

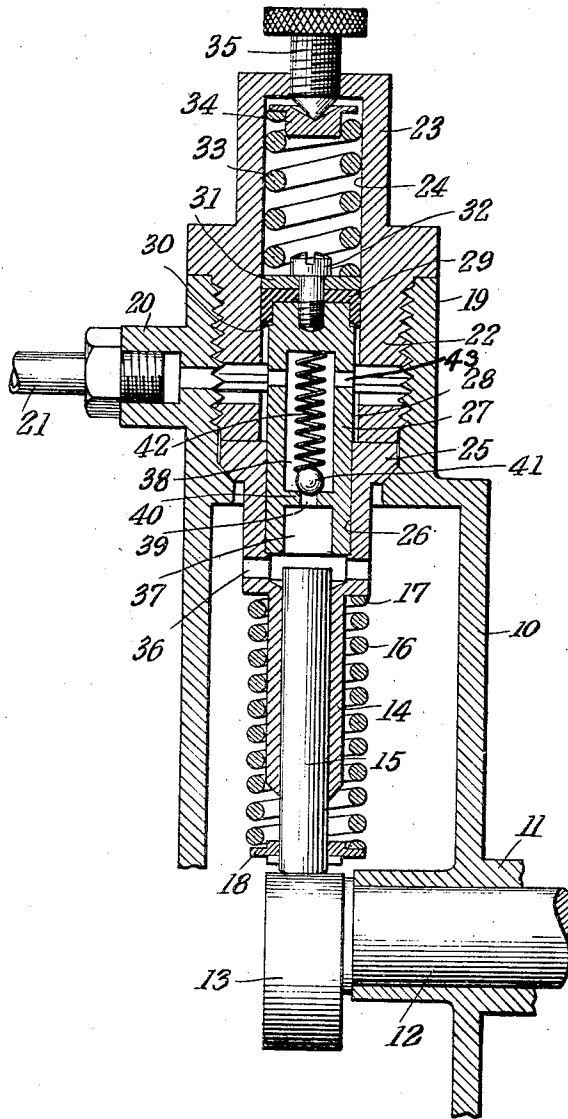
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HYDRAULIC PUMP

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HYDRAULIC PUMP

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My present invention relates to hydraulic pumps and aims to devise devices of the general character specified which are exceedingly simple in construction, very little, if any, more expensive than those existing at present, and which function in such a manner as to afford certain very important practical and theoretical advantages over similar devices existing at the present time.

At the present time, hydraulic pumps are so constructed that should the fluid being pumped meet with an increased pressure at the place where it is being utilized, a head is built up which produces a back pressure in the pump, which brings about one of two disadvantages. In the first place, a terrific strain is brought to bear upon the motor or other source of power being used to drive the pump. The result of this strain is either, in the case of an electric motor, that the fuse in the electrical circuit feeding said motor is blown out, thus interrupting service, or the back pressure is stronger than the power developed by the motor, which causes the motor to cease functioning. If the latter occurs, the pressure in the pump cylinder is likely to be increased to such an extent that the cylinder is itself may crack or become entirely broken. Many other disadvantages exist which it is believed will be obvious to those skilled in the art to which the present invention relates and, therefore, need not be gone into in any further detail in this specification.

However, by means of the present invention I eliminate these disadvantages by providing means whereby, should the fluid being pumped meet with unusual resistance, said resistance becomes compensated for automatically in the pump mechanism itself, so that the R. P. M. of the motor is unaffected in any way whatsoever; that is, it remains constant no matter what conditions the fluid being pumped meets.

In the accompanying specification I shall describe, and in the annexed drawing show, an illustrative embodiment of the hydraulic pumps of the present invention. It is, however, to be clearly understood that I do not wish to be limited to the exact details thereof herein shown and described for purposes of illustration only.

In the accompanying drawing, the single figure is a longitudinal sectional view taken substantially through the center of the aforesaid illustrative embodiment of the present invention.

Referring now more in detail to the aforesaid illustrative embodiment of the hydraulic pumps of the present invention, and with particular reference to the drawing illustrating the same, the numeral 10 generally designates a reservoir for storing oil or any other fluid which it is desired to pump. The reservoir 10 is provided with a bearing 11 in which is journaled the shaft 12 of an electric motor (not shown) on

the end of which, within the reservoir, there may be fixed an eccentric cam 13. Secured within the reservoir 10 is a pump cylinder 14 in which there is adapted to reciprocate a plunger 15, the lower end of which is maintained in constant contact with the eccentric 13 by means of an expansion spring 16, the upper end of which abuts a shoulder 17 formed on the cylinder 14, and the lower end of which engages a spring retainer 18 fixed adjacent the lower end of the plunger.

Integrally formed with the reservoir 10 is a threaded upper portion 19 provided with a nipple 20 with which there may be connected any desired type of outlet hose or pipe 21 and threadedly engaged within the upper portion 19 of the reservoir 10 is a sleeve portion 22 of a cap 23, the sleeve and cap being provided with a central bore 24.

The upper portion 25 of the pump cylinder 14 is provided with a bore 26 of lesser diameter than the bore 24 of the combined cap and sleeve 23-22 and snugly fitting the bore 26 of the upper portion 25 of the pump cylinder 14 is a pressure-reducing member 27, the upper end of this member extending into the bore 24 and, being of lesser diameter than said bore, presenting a space 28, the purpose of which will later be described.

Fixed upon the upper end of the member 27 is a self-sealing cup 29, the lower edge 30 of which acts as a piston, which will also later be described, the cup snugly fitting the bore 24 and being retained in place by a washer 31, in turn held in place by the screw 32 anchored in the member 27. The member 27 is normally retained in its lowermost position, shown in the drawing, by means of an expansion spring 33, the lower end of which abuts the upper surface of the washer 31 and the upper end of which abuts a spring retainer 34 engageable with a set screw 35, the purpose of which will likewise later be described.

The upper portion 25 of the cylinder 14 is provided with the inlet ports 36 and the pressure-reducing member 27 is provided with the chamber 37 communicating with another chamber 38 by means of the port 39 formed in the wall 40 separating the two chambers. The port 39 is normally closed by the ball valve 41 actuated by the expansion spring 42 and the chamber 38 is provided with an outlet port 43 which communicates with the space 28 which, in turn, communicates with the outlet nipple 20 of the upper portion 19 of the reservoir 10.

This completes the description of the aforesaid illustrative embodiment of the hydraulic pumps of the present invention and, while the mode of operation and use thereof is believed to be apparent from the foregoing description,

the same may be briefly summarized as follows:

To begin with, the reservoir 10 is filled with oil or any other fluid which it is desired to pump through the hose 21 or other conveying means to the place where it is to be used. The motor (as above stated, not here shown) has, of course, a definite and constant R.P.M. It will be assumed that the R.P.M. of the motor and the size of the bore and stroke of the pump is such that the fluid delivered out of the device has a pressure of five hundred pounds. It will further be assumed that the motor is of such strength that it will be unaffected, even by increased pressures, up to, let us say, one thousand pounds. This being so, the adjusting screw 35 is manipulated in such a way that the spring 33 will only be overcome should the resistance with which the fluid being pumped meets exceed one thousand pounds. This having been done, the pump is ready for use.

Upon completing the electrical circuit through the motor, the same will be operated to rotate the cam 13 and thus reciprocate the pump plunger 15. The oil or other fluid stored in the reservoir 10 will pass through the inlet port 36 and be forced by the plunger through the chamber 37, port 39, past the valve 41, through the chamber 38, port 43 and into the space 28, from where it will continue through the outlet nipple 20 and hose or other conveying means 21. Should the oil or other fluid meet with an increased resistance, obviously a head will be built up which will cause a back pressure in the space 28. This back pressure will act upon the lower edge 30 of the cup 29 which, as above stated, acts as a piston, and will force the same upwardly against the action of the expansion spring 33. This action will raise the pressure-reducing member 27 so as to move the chamber 27 further away from the plunger 15. The result will be a decreased displacement within the chamber 37 so that while the pressure against the cup 29 may be over one thousand pounds, the pressure against which the plunger operates will remain as it was before, to wit, five hundred pounds, or thereabouts. The result will be that the R.P.M. of the motor will be unaffected and will remain constant. As soon as the pressure with which the fluid being pumped meets is reduced to normal, the spring 33 will force the pressure-reducing member 27 to its normal position, thus increasing the displacement in the chamber 37 and permitting the pump to function in a normal condition, as before described.

This completes the description of the mode of operation and use of the aforesaid illustrative embodiment of the hydraulic pumps of the present invention. It will be noted from such description that such pumps are simple in construction, easy and economical to fabricate and assemble, and admirably adapted to perform the functions heretofore outlined. Other superiorities and advantages 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:

1. A pump comprising a casing having an inlet port, an outlet port and a bore connecting said ports, said bore having an enlarged portion adjacent one end, a hollow cylinder slidably mounted in the smaller portion of the bore and carry-

ing a piston member which is slidable in the enlarged portion of the bore, said cylinder having an inlet and outlet adapted to communicate with the casing inlet and outlet respectively, a pump piston having a fixed stroke operable in the cylinder and adapted to control the cylinder inlet, resilient means normally operative to move the cylinder towards the pump piston, a stop to limit such movement of the cylinder, and means for admitting fluid under pressure from the cylinder and casing outlet ports to said piston member, whereby excessive pump pressure acting on said piston member will move said cylinder away from the pump piston to reduce the effective stroke of the latter.

2. A pump comprising a casing having inlet and outlet ports and a stepped bore connecting said inlet and outlet ports, said stepped bore having a reduced portion, an intermediate portion and an enlarged portion, a plunger having a fixed stroke operable within the reduced portion of said stepped bore, a cylinder slidable in the intermediate portion of said stepped bore and being normally urged toward said plunger, said cylinder having an outlet port communicating with said casing outlet port, an inlet port communicating with said casing inlet port and a bore of the same diameter as the reduced portion of said stepped bore, said plunger controlling the opening and closing of said cylinder inlet port and said cylinder bore being cooperable with the same to determine the effective stroke of said plunger, the enlarged portion of said stepped bore communicating with said casing and cylinder outlet ports, and, a piston carried by said cylinder and operable within the enlarged portion of said stepped bore so that excessive pressure of fluid entering the enlarged portion of said stepped bore from said casing or cylinder outlet ports acts upon said piston to move said cylinder away from said plunger to decrease the effective stroke of the latter.

3. A pump comprising a casing having inlet and outlet ports and a stepped bore connecting said inlet and outlet ports, said stepped bore having a reduced portion, an intermediate portion and an enlarged portion, a plunger having a fixed stroke operable within the reduced portion of said stepped bore, a cylinder slidable in the intermediate portion of said stepped bore and being normally urged toward said plunger, said cylinder having an outlet port communicating with said casing outlet port, an inlet port communicating with said casing inlet port and a bore of the same diameter as the reduced portion of said stepped bore, said plunger controlling the opening and closing of said cylinder inlet port and said cylinder bore being cooperable with the same to determine the effective stroke of said plunger, the enlarged portion of said stepped bore communicating with said casing and cylinder outlet ports, a piston carried by said cylinder and operable within the enlarged portion of said stepped bore so that excessive pressure of fluid entering the enlarged portion of said stepped bore from the said casing or cylinder outlet ports acts upon said piston to move said cylinder away from said plunger to decrease the effective stroke of the latter, and means, cooperable with said piston to predetermine the pressure at which the effective stroke of the plunger will be varied.

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