

April 26, 1932.

E. W. DILG

1,855,708

PUMP MECHANISM

Filed June 28, 1929

2 Sheets-Sheet 1

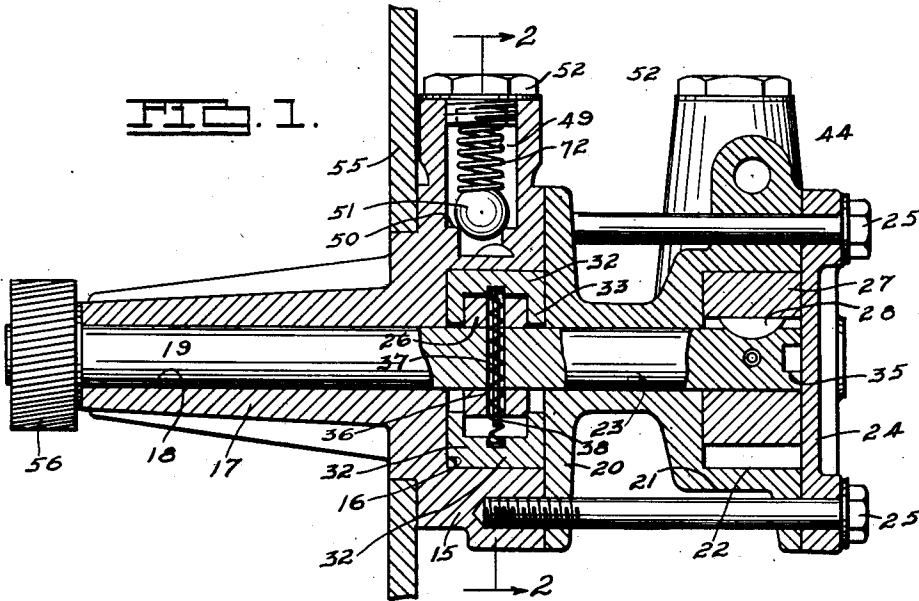


FIG. 2.

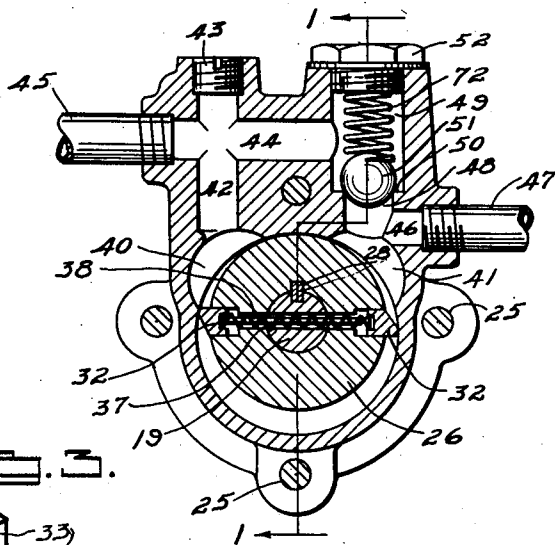
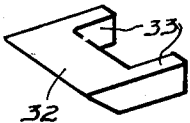


FIG. 3.



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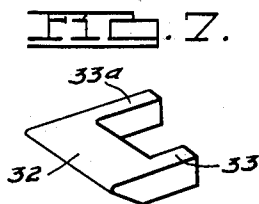
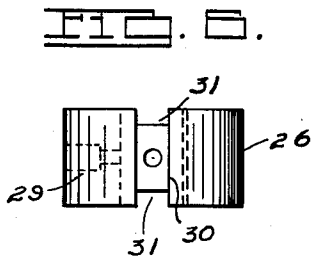
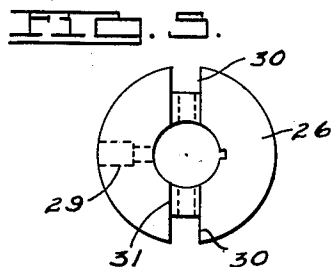
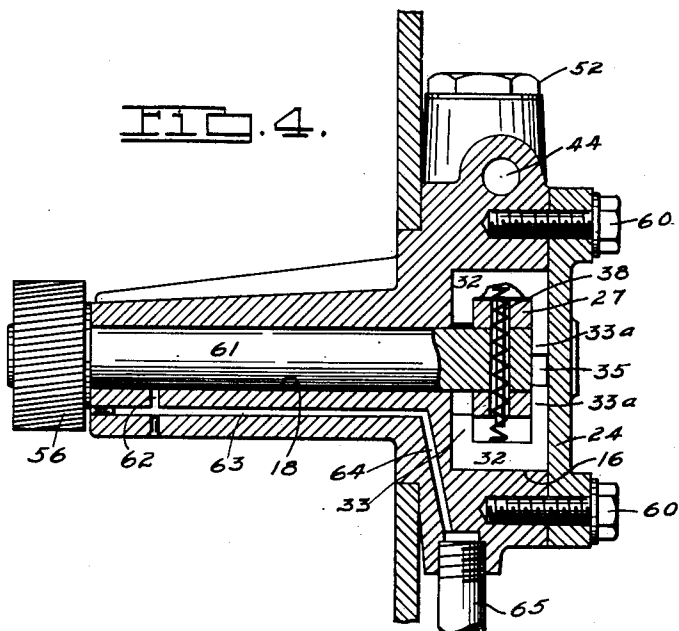
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PUMP MECHANISM

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2 Sheets-Sheet 2



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PUMP MECHANISM

Application filed June 28, 1929. Serial No. 374,315.

This invention relates to pumps, and particularly to pumps of the rotating type in which a rotor is mounted eccentrically in a generally circular pumping chamber and provided with radially disposed and movable blades which cooperate with the walls of the chamber to effect a pumping action, the principal object being the provision of certain new and novel features for use in connection with pumps of this type.

Another object is to provide a new and novel form of rotor blade and rotor blade mounting for pumps of the type described.

Another object is to provide a pump rotor and cooperating radially slidable blades in which the blades are provided with radially extending portions received in extended slots in the rotor and in its shaft, and whereby a more extensive and favorably shaped bearing face is provided for the blades in their sliding movement than in conventional constructions.

Another object is to provide a dual pumping mechanism of simple and novel construction.

The above being among the objects of the present invention, the same consists in certain novel 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 show 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 partially broken sectional view taken through a pump mechanism as on the line 1—1 of Fig. 2.

Fig. 2 is a transverse sectional view of the pump mechanism shown in Fig. 1, taken on the line 2—2 of Fig. 1 but not simultaneous therewith.

Fig. 3 is a perspective view of one of the pump rotor blades.

Fig. 4 is a longitudinal sectional view through a modified form of construction.

Fig. 5 is an end view of one of the pump rotors.

Fig. 6 is a side view of the pump rotor shown in Fig. 5.

Fig. 7 is a perspective view of the type of rotor blades employed in the construction shown in Fig. 4 and preferably employed in connection with that rotor of Fig. 1 most remote from the driving gear.

The type of two-fluid pump herein disclosed is, in general, similar to that shown and described in connection with the patent to Sumner Wiltse, on Pump mechanism, Number 1,711,298, issued April 30, 1929, but involves various novel features designed to improve the construction therein shown.

Referring to Fig. 1 I show a pump comprising a housing portion 15 having a recess 16 opening on one face thereof. The housing 15 is provided with an extension 17 having an opening 18 therein eccentric with the recess 16 and in which a drive shaft 19 is journaled. The open end of the recess 16 is closed by a cap member 20 which has formed thereon, as an extension, a second housing portion 21 which is in turn provided with a recess 22 opening on one face thereof and concentric with the recess 16. The cap portion 20 and housing portion 21 are provided with a central opening 23 concentric with the opening 18 and in which the drive shaft 19 is journaled. A cap member 24 is provided for the open end of the recess 22 and is secured to the housing 21 by bolts 25 which extend not only through it and the housing 21, but through the cap portion 20, and thread into the housing 15, thereby acting to hold all the parts in proper assembled relationship.

Within the recess 16 a rotor 26 is secured to the shaft 19 for equal rotation therewith, and within the recess 22 a rotor 27 is secured to the shaft 19 for equal rotation therewith. These rotors may be secured to the shaft against relative rotation by means of a key such as 28 or other suitable means.

The rotors themselves are formed as indicated in Figs. 5 and 6 and are identical to each other except that the rotor most remote from the driving end of the pump may be secured against longitudinal movement relative to the shaft 19 by means of a screw (not

shown) threaded into an opening 29, Fig. 5 and thus lock the shaft 19 against axial movement relative to the rotor. These rotors as previously made in conventional constructions, were provided only with diametrically opposite axially extending slots in their outer faces in which the sliding blades were received. The radial depth of these slots or grooves is necessarily limited for structural reasons, with the result that in conventional constructions the blades sliding in the diametral grooves have less bearing area and less length in the last mentioned grooves than is desirable.

In accordance with the present invention, to provide the necessary bearing area or extent of bearing between the blades and the rotor without seriously interfering with the proper strength of the rotor itself, I form the axially extending grooves 30 in the diametrically opposite faces of the rotors 26—27 the same as in conventional constructions, but I further connect the grooves 30 at each end of each rotor by diametrically disposed grooves 31. The blades 32 are radially slidably received in the grooves 30 and each blade 32 is provided with a pair of radially inward extensions 33 which are spaced from each other an amount equal to the distance between the adjacent sides of the grooves 31 and are slidably received in the grooves 31. The extensions 33 are preferably of such a length that when the rotors have turned to bring them to the near side of their respective eccentric recesses, the extensions lie in closely adjacent relationship to the surface of the shaft 19. Furthermore, in order to obtain a still greater bearing area and diametral length for the blades in a rotor such as that nearest the cap 24, such blades may be formed as indicated in Fig. 7. That is, each blade may be formed with one extension or leg (and preferably that leg closest the cap 24) in length as at 33a in Fig. 7, and the end of the shaft 19 grooved out or otherwise provided with a transverse clearance space, as at 35 in Fig. 1, in alignment with the grooves 31 at the end of the rotor, so that such extended leg 33a may be further guided in the groove 35, as indicated in Fig. 4. It will also be apparent that the shaft 19 between its ends might be slotted to permit legs of the length indicated at 33a to be employed throughout, but inasmuch as such a slotting operation would increase the cost of production of the shaft 19, and in view of the fact that by the construction shown without slotting the shaft 19 an ample bearing area and diametral length may be provided, this is not ordinarily deemed necessary. It is, of course, understood that the shaft 19 and rotors 26—27 between each of the blades 32 are drilled as at 36, and a spring 37 is held under compression in the opening 36 and

constantly urges the blades 32 apart and into contact with the walls of the recess 16—22.

Pins such as 38 are preferably provided within the springs 37 in sliding relation thereto so as to prevent undue bending of the springs 37. These pins are, of course, slightly less than the minimum operative length of the springs so as not to interfere with the proper action of the blades.

The housings 15 and 21 are, of course, each provided with suitable inlets and outlets and preferably with a by-pass between them controlled by a relief valve for the purpose of limiting the maximum amount of pressure which may be built up by the respective pumping devices. This may take the form as illustrated in Fig. 2 in which is shown an inlet port 40 and an outlet port 41 for the recess 16. The inlet port 40 is connected by a threaded opening 42 plugged as at 43 with a passage 44 which communicates with the inlet pipe 45. The outlet port 41 communicates through the passage 46 with the outlet pipe 47 and is also connected through the openings 48 and 49 with the passage 44. The opening 48 is smaller than the opening 49 so as to form a shoulder 50 forming a seat for the ball 51 which is constantly urged against the same by the coil spring 72 held under compression between the ball 51 and the plug 52 for the opening 49. The tension of the spring 72 thus controls the maximum amount of pressure which may be built up by the pump, for as soon as such pressure is reached the ball 51 is lifted, thus permitting the liquid being pumped to pass directly from the discharge 41 around to the inlet port 40. Each of the two pumps is, of course, provided with its own independent system of ports and passages as above described.

It will be noted that the shaft 19 has a relatively long bearing area in the housing 15 and housing extension 17, and also has an extended bearing area in the cap portion 20 and that portion of the housing 21 connecting it to the cap portion 20. These extended bearing surfaces for the shaft 19, each exceeding in length the diameter of either rotor, permit the employment of the shaft 19 for aligning the housings 15 and 21 so that the joint between the housing 15 and cap portion 20 may be made perfectly flat, which thus tends to decrease the cost of production.

The pumping mechanism may be supported in any suitable way, the particular manner illustrated being by securement to a wall such as 55 which may be considered as the wall of a crank case of an internal combustion engine where the pump is employed in connection with the same. It will also be obvious that the extension 17 may be formed as a support for the entire pumping mechanism if desired. The shaft 19 may be driven in any suitable manner, the particular manner shown comprising a gear member 56 se-

cured to its exposed end and which in turn may mesh with a suitable gear formed on the engine cam shaft (not shown) or supported and driven in any other suitable manner.

5 While the construction shown in the drawing has been primarily designed for pumping both the oil and the fuel for an internal combustion engine, it will be apparent that it is capable of separately pumping the same or
10 different types of liquids. Where it is employed for pumping fuel and oil I prefer to employ that pump portion nearest the gear 56 for circulating the lubricating oil and that pump portion most remote from the gear 56
15 for pumping the fuel, as in such an arrangement the pressure of the oil built up in the oil pumping portion is normally superior to the pressure of the fuel built up in the fuel pumping portion so that the oil will be forced
20 along the shaft 19 towards the fuel pumping portion and thus not only lubricate the shaft 19 but also prevent the seepage of fuel into the oil pumping portion where its presence is disadvantageous.

25 Where the device is to be employed for pumping fuel only, it may be modified as illustrated in Fig. 4, in which case the cap portion 20 and housing portion 21 are eliminated, and the cap 24 is secured directly by short
30 screws such as 60 to the housing 15. In such a case the shaft 19 is replaced by a shorter shaft such as 61 and the rotor 27 is employed instead of the rotor 26 in the recess 16. This construction permits either a single or double
35 pump to be built with substantially no change in parts, by simply eliminating some of the parts shown in Fig. 1. Where such single pump is to be employed for pumping fuel
40 only, the shaft 61 is preferably lubricated and sealed against the leakage of fuel to its bearing surfaces by providing passages such as 62, 63 and 64 which are connected to the tube such as 65 connected with the high pressure side of the engine lubricating system.

45 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 claim.

50 What I claim is:

In a device of the type described, in combination, a single piece rotor, a shaft extending through said rotor and non-rotatably secured thereto, said rotor having a pair of
55 diametrically opposed axially disposed grooves in the periphery thereof and diametrically disposed grooves in its end faces connected with said axially disposed grooves, said shaft having a diametrically disposed
60 groove in the end thereof connecting said diametrically disposed grooves in the adjacent end of said rotor, and blades slidably received in said radially disposed grooves, said
65 blades having end extensions received in said diametrically disposed grooves, and one of

said extensions for each of said blades being longer than the other of said extensions and adapted to slidably engage said groove in said shaft while the other extension terminates before intersection with the shaft.

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