May 15, 1923. 1,455,528

A. E. HANSEN

HYDRAULIC HOIST FOR TRUCKS

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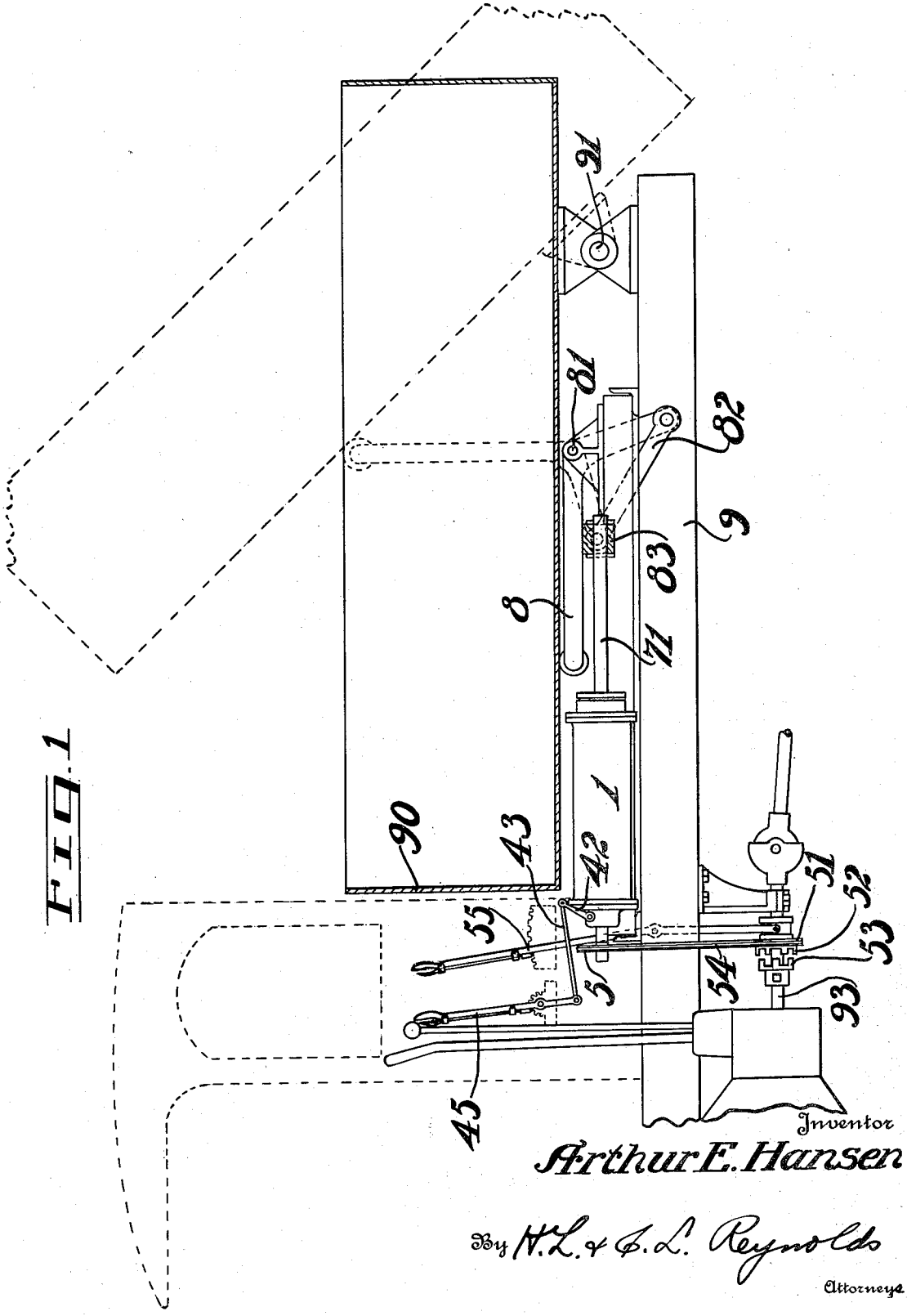


FIG. 1

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FIG. 3

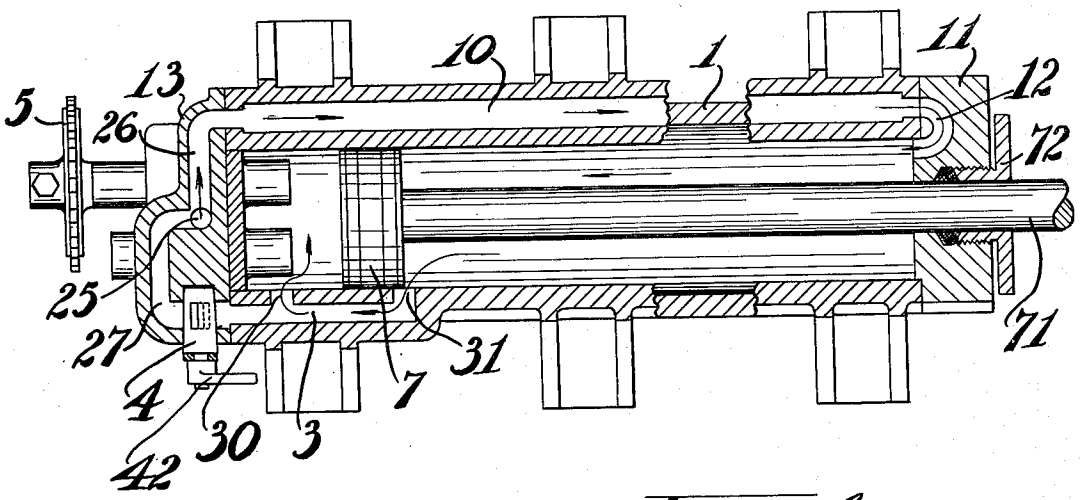


FIG. 4

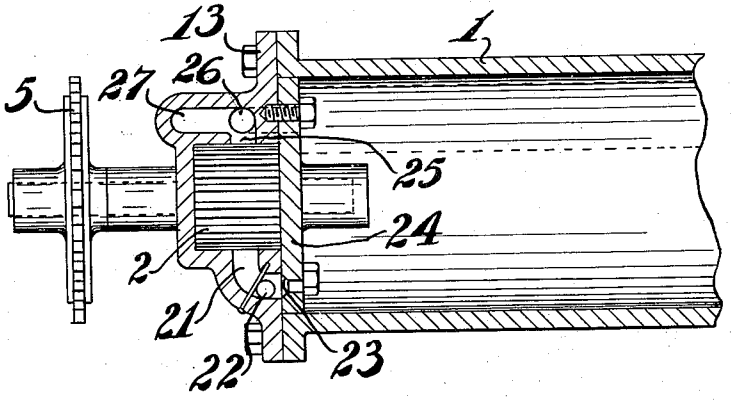
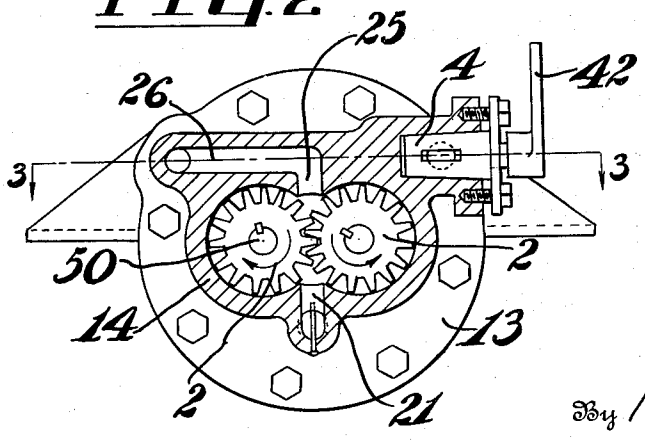


FIG. 2



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UNITED STATES PATENT OFFICE.

ARTHUR E. HANSEN, OF SEATTLE, WASHINGTON, ASSIGNOR TO YOUNG IRON WORKS, INC., OF SEATTLE, WASHINGTON, A CORPORATION OF WASHINGTON.

HYDRAULIC HOIST FOR TRUCKS.

Application filed June 27, 1921. Serial No. 480,712.

To all whom it may concern:

Be it known that I, ARTHUR E. HANSEN, a citizen of the United States of America, and resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Hydraulic Hoists for Trucks, of which the following is a specification.

My invention relates to hydraulic hoists for automobile trucks and is adaptable either to vertical or horizontal hoists, although it is shown in the accompanying drawings only in connection with a horizontal hoist.

An important object of my invention is to eliminate any chance for leakage of the fluid used in the hoist cylinder which is caused by wracking of the vehicle when used over rough territory.

A further object of my invention is to provide automatic means for limiting the hoisting movement of the piston within the hoist cylinder.

A further object is to provide simplified means for controlling and operating a hydraulic hoist.

A further object is to provide improved means whereby power may be supplied to a pump for a hydraulic hoist.

My invention comprises those novel parts and combinations thereof which are shown in the accompanying drawings, described in the specification and particularly defined by the claims terminating the same.

In the accompanying drawings I have shown my invention in the form which is now preferred by me.

Figure 1 is a side elevation of my invention mounted upon an automobile truck frame.

Figure 2 is a transverse section through the forward head of the hoist cylinder and the pump casing contained therein.

Figure 3 is a section on line 3—3 of Figure 2.

Figure 4 is a vertical axial section through an end of the hoist cylinder.

Automobile trucks having dumping bodies are ordinarily required to travel over very rough territory. They are consequently subjected to severe strains and their frames are wracked considerably. It has been found, in connection with hydraulic hoists used upon such trucks, that where the pump is connected to the hoist cylinder through lines of piping, that these lines will be wracked, and in time leakage will occur. By forming the pump integral with the hoist cylinder, or as shown in the drawings herein, integral with one head of the hoist cylinder, and by connecting the pump casing to the cylinder through cored or self-contained passages, the possibility of leakage through wracking of the frame is entirely eliminated. With such a connection it is preferable that a more or less flexible connection be employed between the source of power, usually the main drive shaft of the automobile truck and the pump, and this I have shown in the drawings and will described hereinafter.

Pivoted at 91 at the rear end of the frame 9 of the automobile truck is the body 90. Its forward end is raised upon hoist arms 8. These arms may be made in any form desired, those shown herein being pivoted at 81 upon the frame 9 and having one end connected by a link 82 to a cross head 83, the cross head being movable through the movement of a piston rod 71. Beneath the body 90 the hoist cylinder 1 is secured upon the truck frame 9.

The cylinder 1 has a longitudinal passage 10 extending from end to end. Preferably this passage is cored in the cylinder wall as it is cast. At one end, as shown herein the rear end, a head 11 is provided for the cylinder, and a short passage 12 therein forms the communication between one end of the passage 10 and the interior of the cylinder. A piston 7 is movable axially within the cylinder and its piston rod 71 projects through the head 11, a stuffing box 72 being provided to prevent leakage thereabout.

At the end of the cylinder opposite the head 11, I provide a head 13 which contains a pump casing 14 within it. This pump casing 14 has mounted therein any suitable form of pump, that shown herein consisting of the intermeshing gears 2 rotating in the directions shown by the arrows in Figure 2. A pump feed connection 21 is formed as a cored passage in the head 12, and serves as the discharge opening for the forward end of the cylinder 1, with which it connects. A ball 22 may be positioned in this passage 21, a seat 23 being provided in a cover plate

24 which encloses the inner face of the head 13. The cover plate 24 lies within the cylinder and is suitably secured to the head 13, and contains bearings for the shafts carrying the gears 2.

The pump casing 14 contains also a pump discharge connection 25, which is divided into two branches 26 and 27. All of these are formed preferably as cored passages in the head 13. The branch 26 communicates with the longitudinally extending passage 10, these two passages and the short port 12 forming the cylinder intake passage leading to the high pressure end of the cylinder when the hoist is in operation. The other branch 27 communicates with the low pressure end, that is, the adjacent end of the cylinder 1, through a port 30 located adjacent the head 13. A valve 4 is interposed between the branch 27 and the port 30 to close off this branch from the cylinder when desired.

I provide means for limiting the movement of the piston 7 toward the forward end of the cylinder, that is in the direction which causes the raising of the hoist arms 8. This means I have shown as consisting of a relief by-pass 3 which extends axially of the cylinder walls adjacent its head end. This may be open throughout its length or it may communicate with the cylinder through two ports, spaced axially by at least the thickness of the piston 7. Of these, the port 30 may be one, the other being shown at 31.

Driving means for the pump may be any that are found suitable or desirable. I have shown a sprocket 5 secured upon the shaft 50 upon which one of the pump gears 2 is secured. A second sprocket 51 is loosely mounted upon the main drive shaft 93, and clutch members 52 and 53 are mounted also upon the shaft 93, one being fixed and the other connected to the sprocket 51 to drive it when the clutch members are engaged. A sprocket chain 54 may connect the sprockets 5 and 51 directly or indirectly. Control levers 55 and 45 are employed for controlling respectively the clutch 52, 53, and the valve 4. The control lever 45 is connected to a lever 42 secured upon the stem of valve 4 through a link 43.

When it is desired to raise the truck body 90 the clutch members 52, 53, are engaged by manipulating the handle 55. The sprocket wheels 51 and 5 are thus caused to rotate, and the pump members 2 commence to pump oil, taking in through the port 22 from the head end of the cylinder and delivering through one of the branches 26 or 27. If the valve 4 is closed, the fluid cannot pass through the branch 27 to reach the head end of the cylinder but passes through the branch 26, and the passages 10 and 12, to the rear end of the cylinder behind the piston 7. This causes the advance of the piston within the cylinder and the consequent raising of the hoist arms 8 to raise the body.

If at any time it is desired to halt the raising of the body, this may be accomplished by opening the valve 4 by manipulating the handle 45. This permits the fluid to pass through the valve and out through the ports 30 and 31 to the low pressure side of the piston. The fluid will then form a continuous circuit through the port 21, the pump casing 14, the passages 25, 27, and the port 30, to return to the cylinder. Pressure is equalized upon each side of the piston and this remains stationary.

However, assuming the valve 4 to remain closed, the piston will continue to advance toward the forward end of the cylinder until the port 31 is uncovered. This permits leakage of the fluid from the rear or high pressure side of the passage through the port 31 and the relief by-pass 3, and out through the port 30 to the low pressure side of the piston, whence it returns through the pump casing and the longitudinally extending passage 10 to the rear side of the piston again. The advance of the piston is in this manner stopped. When it is desired to lower the body, the valve 4 may be opened and the clutch members 52, 53 disengaged. This permits the fluid to pass from the rear end of the cylinder through the passages 12, 10, 26, 27, and through the ports 30 and 31 to the forward end of the cylinder, movement of the piston being caused by the weight of the body 90.

By means of the apparatus described, there is provided a hoist in which all fluid connections are self-contained in a unitary hoist cylinder. There are no connections between a pump and a distant hoist cylinder which may be wracked and caused to leak thereby. The connection between the pump and the source of power is flexible and may be made more so if this is desirable. In this manner the wracking of the body is compensated for in the drive connections rather than in the fluid connections. The device is easily controlled and simply constructed, and the automatic stop employed is simple and yet effective in operation.

It will be apparent that the details of the clutch members, their connection to the drive shaft, the various controls employed and the operative connections between the pump and clutch, may be varied to suit conditions under which the device is employed. The details of the truck frame and body and of the hoisting arms and their connection to the piston rod likewise form no part of my invention. My invention resides in the hoist cylinder and its heads, in the arrangement and combination of passages formed therein, in combination with the pump and the piston and in such other members as are particularly defined by the following claims.

What I claim as my invention is:

1. A hydraulic hoist for automobile trucks comprising, in combination, a cylinder, a piston movable therein, hoisting apparatus operable by the movement of said piston, a pump casing forming one head of said cylinder and connected thereto through self-contained passages, a rotary pump within said casing, and driving means adapted to connect said pump with a power source.

2. A hydraulic hoist for automobile trucks comprising, in combination, a cylinder, a piston movable therein, hoisting apparatus operable by the movement of said piston, a pump casing formed integral with a head of said cylinder and communicating therewith, a gear pump contained within said casing, and having a shaft projecting therefrom in parallelism with the axis of the cylinder, a sprocket wheel mounted upon said shaft adjacent the pump casing, a main drive shaft, clutch elements thereon, a second sprocket wheel connected with one of said clutch elements to be driven therethrough, and operative connections between said sprocket wheels.

3. In a hydraulic hoist, in combination, a cylinder having an intake port at one end adapted to be connected to a source of supply of fluid under pressure, and a discharge port at its opposite end, a piston movable axially within said cylinder, and means for limiting the movement of said piston in the hoisting direction comprising a relief by-pass adapted to span the piston and to connect its high and low pressure sides.

4. In a hydraulic hoist, in combination, a cylinder having an intake port at one end and a discharge port at its opposite end, a pump having a connection to each of said ports, a piston movable axially within said cylinder, said cylinder having a pair of connected relief ports positioned adjacent but independent of its discharge port, and spaced axially along its side wall by at least the thickness of the piston.

5. A cylinder and heads for a hydraulic hoist, said cylinder having a self-contained passage extending longitudinally thereof and connected directly with one end of the cylinder, a pump casing formed in the head at the opposite end of the cylinder, said head containing a pump feed connection between the pump casing and this end of the cylinder, and said head also containing a branched pump discharge connection, one branch thereof connecting with the same end of the cylinder independently of the pump feed connection, and the other branch connecting with said longitudinal passage, and a valve controlling the passage of fluid through said first branch.

6. A cylinder and heads for a hydraulic hoist, said cylinder having a self-contained passage extending longitudinally thereof and connected directly with one end of the cylinder, a longitudinally-extending relief by-pass in the cylinder wall adjacent the opposite end, a pump casing formed in the head at this end of the cylinder, said head containing a pump feed connection between the pump casing and this end of the cylinder, and said head also containing a branched pump discharge connection, one branch thereof connecting with said relief by-pass, and the other branch connecting with said longitudinal passage, and a valve controlling the passage of fluid through said first branch.

7. In a hydraulic hoist, the combination with a horizontal closed cylinder having a passage formed therein connecting the two ends thereof, of a piston within the cylinder, a gear-pump mounted within the forward cylinder head, and a rotative driving shaft for the gear pump which projects through the front wall of the cylinder head and lies in parallelism with the cylinder axis.

8. In combination with a motor vehicle having a longitudinally extending drive shaft operatively connected to its engine, a hydraulic hoist cylinder mounted thereon with its axis substantially parallel to the drive shaft, a piston reciprocable therein, a pump casing forming the forward head of said cylinder, a gear pump therein, a rotative shaft operatively connected with said gear pump and projecting forwardly from the casing thereof parallel to the cylinder axis, a sprocket wheel upon said rotative shaft, a second sprocket secured upon said live shaft in substantially the same plane as the first sprocket wheel, and a chain connecting said sprockets.

9. In combination with a motor vehicle having a longitudinally extending drive shaft, a hydraulic hoist cylinder mounted thereon with its axis substantially parallel to the drive shaft, a piston reciprocable therein, a pump casing forming the forward head of said cylinder, a gear pump therein, a rotative shaft connected with said gear pump and projecting forwardly from the casing thereof parallel to the cylinder axis, a sprocket wheel upon said rotative shaft, a second sprocket wheel secured upon said live shaft in substantially the same plane as the first sprocket wheel, a chain connecting said sprockets, cooperating clutch elements upon the live shaft and upon said second sprocket wheel, and a means for controlling the engagement of said clutch elements.

10. In a hydraulic hoist, the combination with a closed cylinder having a pump chamber formed in one head thereof and opening inwardly, pump mechanism therein, a pump actuating shaft projecting outwardly from said pump chamber, and a plate covering the inner side of said pump chamber and se-

cured to the cylinder head, whereby the pump assembly may be removed by the removal of the cylinder head.

11. In a hydraulic hoist, the combination with a closed cylinder having a pump chamber formed in one head thereof and opening inwardly, a rotary pump mechanism therein, a rotary pump-actuating shaft projecting outwardly from said pump chamber in parallelism with the axis of the cylinder, a plate secured to the said cylinder head to close the inner side of the pump chamber therein, and bearings in the cylinder head and in said plate for the rotating units of the pump mechanism.

12. In combination with a vehicle comprising a chassis and a motor, a body mounted for movement on said chassis, a substantially horizontal cylinder fixedly supported from said chassis and underlying said body, a piston mounted to reciprocate in said cylinder, a piston rod connected to said piston, operating connections between the vehicle body and the piston rod, a rotary gear pump mounted in a head of the cylinder and driving connection between said gear pump and the motor of the vehicle.

13. In combination with a vehicle comprising a chassis and a motor, a body mounted for movement on said chassis, a substantially horizontal cylinder fixedly supported from said chassis and underlying said body, a piston mounted to reciprocate in said cylinder, a piston rod connected to said piston and projecting rearwardly from the cylinder, operating connections between the vehicle body and the piston rod, a gear pump mounted in the forward cylinder head comprising a rotary drive shaft projecting therefrom and driving connections between said gear pump and the motor of the vehicle.

Signed at Seattle, King County, Washington, this 21st day of June 1921.

ARTHUR E. HANSEN.