

Aug. 18, 1925.

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G. B. SAYRE

OIL PUMP

Filed July 21, 1920

3 Sheets-Sheet 1

*Fig. 1.*

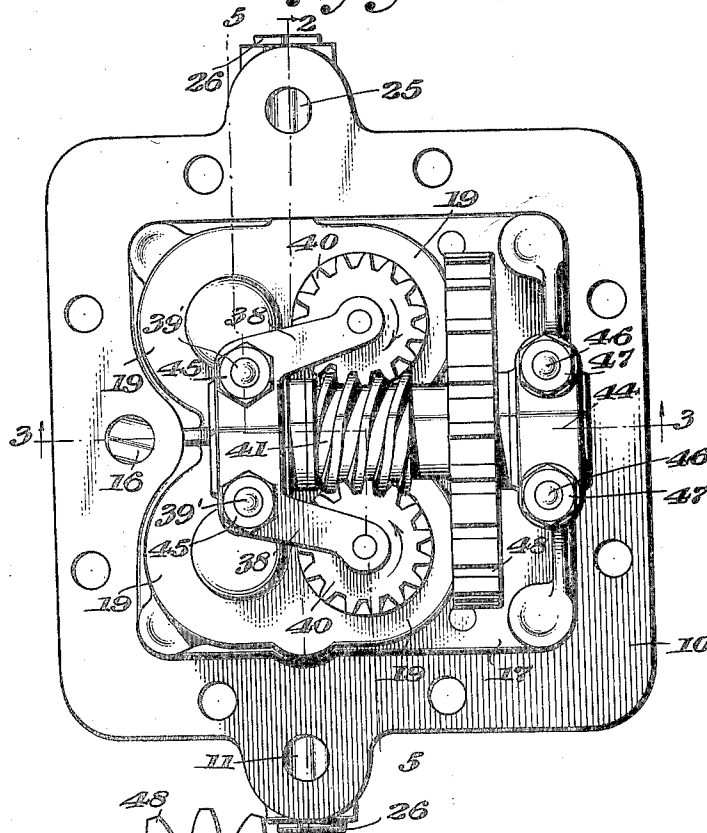
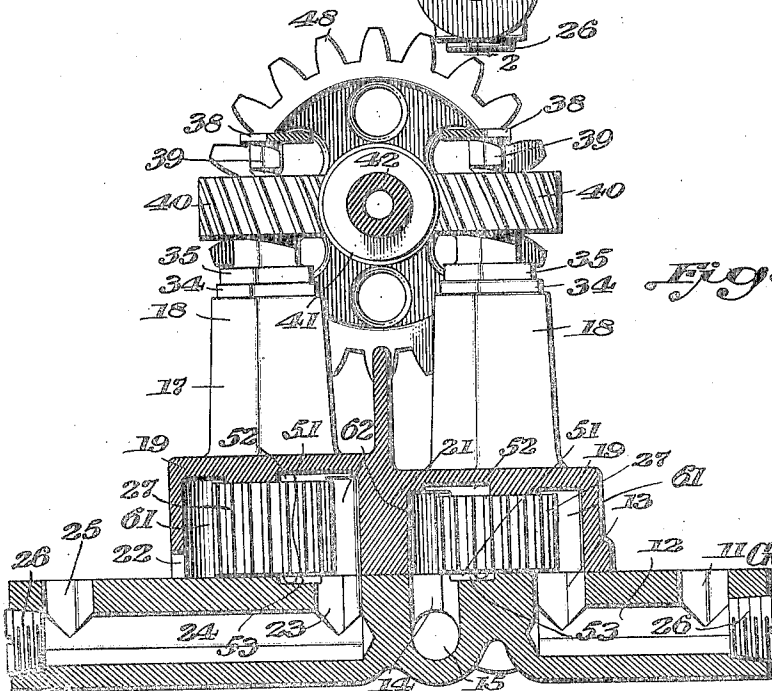


*Fig. 2.*



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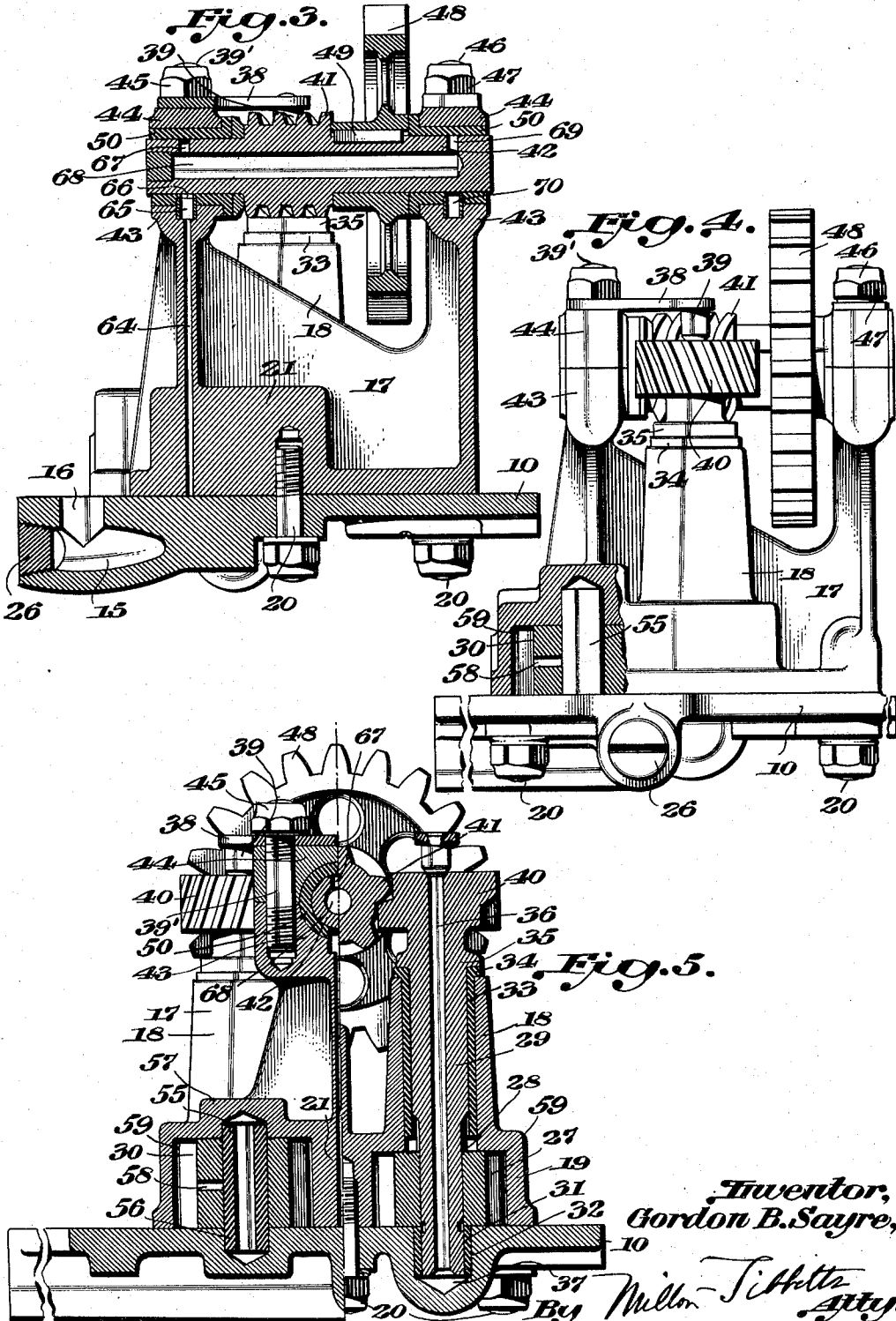
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OIL PUMP

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OIL PUMP

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*Fig. 6*

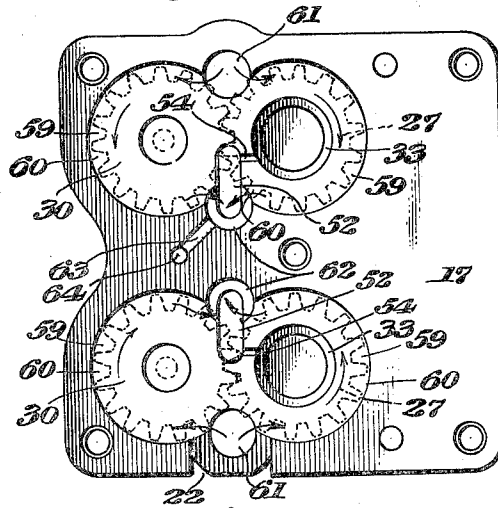
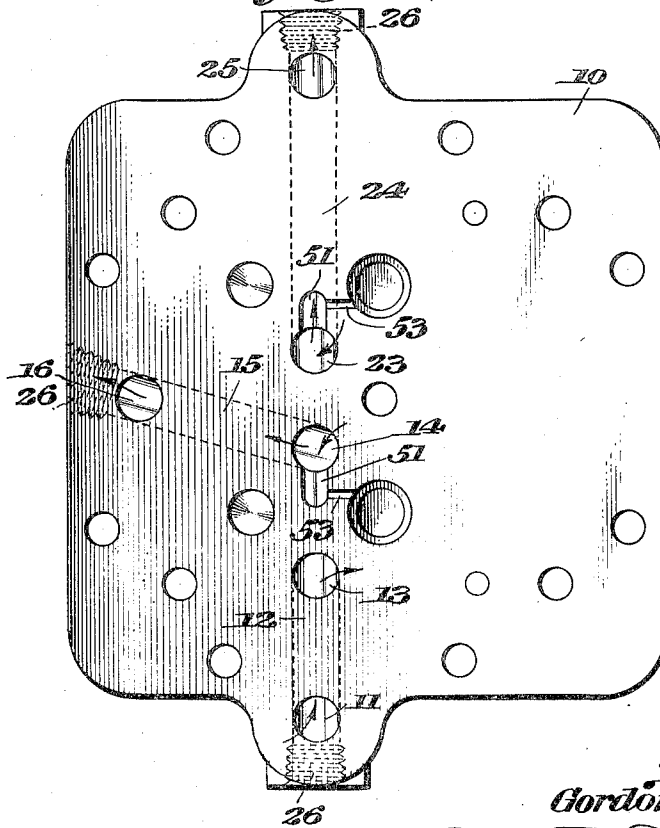


*Fig. 7.*



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Patented Aug. 18, 1925.

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# UNITED STATES PATENT OFFICE.

GORDON B. SAYRE, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

## OIL PUMP.

Application filed July 21, 1920. Serial No. 397,961.

*To all whom it may concern:*

Be it known that I, GORDON B. SAYRE, a citizen of the United States, and resident of 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 relates to hydrocarbon motors and more particularly to oil pumping mechanism for such motors.

One of the objects of the invention is to simplify the construction of motor oil pumping mechanism and to simplify the driving connections for such devices.

Another object of the invention is to properly lubricate the rotating parts of the pumping mechanism.

Another object of the invention is to provide a construction having few parts and also a construction which may be easily and quickly detached from the motor, taken apart and reassembled.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which:

Fig. 1 is a top plan view of an oil pump constructed in accordance with my invention;

Fig. 2 is a transverse section taken on line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a view in elevation and partly broken away, showing the pump construction illustrated in Fig. 1;

Fig. 5 is an irregular section taken on line 5—5 of Fig. 1;

Fig. 6 is a bottom plan view of the casting which forms the casing for the pumping mechanism; and

Fig. 7 is a top plan view of the base plate upon which the pumping mechanism is mounted.

The pumping mechanism is mounted on a base plate or cover plate 10 which is adapted to be secured to the crankcase of a hydrocarbon motor and is preferably located in the sump of the motor. The base plate is provided with a plurality of openings adapted to receive and discharge oil, and with conduits adapted to conduct the oil from the receiving openings to the pumping mechanism and from the pumping mechanism to discharge openings and thence

to the supply tank or to the pressure feeding system.

In the embodiment of the invention shown, the oil from the tank or source of supply is adapted to flow into an opening 11 through a conduit 12 to an outlet opening 13, through the pumping mechanism to a discharge opening 14 and thence through a conduit 15 to an opening 16 which is adapted to be connected to the oil feeding system for the various bearings and rotating parts of the motor.

The pumping mechanism which has been particularly illustrated comprises a pair of pumping units, one of the units being utilized to receive the oil from the tank and feed it under pressure to the feeding system for the motor, and the other of the units being adapted to receive oil from the crankcase and to feed this oil back into the supply tank.

The pumping units referred to are both mounted in a single casting 17, this casting having upwardly extending sleeve portions 18 in which are mounted the pump shafts, and being provided with pump casings 19 in which are mounted the pump units. The casting 17 is secured to the base plate 10 by means of bolts 20 which pass upwardly through the base plate into the casting and secure the casting with the walls of the pump casings 19 flush with the upper surface of the base plate, thereby preventing any escape of the oil from these casings. The two pump casings, although they are both formed integral with the casting 17 in this instance, are, however, entirely separate from each other, a vertical wall or web 21 dividing the casting into the two casings. One of the casings 19 is cut away on its lower edge to form an opening 22 adjacent the base plate, and the oil which is discharged in various ways into the crankcase flows downwardly along the bottom of the crankcase to the sump in which the pumping mechanism is located and flows inwardly into one of the pump units through the opening 22. After passing through this pump unit, this oil is discharged into an opening 23 in the base plate 10 and passes through a conduit 24 to an opening 25 which is connected by any suitable conduit to the supply tank.

In the form of the invention shown in the drawings, the conduits 12, 15 and 24 are

formed by drilling into the base plate and the ends of the openings are closed in any suitable manner, as by plugs 26. It will, of course, be understood, however, that these conduits may be formed in any other manner if desired.

Each of the pump units is provided with a positively driven pump element, and in this instance these positively driven elements comprise the gears 27 splined, as shown at 28, to pump shafts 29 and idler elements, which in this case are formed by the idler gears 30 which mesh with the gears 27. The pump shafts 29 are journaled at their lower ends in bushings 31 carried by drilled out openings 32 formed in the base plate and the shafts are also journaled in flanged bushings 33, these bushings being carried by the sleeves 18 formed in the casting 17 and the flanges 34 of the bushings resting on the upper ends of the sleeves. The shafts 29 are flanged, as shown at 35, and the flanges 35 rest on the flanges 34 of the bushings and take up the end thrust on the shafts. As illustrated in Fig. 5, each of the shafts 29 is provided with a longitudinal opening 36 for the purpose of conducting oil from the pocket 37 formed in the opening 32 at the lower end of the shaft to the upper end of the shaft and means is provided for preventing the upward movement of these shafts, this means comprising a pair of flat springs 38 having buttons 39 at their outer ends engaging the upper ends of the shafts and secured at their opposite ends by bolts 39' to the casting 17. Each of the shafts 29 has in this instance formed integrally therewith at its upper end a worm gear 40 and these gears both mesh with a single worm 41 carried by a shaft 42. The shaft 42 is mounted at its opposite ends in journal boxes formed by half boxes 43, preferably formed integral with the casting 17, and complementary boxes 44 bolted to the boxes 43. The box 44 is secured to the box 43 at one end of the shaft by means of the bolts 39' above mentioned, nuts 45 securing the box and the flat springs 38 in place. At the opposite end the box 44 is secured by similar bolts 46 and nuts 47. A spur gear 48 is keyed, as shown at 49, to the shaft 42 and this gear may be connected in any suitable manner to the crankshaft of the motor or any other power driven element. Suitable bushings 50 may, of course, be positioned between the journal boxes and shaft 42.

In order to assure the ready egress of the oil from the pumping units and to permit the escape of the oil from the intermeshing teeth of the pump gears, the base plate and the pump casings are provided respectively with recesses or grooves 51 and 52, these grooves effectively preventing any clogging

or backing up of the oil due to rapid feeding of the oil through the pump.

Suitable means is provided for lubricating the bearings of each of the pump shafts 29, this means comprising a groove 53 which leads from the groove 51 in the base plate 10 to the bushing 32 which surrounds the lower end of the shaft, and a groove 54 which leads from the groove or channel 52 formed in the casting 17 to the bushing 33 which surrounds the intermediate portion of the shaft 29. It will be understood that the oil which is fed through the groove 53 to the bushing 31 passes downwardly into the well 37 and from this well may pass upwardly through the opening 36 in the shaft to lubricate the buttons 39. It will also be understood that the oil which is fed to the bushing 33 may pass upwardly and lubricate the shaft 29 and any excess may pass outwardly between the flanges 34 and 35. The idler gears 30 rotate on hollow pins 55 mounted in bosses 56 and 57 formed respectively on the base plate 10 and the casting 17. Means is provided for conducting lubricant to the pins 55 and, as shown in Figs. 4 and 5, the idler gears 30 are provided with radial openings 58, preferably positioned between two consecutive teeth of the gears and conducting oil outwardly to the bearings of the gears on the pins.

The pump casings 19 are clearly illustrated in Figs. 2 and 6, these casings comprising a pair of chambers 59, these chambers having cylindrical portions 60 opening into each other, the shape of the opening formed by the two chambers taking the form of a figure 8. It will be understood that the driven gear and idler gear of each pump unit are mounted in this casing, and the bottom of the casting 17 is provided on each side with a pair of small cylindrical openings 61 and 62 communicating with each pump chamber and registering with the openings 13, 14 and 23 formed in the base plate 10.

In order to lubricate the bearings for the drive shaft 42, a channel 63 is formed in the lower surface of the casting 17 and communicates at one end with opening 62 and at its opposite end with a vertical conduit 64, preferably formed integral with the casting 17, and communicating at its upper end with a hollow dowel pin or tube 65, which secures the bushing 50 against rotation in the lower half 43 of the journal box at one end of the shaft 42. The bushing 50 has formed therein an opening 66 communicating with the dowel pin 65, and oil is fed through this opening to a radial opening 67 formed in the shaft 42 and leading to a longitudinal opening 68 in the interior of the drive shaft. The shaft 42 is provided at its opposite end with a radial opening 69 which communicates with the interior of

the shaft and conducts the oil from the interior to the bushing 50 at this end of the shaft, this bushing being prevented from rotation by a dowel pin 70 similar to the pin 65 just described.

A brief description of the operation of the device will now be given:—Assuming that the drive shaft 42 is being driven from the crankshaft of the motor or in any other suitable manner, oil flows into the opening 11 in the base plate 10 from the oil tank or source of supply and from this opening passes through conduit 12 and opening 13 into one of the pump units. The oil in each instance is received by the gears as they are rotating away from each other and is carried around the casing and is discharged by the gears at their meshing point. From the gears of the pump unit now being described, the oil passes through the channels 51 and 52 and opening 14, through the conduit 15 to the discharge opening 16, and from this opening passes to the pressure feeding system of the motor.

The other pump unit receives oil through the opening 22 in the casing and travels around with the gears in the same manner as in the other unit, and is discharged through the opening 23 and the conduit 24 to opening 25, which is connected to the oil tank or source of supply. Inasmuch as the openings 61 and 62 in the casting 17 constitute a portion of the pump chambers, they have not been mentioned particularly in the description of the operation.

Effective means has been provided for lubricating the bearings of the various rotating parts and, as explained in the foregoing description, oil is conducted through channels 51 and 53 in the base plate to the bearing for the lower end of the pump shaft and through channels 52 and 54 to the other bearing of the pump shaft. The oil also passes upwardly through the longitudinal opening in this shaft to lubricate the contact between the button 39 and the shaft. The pins 55 which carry the idler gears receive lubrication through the opening 58 formed in the gears. Oil is conducted through the channel 63 formed in the casting 17 to conduit 64 and thence to the bushings of the drive shaft 42, this shaft being hollow and oil being passed through the interior of the shaft from one end thereof to the other.

Although I have in the above specification described one specific embodiment of the invention, it will be understood that the invention is capable of modification, and that modifications and changes in the construction and in the arrangement of the various cooperating parts may be made without de-

parting from the spirit or scope of the invention as expressed in the following claims.

Having described my invention, what I claim and desire to secure by Letters Patent is:—

1. In oil pumping mechanism, a base plate, a support mounted thereon, a pair of coaxing pumping elements mounted in said support, separate bearings mounted above the base plate, a drive shaft journaled in the bearings and operatively connected to said elements, means for conducting oil from the point of discharge of said elements to one of the bearings, and means for conducting oil from said bearing to the other bearing.

2. Pumping mechanism comprising in combination a base plate, a pump unit mounted thereon and including a vertical pump shaft and means engaging the upper end of said shaft to take up the end thrust thereof.

3. Pumping mechanism comprising in combination a plate, a pump casing mounted thereon, a pump unit mounted in said casing and including a vertical pump shaft, and means carried by said casing engaging the upper end of said shaft to prevent upward movement thereof.

4. Pumping mechanism comprising in combination a plate, a pump casing mounted thereon, a pump unit mounted in said casing and including a vertical pump shaft, and resilient means carried by said casing engaging the upper end of said shaft to prevent upward movement thereof.

5. Pumping mechanism comprising in combination a plate, a pump casing mounted thereon, a pump unit mounted in said casing and including a vertical pump shaft, means carried by said casing engaging the upper end of said shaft to prevent upward movement thereof, and means for lubricating the point of engagement between said last named means and said shaft.

6. Pumping mechanism comprising in combination a plate, a casting secured thereto and having formed therein a plurality of pump casings, a pump unit mounted in each casing, a pump shaft for each unit and resiliently actuated thrust bearing members engaging the upper ends of said shafts.

7. Pumping mechanism comprising in combination a plate, a pump casing secured thereto, a pump unit in said casing and including a pump shaft having a longitudinal opening therethrough, a thrust bearing member engaging the upper end of said shaft, and means for conducting lubricant to said bearing through said shaft.

In testimony whereof I affix my signature.

GORDON B. SAYRE.