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C. W. MANZEL

COMBINED LOW AND HIGH PRESSURE OIL PUMP

Filed April 22, 1925

Fig. 1.

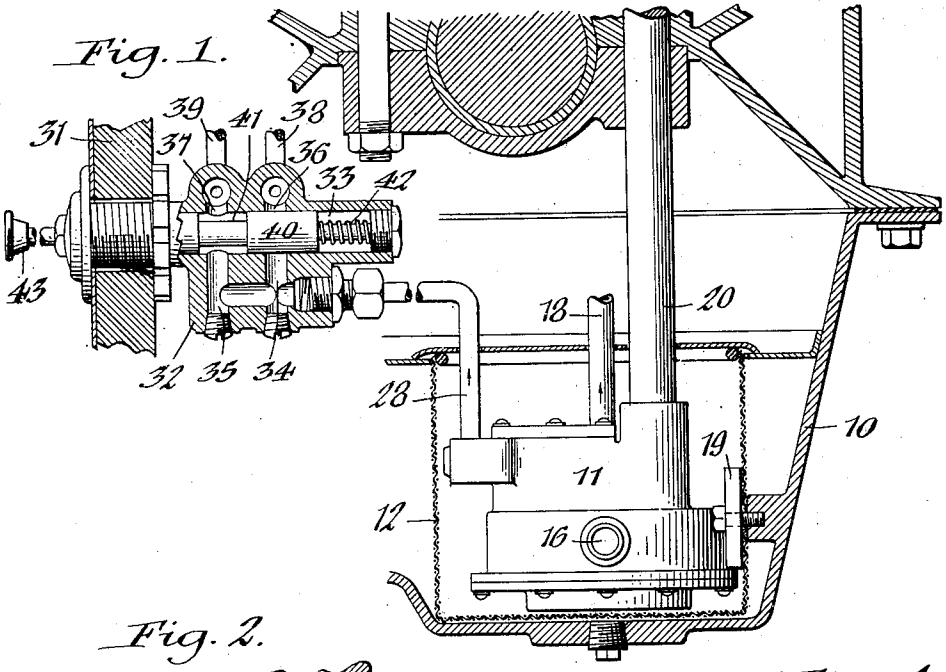


Fig. 2.

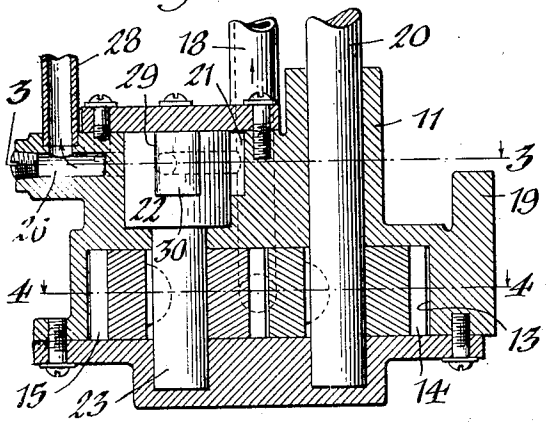


Fig. 4.

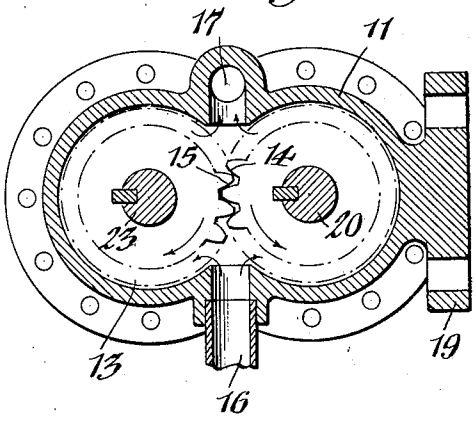
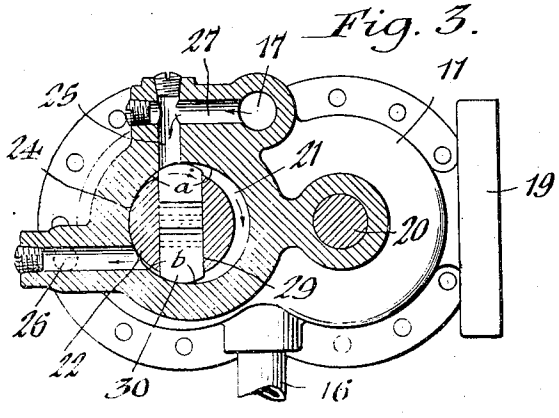


Fig. 3.



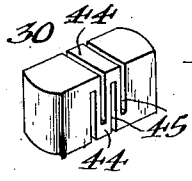


Fig. 5.

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UNITED STATES PATENT OFFICE.

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COMBINED LOW AND HIGH PRESSURE OIL PUMP.

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This invention relates to a combined low and high pressure pump which is intended more particularly for delivering oil at low and high pressures to the motor and chassis bearings, respectively, of automobiles.

One of its objects is to combine the high and low pressure pumps in a single compact unit in such a way that while cooperating, neither interferes with the action of the other.

Another object of the invention is to so construct the high pressure pump that when a predetermined pressure is reached, it will automatically act to relieve the pressure and prevent breakage of its parts, as well as those associated with the chassis bearings.

In the accompanying drawings:

Figure 1 is a vertical section of the crank case of a motor equipped with the improved low and high pressure pump which is shown in elevation. Figure 2 is a vertical section of the pump unit. Figure 3 is a horizontal section thereof on line 3—3, Fig. 2. Figure 4 is a similar section on line 4—4, Fig. 2. Figure 5 is a perspective view of the reciprocating blade of the high pressure pump.

Similar characters of reference indicate corresponding parts throughout the several views.

10 indicates the oil pan or well of the crank case of a motor vehicle, and 11 designates generally the oil pump unit located in the said pan and enclosed by the customary screen 12.

Superposed one upon the other are a pair of low and high pressure oil pumps, constituting said pump unit, the low pressure pump serving, as usual, to constantly circulate the oil through the crank case and the motor during its operation for lubricating the various motor parts while the booster or high pressure pump serves to boost the pressure above that of the low pressure pump for chassis lubrication which requires a considerably higher pressure, say approximately five hundred pounds to the square inch, this high-pressure pump being under the control of the driver of the car, so that it may be readily brought into service when it is desired to lubricate the various bearings of the chassis.

In the preferred construction illustrated in the drawings, the high-pressure pump is superposed upon the low-pressure pump and the latter may be of any suitable construction, that shown in the drawings comprising the usual horizontal case 13 and intermeshing pump-gears 14, 15. This case has the customary inlet 16 through which the oil is drawn from the crank-case, and the outlet 17 through which it is expelled by the gears into and through the delivery tube 18 to the motor parts. The pump-case 13 is provided with the usual bracket 19 for attaching it to the wall of the crank case. One of the pump gears, preferably the gear 14, is driven by the customary upright shaft 20 geared to the cam shaft or other appropriate rotary part of the motor, not shown.

The booster or high pressure pump may be of any appropriate construction to deliver the lubricant to the chassis bearings under the required relatively high pressure. It preferably comprises a cylinder or case 21 cast integral with the case 13 of the low pressure pump and a rotary cylindrical drum or rotor 22 arranged eccentrically in the cylindrical bore of said case and driven by the shaft 23 of the subjacent idle gear 15 of the low-pressure pump, as best shown in Fig. 2. As seen in Fig. 3, one side of the rotor bears against an abutment or side 24 of the cylinder 21 located between the inlet 25 and the outlet 26 thereof, which are arranged substantially at right angles to each other. This inlet is connected by a passage 27 with the outlet 17 of the low pressure pump, while connected to the outlet 26 is a delivery pipe 28 leading to the bearings of the chassis, not shown.

Arranged to reciprocate in a diametrical guideway or slot 29 of the rotor is a blade or piston 30 having convex ends shaped to coincide with the contour of the inside wall of the cylinder 21 and guide the blade in close contact therewith. The shape of the cylinder wall is such, that as the rotor is revolved, the curved ends of its blade will be in close contact with said cylinder at all points of its circumference without contraction of the blade taking place. For this reason, the chamber 21 is not perfectly cylindrical, but is slightly distorted as indicated at *a* and *b*, above and below a line drawn through the axes of said chamber and the rotor.

In the operation of this low and high pressure pumping apparatus, some of the oil discharged from the low pressure pump is diverted through the branch or passage 27 into the cylinder of the high pressure

pump in front of the projecting end of the rotor blade under a pressure of about fifty pounds to the square inch. The blade propels the oil through the gradually contracting space between the rotor and the cylinder and discharges it at a greatly increased pressure, say five hundred pounds to the square inch, through the outlet 26 and the delivery pipe 28 to the various chassis bearings. This high-pressure delivery of the oil to said bearings is controlled at the will of the driver by a manually operated valve, mounted on the dash board 31 of the vehicle. As shown in Fig. 1, by way of example, this valve consists of a body 32 containing a cylinder 33 having a pair of inlet ports 34, 35 in one side to which the high pressure delivering pipe 28 is connected and a pair of companion outlet ports 36, 37 in its opposite side, the outlet 36 having one or more pipes 38 connected therewith for conducting the oil to the bearings to be lubricated and the outlet 37 having a pipe 39 connected therewith and leading to the oil-pan of the engine. A piston-valve 40 is operable in the cylinder 33 and has an annular groove 41 constituting a port adapted to register with either set of inlet and outlet ports. A spring 42 normally holds the valve closed with its grove in register with the ports 35, 37 while an actuating rod 43 serves to move the piston-valve forwardly to its open position to bring said groove into register with the other ports 34, 36. Ordinarily, the lubricant delivered by the high pressure pump is intercepted by this controlling valve before reaching the chassis bearings and is returned to the pan or well of the crank case by the return pipe 39, the high pressure pump working idly under these conditions. When, however, said controlling valve is opened by the driver from time to time, the oil delivered by the high pressure pump is allowed to pass through the pipe or pipes 38 to said bearings. As soon as the actuating rod 43 of said valve is released, the valve closes and diverts the high pressure oil back to the pan.

In order to automatically take up end-wear of the rotor blade, the same is preferably formed of two sections between which are interposed suitable resilient means which tend constantly to press the outer ends of the sections against the surrounding cylinder-wall. As shown in Fig. 5, the preferred means consist of resilient zig-zag webs or tongues 44 connecting the two-blade sections and formed integral therewith by cutting transverse slits 45 in a one-piece blade-block alternately in opposite sides thereof with the slits in one side terminating short of the opposite side. This resilient construction of the blade also furnishes a safety feature which prevents breakage of any of the parts when the high pressure exceeds the predetermined limit of say five hundred pounds. When this occurs, the excess pressure overcomes the resistance of the spring tongues 44 allowing some of the oil to pass over the ends of the blade and return into the cylinder-inlet 25.

By the construction herein shown and described, the low and high pressure pumps for motor and chassis lubrication are combined in a single compact unit, producing a simple structure which can be readily installed and which can be produced at correspondingly low cost. At the same time, neither of the pumping elements interferes with the action of the other, permitting a constant lubrication of the motor, as usual, and a periodical lubrication of the chassis bearings, as required.

I claim as my invention:—

1. An oil pump of the character described, comprising a casing having low and high pressure oil chambers each provided with an inlet and an outlet, the outlets of said chambers delivering the oil to two separate distributing points and the outlet of the low pressure chamber having a branch communicating with the inlet of the high pressure chamber, and rotary means in said chambers for pumping the oil from the inlets to the outlets thereof, respectively.

2. An oil pump of the character described, comprising a casing having low and high pressure oil chambers, each provided with an inlet and an outlet, the outlets of said chambers delivering the oil to two separate distributing points and the outlet of the low pressure chamber having a branch communicating with the inlet of the high pressure chamber, rotatable members in said low pressure chamber for forcing the oil through the same, and a rotor in said high pressure chamber carrying a blade for forcing the oil from the inlet to the outlet side thereof, said rotor being driven by one of said rotatable members.

3. An oil pump of the character described, comprising a casing having superposed low and high pressure oil chambers each provided with an inlet and an outlet, the outlet of the low pressure chamber having a branch communicating with the inlet of the high pressure chamber, rotatable members in said low pressure chamber for forcing the oil through the same, a rotor eccentrically mounted within said high pressure chamber and carrying a reciprocating blade for forcing the oil from the inlet to the outlet side thereof, said rotor being driven by one of said rotatable members, and independent conduits leading from the outlets of said low and high pressure chambers.

4. An oil pump, comprising a casing having a cylinder containing an inlet and an outlet, a rotor mounted in said cylinder and

a reciprocating blade guided in said rotor, and normally contacting at its ends with the cylinder, said blade consisting of sections movable as a unit lengthwise of the rotor, and resilient means interposed between said blade sections and forming an integral part thereof, the tension of said resilient means permitting contraction of the blade-sections only when a predetermined oil pressure is reached.

5. An oil pump, comprising a casing having a cylinder containing an inlet and an outlet, a rotor mounted in said cylinder, and a reciprocating blade guided in said rotor, said blade consisting of sections movable lengthwise thereof and connected by integral resilient zig-zag tongues tending to press the sections against the cylinder wall.

6. An oil pump, comprising a casing having a cylinder containing an inlet and an outlet, a rotor mounted in said cylinder, and a reciprocating blade guided in said rotor, said blade consisting of a block provided in its central portion with transverse slits extending alternately from opposite sides thereof, forming resilient tongues which connect the end portions of said block.

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