E. WOERNER.

PUMP FOR LUBRICATING SYSTEMS.

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1,099,229.

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Fig. 1.

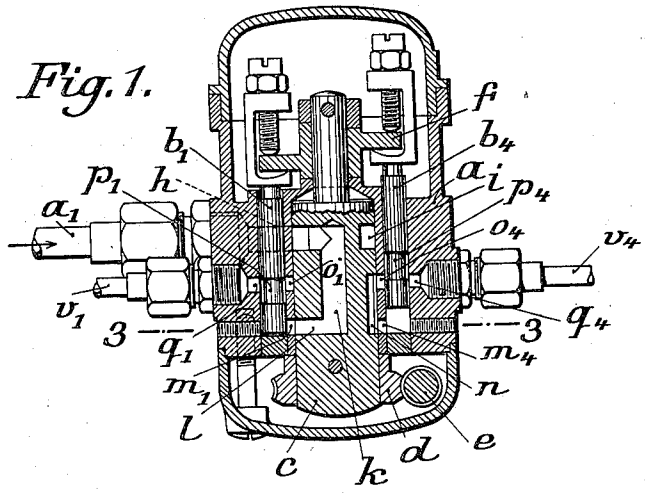


Fig. 2.

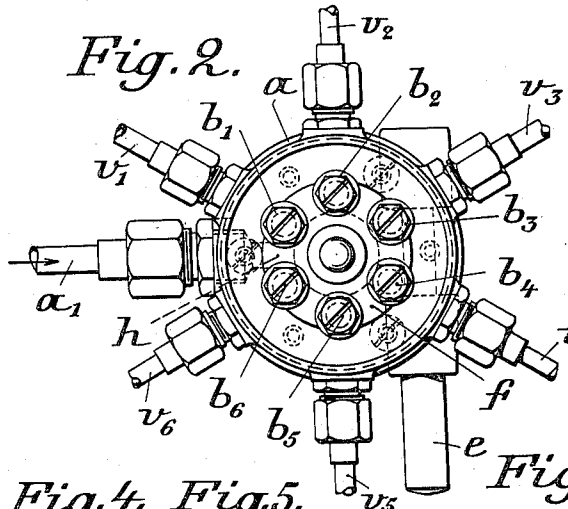


Fig. 4.

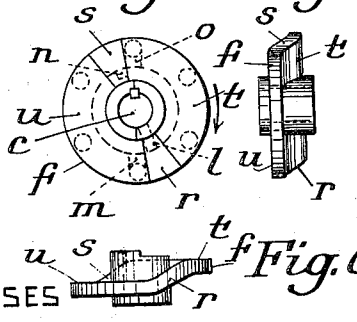


Fig. 5.

Fig. 3.

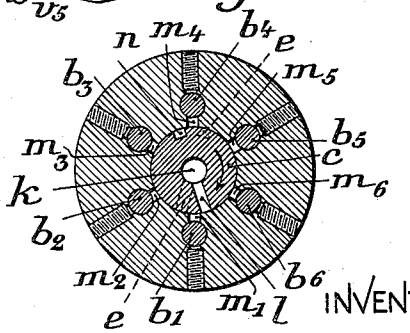


Fig. 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

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PUMP FOR LUBRICATING SYSTEMS.

1,099,229. Specification of Letters Patent. Patented June 9, 1914.

Application filed February 8, 1913. Serial No. 746,987.

To all whom it may concern:

Be it known that I, EUGEN WOERNER, a subject of the Emperor of Germany, residing at and whose post-office address is Cannstatt, Burgstrasse 7, Germany, have invented certain new and useful Improvements in Pumps for Lubricating Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to pumps for lubricating systems for forcing oil or the like to the friction surfaces of machines, and it relates particularly to an organization of this kind having in its preferred form a plurality of piston pumps disposed in circular arrangement about a rotatable actuating and valve member provided with mechanism for periodically reciprocating all the pistons and having passages for the supply of oil from a lubricant supply conduit and for the discharge of the oil to the individual lubricant discharge conduits. Furthermore, the pump cylinders are parallel with the actuating and valve member so that the actuating mechanism for reciprocating all the pistons may consist of a single cam disk, preferably having one or more elevated level portions and a corresponding number of depressed portions connected at diametrically opposite points by inclined portions of the desired angular extent and slope to bring about the desired cycle of operations. By these means an effective organization for supplying lubricant to any number of discharge conduits is made possible by a simple and reliable construction operated by a single rotatable element. In this way the parts shown in my copending applications, Serial No. 581,479, filed September 12, 1910, and Serial No. 652,519, filed October 3, 1911, for turning the pistons of the pumps to control the passage of oil from the source of supply to the discharge conduits and for preventing the return of the oil to the reservoir during the pressure stroke of the pumps are eliminated, while the construction of driving mechanism common in other types of pumps for this purpose is considerably simplified.

In the accompanying drawings, illustrating the preferred embodiment within my invention, Figure 1 represents a central vertical section of an organization having, for example, six pumps; Fig. 2 is a plan view of Fig. 1 with the top cover removed; Fig. 3 is a section on line 3—3 of Fig. 1; Fig. 4 represents a plan view of the actuating cam disk of Fig. 1, and it also shows diagrammatically the relative positions of the oil passages; and Figs. 5 and 6 represent side views of the actuating cam disk.

The pump housing a contains six pumps with their pistons b_1, b_2, b_3, b_4, b_5, and b_6 disposed in parallel relation to each other and arranged concentrically about the rotatable actuating and valve member c, which is driven by any suitable means through the operatively engaging worm wheel d and worm e. The actuating cam disk f is splined on the upper end of the member c in driving engagement with the adjustable yokes carried by the individual pump pistons. In the pump shown in the drawings, the actuating cam disk f has an elevated level portion t and a depressed level portion u connected at diametrically opposite points by the inclined portions r and s whose angular extent and slope are dependent upon the exigencies of design and operation. In the case illustrated, r and s may each have an angular extent of about 30° to 45°. The passage h in the casing communicates on one side with the lubricant supply conduit a_1 from the oil reservoir (not shown), and on the other side with the annular groove i in the member c, while the vertical passage k leads from the groove i to the radial passage l which during the rotation of the member c periodically registers with the individual supply passages m_1, m_2, m_3, m_4, m_5, and m_6 of the pump cylinders to form a suction conduit from the oil reservoir for each pump in turn during the suction stroke of the corresponding piston. The vertical passage n is so disposed in the member c as to periodi-

cally connect in turn the passages m and o of that pump cylinder which is diametrically opposite the pump then in communication with the oil reservoir. The discharge passages o_1, o_2, o_3, o_4, o_5, and o_6 are opposite the discharge passages q_1, q_2, q_3, q_4, q_5, and q_6 and communicate therewith across the reduced portions p_1, p_2, p_3, p_4, p_5, and p_6 of the respective pistons, whereupon the oil is periodically discharged through the lubricant discharge conduits v_1, v_2, v_3, v_4, v_5, and v_6 to the friction surfaces of the machine to be lubricated during the pressure stroke of the corresponding piston.

The operation of the organization will now be described. In the position shown in Fig. 3, the piston b_1 is at the bottom of its reciprocation, ready to start its upward or suction stroke as a result of the engagement between its yoke and the depressed portion of the cam disk f at the base of the inclined portion r. The passage l in the actuating and valve member c just starts to register with the passage m_1 at the bottom of the cylinder. The inclined portion r of the actuating cam disk lifts the piston b_1 to the top of its suction stroke, which ends when the passage l has the position shown in the broken lines in Fig. 3. The oil which is drawn into the pump cylinder below the piston b_1 from the oil reservoir through the lubricant supply conduit a_1 and the passages h, k, l, and m_1, as a result of a suction stroke of the piston, is entrapped in the cylinder until the member c is turned almost a half rotation, whereupon the vertical passage n then connects the passages n_1 and o_1. At this time the yoke of piston b_1 engages the downwardly inclined portion s of the actuating cam disk f, so that the piston b_1 then starts to move down and thereby forces the oil, which was previously entrapped below piston b_1, through the passages m_1, n_1 and q_1 and by way of the reduced portion p_1 of the piston into the lubricant discharge conduit v_1. When the piston b_1 reaches its lowest position, it remains idle until the upwardly inclined portion r of the cam again engages the yoke, whereupon the described cycle is again started. The other pistons have the same cycle of operation as b_1, but in the case of the six pumps shown as an example, the successive cycles are displaced 60° from each other, so that diametrically opposite pumps as b_1 and b_4 are half a cycle apart at all times. In the example illustrated, each piston is given a suction stroke and a pressure stroke during each rotation of the actuating and valve member c so that each lubricant discharge conduit receives a discharge of oil once in each rotation, or all together a total of six discharges.

It will be apparent that the number of cycles performed by each piston during a rotation of the actuating and valve member c may be variously modified by changing the number of inclined portions of the cam disk and correspondingly changing the number of passages l and n. Furthermore, any desired number of pistons may be incorporated in a pump organization of this kind.

Having thus described my invention, what I claim is:

1. In force pump mechanism for lubricating systems, a pump cylinder provided with supply and discharge passages, a reciprocative piston in the cylinder provided with a passage arranged to complete the discharge passage through the cylinder during the pressure stroke of the piston, a source of lubricant supply, and a valve member designed to establish communication between the source of supply and the supply passage of the cylinder during the suction stroke of the piston and to establish communication between the supply and discharge passages of the cylinder during the pressure stroke of the piston; substantially as described.

2. In force pump mechanism for lubricating systems, a plurality of pump cylinders provided each with a supply passage and discharge passages, a reciprocative piston arranged in each cylinder and provided with a passage adapted to establish communication between the discharge passages in the cylinder, a source of lubricant supply, an individual lubricant discharge conduit for each pump, and an actuating and valve member having mechanism for reciprocating the pistons in order, said member containing a passage adapted to establish communication between the source of supply and the supply passage during the suction stroke of each piston, whereby lubricant is drawn into the corresponding cylinder, and also containing another passage adapted to establish communication between the supply passage in each cylinder and the discharge conduit through the discharge passages in that cylinder and the passage in the piston during the pressure stroke of the piston, whereby the lubricant is then forced into the discharge conduit; substantially as described.

3. In a force pump for lubricating systems, a lubricant supply conduit, a lubricant discharge conduit, a pump cylinder having a supply passage near the bottom and discharge passages above the supply passage in registry with the discharge conduit, a reciprocative piston in the pump cylinder having a portion adapted to establish communication between the discharge passages in the cylinder, and a rotatable actuating and valve member provided with mechanism for reciprocating the piston, said member having an annular groove registering with the supply conduit, a radial passage adapted

to register with the supply passage in the cylinder during the suction stroke of the piston, and an axial passage between the annular groove and the radial passage, and also having a passage adapted to establish communication between the supply passage in the cylinder and the discharge conduit through the discharge passages in the cylinder during the pressure stroke of the pump; substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

EUGEN WOERNER.

Witnesses:

PAUL WOLFAST,

HERMANN SCHNEIDER.