Nov. 4, 1930. S. WILTSE 1,780,217

PUMP MECHANISM

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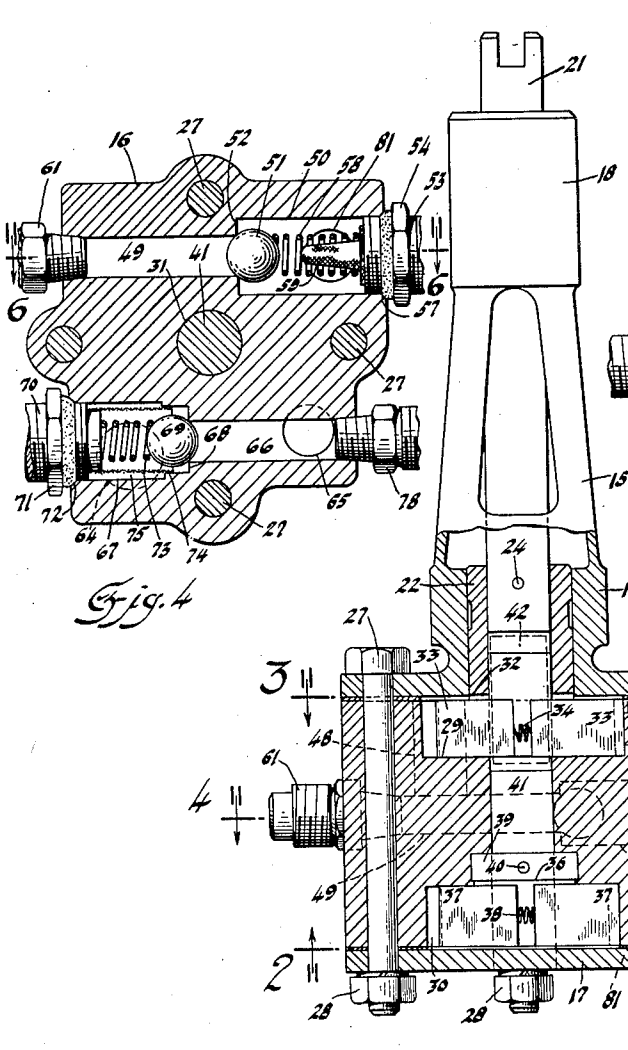

Fig. 4

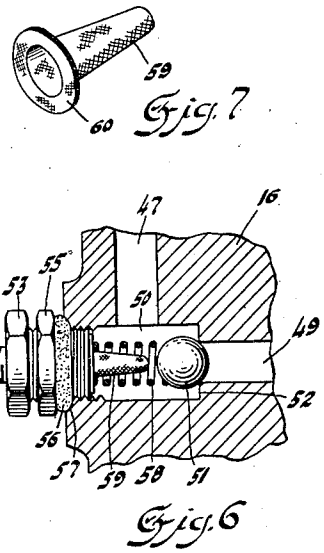

Fig. 6

Fig. 7

Fig. 1

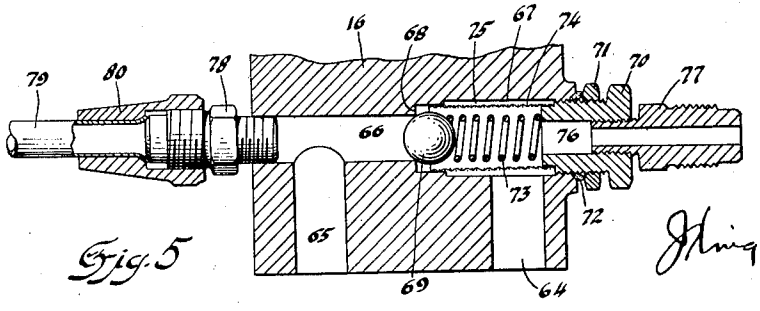

Fig. 5

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PUMP MECHANISM

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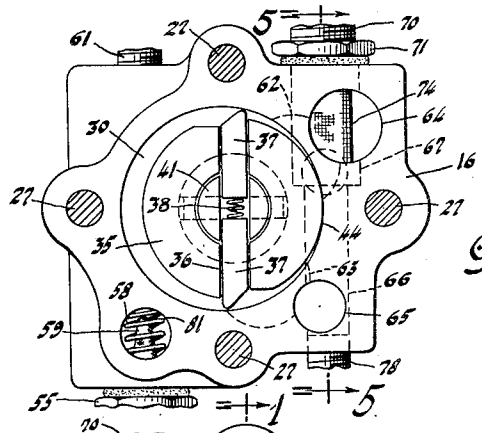

Fig. 2

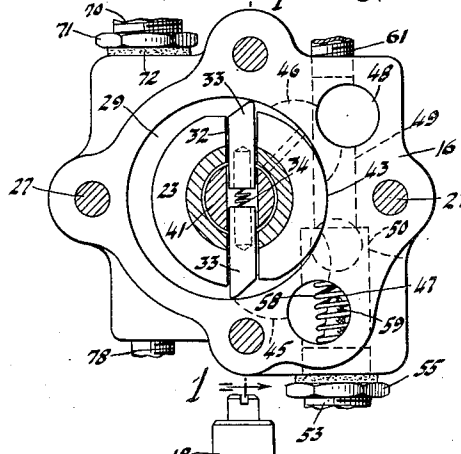

Fig. 3

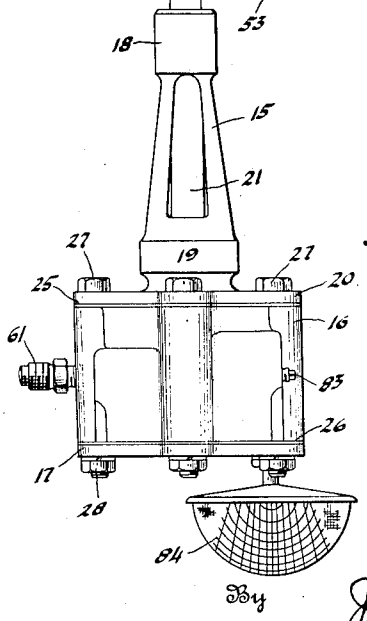

Fig. 8

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UNITED STATES PATENT OFFICE

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PUMP MECHANISM

Application filed August 25, 1927. Serial No. 215,317.

This invention relates to pump mechanisms and particularly to a combined oil and fuel pump for internal combustion engines, the principal object being the provision of a unitary oil and fuel pump simple in construction, efficient in operation and economical to manufacture.

Another object is to provide a combination oil and fuel pump in which a casing is provided for receiving a pair of aligned pump rotors both of which are driven by a common line of shafting, and which casing is provided with self contained pressure relief means for the oil and fuel being pumped.

A further object is to provide a combined oil and fuel pump comprising a housing including a casing provided with recesses for the reception of separate pump elements which are driven directly by a common line of shafting, and in which passages for the flow of oil and fuel are provided, relief means being provided cooperating with said passages within said casing whereby to control the maximum pressure of oil and fuel which may be built up by said pump mechanism.

The above being among the objects of the present invention, the same consists in certain features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawings, and then claimed, having the above and other objects in view.

In the accompanying drawings which illustrate a suitable embodiment of the present invention and in which like numerals refer to like parts throughout the several different views,—

Fig. 1 is a side view of a pump constructed in accordance with the present invention, parts thereof being shown in section and taken as on the line 1—1 of Fig. 3.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, it being a bottom view of the pump casing.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1, it being a top view of the pump casing.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a sectional view taken as on the line 5—5 of Fig. 2.

Fig. 6 is a fragmentary sectional view taken on the line 6—6 of Fig. 4.

Fig. 7 is a perspective view of the strainer member employed in the oil passages of the pump mechanism.

Fig. 8 is a side elevation of the pump mechanism showing the method of applying a screened suction passage thereto when the pump mechanism is immersed or partly immersed in oil.

The present invention is an improvement on the constructions shown and described in my patent applications for improvements in pumps filed April 18, 1927, Serial No. 184,573 and improvements in pump mechanism filed June 9, 1927, Serial No. 197,753.

As stated above the present invention relates to a combined oil and fuel pump adapted for use in connection with internal combustion engines and so constructed as to be particularly economical for use in connection with the same. In accordance with the present invention I so construct the mechanism as to provide a minimum of parts upon which machine work must be done and have provided a compact casing of relatively small dimensions which forms a part of the pump housing and have provided passages in the casing for the flow of oil and fuel, and have included in such passages means for governing the pressure of such oil and fuel, thereby confining to such casing the maximum amount of the machine operations on the entire pump assembly and making the same particularly economical to manufacture, assemble and service.

In accordance with the present invention I show a housing made up of a combined supporting and cap member 15, a casing 16 and a lower cap 17. The upper portion 15 is provided with two centering, locating and securing portions 18 and 19, and a flange portion 20 which serves as a top cap for the casing 16. The interior of the portion 18 is bored out to provide a journal for the upper end of the drive shaft 21 which extends downwardly therethrough and is loosely received in the

hub 22 of the upper rotor 23 of the pump, which hub 22 is journaled in the lower portion of the same with the shaft 21 secured against rotation therein by the pin 24. The casing 16 is provided with plane upper and lower faces, gaskets 25 and 26 being provided between the flange portion 20 and the casing 16 and between the cap 17 and casing 16 respectively. Bolts such as 27 extend downwardly through the flange portion 20, casing 16 and the cap 17 and receive nuts 28 on the lower ends thereof for securely holding the parts in assembled relationship. The casing 16 is provided with a circular recess 29 in its upper surface eccentric to the shaft 21 and is provided with a like recess 30 in its lower face also eccentric to the shaft 21, the recesses 29 and 30 being joined by an opening 31 in axial alignment with the shaft 21. The rotor 23 is provided with a diametrical slot 32 extending through the depth thereof which is of substantially the same depth as the depth of the recess 29, and slidably received within the slot 32 are the sliding vanes or blades 33 which are forced apart from each other by the spring 34 interposed between the same so as to urge their outer ends into contact with the side walls of the recess 29. Positioned in the lower recess 30 is a rotor 35 similar to the rotor 23 and provided with a like slot 36, blades or vanes 37 and spring 38. The rotor 35 is provided with an upwardly extending hub 39 which is provided with a suitable bearing in the casing 16, and loosely secured against rotation in the hub 39 by the pin 40 and extending upwardly therefrom is the short shaft 41, the upper end of which is slotted and passes around the blades 33 and through the rotor 23 and engages the tongue 42 formed on the lower end of the shaft 21 within the hub 22 so as to be driven thereby. Rotors 23 and 35 are of such a diameter that the same slidably contact with line engagement against the side walls of the recesses 29 and 30 respectively as at 43 and 44 respectively.

An inlet slot or port 45 of less depth than the recess 29 is milled in the side walls thereof on one side of the line 43 and a similar outlet port or slot 46 is milled on the other side of the line 43. An opening 47 is drilled downwardly from the upper surface of the casing 16 to a point adjacent the center of the casing 16 and in intersecting relationship with the port 45, and a similar opening 48 is drilled downwardly in intersecting relationship with the port 46. Aligned cross passages 49 and 50 extending from one side face of the casing 16 to the opposite side face thereof, connect the openings 47 and 48 at a point substantially midway between the upper and lower faces of the casing 16. The passage 50 is of greater diameter than the passage 49 and a ball 51 is positioned against the shoulder 52 between the two passages to provide a check valve for the same.

Threaded into the open end of the passage 50 is a plug member 53 provided with a central passage (not shown) in the outer end of which the nipple 54 is threadably received for connection to a suitable tube or pipe (not shown) which extends to a source of oil such as the engine sump. The plug 53 is axially adjustable in the end of the passage 50 and a nut 55 is provided thereon for forcing the gasket 56 against the beveled outer edge 57 of the opening 50 in order to prevent leakage between the plug member 53 and the casing 16, and also for locking the plug 53 in adjusted position. A coil spring 58 is held under compression between the ball 51 and the inner end of the plug 53 thereby tending to hold the ball 51 in contact with the shoulder 52 and preventing the flow of oil from the passage 49 to the passage 50, the tension of the spring 58 and therefore the pressure within the passage 49 necessary to cause the ball 51 to be moved away from the shoulder 52 in order to allow the flow of oil from the passage 49 to the passage 50 being adjusted by threading the plug member 53 inwardly or outwardly in the opening 50. If desired a strainer member 59 of fine wire mesh such as is shown in perspective in Fig. 7 may be inserted within the spring 58 with its outwardly flared flange portion 60 clamped against the end of the plug 53 by pressure of the spring 58, thus providing a strainer for the oil entering the pump through the plug 53. In the outer end of the passage 49 a nipple is threadably received for connection with a tube or pipe (not shown) leading to the engine bearing surfaces which are lubricated from the pump. An inlet and an outlet port 62 and 63 respectively are provided in the side walls of the recess 30 on either side of the line 44 in exactly the same manner as the ports 45 and 46 are provided in the recess 29. Two openings 64 and 65 similar to the openings 47 and 48 previously described extend from the lower face of the casing 16 upwardly, intersecting the ports 62 and 63 respectively and extend to a point substantially midway between the upper and lower surfaces of the casing 16. Cross passages 66 and 67 similar to the cross passages 49 and 50 extend from side to side of the casing 16 and connect the openings 64 and 65 in exactly the same manner as the passages 49 and 50 connect the openings 47 and 48, a shoulder 68 similar to the shoulder 52 being provided at the junction of the two openings and a ball 69 being provided against the same. A plug 70 similar to the plug 53 is slidably received in the open end of the opening 67 and is provided with a nut 71 and gasket 72 similar to the nut 55 and gasket 56 described in connection with

the plug 53, a spring 73 being provided between the ball 69 and the adjacent end of the plug 70 for urging the ball 69 against the shoulder 68, the tension of the spring being adjusted by axial adjustment of the plug 70. An alternate form of strainer screen is shown in connection with the passage 67, the screen 74 in this case being cylindrical and being held in spaced relationship with respect to the walls of the opening 67 in order to provide a passage 75 for fuel surrounding the complete circumference of the same.

The plug 70 is provided with an axial opening 76 in the same manner as the plug 53 and a nipple 17 is threadably received within the same for connection to a tube or pipe leading to the fuel supply. The open end of the passage 66 is provided with a nipple 78 for connection to a tube such as 79 secured thereto by the nut 80, the tube 79 extending to the carbureter in order to supply fuel to the same.

If desired the opening 47 may be continued downward past the cross passage 50 as at 81 and through the cap 17, a plug 82 being provided in the same when the oil is taken into the pump through the plug 53 as previously described. If, however, the pump is to be positioned in the oil sump of the engine of which it forms a part, the central opening in the plug 53 may be plugged as at 83 in Fig. 8, the plug 82 in the passage 81 be removed and a screen such as 84 in Fig. 8 be connected to and supported from the opening 81 so as to be immersed in the oil, thereby dispensing with the necessity of an added pipe extending into the oil.

The operation of the pump will be apparent from the foregoing. Upon rotation of the rotor 23 the blades continually draw in oil through the plug 53, passage 50, opening 47 and port 45 to the recess 29 and force the same out of the recess 29 through the port 46, opening 47 and passages 49. As previously described when the oil in the passage 49 exceeds a predetermined pressure value the ball 51 is caused to move away from its seat and to allow part of the oil passing through the pump to be by-passed back to the intake side of the same and recirculated. In cases where it is desired to employ a pressure relief valve at a place other than within the pump as indicated, the passages 49 and 50 may be extended only far enough to connect them with the openings 47 and 48 so as to prevent any recirculation of the oil within the pump itself. The ball 69, passages 66 and 67 and openings 64 and 65 function in exactly the same manner as the ball 51 and connected openings just discussed causing the fuel, upon rotation of the pump, to be drawn into the port 62 and forced out of the port 63 and be by-passed from the passage 66 into the passage 67 when the pressure thereof becomes greater than a predetermined value as previously mentioned.

From the foregoing it will be seen that the central casing 16 is so designed as to require most of machine work which is necessary to be done on the entire pump and so formed as to include therein as a part thereof the pressure relief means for controlling the maximum pressure of oil and fuel that may be built up by the pump. The casing 16 is so designed that all of the operations to be formed thereon may be done in a drill press in connection with a single jig without necessitating the removal of the casing 16 from the jig in order to perform the different operations upon the same. It also provides a construction that is readily assembled together simply by means of the four bolts 27 and corresponding nuts 29 and for that reason provides a construction that is economical to assemble and service.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In a pump of the class described, a casing having a recess therein, a pump element in said recess, an opening in one face of said casing, a second opening in another face of said casing of larger diameter than the first mentioned opening and in axial alignment therewith, said openings being connected together whereby a shoulder is formed at their point of connection, a passage connecting said second opening with said recess, a passage connecting said first mentioned opening with said recess, a member threaded into the outer end of said second opening, a ball within said second opening positioned against said shoulder, a spring held under compression between said member and said ball, a passageway through said member, and a filtering member in said second opening maintained in position by said spring.

2. In a pump of the class described, a casing provided with opposed faces, a recess in each of said faces, a pump element in each of said recesses, said pump elements being connected together for simultaneous movement, a pair of separated openings extending between side walls of said casing between said faces, a pair of passages in said casing connecting one of said openings with one of said recesses, another pair of passages in said casing connecting the other of said openings with the other of said recesses, a valve member in each of said openings for controlling the by-passing of fluid between each pair of said passages, a coil spring cooperating with each of said valve members for controlling the same, an adjustable member threadably received in one end of each of said openings for controlling the tension of the correspond-

ing spring, and means cooperating with each of said adjustable members for preventing leakage between said adjustable members and said casing, said means comprising a beveled face on said casing concentric with each of said adjustable members, a resilient ring surrounding each of said adjustable members, and an adjustable nut on each of said adjustable members adapted to compress the corresponding ring between itself and the corresponding beveled face.

3. A pump comprising, in combination, a housing including a casing provided with opposed plane faces and a removable cover for each of said faces, a recess in each of said faces closed by the corresponding of said covers, a rotatable pump element in each of said recesses, a single line of shafting extending into said housing and drivingly engaging said pump elements, inlet and outlet passages in said housing for said recesses, and an axial extension on one of said covers forming the sole means for supporting said pump and providing an outboard bearing for said line of shafting.

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