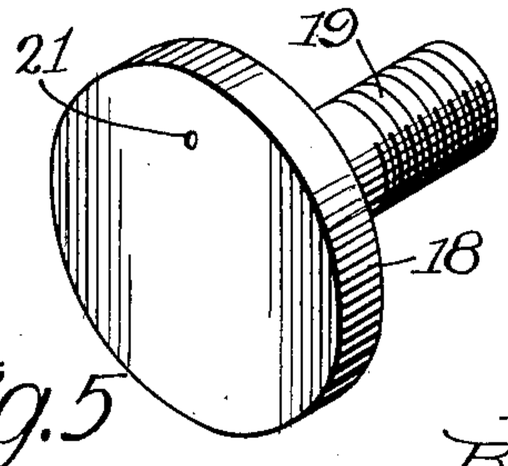

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Fig. 6

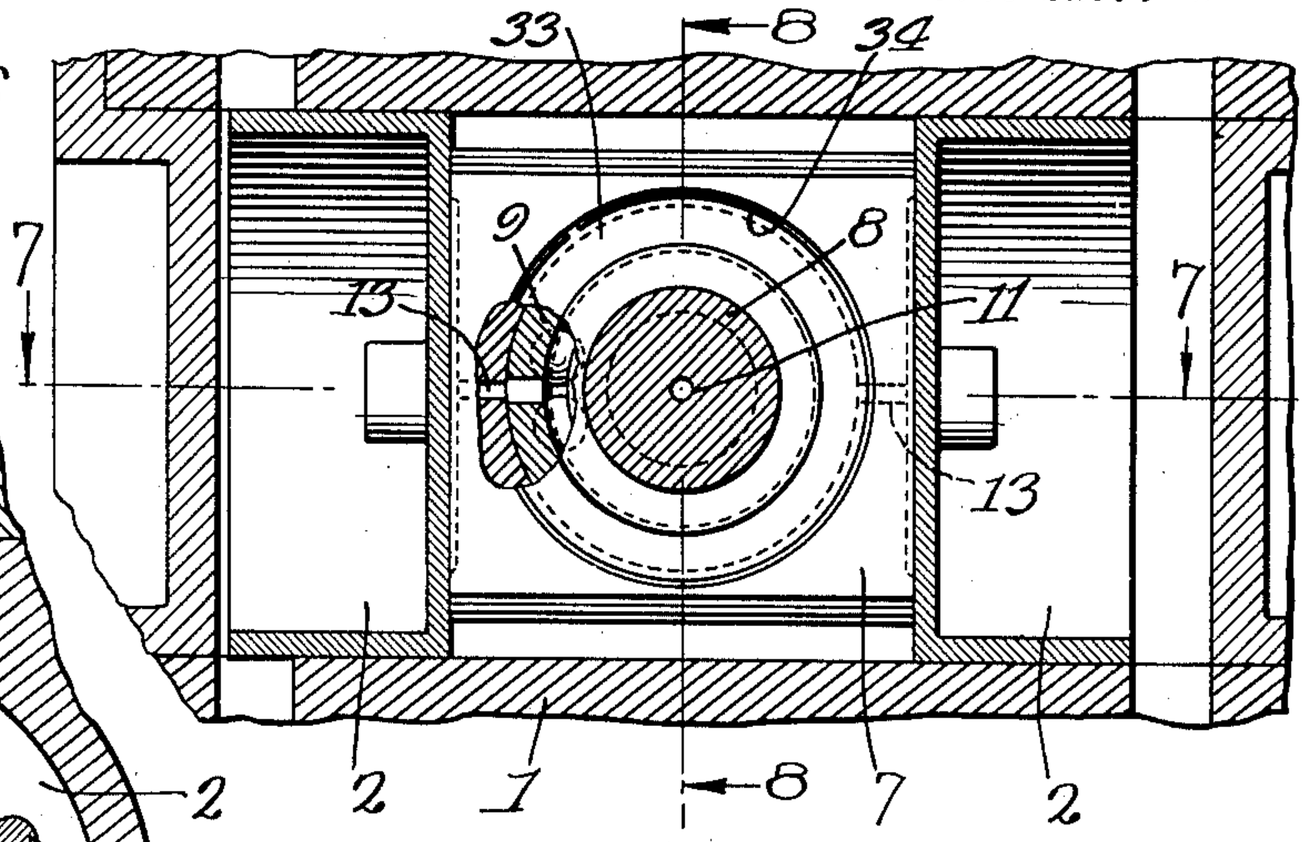


Fig. 8

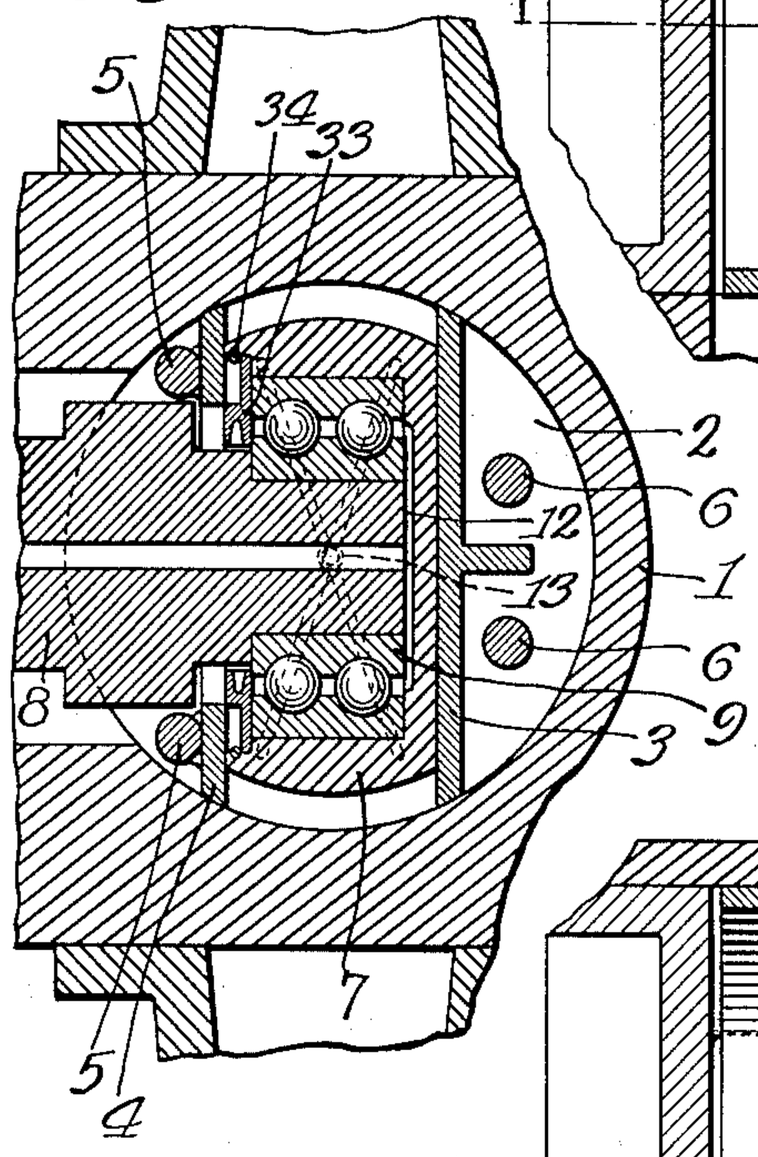


Fig. 7

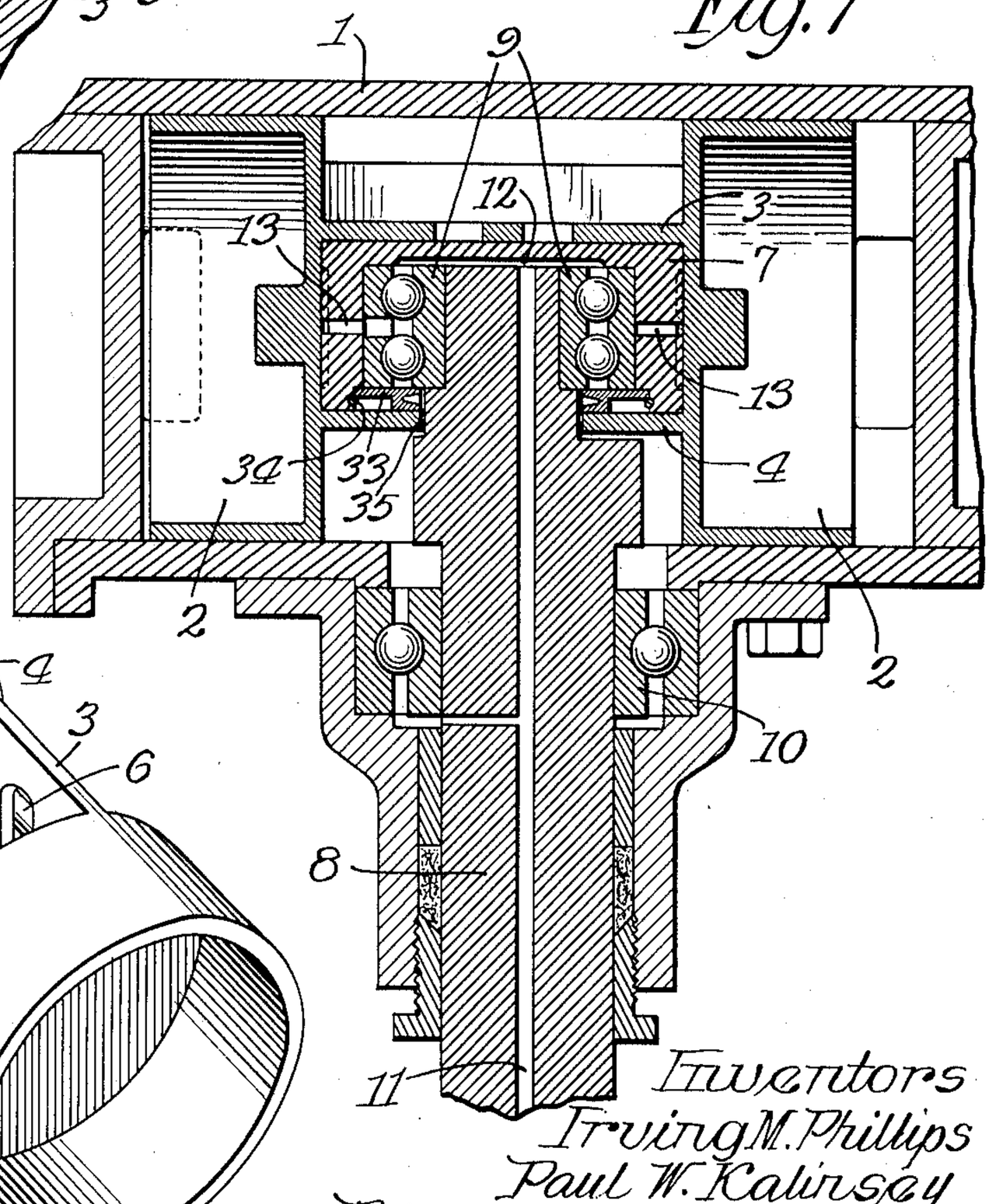
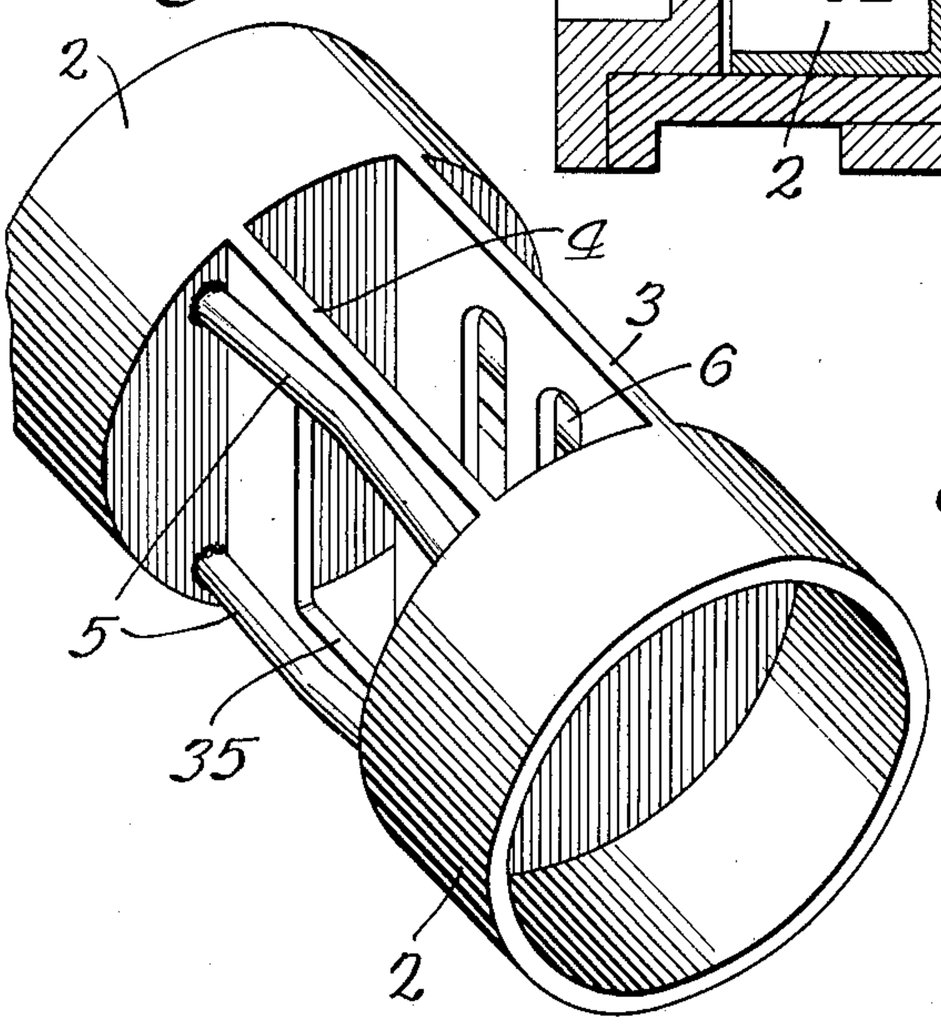


Fig. 9



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UNITED STATES PATENT OFFICE

1,961,451

PUMP CONSTRUCTION AND LUBRICATION THEREOF

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Application January 15, 1932, Serial No. 586,904

15 Claims. (Cl. 184—6)

This invention relates to reciprocating pumps and means for lubricating the piston and other parts thereof.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement whereby lubricating oil is forced through the pump shaft to the piston, and to the means for actuating the piston, in a manner calculated to keep the parts well lubricated, but without danger of flooding the interior of the pump with too much oil.

It is also an object to provide certain details and features of construction and combinations tending to increase the general effieciency and the desirability of a pump piston lubricating construction and system of this particular character.

To the foregoing and other useful ends, the invention consists in matters hereinafter set forth and claimed, and shown in the accompanying drawings in which—

Fig. 1 is a plan view of a pump and lubricating system therefor embodying the principles of the invention.

Fig. 2 is an enlarged section of the outer end portion of said lubricating system.

Fig. 3 is a transverse section on line 3—3 in Fig. 2 of the drawings.

Fig. 4 is a prespective of one of the parts of the valve device which controls the supply of oil to the pump.

Fig. 5 is a perspective of another portion of said valve device.

Fig. 6 is an enlarged section on line 6—6 in Fig. 1 of the drawings.

Fig. 7 is a horizontal section on line 7—7 in Fig. 6 of the drawings.

Fig. 8 is a transverse section on line 8—8 in Fig. 6 of the drawings.

Fig. 9 is a perspective of the piston or plunger of the pump.

As thus illustrated, the invention comprises a pump cylinder 1, of any suitable known or approved character, having valve inlet and outlet ports of any suitable character. Within the said cylinder there is a piston or plunger comprising the two cylindrical sections 2 rigidly connected together by the two webs or walls 3 and 4, and by the rods 5 and 6, as shown more clearly in Fig. 9 of the drawings. The sections 2 are cup-shaped, preferably, as shown, with the interior of each cup facing the adjacent cylinder head. The block 7 slides up and down between the webs 3 and 4, and between the bottom walls of the two cup sections of the piston or plunger, and the pump shaft 8 has its inner end provided with a ball bearing eccentric 9 engaging the block 7, whereby rotation of the shaft will cause the piston or plunger to reciprocate within the cylinder, the blocks 7 sliding up and down during this action. The shaft 8 is supported in a lateral bearing 10 on the side of the pump cylinder, and is provided with a longitudinal bore or oil duct 11 terminating at the space 12 within the block 7, as shown more clearly in Fig. 7 of the drawings. Oil ducts 13 are drilled through the opposite side walls of the block 7, as shown in Fig. 7, and oil forced through the duct 11 will escape through the ball bearing, through the radial opening in the outer ball race, through the ducts 13, and lubricate the surfaces between the block 7 and the piston or plunger, and some of this oil will drip to the bottom of the cylinder 1, and will in that way lubricate the piston or plunger within the cylinder.

The shaft 8 extends through the gear housing 14, and through the stuffing box 15, as shown more clearly in Fig. 2 of the drawings. The outer end of this stuffing box has a removable cap 16, and a lubricating oil feed pipe 17 is screwed into the outer end of this cap, to feed oil to the interior of the cap. The disk-like member 18 is provided with a threaded stem 19, which is screwed into the threaded socket 20 formed in the end of the shaft 8, and this member 18 is provided with a hole 21 extending through the thickness thereof, preferably at an angle, as shown in Fig. 2 of the drawings, said member 18 having an oil duct 22 leading from this hole to the end of the stem 19, in the manner shown, whereby oil forced in will eventually reach the passage or oil duct 11 previously mentioned. A ball bearing 23, in the nature of a thrust bearing, is interposed between the end of the stuffing box 15 and the marginal portion of the member 18, whereby the latter rotates freely with the shaft. A valve member 24, in the form of a disk provided on its inner side or face with a radial groove 25 and formed with a marginal notch 26, bears against the face of the member 18, in the manner shown, and is provided with a short stem 27 engaged by the spring 28, whereby the members 18 and 24 are maintained in flatwise engagement with each other. The stationary pin 29 engages the notch 26, thereby to keep the member 24 from rotating. Each time the groove 25 passes the opening 21, oil is admitted to the passage or duct 22, from

the body of oil maintained within the interior of the cap 16 previously mentioned.

If the supply of oil to the pump, brought about in this manner, becomes too great, the oil pressure will open the safety valve 30 and allow the oil entering through the feed connection 17 to pass out of the cap 16 through the outlet 31, and for this purpose the said safety valve is adjustable or adapted to be regulated by the screw 32 shown at the outer end of this device. In this way the pump is properly lubricated, but without danger of flooding the interior thereof with too much oil.

It will be understood that any suitable means can be employed for supplying the oil under pressure to the feed connection 17, whereby the oil will be forced through the lubricating system to the interior of the pump.

The construction of the piston or plunger is advantageous, not only in the manufacture thereof, but also in the use and operation of the pump. It is strong, but at the same time it is quite light, both of which are essential in a reciprocating pump of this kind, as the lightness of the piston or plunger reduces vibration and the amount of power necessary to drive the pump at the required speed. A plate 33, which is held in place by the spring ring 34, holds the ball bearing in the block 7 when the shaft 8 is disengaged from the piston or plunger, which is accomplished by pulling the eccentric end of the shaft outwardly through the opening 35 formed in the wall 4 of the plunger structure.

What we claim as our invention is:

1. In a pump, a driving shaft therefor, said shaft being provided with a longitudinal oil duct, and control devices at the outer end of said shaft and operated thereby for feeding oil under pressure to said duct, comprising an oil reservoir into which the oil is admitted and into which the end of said shaft extends, thereby to supply oil to the interior bearings of the pump for lubricating purposes, with a stuffing box on said shaft between said devices and said pump.

2. A structure as specified in claim 1, said devices comprising a rotary valve member removably secured to and rigid with the shaft, having an oil passage communicating with said duct, and a stationary valve member bearing flatwise against said rotary valve member, provided with a groove disposed in position to intermittently communicate with said oil passage in the rotary valve member, together with a housing for enclosing said valve devices in a body of the lubricating oil.

3. A structure as specified in claim 1, said devices comprising means for intermittently admitting oil to said oil duct.

4. A structure as specified in claim 1, comprising a safety valve adjacent said devices, adapted to open if the pressure in said oil duct becomes too great.

5. A structure as specified in claim 1, said devices comprising a rotary valve member screwed into the end of said shaft, a stationary valve member flatwise engaging the face of said rotary member, a spring bearing against said stationary member to maintain the two members in flatwise engagement with each other, said members having co-operating oil passages to intermittently admit oil to said oil duct in the shaft, and a stuffing box and housing for enclosing the end portion of said shaft and said devices, said housing forming a chamber for a body of oil in which said devices operate.

6. In combination with a bearing to be lubricated, a lubrication device therefor comprising a rotary disk having a passage extending therefrom, with an opening in the face of the disk communicating with said passage, a stationary disk bearing against the face of said rotary disk, said stationary disk having a groove in the face thereof communicating intermittently with said opening, and means for maintaining a body of lubricating fluid around said disks, whereby said body of fluid is intermittently admitted through said groove and opening to said passage.

7. A structure as specified in claim 6, said rotary disk being carried on the end of the shaft having a longitudinal duct therein for the lubricating fluid, said duct leading to the bearing to be lubricated.

8. A structure as specified in claim 6, comprising a safety valve providing an outlet for the fluid if the pressure thereof in said body becomes too great, thereby to prevent overlubrication of said bearing, while permitting re-circulation of the fluid into and out of the means for maintaining said body of fluid.

9. A structure as specified in claim 6, comprising a stationary projection for engaging an edge portion of said stationary disk, to prevent rotation thereof, and a spring for yieldingly holding the stationary disk flatwise against the face of the rotary disk.

10. A structure as specified in claim 6, comprising a shaft provided with a fluid duct communicating with said passage, said rotary disk having a threaded stem screwed into the end of said shaft.

11. A structure as specified in claim 6, said groove being radially disposed on the face of said stationary disk, whereby the passage of fluid in said groove is from the outer edge of the stationary disk toward the center thereof, said opening being disposed a distance from the periphery of the rotary disk.

12. In combination with a machine to be lubricated, lubricating devices therefor, said devices comprising a rotary valve member removably secured to and rigid with the shaft, having an oil passage communicating with said duct, and a stationary valve member bearing flatwise against said rotary valve member, provided with a groove disposed in position to intermittently communicate with said oil passage in the rotary valve member, together with a housing for enclosing said valve devices in a body of the lubricating oil.

13. In combination with a machine to be lubricated, lubricating devices therefor, said devices comprising a rotary valve member screwed into the end of said shaft, a stationary valve member flatwise engaging the face of said rotary member, a spring bearing against said stationary member to maintain the two members in flatwise engagement with each other, said members having co-operating oil passages to intermittently admit oil to said oil duct in the shaft, and a stuffing box and housing for enclosing the end portion of said shaft and said devices, said housing forming a chamber for a body of oil in which said devices operate.

14. In a pump, a driving shaft therefor, said shaft being provided with a longitudinal oil duct, and control devices at the outer end of said shaft and operated thereby for feeding oil

under pressure to said duct, thereby to supply oil to the interior bearings of the pump for lubricating purposes, said devices comprising a rotary valve member removably secured to and rigid with the shaft, having an oil passage communicating with said duct, and a stationary valve member bearing flatwise against said rotary valve member, provided with a groove disposed in position to intermittently communicate with said oil passage in the rotary valve member, together with a housing for enclosing said valve devices in a body of the lubricating oil.

15. In a pump, a driving shaft therefor, said shaft being provided with a longitudinal oil duct, and control devices at the outer end of said shaft and operated thereby for feeding oil under pressure to said duct, thereby to supply oil to the interior bearings of the pump for lubricating purposes, said devices comprising a rotary valve member screwed into the end of said shaft, a stationary valve member flatwise engaging the face of said rotary member, a spring bearing against said stationary member to maintain the two members in flatwise engagement with each other, said members having co-operating oil passages to intermittently admit oil to said oil duct in the shaft, and a stuffing box and housing for enclosing the end portion of said shaft and said devices, said housing forming a chamber for a body of oil in which said devices operate.

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