Nov. 18, 1930. A. BIZZARRI 1,781,803

OIL PUMP

Filed June 29, 1927 2 Sheets-Sheet 1

Fig. 1

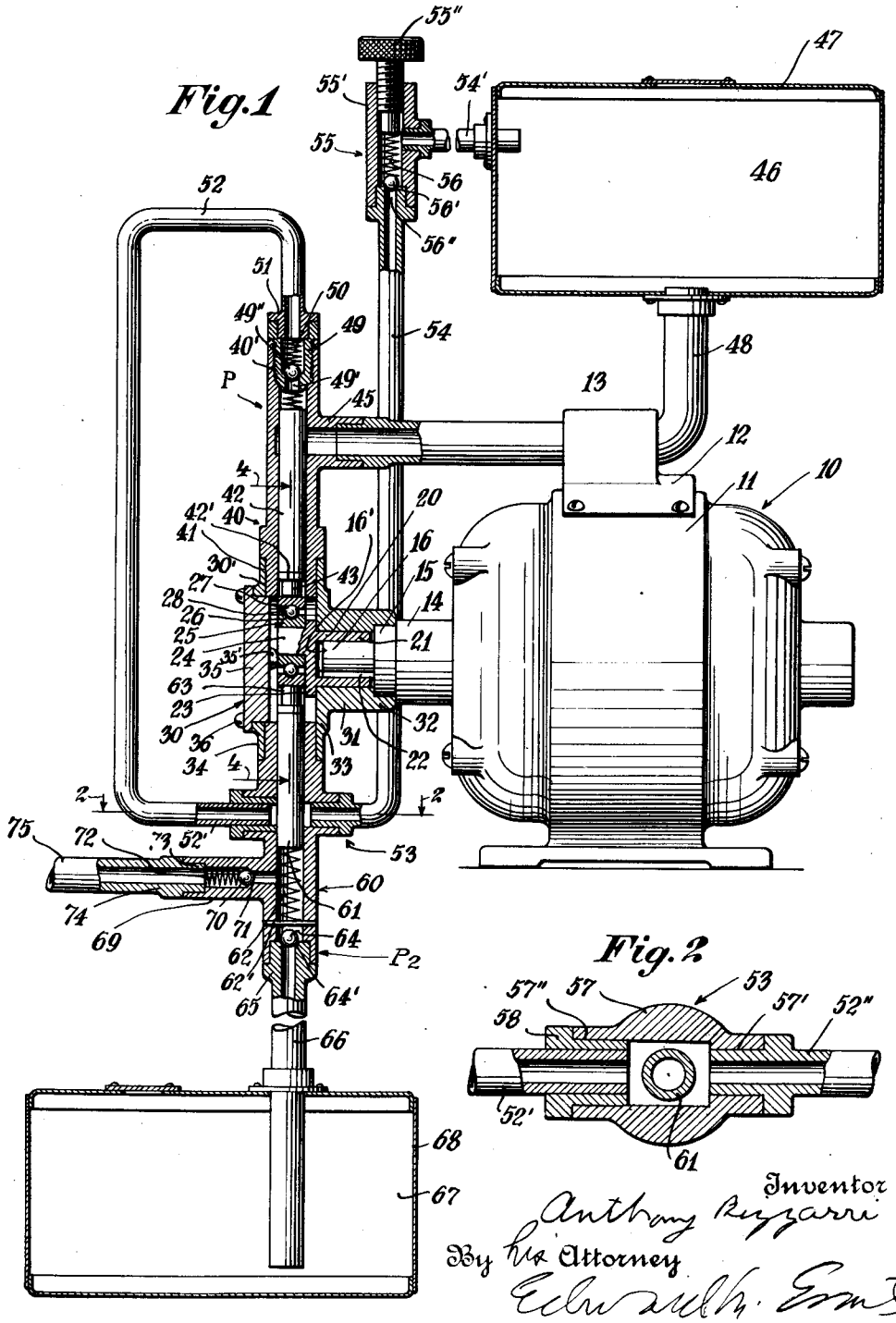


Fig. 2

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OIL PUMP

Filed June 29, 1927 2 Sheets-Sheet 2

Fig. 5

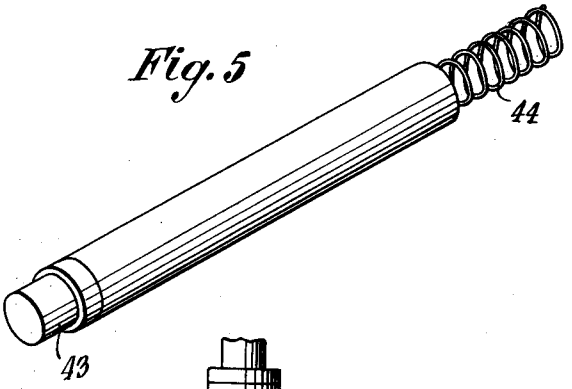


Fig. 4

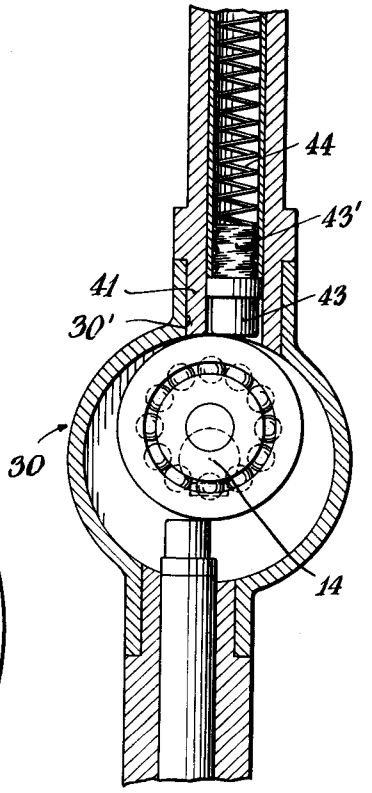
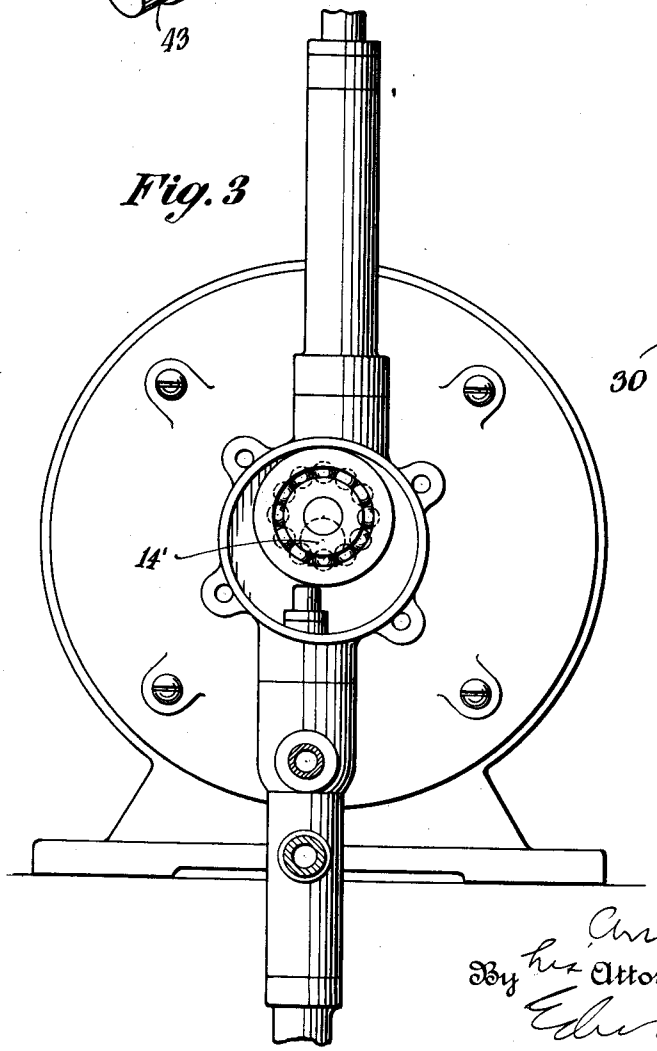


Fig. 3



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Patented Nov. 18, 1930 1,781,803

UNITED STATES PATENT OFFICE

ANTHONY BIZZARRI, OF NEW YORK, N. Y.

OIL PUMP

Application filed June 29, 1927. Serial No. 202,214.

My present invention relates to pumps and pump constructions and aims to devise devices of the general character indicated which are simple in construction, which may be readily fabricated and assembled, which are economical in the use of the power required for their operation, and which are highly efficient in operation. In one of its forms the present invention is adapted to be used with particular success for pumping fuel oil in connection with fuel oil burners, although adapted for all other uses for which pumps are ordinarily employed. In another of its forms, the pump of the present invention is adapted with particular success to be employed for the pumping of non-lubricating liquids at high pressures under such conditions that the non-lubricating liquids are not permitted to impair the operating properties of the pump or to interfere with its efficiency, as would be the case in the pumps of ordinary constructions now employed for pumping non-lubricating liquids.

Other objects and advantages of the devices of the present invention will in part be pointed out in detail hereinafter and will in part be obvious to those skilled in the art to which the present invention relates.

In the accompanying specification I shall describe and in the annexed drawings illustrate an illustrative embodiment of the present invention. It is, however, to be clearly understood that my present invention is not limited to the specific embodiment thereof which is herein shown and described for the purposes of illustration only. It is further to be understood that while said embodiment is described herein as used in connection with the pumping of fuel oil into fuel burners, this is an example merely of one particular type of fluid adapted to be pumped by means of the pumps of the present invention, the invention being equally well adapted for pumping other types of liquids and not being limited to any particular type of liquid whatsoever.

Referring to the drawing wherein I have illustrated the aforesaid illustrative embodiment of the present invention:

Fig. 1 is a more or less diagrammatic view, partly in section and partly in elevation, illustrating the aforesaid illustrative embodiment of the present invention, more particularly as applied to pumping fuel oil for a fuel oil burner;

Fig. 2 is a sectional view on an enlarged scale taken along line 2—2 of Fig. 1 of the drawing;

Fig. 3 is an end view on an enlarged scale, partly broken away, showing more particularly the driving mechanism for the pump elements;

Fig. 4 is a longitudinal sectional view, partly in elevation, and on an enlarged scale, taken along line 4—4 of Fig. 1 of the drawing; and

Fig. 5 is a perspective view showing one of the pump plungers and contained spring.

Referring now to the aforesaid illustrative embodiment of the present invention and more particularly to the drawing illustrating the same, 10 indicates an electric motor or other suitable source of rotary power, the circuit for which may readily be controlled by a hand-operated or other switch not here deemed necessary to be shown. The electric motor 10 has the usual framework 11 and may carry the saddle 12 provided with the housing 13 for a purpose shortly to be described. 14 is the motor bracket having the reduced end portion 15 through which passes the motor shaft 16 having the segmental-circular end portion 16′.

While I may use various means for driving the pump elements of the aforesaid illustrative embodiment of the present invention, I prefer to employ an eccentric 20 having the cup-shaped member 21 provided with the flat key portion 22 and so proportioned and constructed as to be adapted to slip readily

with the necessary loose fit over the end portion 16 of the motor shaft 16′ and to be as readily removable from said end portion. Forming a continuation of the cup-shaped member 21 of the eccentric 20, is the flanged portion 23 and the eccentric pin or boss 24, which latter preferably carries a ball bearing 25 comprising the inner raceway 26, the outer raceway 27, and the ball bearings 28 between the inner and outer raceways 26 and 27, respectively.

30 indicates the eccentric housing preferably comprising the neck portion 31 having the inner portion 32 adapted to fit over the intermediate portion 15 of the motor bracket 14. 33 indicates the inner portion of the eccentric housing 30, 34 indicates the outer portion of such eccentric housing, and 35 indicates a removable head which may be secured in place by the screws 36 or other suitable fastening members. I provide the inner surface of the head 35 with the said adjustment 35′, preferably in the form of a steel ball in a position corresponding to the center of rotation of the shaft 16′, in order to maintain the eccentric in proper operative position.

I provide in addition to means for pumping the fuel oil, for example, to the fuel oil burner, means for effectively lubricating the fuel oil pump and also means for providing a high pressure oil packing box to prevent the pressure of the fuel oil in the pumping system from forcing the fuel oil or other non-lubricating liquid into those parts of the system where such liquid would cause the rapid deterioration of the moving and associated parts of the pumping system.

For this purpose, I prefer to employ in addition to the pump for pumping the fuel oil or other non-lubricating or other liquid, a pump for the forced circulation under high pressure of a lubricating fluid, the path of travel of such lubricating fluid being such as to provide a high pressure, lubricating oil packing for the pump for the fuel oil or other non-lubricating liquid. I prefer also that both of these pumps shall be driven from the same driving element, preferably the ball bearing eccentric already described.

Furthermore, while I have shown but two pump elements embodied in the aforesaid illustrative embodiment of the present invention, a greater number of such pump elements may be employed, as three or more pumps driven by the same driving element for pumping non-lubricating fluids, such as fuel oil, water, and so forth, while the lubricating oil pump may be so arranged and the path of circulation of the lubricating oil may be so disposed as to provide a high pressure, lubricating oil packing for each of the pumps used to pump non-lubricating liquids. In the present embodiment I have, however, shown and described but two such pump elements in the device, one being for lubricating oil and the other for fuel oil or other non-lubricating liquid, and I shall now describe this particular arrangement.

Communicating with the eccentric casing 30 are a plurality, here shown as two, plunger cylinders 40 and 60, the former for the lubricating oil pump and the latter for the fuel oil pump, for example. The cylinder 40 has the lower reduced end portion 41 fitting into the opening 30′ in the eccentric casing 30. Within the cylinder 40 is the plunger 42 into the lower end 42′ of which is sweated or otherwise securely attached the plunger end portion 43 having the inner threaded reduced end portion 43′ which is so threaded in order to permit the attachment thereto of the compression spring 44, the plunger 42 being hollow for this purpose and its upper end being left open.

The plunger 42 is of an external diameter to permit it to fit snugly into the bore of the cylinder 40. 45 is a nipple or connection for permitting the introduction of the lubricating oil 46 from the tank 47 by means of the pipe 48 into the interior of the plunger cylinder 40, the pump being generally designated by reference character P_1. 49 indicates an outlet valve housing having the port 49′ on which is seated the ball 49″ held in place on the seat by means of the spring 50. The housing 49′ is threaded into the upper end 40′ of the plunger cylinder 40.

51 indicates a union or coupling communicating with the upper end 40′ of the plunger cylinder 40 by way of the valve 49, and 52 indicates a circulation pipe for lubricating oil, the portion 52′ of which communicates with the high pressure lubricating oil packing box 53 surrounding the plunger 61 within the plunger casing 60 of the fuel oil pump, here generally designated by reference character P_2. 52″ indicates the outlet from the packing box 53 and 54 indicates the return portion of the circulation pipe for the lubricating oil coming from the lubricating oil tank 47.

54′ indicates the discharge outlet for returning the lubricating oil to the tank 47. 55 indicates a check valve comprising the housing 55′ into the upper end of which is threaded the adjustable nut 55″ by the adjustment of which the pressure which the spring 56 exerts on the ball 56′ controlling the port 56″ may be readily controlled and adjusted, increasing the pressure on the ball valve 56′ increasing the pressure of the oil in circulation, and decreasing the pressure of the spring 56 on the ball valve 56′ diminishing the pressure of the oil in circulation.

The packing box 53 is so arranged as to surround a portion of the plunger 61, as already indicated above. It is in the form of a substantially cylindrical fitting which receives the ends 52′ and 52″ of the portions

of the pipe system 52 and 54 of the oil circulating system. For this purpose the packing box 53 may comprise the substantially cylindrical sleeve 57, one end 57′ of which is so shaped and proportioned as to receive with the necessary tight fit the end 52″ of the pipe 54, while the other end 57″ is so shaped and proportioned as to receive the reducing nipple 58, which in turn receives the end 52′ of the pipe 52.

Referring now to the fuel oil pump P_2 which is provided with the plunger casing 60 and the plunger 61, the plunger 61 is preferably constructed in the same manner as the plunger 42 of the lubricating oil pump P_1 already described and is, in particular, provided with the compression spring 62 which is within the plunger 61, which latter is hollow. The plunger 61 has the inner operative end 63 which bears against the ball bearing 25 carried by the eccentric pin 24, as in the case of the plunger 42 already described.

It will thus be apparent that each of the plungers 42 and 61 is operated from the same driving element at the same speed, each of the plungers travelling in a substantially strictly rectilinear line, thus avoiding the side thrust and consequent frictional and mechanical losses inherent in the crank shaft and crank type of driving means for pistons as hitherto employed in the art. It may here further be stated that the relative displacements of the pumps P_1 and P_2 may be suitably chosen so as to at the same time obtain the desired lubricating and packing effect and the desired speed of delivery of the fuel oil.

The lower end 62′ of the expansion spring 62 bears against the pin marked 64″ which is situated in the valve seat 64′ at the upper end of the connection 65 forming a part of the pipe line 66 communicating at its lower end with the fuel oil 67 contained in the fuel oil tank 68. The valve 64 and the fitting 65 with the pipe 66 constitute the inlet means for fuel oil to the fuel oil pump P_2. The outlet means comprises the fitting 69 containing the ball valve 70 held against the valve seat 71 by means of the compression spring 72, the other end of which is held in position by the end 73 of the fitting 74 forming a part of the outlet pipe 75 leading to the fuel oil burner or the like. It may here be stated that other fluids than fuel oil may be handled in this matter and that the pipe 75 may consequently be used for other means than the fuel oil burner given herein as a specific example.

This completes the description of the aforesaid illustrative embodiment of the present invention. The construction of said embodiment will, it is believed, be clear from the foregoing description. Likewise the manner of assembling said embodiment will, it is believed, be clear from the foregoing description. The operation of the device will be sufficiently clear from the foregoing description but may be briefly summarized as follows:

The motor 10 having been set in operation by the closing of a suitable switch, not here deemed necessary to be shown, which switch may be manually operated or automatically operated, as in thermal or other suitable controlling means, as desired, the operation of the motor causes the rotation of the eccentric carrying the ball bearing 25 against which the plungers 42 and 61 of the pump P_1 and P_2, respectively, bear. The plungers 42 and 61 are kept in operative contact with the ball bearing 25 by means of the springs which said plungers contain.

The operation of the plungers causes the circulation of lubricating oil from the tank 47 through the inlet 45, through the outlet 49′ controlled by the one-way valve 40′, into the pipe 52, through the packing box 53, thence through the pipe 54, through the valve controlled fitting 55 and thus back into the tank 47. It will be noted that the pump P_1 has no induction valve, the plunger acting as a piston valve. I find that with the construction of the pump here illustrated, no induction valve is necessary.

Assuming now that the tension of the spring 56 has been regulated by the adjusting member 55″ to give a certain predetermined pressure of lubricating oil 46 in the system just described, which pressure should be substantially in excess of the pressure in the fuel oil cylinder and associated system, such pressure will be exerted around that portion of the plunger 61 which passes through the packing box 53. The plunger 61 will therefore be properly lubricated in its reciprocating motion in the eccentric housing 34 and in the plunger casing 60.

The result of this arrangement will furthermore be to prevent any fuel oil coming from the tank 67 from being forced by its pressure past the plunger 61 into the moving parts of the pump, including the eccentric 25 and the other plunger 42. That is, the hydraulic pressure created by the oil circulating through the system through the pipe 52 and 54 and the packing box 53, exceeding the pressure exerted by the fuel oil in the plunger casing 60. There will be no tendency of the fuel oil to leak past the packing box 53 and thus get into the working part of the pumps. By this arrangement, I obtain a high pressure packing box which insures the proper lubrication of the various working parts of the different pumps and prevents the fuel oil or other non-lubricating fuel from coming into contact with the other working various parts of the pumps.

As to the pump P_2, fuel oil or other fluid 67 will be fed from the tank 68 through the pipe 66, thence past the induction valve 64

and out past the outlet valve 70 through the outlet pipe 75 leading to the fuel oil burner or other fluid consuming device for the liquid 67 coming from the tank 68.

This completes the description of the aforesaid illustrative embodiment of the present invention and of the manner of constructing, assembling and operating the same. It will be noted that in a simple and compact manner, I have provided high pressure packing means embodying a lubricating fluid for preventing the admission to the working parts of the pump or pumps of fuel oil or other non-lubricating fluid. This I do in a simple manner which provides for proper lubrication of the various moving parts of the pump system. The pumping arrangement is furthermore such that the pistons or plungers of the several pumps may and preferably are operated from a single driving element, preferably in the form of a ball bearing eccentric which operates the pistons in a substantially strictly rectilinear line, thus avoiding the frictional losses and wear due to side thrusts and the like where the usual crank shaft and crank type of mechanical movement for operating the pistons or plungers is employed.

It may here be stated that from Figs. 3 and 4 of the drawing it will be apparent that the axes of the plungers 42 and 61 are not in alignment with the center of rotation of the motor shaft 16', but the axis of each of said plungers is somewhat offset with respect to such center of rotation. I prefer this arrangement since I have discovered that by means of it the efficiency of each of the pump elements is apparently considerably increased and the operation of the pump elements and of the combined pumping system is apparently considerably improved.

The arrangement described above has the further advantages that it is highly efficient mechanically, and provides for the proper distribution of the various fluids in a very efficient and economical manner. The high pressure lubricating oil packing box furthermore provides proper lubrication for the various moving parts of the pumps and prevents the non-lubricating liquid from coming into contact with such moving parts. Other advantages and superiorities of the devices of the present invention will readily occur to those skilled in the art to which the present invention relates.

What I claim as my invention is as follows:

1. In a fluid pumping system, a source of supply of fluid, outlet means communicating with said source of supply of fluid, pumping means communicating with said outlet means and therethrough with said source of supply of fluid, and a discharge conduit communicating with the outlet of said pumping means, in combination with a second source of supply of fluid, outlet means communicating with said second source of supply of fluid, and pumping means including a plunger communicating with said last-mentioned source of supply of fluid, said plunger traversing said conduit so as to be in contact with the fluid passing therethrough, both of said pumping means being eccentrically operated.

2. In a fluid pumping system, a source of supply of lubricating fluid, outlet means communicating with said source of supply of fluid, pumping means communicating with said outlet means and therethrough with said source of supply of fluid, and a discharge conduit communicating with the outlet of said pumping means, in combination with a second source of supply of non-lubricating fluid, outlet means communicating with said second source of supply of fluid, and pumping means including a plunger communicating with said last-mentioned source of supply of fluid, said plunger traversing said conduit so as to be in contact with the lubricating fluid passing therethrough, both of said pumping means being eccentrically operated.

3. In a fluid pressure system, a source of supply of fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a plunger mounted for reciprocation within said plunger casing, and an eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the outlet of said pumping means; a second source of supply of fluid; additional pumping means communicating with said second source of supply of fluid, said additional pumping means comprising an additional plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means interposed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid.

4. In a fluid pressure system, a source of supply of fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a hollow, spring-pressed plunger mounted for reciprocation within said plunger casing, and ball-bearing eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the

outlet of said pumping means; a second source of supply of fluid; additional pumping means communicating with second source of supply of fluid, said additional pumping means comprising an additional hollow, spring-pressed plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means interposed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid.

5. In a fluid pressure system, a source of supply of fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a plunger mounted for reciprocation within said plunger casing, and an eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the outlet of said pumping means; a second source of supply of fluid; additional pumping means communicating with said second source of supply of fluid, said additional pumping means comprising an additional plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means comprising a sleeve interposed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing so as to provide a high pressure fluid packing space about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid.

6. In a fluid pressure system, a source of supply of fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a hollow, spring-pressed plunger mounted for reciprocation within said plunger casing, and ball-bearing eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the outlet of said pumping means; a second source of supply of fluid; additional pumping means communicating with second source of supply of fluid, said additional pumping means comprising an additional hollow, spring-pressed plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means comprising a sleeve interposed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing so as to provide a high pressure fluid packing space about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid.

7. In a fluid pressure system, a source of supply of lubricating fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a plunger mounted for reciprocation within said plunger casing, and an eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the outlet of said pumping means; a second source of supply of non-lubricating fluid; additional pumping means communicating with said second source of supply of fluid, said additional pumping means comprising an additional plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means comprising a sleeve interposed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing so as to provide a high pressure fluid packing space about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid; in combination with means for regulating the pressure of said lubricating fluid.

8. In a fluid pressure system, a source of supply of lubricating fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a plunger mounted for reciprocation within said plunger casing, and an eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the outlet of said pumping means; a second source of supply of nonlubricating fluid; additional pumping means communicating with said second source of supply of fluid, said additional pumping means comprising an additional plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means inter-

posed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid; in combination with means for regulating the pressure of said lubricating fluid.

9. In a fluid pressure system, a source of supply of lubricating fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a hollow, spring-pressed plunger mounted for reciprocation within said plunger casing, and ball-bearing eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the outlet of said pumping means; a second source of supply of non-lubricating fluid; additional pumping means communicating with second source of supply of fluid, said additional pumping means comprising an additional hollow, spring-pressed plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means comprising a sleeve interposed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing so as to provide a high pressure fluid packing space about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid; in combination with means for regulating the pressure of said lubricating fluid.

10. In a fluid pressure system, a source of supply of lubricating fluid; pumping means communicating with said source of supply of fluid, said pumping means comprising a plunger casing, a hollow, spring-pressed plunger mounted for reciprocation within said plunger casing, and ball-bearing eccentric casing communicating with said plunger casing, and an eccentric mounted within said eccentric casing for operating said plunger; a discharge conduit communicating with the outlet of said pumping means; a second source of supply of non-lubricating fluid; additional pumping means communicating with second source of supply of fluid, said additional pumping means comprising an additional hollow, spring-pressed plunger casing communicating with said eccentric casing and an additional plunger within said additional plunger casing adapted to be operated by said eccentric; and means interposed in said discharge conduit and communicating with said discharge conduit and with said additional plunger casing about said additional plunger for providing about said last-mentioned plunger a pressure of said first-mentioned fluid at least equal to the normal pressure of the fluid coming from said second source of supply of fluid; in combination with means for regulating the pressure of said lubricating fluid.

In testimony whereof I have signed my name to this specification this 19th day of May, 1927.

ANTHONY BIZZARRI.