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PORTABLE HYDRAULIC JACK WITH SWIVELLING OIL RESERVOIR

Filed Dec. 7, 1965

2 Sheets-Sheet 1

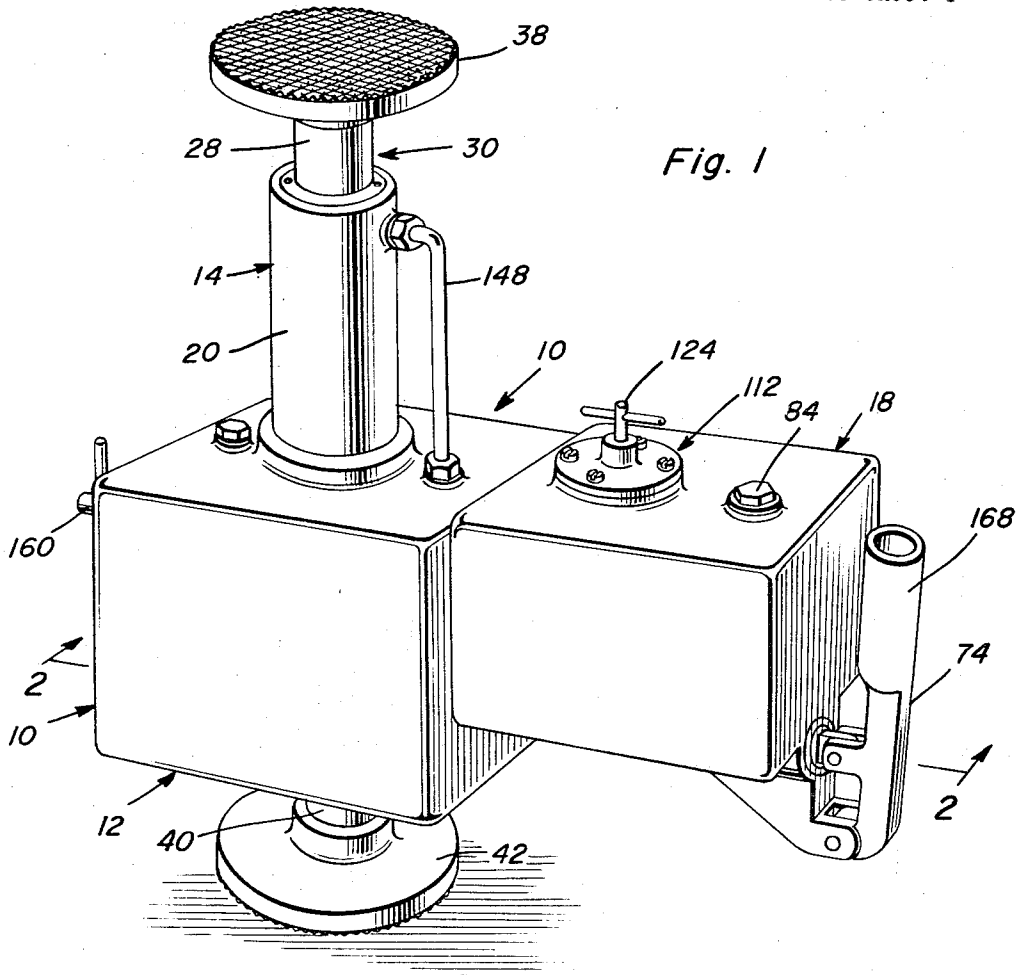


Fig. 1

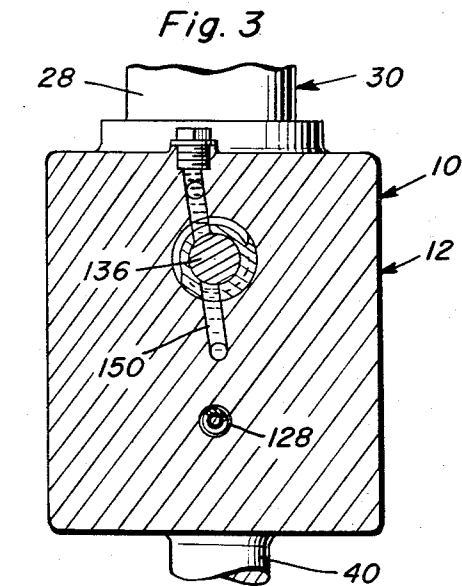


Fig. 3

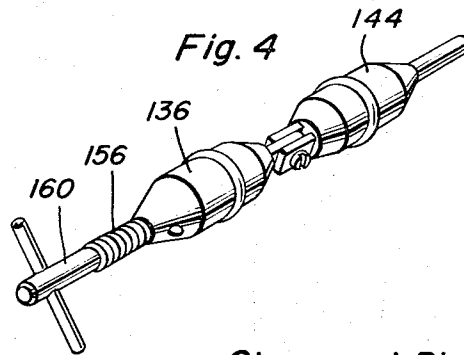


Fig. 4

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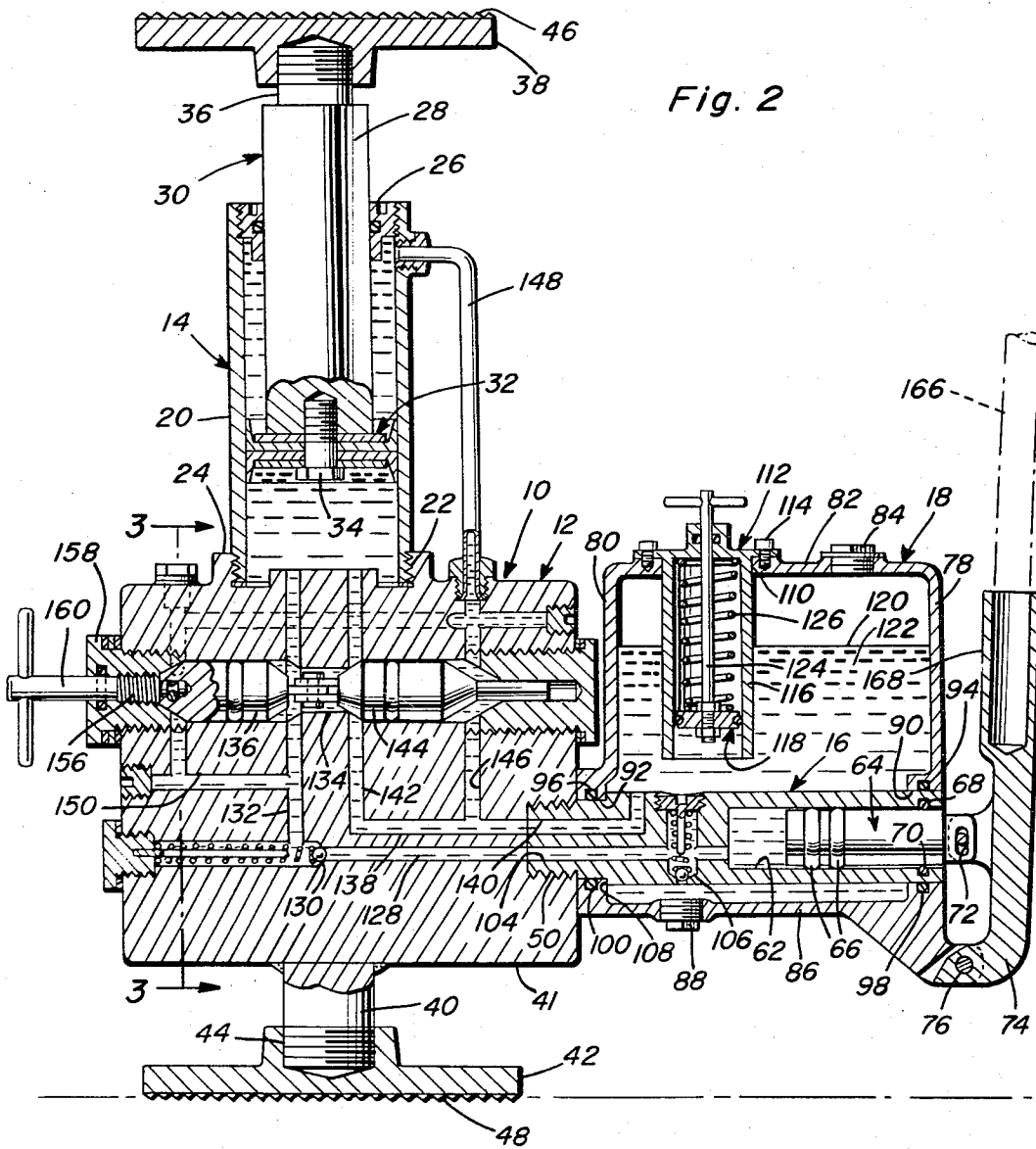


Fig. 2

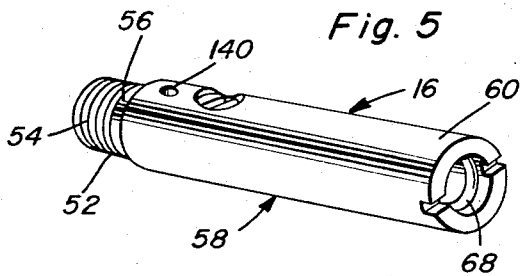


Fig. 5

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**PORTABLE HYDRAULIC JACK WITH  
 SWIVELLING OIL RESERVOIR**  
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**ABSTRACT OF THE DISCLOSURE**

A fluid pump assembly provided with a shank portion, a fluid inlet and a fluid outlet opening through the shank portion with a fluid reservoir journaled on the shank portion independent of axial displacement relative thereto and fully encircling and enclosing at least one section of the shank portion through which the fluid inlet opens, the shank portion including a second section thereof disposed outwardly of the interior of said reservoir and through which the outlet for the fluid pump assembly opens.

This invention relates to a novel and useful double acting hydraulic jack and more specifically to a double acting hydraulic jack provided with a fluid pump and reservoir assembly for actuating the jack and which reservoir is swivelly supported from the jack in a manner such that the reservoir may be maintained substantially upright at all times even though the double acting jack is inverted in position.

The portable hydraulic jack of the instant invention is designed to be used as an apparatus to apply a lifting or pushing force on an object with which it is operatively associated and to also apply a pulling force on an object with which it is operatively associated. The hydraulic jack includes a pump assembly having a shank portion through which the fluid outlet of the pump assembly extends and a fluid reservoir for the jack is provided and swivelly mounted on the shank portion with the fluid inlet for the pump enclosed within and thereby in constant communication with the interior of the fluid reservoir. In this manner, the fluid reservoir of the instant invention may be maintained in an upright position while the jack and associated fluid pump associated therefrom may be rotated to any position about the longitudinal axis of the shank portion of the pump assembly relative to the fluid reservoir.

The main object of this invention is to provide a hydraulic jack assembly of the double acting type and including a fluid pump structure and reservoir for supplying fluid to the jack pump structure and with the reservoir rotatably supported from the integral unit comprising the double acting shank and the pump assembly therefore in such a manner that the unit may be adjustably rotatably positioned in an infinite number of positions of rotation relative to the reservoir for containing the fluid to be supplied to the pump assembly of the jack structure.

Another important object of this invention is to provide a jack assembly in accordance with the preceding object and which is of the double acting type and includes novel valve means operative to selectively cause the pump assembly to extend and collapse the extendable jack portion of the apparatus.

Yet another object of this invention is to provide a portable hydraulic jack assembly or apparatus in accordance with the preceding objects which is constructed in a manner whereby it may be readily overhauled and have unitary components thereof readily replaced when necessary.

A final object of this invention to be specifically enumerated herein is to provide a portable hydraulic jack

assembly which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of the portable hydraulic jack assembly of the instant invention;

FIGURE 2 is an enlarged longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 2—2 of FIGURE 1;

FIGURE 3 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 3—3 of FIGURE 2;

FIGURE 4 is a perspective view of the movable valve actuating portion of the jack assembly; and

FIGURE 5 is a perspective view of the pump body of the jack assembly from which the fluid reservoir of the assembly is rotatably journaled.

Referring now more specifically to the drawings the numeral 10 generally designates the hydraulic jack assembly of the instant invention. The assembly 10 includes a valve body generally referred to by the reference numeral 12, a cylinder assembly generally referred to by the reference numeral 14, a pump assembly generally referred to by the reference numeral 16, and a hydraulic fluid reservoir assembly generally referred to by the reference numeral 18.

The cylinder assembly 14 includes an elongated cylinder member 20 which is externally threaded on one end as at 22 and threadedly secured in an internally threaded neck portion 24 formed on the valve body 12. A seal assembly 26 is threadedly secured in the end of the cylinder member 20 remote from the neck portion 24 and a piston rod portion 28 of a piston member generally referred to by the reference numeral 30 is slidably received through the seal assembly 26 in fluid tight sealing engagement therewith. The end of the piston rod portion 28 adjacent the neck portion 24 and disposed within the cylinder member 20 has a piston assembly generally referred to by the reference numeral 32 removably secured thereto by means of a threaded fastener 34 and it will be noted that the piston assembly 32 is diametrically enlarged as compared to the piston rod portion 28. The end of the piston rod portion 28 remote from the piston assembly 32 is disposed outwardly of the seal assembly 26 and includes an externally threaded diametrically reduced terminal end portion 36 on which a force plate or head 38 is threadedly secured.

A support shank portion 40 is secured to and projects downwardly from the undersurface 41 of the valve body 12 and has a second force plate or head 42 removably threadedly secured to its lower end portion as at 44. The remote surfaces of the force plates or heads 38 and 42 are roughened as at 46 and 48 and are adapted to engage confronting surfaces between which the jack assembly 10 is disposed.

The valve body 12 includes a threaded bore 50 and the pump assembly 16 includes a shank portion 52 whose free end is externally threaded as at 54 and which is threadedly secured in the bore 50. The shank portion 52 also includes a base end 56 which is smooth and cylindrical and which projects outwardly from one end of the cylinder assembly generally referred to by the reference numeral 58 of the pump assembly 16.

The cylindrical assembly is also smooth and substantially cylindrical in configuration as at 60 on its end re-

remote from the shank portion 52 and provided with a pump bore 62 opening outwardly of the end of the cylinder assembly 58 remote from the shank portion 52.

A piston assembly generally referred to by the reference numeral 64 is slidably disposed in the bore 62 and includes a pair of resilient sealing cups 66. In addition, the outer end of the bore 62 is provided with a circumferential inwardly opening groove 68 in which a resilient O-ring seal 70 is disposed for sealing engagement with the piston assembly 64. One end of the piston assembly 64 projects outwardly of the bore 62 and is transversely slotted as at 72 and an actuating lever 74 has one end portion thereof pivotally secured to the reservoir assembly 18 as at 76 and is operatively connected to the piston assembly 64 for reciprocation of the latter in response to oscillation of the lever 74.

The reservoir assembly 18 includes a pair of opposite side walls 78 and 80 and a top wall 82 enclosing the upper end of the reservoir assembly 18 and having a removable threaded filler plug 84 supported therefrom. The bottom wall 86 of the reservoir assembly 18 is provided with a threaded drain plug 88 and the opposite side walls 78 and 80 have aligned bores 90 and 92, respectively, formed therein which rotatably receive the end of the cylinder assembly 58 remote from the valve body 12 and the base end 56 of the shank portion 52. In addition, the bores 90 and 92 are provided with inwardly opening circumferentially extending grooves 94 and 96 in which suitable O-ring seals 98 and 100 are disposed for forming a fluid tight seal between the side walls 78 and 80 on the opposite ends of the cylinder assembly 58.

The shank portion 52 of the cylinder assembly 58 includes a longitudinal fluid outlet passage 104 which opens into the bore 62 at its inner end and a check valved fluid inlet passage 106 is also formed in the cylinder assembly 58 and communicates the fluid outlet passage 104 with the interior of the reservoir assembly 18 adjacent the bottom thereof. Further, it will be noted that the shank portion 52 is diametrically reduced in diameter relative to the adjacent end of the cylinder assembly 58 and therefore that the reservoir assembly 18 is maintained in position against movement axially thereof by means of the portions of the side wall 80 defining the bore 92 being disposed between the adjacent side of the valve body 12 and the shoulder 108 on the cylinder assembly 58 defining the inner end of the shank portion 52.

The top wall 82 of the reservoir assembly 18 has an opening 110 formed therein in which the upper end of an accumulator assembly generally referred to by the reference numeral 112 is secured by means of suitable fasteners 114. The assembly 112 includes a depending sleeve portion 116 disposed within the reservoir assembly 18 and in which a piston assembly generally referred to by the reference numeral 118 is slidably disposed. The lower end of the sleeve portion 116 projects downwardly below the level 120 of fluid 122 in the reservoir assembly 18 and the lower end of a piston rod 124 slidable through the upper closed end of the accumulator assembly 112 is secured to the piston assembly 118, a compression spring 126 being disposed about the piston rod 124 and between the piston assembly 118 and the upper closed end of the sleeve portion 116.

The valve body 12 has a fluid inlet passage 128 formed therein including one end which opens into the bore 50 in registry with the end of the fluid outlet passage 104 opening outwardly of the shank portion 52. The other end of the fluid inlet passage 128 is check valved as at 130 and communicated with one end of a supply passage 132 whose other end opens into the lower end of the cylinder member 20. The supply passage 132 opens into a valve chamber bore 134 intermediate its opposite ends and may be closed by one end of a first valve member 136 axially slidable in the valve chamber bore 134.

In addition, the valve body 12 also has a fluid outlet passage 138 formed therein also provided with one end

portion which opens into the bore 50 and in registry with a return passage 140 formed in the shank portion 52 and opening into the interior of the reservoir assembly 18 at its end remote from the outlet passage 138. The end of the fluid outlet passage 138 remote from the bore 50 opens into one end of a return passage 142 also formed in the body 12 and which has its other end communicated with the interior of the cylinder member 20. The return passage 142 also opens into the valve chamber bore 134 intermediate its opposite ends and may be closed by a first end portion of a second valve member 144 also reciprocal in the valve chamber bore 134 and connected to the first valve member 136 for movement rearward axially of the valve chamber bore 134.

A second return passage 146 is also formed in the valve body 12 and has one end communicated with the fluid outlet passage 138 intermediate the return passages 140 and 142 and a second end communicated with the interior of the upper end of the fluid member 20 disposed above the piston assembly 132 by means of a supply and return conduit 148. The return passage 146 also opens into the valve chamber bore 134 and may be closed by means of a second end portion of the second valve member 144.

Finally, a second supply passage 150 is formed in the valve body 12 and is communicated at one end with the supply passage 132 intermediate the fluid inlet passage 128 and the valve chamber bore 134. The other end of the supply passage 148 is communicated with the return passage 146 intermediate the valve chamber bore 134 and the supply and return conduit 148. Further, the supply passage 150, intermediate its opposite ends, also opens into the valve chamber bore 134 and may be closed by the second end portion of the first valve member 136.

As previously stated, the first and second valve members 136 and 144 are interconnected for simultaneous reciprocation in the valve chamber bore 134 and the second end of the first valve member 136 has pinned thereto one end of a screw shaft 156 threadedly engaged in a fitting 158 secured to the valve body 12. The screw shaft 156 includes an extension handle portion 160 disposed outwardly of the valve body 12 and the fitting 158 and which may be manually actuated to effect rotation of the screw shaft 156 and thereby axial displacement of the valve members 136 and 144 between the first limit position closing the supply passage 150 and the return passage 142 illustrated in FIGURE 2 of the drawings and a position shifted to the right as viewed in FIGURE 2 of the drawings closing the supply passage 132 and the return passage 146.

In operation, the jack assembly 10 may be positioned with the reservoir assembly 18 in the upright position illustrated in FIGURE 2 of the drawings and with an extension handle 166 telescoped into the sleeve end portion 168 of the actuating lever 74. Then, the body assembly 12 and the cylinder assembly 14 supported therefrom may be adjustably rotated to any desired position relative to the reservoir assembly 18. Thereafter, if it is desired to extend the piston rod portion 28, the handle portion 160 is manipulated to position the first and second valve members 136 and 144 in the positions thereof illustrated in FIGURE 2 of the drawings. Thereafter, the extension handle 166 may be manipulated to effect reciprocation of the piston assembly 64, during which reciprocation fluid from within the reservoir 18 will be drawn into the fluid inlet passage 28 and the bore 62 through the check valve passage 106 on the outward stroke of the piston assembly 64 and will thereafter be pumped from the bore 62 and through the fluid inlet passage 128 into the supply passage 132 and the lower end of the cylinder member 20 upon inward movement of the piston assembly 64. This of course will cause the piston assembly 32 to be raised from the position illustrated in FIGURE 2 of the drawings and the piston rod portion 28 to be extended.

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As a portion of the fluid 122 within the reservoir assembly 18 is pumped into the cylinder member 20, there will be a tendency for a partial vacuum to be created within the reservoir assembly 18 above the level 120. However, the accumulator assembly 112 will prevent this build up of the vacuum inasmuch as the slight spring pressure of the spring 126 on piston assembly 118 upon a reduction of the air pressure within the reservoir assembly 118 above the fluid 122, will urge piston 118 downwardly so as to displace an approximate equal quantity of fluid from within the sleeve portion 116 into the remainder of the reservoir assembly 18. By preventing a build up of a vacuum above the fluid 122 in the reservoir assembly 18, the tendency for air to be drawn into the reservoir assembly 18 past the O-ring seals 98 and 100 will be substantially reduced.

If it is then desired to retract the piston rod portion 28, the handle portion 160 may be actuated to axially shift the valve members 136 and 144 to the right as viewed in FIGURE 2 of the drawings whereupon communication will be established between the interior of the lower end of the sleeve member 20 below the piston assembly 32 and the return passage 140 enabling the fluid 122 trapped in the lower end of the cylinder member 22 to be returned to the interior of the reservoir assembly 18.

Of course, during the extension of the piston rod portion 28, inasmuch as the valve member 144 was positioned as viewed in FIGURE 2 of the drawings, communication between the interior of the cylinder member 20 above the piston assembly 32 and the return passage 40 is provided by means of the supply return conduit 148 and the return passage 146. Therefore, during extension of the piston rod portion 28, the fluid 122 in the upper portion of the cylinder member 20 above the piston assembly 32 is free to return to the interior of the reservoir assembly 18.

If it is desired to utilize the jack assembly 10 to effect a pulling force, the force plate or head 42 may be suitably anchored and the force plate or head 38 may be suitably attached to the member which is to be pulled. Then, the handle portion 160 may be manipulated to shift the valve members 136 and 144 to the extreme right positions thereof closing the supply passage 132 and the return passage 146. Thereafter, with the interior of the lower end of the cylinder member 20 disposed below the piston assembly 32 in communication with the return passage 140, the extension handle 166 may again be actuated to cause reciprocation of the piston assembly 64 and fluid 122 to be pumped into the upper end portion of the cylinder member 20 disposed above the piston assembly 32 by way of the fluid outlet passage 104, the fluid inlet passage 128, and the adjacent end of the supply passage 132, the supply passage 150, and the supply and return conduit 148.

Although it has been previously stated herein that the reservoir assembly 18 should be maintained in the upright position illustrated in FIGURE 2 of the drawings, it may be readily appreciated from FIGURE 2 that the reservoir assembly 18 may be all but completely inverted before the fluid 122 within the reservoir assembly 18 is disposed so as to uncover the passage or transverse bore 106 defining the inlet for fluid into the pumping bore 162 of the pump assembly 16.

It may be readily appreciated that additional seals may be utilized in the construction of the jack assembly 10 and also that the valve body 12 may have additional passages or passage extensions formed therein opening outwardly of the valve body 12 but provided with suitable removable closure plugs to facilitate in the manufacture and maintenance of the valve body 12.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and de-

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scribed, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A fluid pump assembly including a shank portion, a fluid inlet, and a fluid outlet opening outwardly through said shank portion, a fluid reservoir journaled on said shank portion independent of relative axial displacement and fully encircling and enclosing at least one section of said shank portion, said inlet opening outwardly of said one section into the interior of said reservoir and being in constant communication therewith, and said shank portion including a second section thereof disposed outwardly of the interior of said reservoir and through which said outlet opens.

2. A fluid pump assembly including a shank portion, a fluid inlet, and a fluid outlet opening outwardly through said shank portion, a fluid reservoir journaled on said shank portion, said inlet opening into the interior of said reservoir and being in constant communication therewith, said fluid pump assembly including axially spaced and aligned shank portions, said fluid inlet opening outwardly of said assembly intermediate said shank portions, said outlet being defined by passage means extending longitudinally of and through one of said shank portions, said reservoir defining a chamber formed in part by a pair of spaced wall portions having axially aligned bores formed therein, said shank portions being rotatably received in said bores.

3. The combination of claim 2 wherein said pump assembly includes a pump bore communicated with said outlet and said inlet, a piston reciprocal in said bore, said bore opening outwardly of the end of the other shank portion remote from the first shank portion.

4. The combination of claim 1 wherein said fluid reservoir means defines a chamber, diaphragm means disposed in said chamber including at least one movable portion and dividing said chamber into two sections sealed from each other, one of said sections being in communication with the interior of said reservoir and the other of said sections having at least limited communication with the exterior of said reservoir.

5. A fluid motor assembly comprising a cylinder assembly defining a bore opening outwardly of one end of said cylinder assembly, a piston assembly snugly and slidably disposed in said bore and including a piston rod portion projecting outwardly of said one end of said cylinder assembly, seal means carried by said one end of said cylinder assembly and forming a fluid tight sliding seal between said rod portion and said cylinder member, a fluid pump assembly including an inlet and an outlet, a fluid reservoir with said inlet communicated with and opening into the interior of said reservoir, means supporting said pump assembly from said cylinder assembly, said pump assembly also including a return passage with one end thereof communicated with the interior of said reservoir, said means including passage and valve means operative to selectively inversely communicate the first and second portions of said bore, disposed on opposite sides of said piston assembly, with said outlet and said return passage, said valve means including a single reciprocal valve member assembly operable, upon its movement between first and second positions thereof, to cause extension and retraction of said rod portion during operation of said pump assembly.

6. A fluid motor assembly comprising a cylinder assembly defining a bore, a piston assembly snugly and slidably disposed in said bore, a fluid pump assembly including an inlet and an outlet, a fluid reservoir journaled on said pump assembly with said inlet in constant communication with and opening into the interior of said reservoir, and means supporting said pump assembly from said cylinder assembly with said outlet communicated with one end of said bore, said fluid pump assembly including axially spaced and aligned shank portions, said fluid inlet

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opening outwardly of said assembly intermediate said shank portions, said outlet being defined by passage means extending longitudinally of and through one of said shank portions, said reservoir defining a chamber formed in part by a pair of spaced wall portions having axially aligned bores formed therein, said shank portions being rotatably received in said bores.

7. The combination of claim 6 wherein said pump assembly includes a pump bore communicated with said outlet and said inlet, a piston reciprocal in said bore, said bore opening outwardly of the end of the other shank portion remote from the first shank portion.

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