Feb. 23, 1954

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2,669,933

HYDRAULIC PUMP

Filed March 17, 1948

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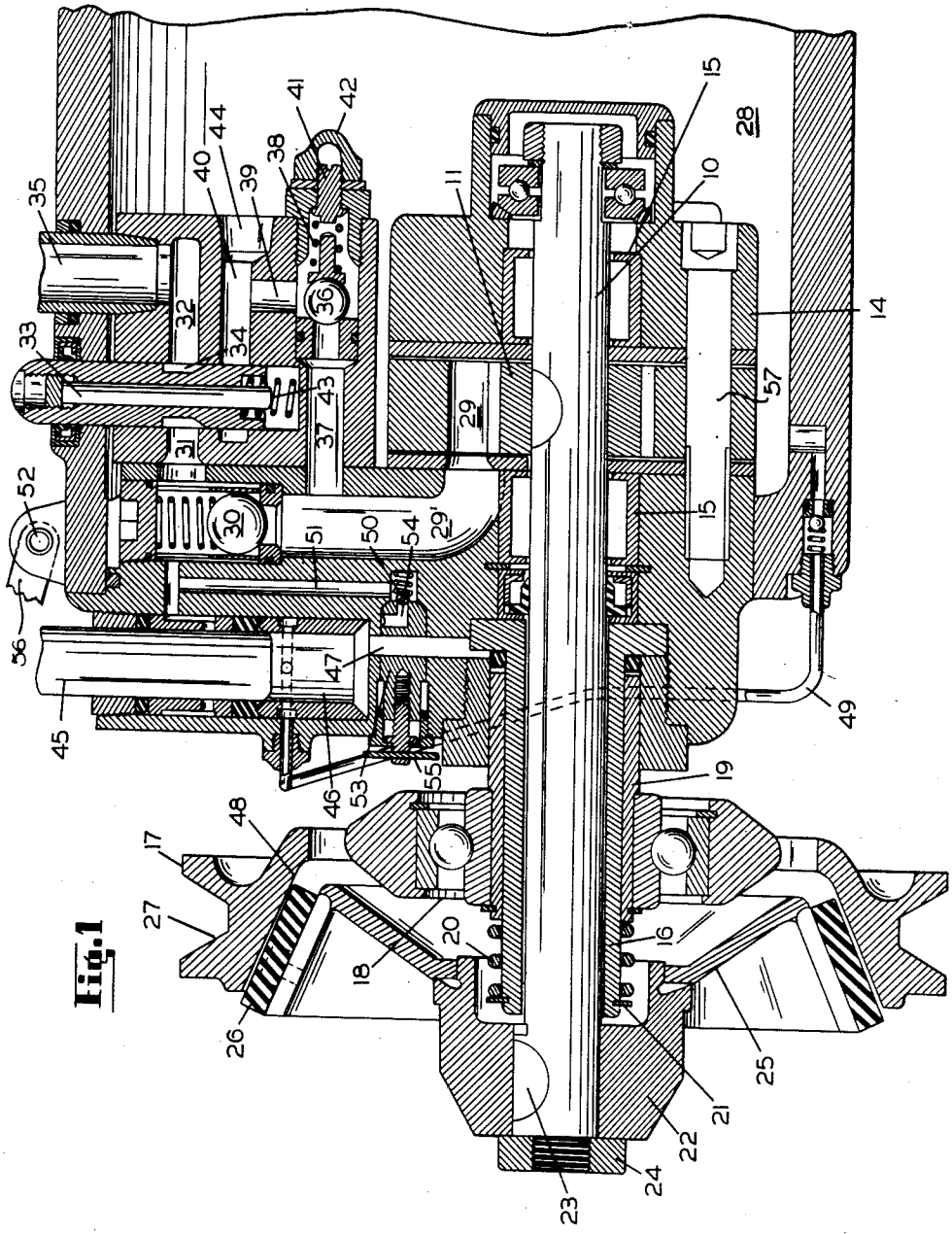


Fig. 1

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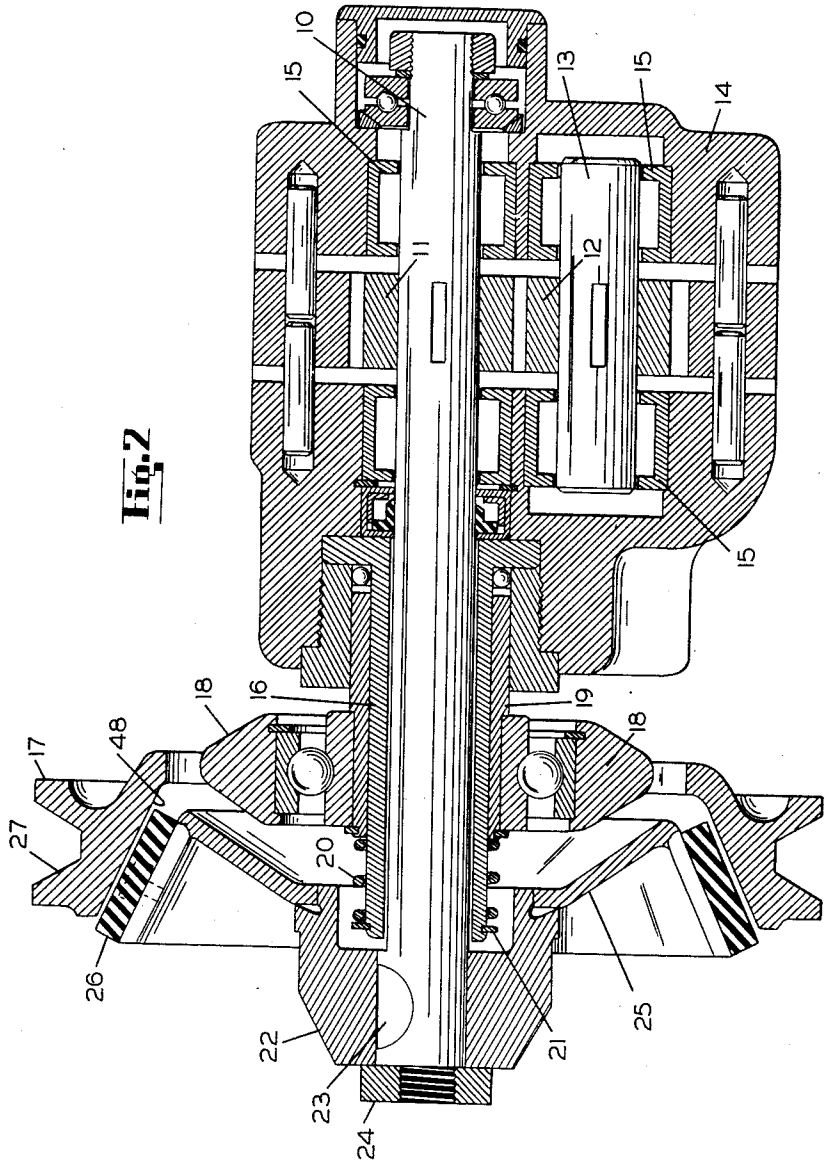
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Fig. 2



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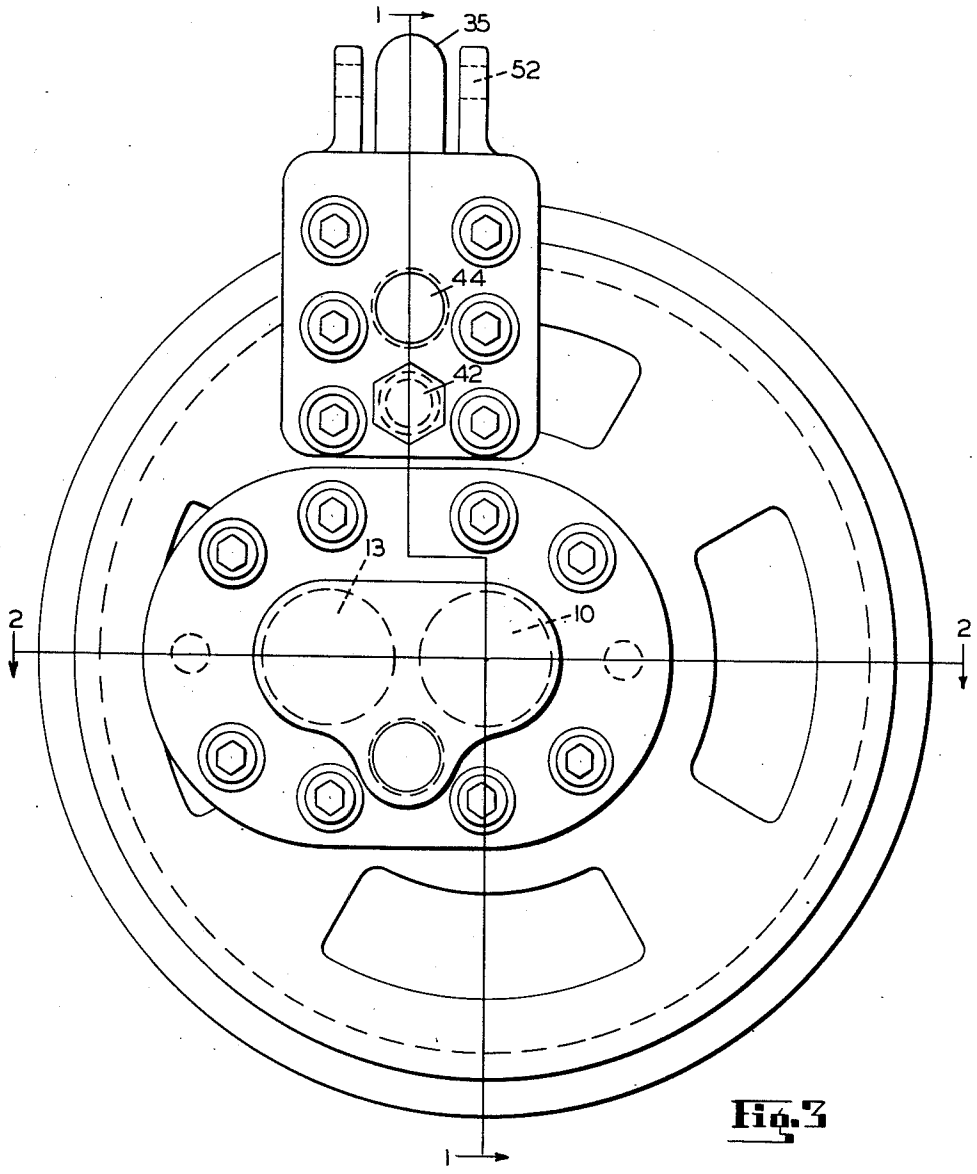


Fig. 3

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HYDRAULIC PUMP

Fred R. Bayles, Waukesha, Wis., assignor, by mesne assignments, to Gar Wood Industries, Incorporated, a corporation of Michigan

Application March 17, 1948, Serial No. 15,349

9 Claims. (Cl. 103—23)

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My invention relates to hydraulic pumps and more particularly to a type of pump that is adaptable and applicable to dump trucks or the like.

The object of my invention is to provide a hydraulic pump unit in which the pump may be actuated only when the hoist or lifting device is to be placed into operation, thereby eliminating unnecessary wear on the pump unit and its circulating system.

Another object of my invention is to provide a device in which the pump may be brought into operation by means of frictional engagement of the pump unit with the driving pulley, thereby making it possible to operate the pump any predetermined amount of time, whether it be seconds or minutes, to actuate the hydraulic hoist.

It is manifest to anyone familiar with the operation of hydraulic pumps in combination with a hoist arrangement on dump trucks or the like, that it is common practice to have the pump operating continuously and by-pass the liquid when the hoist is not in operation, causing the pump to be operated by the truck motor at all times. With the device specified, illustrated and claimed herein, it is possible to have the drive pulley which is actuated by the motor, to revolve freely and frictional engagement with the pump is provided only when it is desirable to have the hydraulic lifting arrangement put into operation, thereby eliminating the continuous revolving of the pump and the constant by-passing of the liquid. This will also eliminate wear on the entire system and arrange for its actual operation only when the hydraulic pressure for the lifting mechanism is required.

The device is compact in construction and may be applied to any conventional type of motor construction, or made an integral part thereof, it is easily assembled and is designed to afford accessibility to all of the component parts constituting the pump.

Other and further objects of my invention will become more apparent as the description proceeds and when taken in conjunction with the drawings in which

Figure 1 is a fragmentary cross-sectional view of the entire unit taken at the line 1—1 in Figure 3.

Figure 2 is a fragmentary cross-sectional view of the entire unit taken at the line 2—2 in Figure 3, and

Figure 3 is an outside view of the general assembled unit.

Similar characters of reference indicate corresponding parts throughout the several views, and referring now to the same, the character 10 indicates a shaft supporting a gear 11 meshing with another gear 12 mounted on a shaft 13 forming the pump unit which is encased within the housing 14. The shafts 10 and 13 are journaled

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in bearings 15 supported by the housing 14 forming a part of the pump enclosure. The shaft 10 extends outward from the housing and is provided with a clutch shifting plunger spindle 16 supporting a pulley 17 which is rotatably mounted to the spindle 16 by means of a self-sealing bearing shown as 18, which is mounted to the periphery of the surface of a sleeve 19 which is slidably supported by the spindle 16 and held in a disengaged position by means of a resilient member 20 surrounding the periphery of the spindle 16 on one end and kept in position by the washer 21 as shown. The extreme outer depending end of the shaft 10 is provided with a cone adapter 22 keyed to the shaft 10 by means of a key 23 and held in position by the nut 24 threadedly engaging the end of the shaft 10 at its extreme end. The cone adapter 22 serves as a mounting for the clutch 25 which is quipped at its outer peripheral face with a lining shown as 26 arranged in an angular manner to engage the angularly disposed inner face of the pulley 17.

In operation the actuating means not shown revolves the pulley 17 by means of a belt not shown engaging the groove 27 on the outer periphery of the pulley 17, and when the sleeve 19 is moved forward against the pressure of the resilient member 20 it will cause engagement of the inner face of the pulley 17 with the clutch lining 26, thereby causing the clutch 25 to revolve and the shaft 10 to which the clutch 25 is attached by means of a key 23, revolves the gears 11 and 12 mounted to the shafts 10 and 13 respectively, thereby causing pumping action.

As the pump unit consisting of the gears 11 and 12 revolves it will force the liquid from the reservoir 28 and inlet port 57 through the outlet ports 29 and 29' against the check valve 30 through the ports 31 and 32, against the valve plunger 33, which plunger is equipped with a groove 34 around its peripheral surface and into the port 35 which acts as an outlet for the pump to feed the hydraulic lifting mechanism not shown. Plunger 33 is shown as comprising a pin portion and a sleeve portion, these parts moving in unison. As the pressure per square inch builds up it will force against the relief valve 36 through the tube 37 and as the valve 36 is opened against the resilient member 38 the liquid will pass through the port 39 into the tube 40 back into the reservoir 28. The relief valve 36 may be adjusted to a pre-determined pressure by means of the adjusting screw 41 covered by the casing or cover 42. As the valve plunger 33 is moved downward by means later described against the pressure of the spring 43 the groove 34 on the outer periphery of the plungers 33 will move downward, thereby permitting the fluid to return to the reservoir 28 through the port 32, the groove 34 and the port 40 to its outlet 44.

The clutch actuating plunger 45 when forced downward by means later described will force the liquid within the cylinder 46 through the tubular port 47 against the end of the slidably mounted sleeve 19, thereby causing the face 48 of the pulley 17 to contact the clutch lining 26 on the clutch cone 25, causing it to revolve, and with it the shaft 10 to actuate the pump consisting of the gears 11 and 12. Obviously, the plunger 45 may be used as a hand pump to force the liquid from the tube 49 into the enclosure 46 and against the check valve 50 through the tube 51 above the check valve 30 when the slide 53 is moved to place the passage 54 into alignment with the outlet 47 in the cylinder 46 for operating the hydraulic lift when the mechanical actuating means is not in operation. The moving of the slide 53 is accomplished by means of the screws 55.

It will be noted from the above description that the device is manually controlled by actuating the clutch plunger 45 and the valve plunger 33. This may be accomplished by various methods such as providing a pivoted lever 56, hingedly supported at 52 on the upper face of the device, or in any other convenient manner. Lever 56 when swung to the left in Figure 1 will depress clutch plunger 45, and when swung to the right will depress valve plunger 33.

The circulation is positive in its action and the pressure of the liquid against the sleeve 19 will insure engagement of the clutch cone 25 with the face 48 of the pulley 17 which is a means of actuating the pump to provide hydraulic pressure to operate the hoist.

In the chosen embodiments of my invention there are present many features not heretofore revealed in the prior art, and although I have shown a particular arrangement of the component parts constituting the device, I am fully cognizant of the fact that many changes may be made in their form and configuration without departing from the spirit of my invention or the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent in the United States is:

1. A hydraulic pump unit comprising in combination a pump body, a reservoir, a pair of shafts mounted within said body, one of said shafts employed as a drive shaft, the other employed as a driven shaft, a pair of inter-meshing gears, said gears mounted on said shafts, said pump body provided with a main inlet and outlet port, said intermeshing gears forcing fluid from said inlet to said outlet port, said outlet port provided with a check valve disposed therein, a slidably mounted plunger in a cylinder inserted into said outlet port, said plunger provided with a groove around its outer periphery, an auxiliary outlet tube extending from said plunger cylinder to said reservoir, said plunger being movable to permit alignment of said groove with said auxiliary outlet tube and main outlet port, a pressure regulator, said regulator provided with a resiliently adjustable valve, said regulator having an inlet leading from said main outlet port, and an outlet leading to said auxiliary tube, an auxiliary cylinder, a clutch actuating piston disposed within said auxiliary cylinder, said drive shaft extending outward from said pump body, a clutch member attached to said drive shaft, a sleeve slidably disposed over said drive shaft between said clutch and said pump body, a pulley, said pulley rotatably mounted to said sleeve, a resilient means disposed around one end of said drive shaft in abutting relation with said sleeve, one end of said resilient means being restricted against longitudinal movement relative to the said one end of said drive shaft, and a tubular port leading from the other end of said sleeve to said auxiliary cylinder, thereby permitting said sleeve to be moved hydraulically against said resilient means when the piston is moved downward in said auxiliary cylinder.

2. A hydraulic pump unit comprising in combination a pump body, a reservoir forming an integral portion of said pump body, a pair of shafts, one of said shafts employed as a drive shaft, the other of said shafts employed as a driven shaft, a pair of intermeshing gears, one of said gears mounted on said drive shaft and another of said gears mounted on said driven shaft, said shafts journaled within said pump body, said pump body provided with a main inlet passage and an outlet port, said intermeshing gears forcing fluid from said inlet passage to said outlet port, said port provided with a slidably mounted plunger in a cylinder, a check valve disposed within said outlet port between said pump and said plunger, said plunger provided with a groove around its outer peripheral surface, an auxiliary outlet passage extending to said reservoir from said cylinder, said groove in said plunger arranged in a manner to permit its alignment with said auxiliary outlet passage and main outlet port when said plunger is moved into a downward position, a pressure regulator, said regulator provided with an adjustable valve, said regulator having an inlet leading from said main outlet port and an outlet leading to said auxiliary passage, an auxiliary cylinder, a clutch actuating piston disposed within said auxiliary cylinder, said drive shaft extending outward from said pump body, a clutch member attached to said drive shaft at its outwardly extending end, a spindle encircling the outer periphery of said drive shaft, a sleeve slidably disposed over said spindle between said clutch and said pump body, a pulley, said pulley rotatably mounted on and shiftable with said sleeve, a resilient means disposed around one end of said drive shaft in abutting relation with said sleeve, one end of said resilient means being restricted against longitudinal movement relative to the said one end of said drive shaft, a passage leading from the auxiliary cylinder to the other end of said sleeve, a piston in said auxiliary cylinder, and means for actuating said piston for shifting said sleeve on said spindle.

3. A hydraulic pump mechanism of the character described comprising in combination a pump body, a reservoir attached to said pump body, a pair of shafts, one of said shafts acting as a drive shaft, the other employed as a driven shaft, a pair of intermeshing gears, each of said gears mounted on one of each of said shafts respectively, said shafts journaled within said pump body, said pump body provided with a main inlet and outlet passage, said intermeshing gears forcing fluid from said inlet to said outlet passage, the outlet passage being provided with a check valve, a slidably mounted plunger in a cylinder inserted into said outlet passage, said plunger provided with a groove around its peripheral surface, an auxiliary outlet passage extending from said cylinder to said reservoir, said plunger being movable to permit alignment of said groove with said auxiliary passage and main outlet passage, a pressure regulator tube, said regulator tube provided with a resiliently sup-

ported manually adjustable valve, said regulator having an inlet port leading from said main outlet passage, an auxiliary cylinder, a clutch actuating piston disposed within said auxiliary cylinder, said drive shaft extending outward from said pump body, a clutch member, said clutch member provided with a lining on its outer peripheral surface, said clutch member attached to said drive shaft at its outwardly extending end, a sleeve member, a spindle encircling the outer periphery of said drive shaft, said sleeve slidably disposed over the outer periphery of said spindle at a point between said clutch and said pump body, a pulley, said pulley rotatably mounted to said sleeve, said sleeve provided at one end with a resilient means supported by said spindle at one end, there being a passage leading from said auxiliary cylinder to the other end of said sleeve, and a piston movable in said auxiliary cylinder for shifting said sleeve so as to move said pulley in engagement with said clutch member on said shaft.

4. A device as described in claim 3 in which the outlet passage from said pump body is provided with a tube leading from said reservoir, and means in conjunction with said tube and said auxiliary cylinder and clutch actuating piston for manually forcing the liquid from said reservoir to said outlet passage.

5. A device for operating hydraulic lifting mechanism or the like, comprising a housing, a hydraulic pump therein including a shaft extending to a point outside the housing, a driven clutch member fixed to the outer end of said shaft outside said housing, a driving member rotatably mounted on and shiftable axially relative to said shaft between said driven clutch member and the portion of said housing through which said shaft extends, a connection extending from said driving member to a point inside said housing, and means inside the latter acting through said connection for shifting said clutch driving member on said shaft into and out of engagement with said driven clutch member.

6. A device for operating hydraulic lifting mechanism or the like, comprising a housing, a hydraulic pump therein including a shaft extending to a point outside the housing, a driven clutch member fixed to the outer end of said shaft outside said housing, a sleeve disposed about said shaft and axially shiftable relative thereto, a driving member rotatably mounted on the outer end of said sleeve between said driven clutch member and the portion of said housing through which said shaft extends, said driving member being shiftable axially with said sleeve toward and away from said driven clutch member, fluid pressure means connected with the inner end of said sleeve for shifting said clutch driving member on said shaft into and out of engagement with said driven clutch member, and valve means inside said housing for controlling the operation of said fluid pressure means.

7. A device for operating hydraulic lifting mechanism or the like, comprising a housing, a hydraulic pump therein including a shaft extending to a point outside the housing, a driven clutch member fixed to the outer end of said shaft outside said housing, a sleeve surrounding said shaft and fixed at its inner end to said housing and extending at its other end outside said housing, a second sleeve axially shiftable on said first sleeve, a driving clutch member rotatable on the outer end of said second sleeve and shiftable therewith relative to said fixed sleeve toward and away from said driven clutch member, spring means acting between said second sleeve and the housing for holding said driving clutch member out of driving engagement with said driven clutch member, fluid pressure means connected with the inner end of said second sleeve for shifting the latter and said driving clutch member toward said driven clutch member, and valve means inside said housing for controlling the operation of said fluid pressure means.

8. A device for operating hydraulic lifting mechanism or the like, comprising a reservoir, a hydraulic pump including a low pressure inlet communicating with said reservoir and a high pressure outlet connected with said mechanism, means for driving said pump including a clutch and piston and cylinder means for operating said clutch, an auxiliary cylinder, a manually operable plunger in said cylinder, means for supplying fluid from said reservoir to said auxiliary cylinder, a first conduit communicating at one end with said piston and cylinder means, a second conduit communicating at one end with said high pressure outlet, and valve means connecting the other end of each of said first and second conduits with said auxiliary cylinder, said valve means being movable into one position in which said auxiliary cylinder is connected with said clutch controlling means, whereby movement of said plunger actuates said clutch controlling means, and into another position in which said auxiliary cylinder is connected through said second conduit with said mechanism, whereby reciprocation of said plunger serves to actuate said mechanism independently of said pump.

9. A device for actuating hydraulic lifting mechanism from a rotating power source, which comprises a pump having a longitudinally extending shaft, a driving member mounted for free rotation on said shaft and disposed to be driven by said power source, a driven member attached to said shaft, normally open clutch means movable in one direction to place the driving and driven members in frictional engagement with each other to drive the pump shaft from the power source and rotate said pump, an oil reservoir connected with said pump, an outlet passage for said pump adapted to be connected with said hydraulic lifting mechanism, a check valve disposed in said passage between said pump and the end of said passage, said valve normally biased to closed position to prevent the return of oil to said pump when said pump is stopped, an outlet in said passage between said check valve and the end of said passage to connect said passage to said reservoir to release oil from said passage, a normally closed valve for said outlet operable in a second direction to open said valve, and a control member movable in one direction from neutral position to cause said clutch means to engage and movable in another direction from neutral position to cause said valve to open.

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