E. WOERNER.

PUMP FOR LUBRICATING SYSTEMS.

APPLICATION FILED SEPT. 12, 1910.

1,078,889. Patented Nov. 18, 1913.

2 SHEETS—SHEET 1.

Fig. 1

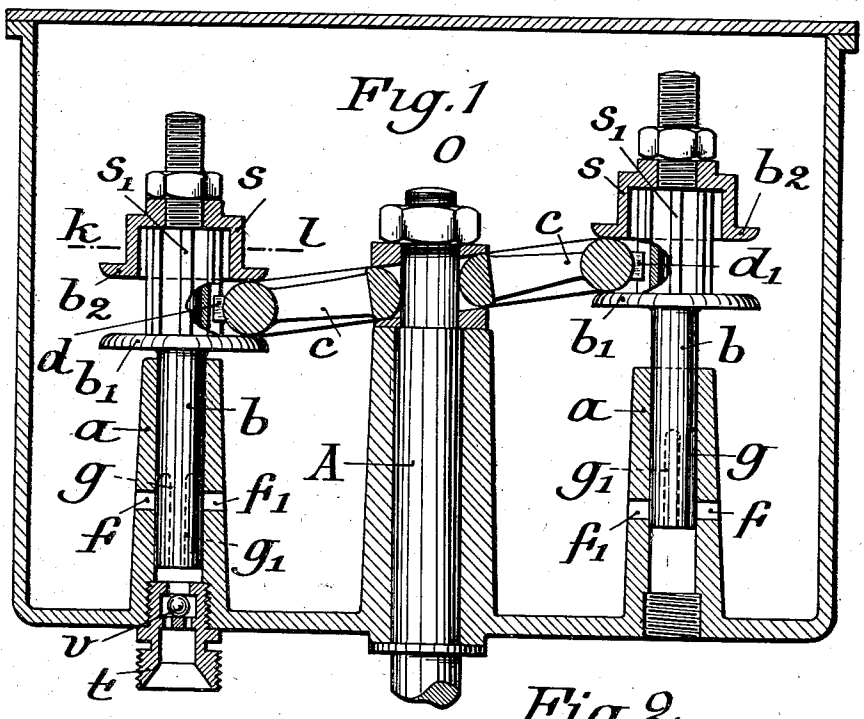

Fig. 2.

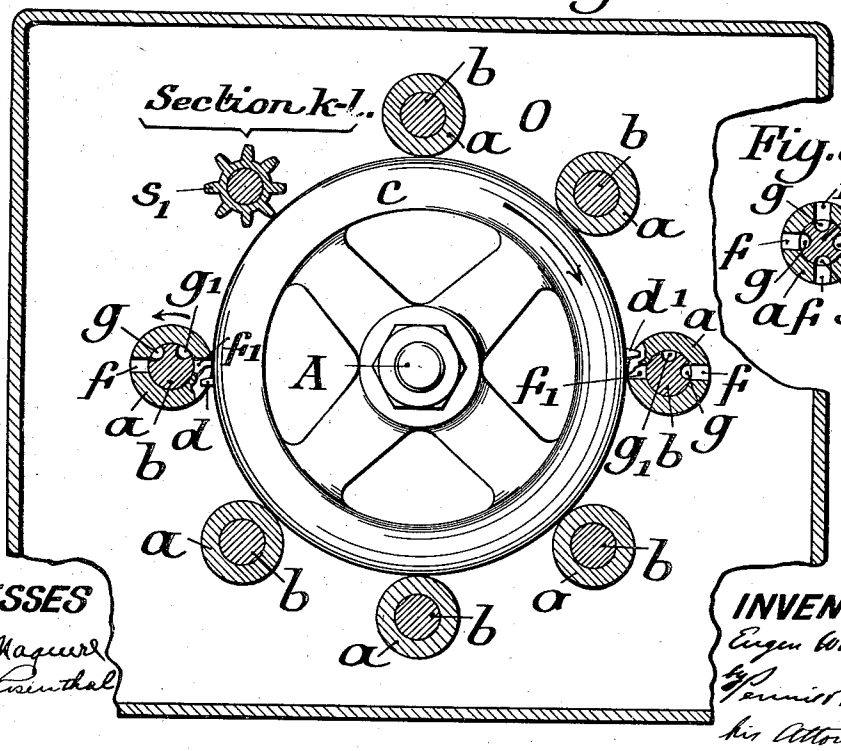

Fig. 3.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 4.

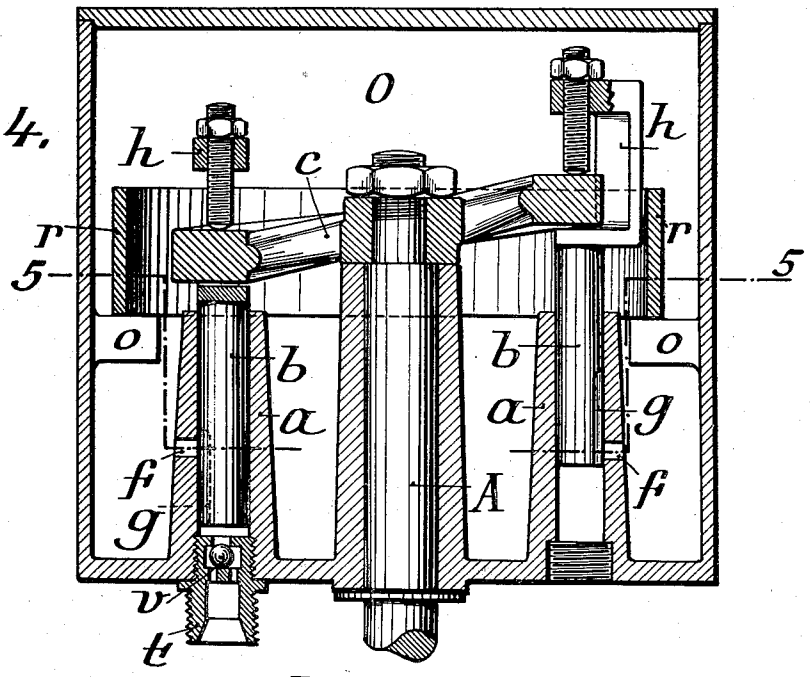
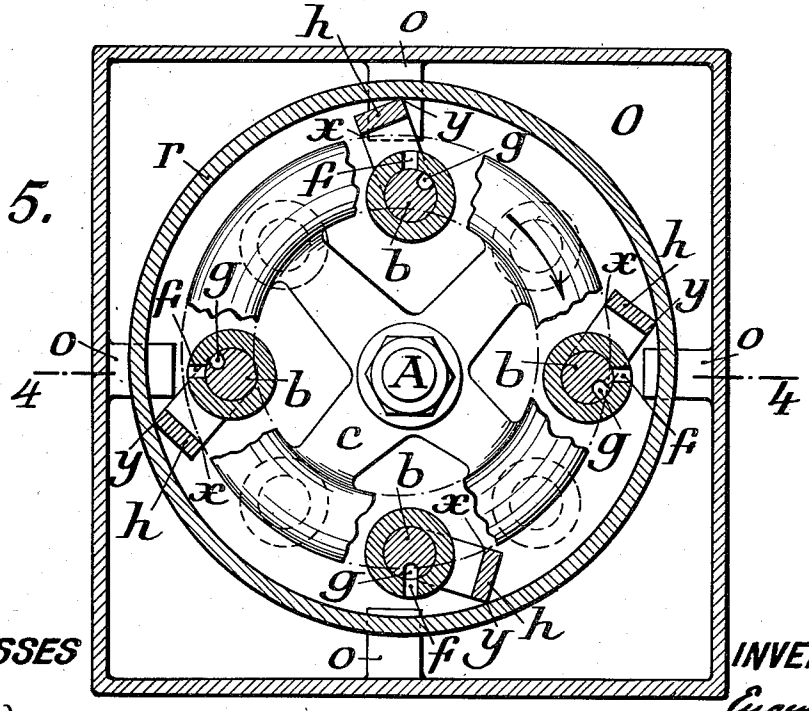


Fig. 5.



WITNESSES

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PUMP FOR LUBRICATING SYSTEMS.

1,078,889. Specification of Letters Patent. Patented Nov. 18, 1913.

Application filed September 12, 1910. Serial No. 581,479.

To all whom it may concern:

Be it known that I, EUGEN WOERNER, a subject of the Emperor of Germany, of Cannstatt, 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 invention relates to lubricating pumps adapted to force the lubricant into conduits which lead to the places to be lubricated.

It consists in imparting to the pump pistons, in addition to the reciprocating motion necessary for their suction and forcing functions, a rotary motion, which is made use of to regulate the distribution of the lubricant to the pump.

The special forms or modifications of the invention hereinafter described, presuppose an arrangement wherein a plurality of cups are set up in a circle about a driving shaft common to them all. The reciprocating movement of the pistons is attained in this arrangement, by providing the heads of the pistons with crank-slides, which engage the rim of an inclined disk mounted upon the driving shaft; and the rotary motion can likewise be imparted to the pump pistons by appropriate projections from the outer periphery of the inclined disk.

In the drawings, Figure 1 is a vertical section through a lubricating pump embodying the invention; Fig. 2 is a top plan view, partly in section; Fig. 3 is a sectional plan of a modified form of pump plunger and surrounding casing; and Figs. 4 and 5 show a modified form of the pump, Fig. 4 being a vertical section on the line 4—4 of Fig. 5, and Fig. 5 a horizontal section on the line 5—5 of Fig. 4.

Upon the driving shaft A the disk c is clamped fast in an inclined position. Its rim projects between the flanges b_1, at the upper ends of the pistons b and other flanges b_2 at the lower ends of the caps s, which are screwed upon the pistons. Sleeves s_1 are clamped between the caps s and the flanges b_1, which sleeves are provided with peripheral teeth, as shown on the section k_1 of Fig. 2.

Upon the periphery of the inclined disk c at the highest and lowest point in the direction of the axis are provided appropriate teeth or lugs d d_1, which are so chosen that they engage with the cogged surfaces of the sleeves s_1. In the walls of the cylinders a, within which work the pistons b, are arranged two suction openings f and f_1, and, at the lower ends of the pistons, grooves g and g_1 are provided. The grooves are spaced apart upon the periphery of the pistons by 90°. Below each piston is a check valve v through which the pump is connected to a nipple t, to which the lubricating conduit is attached.

The device operates as follows: At the instant of time indicated, the tooth d upon the left side of the inclined disk c is about to intermesh with the cogs of the left piston b. If the disk is revolved in the direction of the hands of a watch, then the piston is revolved 45° and the groove g is brought into alinement with the suction opening f. Consequently, the space beneath the piston is connected with the oil supply receptacle O, and, as the pump now begins its suction stroke, oil is drawn into the pump. After a half revolution of the inclined disk the tooth d_1 engages the cogs on sleeve s_1 and imparts to the piston a further one eighth revolution, and just at the moment at which the piston finds itself at its upper dead point. Consequently, the surface lying between the two grooves is caused to cover the aperture f, so that the space below the piston is cut off from communication with the oil receptacle O. At the following force stroke of the piston the oil that has been taken in will be forced through the check valve v into the lubricating conduit. At the beginning of the second suction stroke the tooth d again engages the cogs on sleeve s_1, revolves the piston a further one-eighth of a complete revolution, and consequently brings the groove g_1 into communication with the aperture f. At the beginning of the second force stroke, the fourth revolving of the piston (45°) follows, so that it has now revolved half a complete revolution and has again closed both suction apertures f and f_1. At the beginning of the third suction stroke the groove g again registers with the suction aperture f_1. A closing of both suction apertures follows and then the

groove g_1 registers with the suction aperture f_1, so that after the completion of the fourth force stroke, all of the parts again assume the position illustrated and the same operation begins anew.

Instead of having but two grooves g and g_1, four can be located about the entire periphery of the piston, and these would correspond to four suction openings f, as shown in Fig. 3. In that case, at the beginning of each suction stroke, all four grooves would register with the four suction apertures, and, at the beginning of each force stroke all four of the suction apertures would be closed.

In the modification of the invention shown in Figs. 4 and 5, the inclined disk c upon the driving shaft A is mounted thereon eccentrically and the yokes h at the upper ends of the pistons b extend laterally so far that the periphery of the inclined disk can project over the central axis of the pistons. All of the yokes h are enveloped by a ring r, which rests loosely upon the lugs o which may be cast upon the interior surface of the walls of the oil receptacle O. In like manner as in the modification shown in Figs. 1 and 3, grooves g are arranged at the lower end of the pistons, which grooves, by correspondingly revolving the piston, are caused to register with suction openings f in the pump cylinders. A nipple t having a check valve v is likewise provided, for connection with the lubricating conduit.

The operation of the device shown in Figs. 4 and 5 is apparent. The inner diameter of the ring r is so chosen that the yokes h fit between the ring and the periphery of the disk in such manner that the edges of the yokes x at the periphery of the disk and the edges y at the inner periphery of the ring r are in loose contact with the said ring and disk when the crank-slides are correspondingly oblique. The disk being revolved through the agency of the driving shaft A, the crank-slides and with them the pistons receive an oscillating motion in consequence of the eccentricity of the disk c. Simultaneously, the pistons, because of the inclined position of the disk c, are moved up and down in the direction of their axes. The grooves g on the lower ends of the pistons and the suction apertures f in the pump cylinders are so spaced that the space beneath the piston is connected with the oil receptacle during the suction stroke, and (through the check valve v) with the nipple t during the force stroke.

The modifications shown in Figs. 4 and 5 form the subject-matter of a divisional application, Serial No. 652,519, filed October 3, 1911.

What I claim is:—

1. Force pump mechanism for lubricating systems comprising a plurality of cylinders having oil passages therein, pistons within said cylinders and containing oil ducts each arranged in a straight line longitudinally of its piston, and mechanism common to all of the pumps for reciprocating the pistons, said pistons and said mechanism having coöperative means whereby each piston is given step-by-step rotary movements in the same direction to bring the oil duct therein into register with the respective oil passage when the piston is being reciprocated in one direction and out of register when the piston is being reciprocated in the other direction; substantially as described.

2. Force-pump mechanism for lubricating systems comprising a plurality of cylinders having oil passages therein and arranged concentrically about a common center, pistons within said cylinders and containing oil ducts, an inclined disk mounted for rotation about said common center and engaging the pistons to reciprocate them, and means whereby the rotation of the inclined disk imparts periodic rotary movements to the pistons to bring the oil ducts therein into register with the oil passages when the pistons are moving in one direction and out of register with said passages when the pistons are moving in the other direction; substantially as described.

3. Force-pump mechanism for lubricating systems comprising a plurality of cylinders having oil passages therein and arranged concentrically about a common center, pistons within said cylinders and containing oil ducts, an inclined disk mounted for rotation about said common center and engaging the pistons to reciprocate them, projections on the periphery of said disk, and cogs engaged by said projections and connected to the pistons to impart periodic rotary movements thereto to bring the oil ducts therein into register with the oil passages when the pistons are moving in one direction and out of register with said passages when the pistons are moving in the opposite direction; substantially as described.

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

EUGEN WOERNER.

Witnesses:
MAX ANSCHUTZ,
A. VIEHLE.