G. WALDREF.

HYDRAULIC UNLOADER.

APPLICATION FILED JUNE 30, 1915.

1,339,079.

Patented May 4, 1920.

2 SHEETS—SHEET 1.

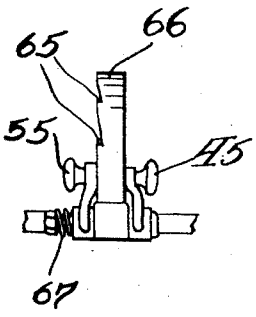


Fig. 3.

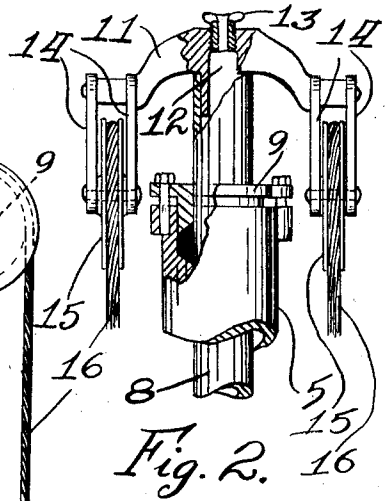


Fig. 2.

Fig. 1.

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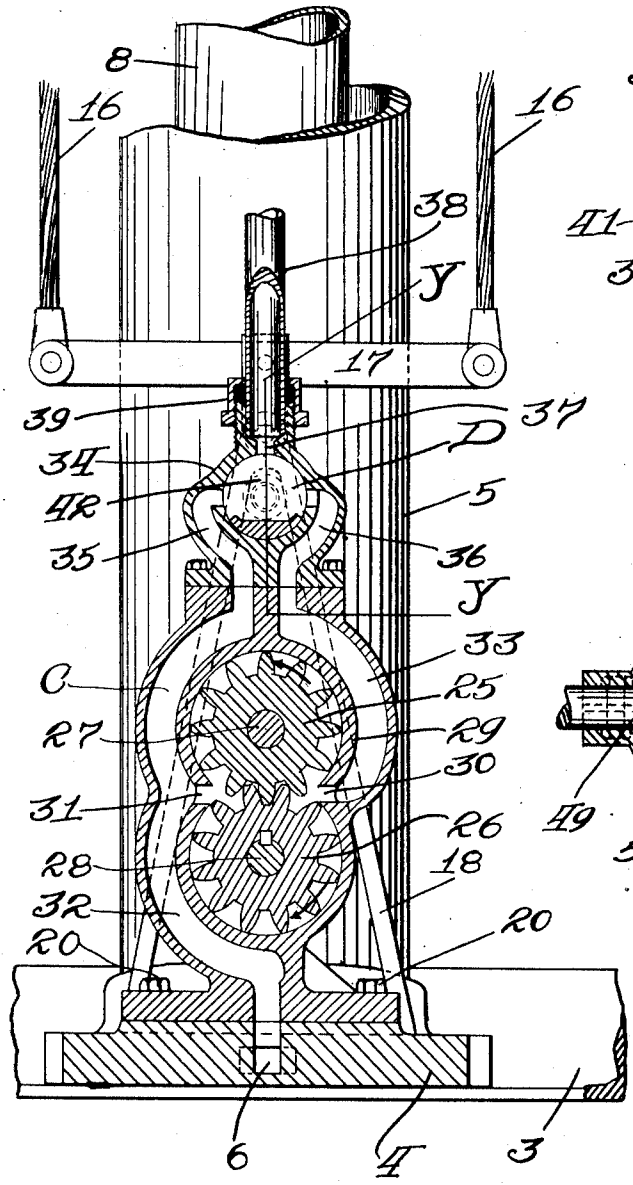


Fig. 4.

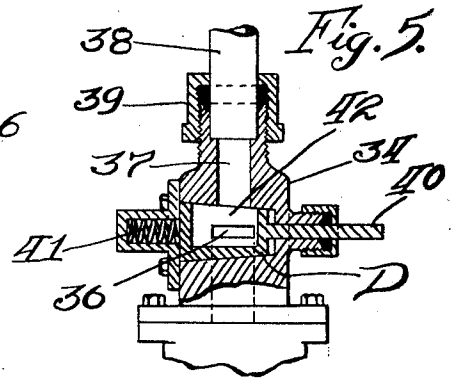


Fig. 5.

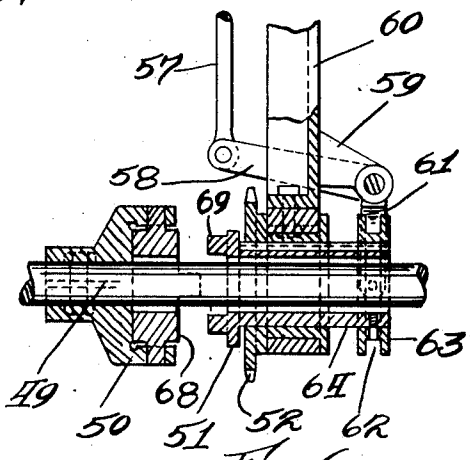


Fig. 6.

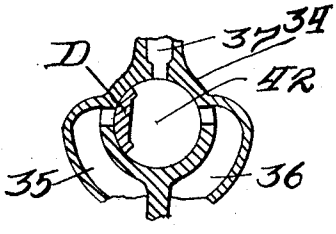


Fig. 7.

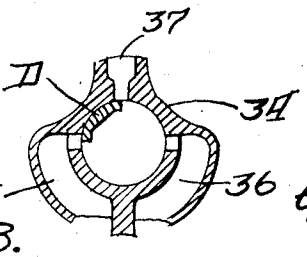


Fig. 8.

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UNITED STATES PATENT OFFICE.

GRANT WALDREF, OF ST. PAUL, MINNESOTA.

HYDRAULIC UNLOADER.

1,339,079. Specification of Letters Patent. Patented May 4, 1920.

Application filed June 30, 1915. Serial No. 37,195.

To all whom it may concern:

Be it known that I, GRANT WALDREF, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Hydraulic Unloaders, of which the following is a specification.

This invention relates to hydraulic unloaders for vehicles, and has for its primary object, to provide an efficient apparatus for tilting the body of a vehicle for the purpose of quickly dumping the contents thereof. More particularly this invention relates to that class of hydraulic unloaders, wherein simple and effective means are provided for circulating fluid in a system of ducts having therein controlling means for the fluid, whereby the elevating means for the tiltable body is adapted to stop automatically in an elevated position by the continuous circulation of the fluid.

With these and other objects in view, my invention comprises the features of construction and combinations of parts which will be hereinafter more particularly set forth.

The subject matter of this application is an improvement upon the hydraulic dump set forth in the patent granted to Garfield A. Wood on the 28th day of December, 1915, Number 1,165,825, and does not claim broadly the particular structure for compensating lateral thrust upon the piston rod, said structure being claimed in companion application Serial Number 37,194, filed June 30, 1915, for hydraulic unloaders, executed this day by Albert S. Anderson and assigned to me.

In the accompanying drawings forming part of this specification, Figure 1 is a side elevation partly in section of my invention showing part of an automobile chassis and a portion of a tiltable body thereon; Fig. 2 is a front elevation partly in section of a detail of my improvement; Fig. 3 is another front elevation of a detail; Fig. 4 is a section on the line X—X of Fig. 1; Fig. 5 is a vertical section of a detail on the line Y—Y of Fig. 4; Fig. 6 is a detail section through the clutch mechanism, the propeller shaft and actuating pitman being partially illustrated; Fig. 7 is a section, broken away, through the valve casing showing one of the positions assumed by the valve; and Fig. 8 is a similar section showing another position assumed by the valve.

In the drawings A indicates a portion of a chassis of an automobile truck and B a detail of the vehicle body and subframe, which are tiltingly mounted upon the chassis in the customary manner, said body and subframe being provided with a depending lifting arm 1 by which they are raised and lowered. Mounted upon the chassis and secured thereto such as by bolts 2 and angle members 3 is a base 4 resembling a plate, into which is threaded or otherwise fastened the upwardly extending hydraulic cylinder 5, the lower end of said cylinder being connected with a passage 6 extending forwardly and upwardly through the base. In the cylinder is a piston 7 having a hollow piston rod 8 extending upwardly through the packing flange 9, in the upper end of the cylinder. The lower end of said rod is formed with passages 10 entering the cylinder and rod and the upper end of said rod carries a yoke 11 fitted closely thereto and provided with a passage 12 entering the piston rod, said passage 12 containing an open threaded stopper 13. By removing the stopper 13 the cylinder can be filled with propelling fluid through the piston rod. The yoke 11 carries on each of its arms which spread laterally from the piston rod a pair of links 14. These links which are freely hung from the yoke carry sheaves 15 positioned on opposite sides of the cylinder and over which travel a pair of flexible lifting cables 16. The forward lower ends of these lifting cables are secured pivotally to an equalizer arm 17 pivoted midway between its ends to a coupler 18, which in turn is secured permanently to the base. This equalizer compensates for any uneven side thrust against the piston rod, due to uneven loading of the body, uneven length of the lifting cables or slanting of the vehicle laterally. The rearward lower ends of the lifting cables are attached to the lifting element 1 by the couplings 19. When the piston moves upwardly in the cylinder the sheaves force the cables 16 upwardly between their ends, thus lifting the load by a short stroke of the piston. All of the parts as described are symmetrically arranged so as to assist in compensating uneven lateral strains and causing the piston and its rod to work evenly and smoothly with little or no binding effort or tendency.

Mounted upon the base 4 and secured such as by bolts 20 is a gear pump C having a pair

of intermeshing toothed gears 25 and 26 carried by shafts 27 and 28, which are journaled in the walls of the pump casing 29. This pump casing is formed with a double cylindrical wall in which the gears revolve, the casing being provided with ingress and egress ports 30 and 31 for the pumping fluid. The pump casing is also formed with a passage 32, which communicates with the passage 6 in the base and the egress port 31 and leads upwardly through the top of the casing to form a by-passageway. The casing is also formed with another passage 33 which leads from the port 30 upwardly through the top of the casing. Mounted upon the casing is a valve D, which is seated in a valve housing 34. This valve housing is formed with a pair of passages 35 and 36 respectively connecting with the passages 32 and 33 in the pump casing and entering the valve seat in opposite position so as to be opened and closed independently by the valve. The valve housing also has another passage 37 entering the valve seat with which a pipe 38 is connected by the coupling 39, said pipe being also connected with the upper end of the cylinder above the piston, the point of connection between the pipe 38 and the cylinder being a short distance below the upper end of the cylinder. Thus the valve seat has three separate ports leading respectively to the upper and lower ends of the cylinder and to the ingress opening of the pump chamber. The valve D is of rotary conical type mounted in the valve housing in the valve seat, and is provided with a stem 40 by which the valve can be rotated. This valve is pressed firmly upon its seat to form a tight connection by means of a compression spring 41 bearing against its end opposite said stem. The valve is formed with a transverse passage 42 which is adapted when the valve is moved into one position as illustrated in Fig. 7 to conduct the fluid which is forced by the gear pump into the lower end of the cylinder, thus raising the piston and the load carried thereby. When the valve is moved into the position illustrated in Fig. 4 a short continuous circuit is formed for the fluid around the pump through the passages 33 and 35 without forcing the piston upwardly. In this position the piston is free to descend by gravity or to be returned slowly into normal position by the weight of the body B. The operation of the valve D is controlled by a handle in the form of a lever 45 pivoted on a supporting member 46, which is secured to the cylinder 5. The free end of this lever handle has pivotally secured thereto a pitman 47, which in turn is pivoted to the free end of an arm 48 carried by the stem 40 of the valve. Thus by raising and lowering the operating lever 45, the valve D is turned in its seat. The base 4, pump casing 29 and valve housing 34 thus are a projecting portion of the extreme lower end of the cylinder.

The pump C is driven by the driving element of the vehicle such as the usual propeller shaft 49. This propeller shaft has secured to it the driving element 50 of a clutch which is adapted to communicate motion from the propeller shaft to a driven element 51, said driven element being feathered to a sprocket 52 around which a sprocket chain 53 travels. This sprocket chain engages over a sprocket pinion 54 carried by the shaft 28 of the pump. Thus when the driven element 51 of the clutch is slid along the propeller shaft 49 into engagement with the driving element 50 of the clutch, power is transmitted to the gear pump, and the gears 25 and 26 of the pump revolved. The driving element of the clutch carries a toothed shifting element 68 slidable diametrically across the axis of the propeller shaft, with the teeth of which the teeth 69 on the driven element 51 are engaged when the clutch is closed, said shifting element forming a universal coupling in the clutch and compensating any uneven motion of the clutch elements and propeller shaft.

The actuating means for throwing the clutch into and out of operation, consists of a handle lever 55 pivoted upon the support 46 and connected by a pitman 57 to one arm 58 of a bell crank lever. This bell crank lever is pivoted at its angle upon a supporting bracket 59, which is attached to a depending support 60, in which the gear member 52 is journaled. The other arm of the bell crank lever is freely connected by bifurcations 61 working in the channel 62 of the collar 63 journaled upon a sleeve 64 forming part of the driven element of the clutch, so that when the bell crank lever is tilted the driven member is thrown into or out of connection with the driving element of the clutch. To hold the operating arm 55 of the clutch operating mechanism in adjusted position with the clutch members in or out of engagement, the arm 55 is made to spring into engagement with teeth 65 of a quadrant 66 formed on the support 46. The lever arm 55 is depressibly mounted upon the supporting member 46 and is releasably pressed into engagement with the teeth 65 on a side of the quadrant by a spring 67.

In operation after the cylinder and connecting passages have all been filled with oil or any other suitable impelling medium desired through the passage 12, the plug 13 is inserted in said passage. When it is desired to raise the body the clutch is thrown into operation by raising the handle 55 until the driven member of the clutch is fully engaged with the driving member. Motion is then imparted by the propeller shaft 49 to the gears in the pump which in turn revolve

in the direction of the arrows shown in Fig. 4 and propel the impelling medium in the pump. The valve operating handle 45 is then moved upwardly until the valve assumes the position indicated in Fig. 7, whereupon the impelling medium is forced upwardly into the cylinder and the piston raised until it moves above the passage in the wall of the cylinder to which the pipe 38 is connected. While the piston is rising the chamber in the piston rod supplies propelling medium to the pump, said chamber being open to the outer atmosphere allowing the fluid to pass freely to the pump as required to fill the space in the cylinder below the piston. Upon reaching uppermost position the body remains tilted while the pump continues in operation, the fluid thereupon passing continuously through the cylinder and back to the pump through the pipe 38. If the pump is then stopped the impelling medium below the piston holds the piston in superior position. To lower the body the pump is stopped and the valve is moved by swinging the handle 45 until it assumes the position illustrated in Fig. 8, whereupon the propelling medium escapes the pump gears and is conducted by passage 32 upwardly, allowing the piston to descend freely and slowly according to the valve opening. While the piston is lowering the impelling medium displaced below the piston in the cylinder fills the space above the piston and in the piston rod. Thus the piston rod acts as a displacement chamber as well as performing its usual function and the use of a tank or other chamber independent of the cylinder is obviated.

By forming the walls of the pump and valve with ducts for the impelling medium, and as a projecting portion from the lower end of the cylinder, the number of parts necessary in the structure is reduced and the efficiency of operation increased. Trouble from loose and leaky joints between parts of the structure is also obviated.

By forming the base of the cylinder with a forwardly or laterally and upwardly extending duct 6, a more compact structure is produced, the cylinder and pump being more intimately associated and the chance for leaking joints occurring being reduced to a minimum. The pump also is more readily accessible for operation and repairing and there is less opportunity for any of the parts working loose, due to vibration and racking movement.

As a result of my invention the construction is simple, compact, light, durable and easily operated.

In accordance with the patent statutes I have described the principles of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction shown is only illustrative, and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A hydraulic unloader, comprising, in combination, a support, a cylinder, a base mounted upon said support and carrying said cylinder, said base being passaged laterally to form a duct communicating with the lower end of said cylinder, a pump mounted upon said base and connected downwardly with said duct for the flow of fluid into and from the lower end of said cylinder, a piston in said cylinder having its rod for lifting a load projecting upwardly therethrough, a passage leading from said pump to the upper end of said cylinder, a valve mounted upon said pump in communication with the passage leading to the upper end of said cylinder and an auxiliary passage in said pump leading through said valve and forming a communication between the ingress and egress portions of the pump, said valve being adapted to control said passages to either force fluid into the lower end of the cylinder to raise said piston or to form a circuit for the fluid independent of the cylinder.

2. A hydraulic unloader, comprising, in combination, a support having a driving element, a load carried by said support, a hydraulic cylinder having a base mounted upon said support, said cylinder having its piston operatively connected to said load, a pump carried by said cylinder, a clutch interposed between said pump and driving element, means for operating said clutch to throw said pump into and out of operation, a valve mounted upon said pump and means for operating said valve, the walls of said pump and valve being formed with a system of ducts connecting said pump through a laterally extending passage in said base entering the lower end of said cylinder for establishing communication between the portions of said cylinder above and below said piston and with said pump, said ducts being arranged in one position of said valve to form a circuit for the impelling fluid upwardly into the lower end of said cylinder to raise said piston, in another position to form a short circuit for the impelling fluid through said pump independent of said cylinder, and in another position permitting the impelling fluid to pass the pump and flow downwardly through the cylinder from below the piston.

3. A vehicle, a hydraulic cylinder formed with a base portion projecting below its body, connections between said base portion

and said cylinder, a portion of said connections being a laterally extending passage in said base portion, motor driven pump mechanism contained wholly within said base portion for maintaining a circulation of fluid through said connections, cylinder and base portion, and means disposed within said base portion for governing and altering the direction of flow of fluid through said parts.

4. A vehicle, a hydraulic cylinder formed with a hollow base portion projecting laterally from its lower end, a piston within said cylinder having a chambered rod projecting upwardly therefrom and communicating at its lower extremity with the interior of said cylinder and communicating at its upper extremity with the outer atmosphere, laterally extending connections between said base portion and said cylinder, motor driven pump mechanism detachably mounted upon said base portion for maintaining a circulation of fluid through said connections, cylinder and casing, and means disposed within said base portion for governing and altering the direction of flow of fluid through said parts.

In testimony whereof I have signed my name to this specification.

GRANT WALDREF.