A. LOOMIS.

OIL PUMP.

APPLICATION FILED OCT. 15, 1907.

1,105,085.

Patented July 28, 1914.

3 SHEETS—SHEET 1.

Fig. 1.

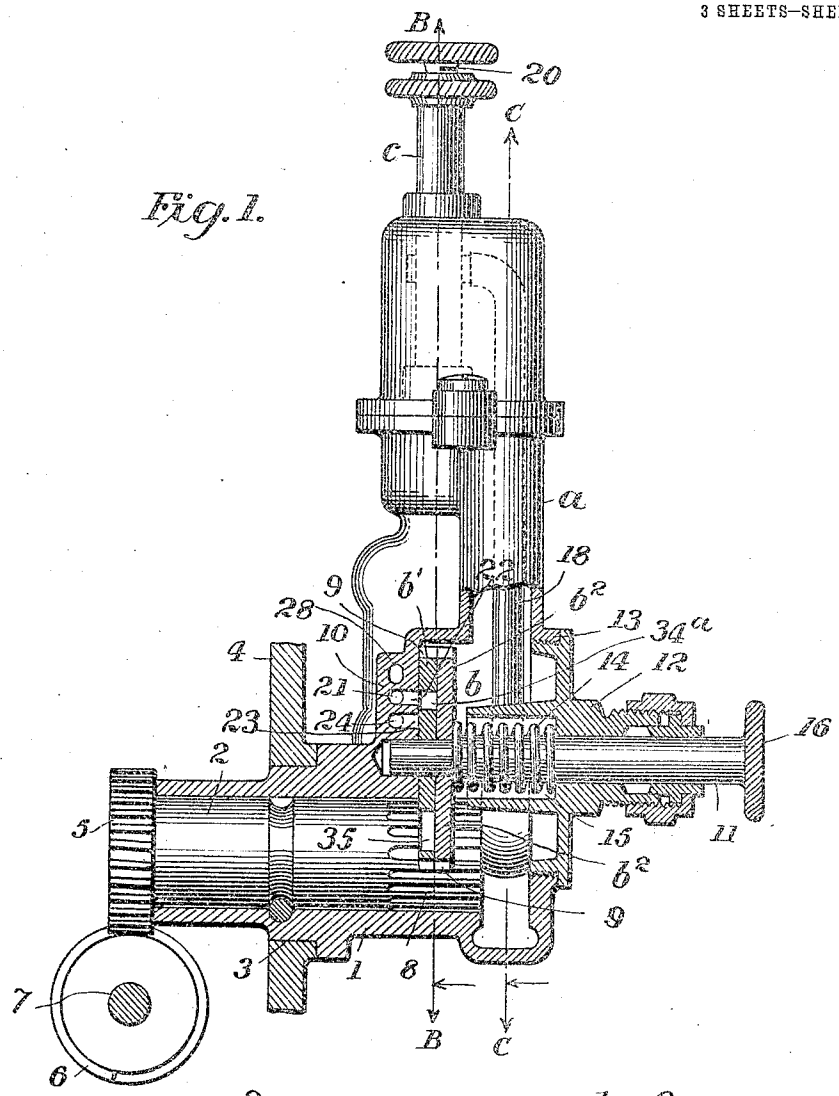


Fig. 4.

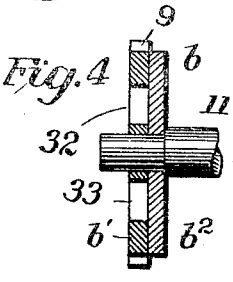
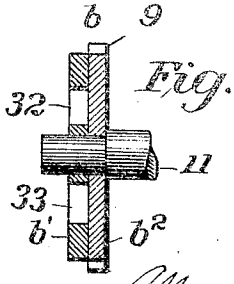


Fig. 5.



Witnesses

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3 SHEETS—SHEET 2.

Fig 3.

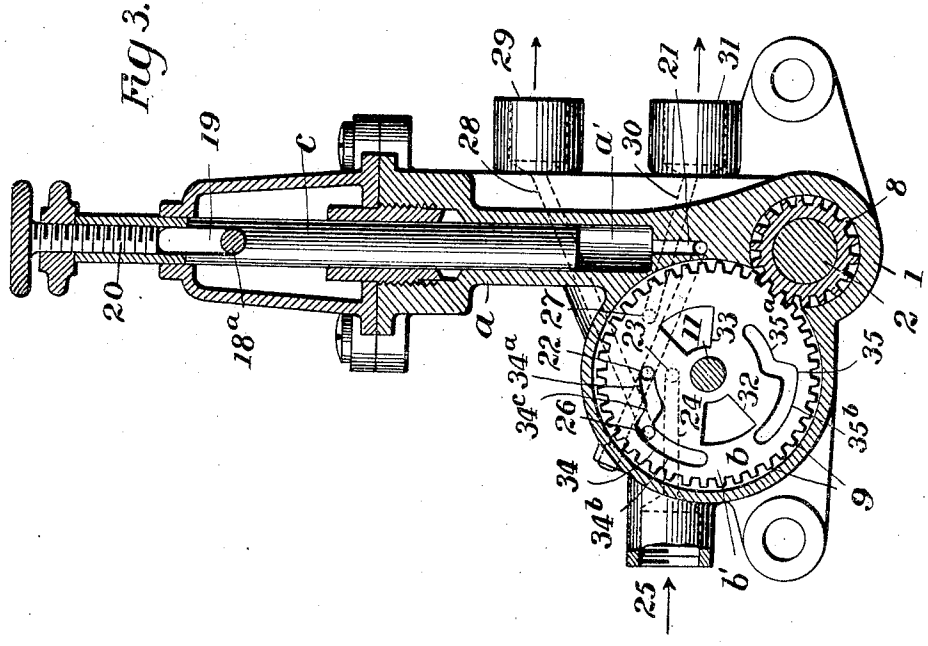
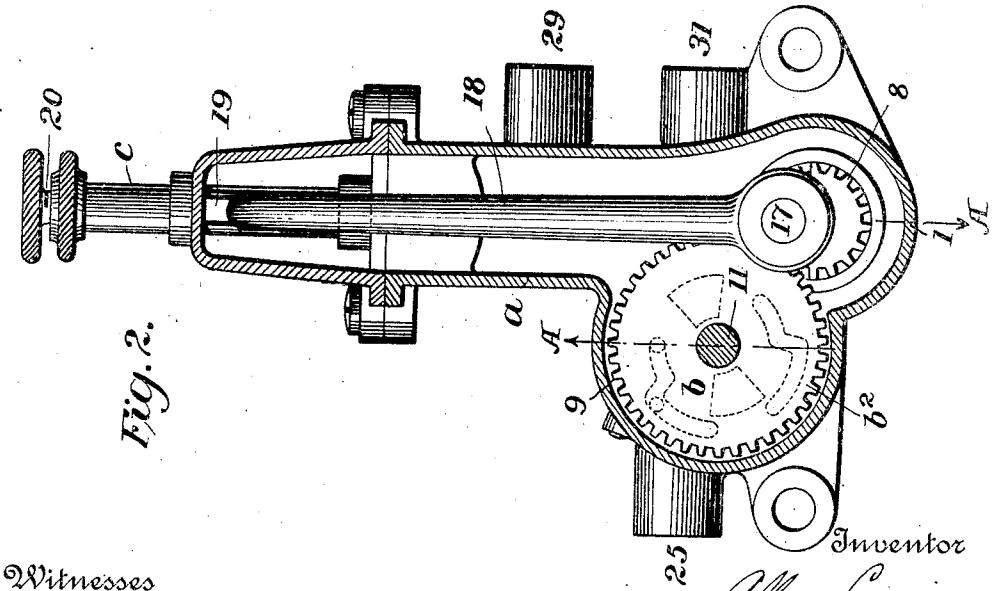


Fig. 2.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 8.

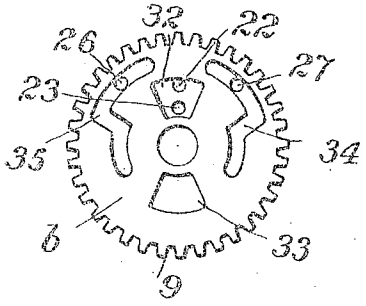


Fig. 9.

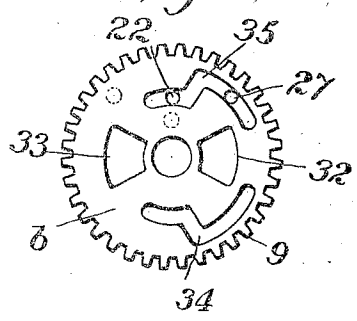


Fig. 6.

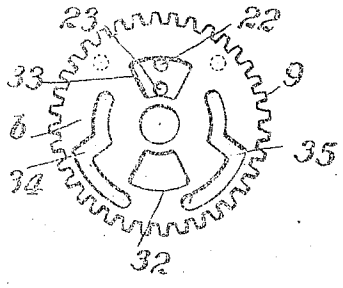
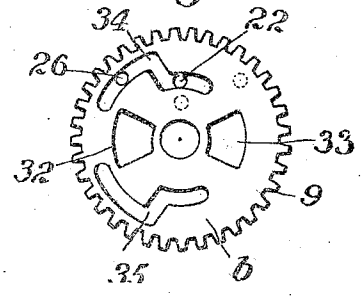


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

ALLEN LOOMIS, OF DETROIT, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

OIL-PUMP.

1,105,085. Specification of Letters Patent. Patented July 28, 1914.

Application filed October 15, 1907. Serial No. 397,572.

To all whom it may concern:

Be it known that I, ALLEN LOOMIS, a citizen of the United States, residing at Detroit, Wayne county, State of Michigan, have invented certain new and useful Improvements in Oil-Pumps, of which the following is a specification.

This invention comprises improvements in pumps for delivering oil from a common source of supply to various parts of an engine or other mechanism, and it is especially adapted for use in connection with the motor mechanism of automobiles.

In the accompanying drawing which illustrates the invention, Figure 1 is a side elevation of the pump, partly in vertical section on the line A—A of Fig. 2; Fig. 2 is a vertical section on the line C—C of Fig. 1; Fig. 3 is a similar view taken on the line B—B of Fig. 1; Figs. 4 and 5 are vertical sections through modified forms of distributing valves, and Figs. 6, 7, 8 and 9 are diagrammatic views showing successive positions of the valve ports relative to the ports in the valve seat during one revolution of the distributing valve.

Referring to the drawing, *a* indicates a pump casing, having at its lower end a laterally projecting tubular bearing 1, in which is fitted an operating shaft 2. The sleeve or bearing 1 fits into a suitable opening 3 in the crank casing 4 of an engine and serves as a support for the pump as well as a bearing for the shaft 2. The shaft 2 is operated by a worm gear 5 arranged on the end thereof and engaging a worm 6 upon a shaft 7 which is driven by the engine. The end of the driving or operating shaft of the pump which is within the casing is provided with spur teeth 8 which engage the gear teeth 9 on a rotary distributing valve *b* which fits against a flat valve seat 10. The distributing valve is secured to a valve-stem 11 which is journaled in a cap 12, fitting into a threaded opening 13 in the side of the casing. This opening is of sufficient diameter to permit the valve to pass therethrough in assembling or dismantling the pump. The valve is held yieldingly against its seat by a spring 14 which encircles the valve-stem and is arranged within a socket 15 on the inner side of the cap. The valve-stem is provided with a suitable knob 16, and by pulling outward upon the knob the valve may be lifted from its seat so that the valve or seat may be cleaned or washed out without removing any of the parts of the pump.

A crank pin 17 is secured to the inner end of the shaft 2, and a link or connecting rod 18 has one end journaled upon said pin and its opposite end 18^a bent over at a right angle and extended into a longitudinal slot 19 in a pump piston or plunger *c* arranged within a cylinder *a'* which is formed in the pump casing. The upper end of the pump plunger is tubular and fitted with an adjusting screw 20 which may be set at varying distances from the lower end of the slot 19 so as to regulate the amount of play of the end 18^a of the connecting rod in the slot 19. The purpose of providing lost motion between the connecting rod and the plunger is to permit the plunger to remain stationary for a short time at the ends of its strokes while the valve is moving from one operative position to the next, as hereinafter explained. By means of the adjusting screw the extent of the delay in the plunger movement, as well as the length of stroke of the plunger may be regulated.

The lower end of the plunger barrel or cylinder *a'* is connected by a passageway 21 to a port 22 in the valve seat. A port 23 is also arranged in the valve seat between its center and the port 22, and this port 23 is connected by a suitable passageway 24 to the inlet connection 25 through which the oil from the source of supply is admitted to the pump. Delivery ports 26 and 27 are also provided in the valve seat at a greater distance from the center of the valve than the port 22, these delivery ports being arranged one at each side of the port 22, and at equal distances therefrom, as shown in the drawing. The port 26 is connected by a passageway 28 to an outlet 29 and the port 27 is connected by a passageway 30 to an outlet 31. These outlets 29 and 31 are suitable for the attachment of pipes for conveying oil to different parts of the mechanism which is to be lubricated.

The valve has twice as many gear teeth as the gear 8, and the valve therefore makes one complete revolution for two complete inward and outward strokes of the plunger, and it has ports arranged to connect the pump cylinder with the source of supply during each outward stroke of the plunger and to connect the pump cylinder with the delivery ports in the valve seat alter-

nately, during successive inward strokes of the plunger, so that the oil is fed into the pipes connected with the outlets 29 and 31 alternately. The valve comprises two disks b', b^2, the former having openings punched or cut through it of the proper size and form and suitably located to serve as ports, and the latter being imperforate and being secured flat against the disk b' by solder or other means. Either one or both of the disks may be provided with teeth for engaging the gear teeth 8 upon the shaft 2. Thus, in Fig. 1, both disks are provided with teeth, in Fig. 4 only the disk b' is provided with teeth and in Fig. 5 only the disk b^2 is provided with teeth. Ordinarily, in valves having by-pass ports, the body of the valve is made in one piece and the channels are cast or cut in the face of the valve.

In the present valve it will be seen that in constructing the valve the openings for the ports may be punched out of a disk or gear b' and the other disk or gear b^2 closes the openings at one side, thus making a very simple and inexpensive valve. The valve has two diametrically opposite wedge or fan-shape inlet ports 32 and 33 which register, in succession, with the ports 22 and 23, during successive upward strokes of the plunger, and which are out of register with said ports 22 and 23 during the downward strokes of the plunger. The valve is constantly driven and during the time the plunger is stationary at the end of its downward stroke one of the inlet ports in the valve moves into register with the ports 22 and 23. The inlet port will remain in register with the ports 22 and 23 while the plunger is moving outward and will pass out of register while the plunger is stationary at the completion of its outward stroke. The valve is also provided with outlet ports 34 and 35, the former of which connects the ports 22 and 26 in the valve seat during one inward stroke of the plunger, while the latter connects the ports 22 and 27 during the succeeding inward stroke of the plunger. These outlet ports in the valve are brought into register with the port 22 before the plunger starts on its inward stroke. As shown in the drawing, the port 34 comprises two arcuate channels 34^a and 34^b, arranged to register with the ports 22 and 26 respectively, and connected end to end by a channel or slot 34^c, and the port 35 is similarly formed, but reversely arranged in the valve, so that its channel 35^b will register with the port 27 when its channel 35^a is in register with the port 22.

The operation will be clear from an inspection of Figs. 6 to 9 inclusive of the drawing. In Fig. 6 the inlet port 33 in the valve is indicated as being in register with the ports 22 and 23 in the valve seat, so that the pump cylinder is connected to the source of supply. In this position of the valve the plunger is moving outwardly and drawing a charge of oil into the pump cylinder. After the plunger has completed its outward movement the port 33 moves out of register with the ports 22 and 23, and just before the plunger moves downward the ports 22 and 26 are connected through the port 34. This position is shown in Fig. 3 and the position of the valve when the plunger is one half way in on its return movement is indicated in Fig. 7. During this inward movement it will be evident that the oil from the pump cylinder will flow through the passageways 22 and 28 to the outlet 29. After the completion of this downward stroke the port 34 moves out of register with the ports 22 and 26, and while the plunger is stationary the inlet port 32 in the valve moves into register with the ports 22 and 23, and thus connects the pump cylinder with the inlet 25. Fig. 8 shows the position of the valve relatively to the ports in the valve seat when the piston is about one half way up on this outward stroke. While the piston is stationary at the end of this second outward stroke the port 32 moves out of register with the ports 22 and 23 and the port 35 moves into register with the ports 22 and 27, and remains in register therewith during the succeeding downward stroke, as indicated in Fig. 9 thus connecting the passageway 30 and outlet 31 with the pump cylinder through the port 22 and passageway 21, so that a charge of oil is delivered into the pipe connected to the outlet 31.

What I claim is,—

1. In a force-feed lubricator, the combination with a pump cylinder, of a plunger therein, a valve-casing, an operating shaft extending into said casing, lost-motion connections between said shaft and plunger for operating the latter, said casing having a valve seat therein, a rotary valve fitting against said seat and geared to said shaft, said seat having an inlet port, two outlet ports at a greater radial distance from the axis of the valve than said inlet port and arranged at opposite sides of the inlet port, and a port located nearer to the axis of the valve than said inlet port and communicating with the pump cylinder, and said valve having diametrically opposite ports arranged to connect said inlet port with the pump cylinder port during each suction stroke of the plunger and having two similar, reversely arranged delivery ports adapted to connect the pump cylinder port with the outlet ports, in succession, during successive compression strokes of the plunger, said delivery ports each comprising two slots in the valve face connected end to end and located at different radial distances from the axis of the valve.

2. In a force-feed lubricator, the combi-

nation with a pump cylinder, of a plunger therein, a casing having a valve seat provided with an inlet port, a plurality of outlet ports and a port communicating with the pump cylinder, an operating shaft projecting into said casing and having spur teeth on its inner end, a distributing valve upon said seat, said valve comprising two disks secured together, one disk having port holes cut therethrough and the other disk extending over said holes, one of said disks having spur teeth engaging the teeth on the shaft, and connections between the shaft and plunger for operating the latter.

3. In a force-feed lubricator, the combination with a pump cylinder and piston, and a suitable valve seat, of a rotary valve comprising a disk having suitable ports therein and an imperforate disk secured thereto and covering said ports on one side of the first named disk, one of said disks being provided with teeth whereby the valve may be rotated.

4. In a force-feed lubricator, the combination with a pump cylinder and piston, and a suitable valve seat, of a rotary valve comprising a disk arranged to move over the valve seat and having perforations coöperating with the ports of the valve seat, an imperforate disk or plate arranged to cover the perforations at one side of the first named disk, teeth upon one of said disks for rotating the same, and means for yieldingly pressing the said rotary valve to its seat.

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

ALLEN LOOMIS.

Witnesses:
MILTON TIBBETTS,
CLARA DALE.