

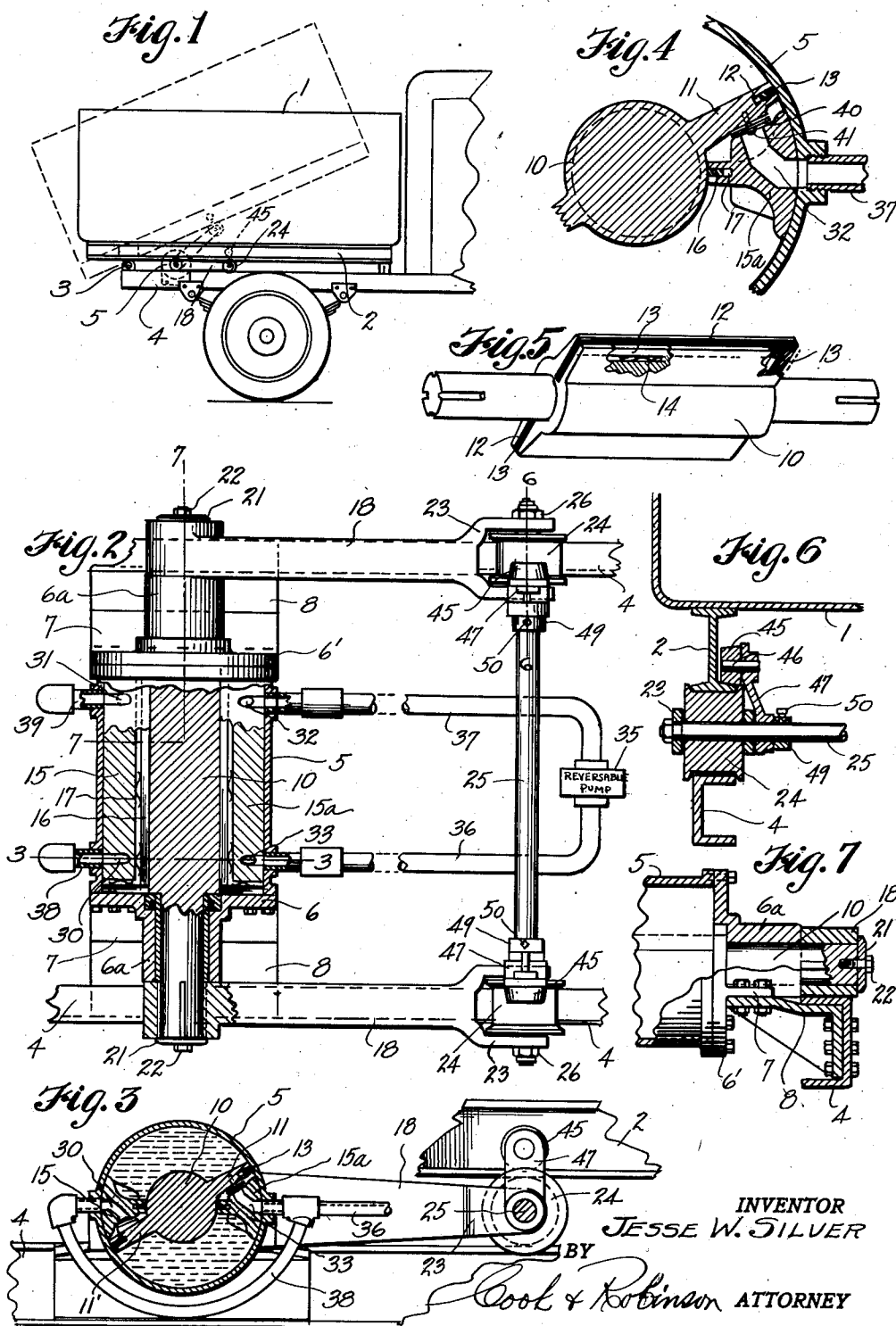
Feb. 19, 1935.

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1,991,634

ROTARY FULCRUM LEVER

Filed July 20, 1931



UNITED STATES PATENT OFFICE

1,991,634

ROTARY FULCRUM LEVER

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Application July 20, 1931, Serial No. 551,977

1 Claim. (Cl. 60—52)

This invention relates to hydraulic power devices, or what, in the present instance, I prefer to term a rotary fulcrum lever hydraulic motor and in which there is a cylinder containing fixed abutments with a concentrically located, rotatable piston arranged to be hydraulically actuated in opposite directions by a controlled application of a fluid pressure medium delivered into the cylinder, and wherein lever arms are attached to the piston shaft for movement thereby to perform various kinds of work incident to rotation of the piston.

It is the principal object of the present invention to provide a device of the above character that is especially useful in connection with automobile dump trucks for moving the body to and from its dumping position.

It is also an object of the invention to provide a device of the above character that is efficient and serviceable in use; which is relatively inexpensive; which is powerful, and which may be positively controlled in its movement in either direction.

It is another object of the invention to provide novel means of a durable character for packing the device against leakage.

Still further objects of the invention reside in the details of construction and in the combination of parts and in their mode of operation, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawing, wherein—

Fig. 1 is a side elevation of a portion of an automobile dump truck, illustrating the application thereto of a hydraulic device embodied by the present invention.

Fig. 2 is a plan view of the hydraulic motor, shown partly in sectional detail for better illustration, and diagrammatically illustrating the connection of the device with a pump for moving the pressure medium.

Fig. 3 is a cross sectional view, taken substantially on the line 3—3 in Fig. 2, showing the arrangement of the piston and abutments within the cylinder.

Fig. 4 is an enlarged, sectional detail, showing one of the abutments and a portion of the rotary piston.

Fig. 5 is a perspective view of the piston member particularly illustrating the packing strips in the edge grooves of the pistons.

Fig. 6 is a cross sectional detail, taken substantially on the line 6—6 in Fig. 2, illustrating the

manner of mounting the lifting and hold back rollers on the fulcrum levers; also showing the rolling connection of the rollers with the flange of the base beam of the truck body.

Fig. 7 is a sectional detail taken substantially on the line 7—7 in Fig. 2, showing a mounting bracket for the cylinder.

It will be stated here that the present mechanism is not intended as a single use device, but it is intended that it shall be applied to any use where a radially swinging action of a lever arm is desirable for accomplishing any certain work or operation. The device may well be applied to various kinds of agitators, washers, laundry tubs, saw raising and lowering machinery, and the like. Therefore, it is to be understood that the present drawing and description are merely for the purpose of illustrating and describing the device in one of its most practical applications; and it is not intended to convey the idea that this use is the only use to which the device may be put.

Referring more in detail to the drawing—

In Fig. 1, I have illustrated a common type of automobile dump truck including a dump body 1, having longitudinally extending base beams 2 fixed thereto. The beams 2 are pivotally attached at points near their rearward ends, as at 3, to the longitudinal beams 4 of the truck chassis, so that the body 1 may be swung upwardly from its normal position, as shown in full lines, to the dumping position, as indicated in dotted lines.

Mounted transversely of the body, beneath it and somewhat forwardly of the pivots 3, is a hydraulic motor device embodied by the present invention, and the purpose of this device is to raise and lower the truck body. In a preferred construction, the hydraulic device comprises a cylinder 5 that is closed at its opposite ends by head plates 6—6' securely bolted to the cylinder ends. The head plates are provided also with horizontal flanges 7, to which supporting brackets 8 are attached, and these brackets, as illustrated in Fig. 7, are bolted, or otherwise secured, within the body frame beams 4, thereby to support the cylinder rigidly within the truck frame, with its axial line transversely of the body and parallel with the line of the pivots 3.

Rotatably contained co-axially within the cylinder, is a piston member comprising a central shaft 10 that is rotatably supported at its opposite ends within bearings 6a—6a', integrally formed with the cylinder end heads. Formed lengthwise of the piston shaft 10, and at diametrically opposite sides thereof, are piston plates 11—11', which, at their ends and outer edges, fit closely to

the end and side walls of the cylinder. These edges of the piston plates are longitudinally grooved, as at 12, and strips of packing material 13, are seated therein, and these strips fit the wall surface to preclude leakage and are urged outwardly into close contact with the walls of the cylinder by means of a suitable number of leaf springs 14 that are placed back of the strips within the bases of the grooves. At the corners of the pistons these strips would be suitably notched and overlapped to preclude leakage.

Fixed lengthwise within the cylinder to its wall at diametrically opposite sides, are abutments 15—15a. These have keyed connections at their ends with the end plates 6 to hold them secure, and are provided with packing strips 16 within grooves 17 along their outer edges. These packing strips preferably would be of a phenol condensation product and also would be urged outwardly by the use of leaf springs, the same as used in connection with the packing strips of the pistons.

The opposite ends of the piston shaft 10 extend through and beyond their supporting bearings and mount a pair of fulcrum levers 18—18. These levers are keyed to the ends of the piston shaft to rotate therewith, and they are held in place by means of caps 21 which overlap them and which are held by bolts 22 threaded into the ends of the shaft. The levers are parallel and extend in the same plane of the cylinder axis, and are of equal length, and at their outer ends are formed with yokes 23 within which rollers 24 are mounted. These rollers are rotatably supported in their yokes upon a shaft 25 which extends between the arms and through openings in the ends thereof and are held in place by nuts 26 threaded onto the ends of the shaft.

In the use of the device, as shown in Fig. 1, the levers are adapted to directly overlie the frame beams 4—4 with the rollers 24 resting thereon. Also, the base beams 3—3 of the body rest upon these rollers so that rotary movement of the piston which would cause the levers to swing upwardly and rearwardly, would cause the truck body to be swung upwardly as indicated by dotted lines in Fig. 1. This movement of the piston is under control of a fluid or liquid pressure medium such as oil which fills the cylinder, between the abutments and pistons, and which may be pumped from one side to the other to move the piston accordingly.

Each abutment has two ports formed therein leading to the outside of the cylinder, one port opening into the cylinder at one face and the other opening at the opposite face. As seen in Fig. 2, the abutment 15 has ports 30 and 31 opening into the cylinder respectively at upper and lower faces thereof. Likewise, the abutment 15a has ports 32 and 33 opening respectively to upper and lower faces thereof. A reversible pump is designated at 35; and this has pipes 36 and 37 leading into opposite sides thereof and pipe 36 connects through the cylinder wall with passage 33 in abutment 15a, and through a conduit 38, with the passage 30 of stator 15. Likewise, pipe 37 connected through a port in the cylinder walls with passage 32 of abutment 15a and through a conduit 39 with passage 31 of abutment 15; the connection with the pump being such that with the pump operating in one direction, the liquid pressure medium will be withdrawn from one side of each piston and abutments and will be forced into the cylinder at the

other sides of the pistons to rotate the piston shaft to swing the arms in one direction. Then, reversal of the pump reverses the flow of liquid to reverse the direction of rotation.

Movement in one direction or the other is limited by exhaustion of liquid from the suction side, also by loosely mounted valve disks as at 40 in Fig. 4, carried by pins 41 on the pistons 11—11' in positions at which they are adapted to close over the outlet passages when the pistons reach their limit of travel, thereby to shut off further delivery of liquid to the pump.

I have also added, as a safety factor, the haul back rollers 45 rotatably mounted on studs 46 fixed in bracket pieces 47 mounted on the cross shaft 25 closely adjacent the yokes 23 and rollers 24. These haul back rollers overlap the flanges of the base beams 2, as seen in Fig. 6, and retain the beams seated against the rollers both in raising and lowering the body. This connection provides not only for positive raising of the body but also positive lowering under power delivered through the lever arms.

The brackets 47 are held in place by collars 49 that are slidable on the shaft 25 against them and which have set screws 50 therein adapted to be tightened against the shaft to hold them at a set position. Should it be desired to disconnect the levers from the body, the collars are loosened and adjusted inwardly on the shaft. Then the brackets 47 may be adjusted inwardly to disengage the haul back rollers from the beam flange. Assembly of these parts is made easy by reason of the fact that shaft 25 is of one diameter and may be slipped through openings provided for it in the yokes and rollers mounted within the yokes.

Devices of this character may be made with one piston and abutment or with any desired number. However, the more used, the less will be the travel of the piston. They may be made in different sizes, and use any desirable pressure medium, either air or liquid.

While, in the specification and in the following claim, I have specified the use of a reversible pump 35, it is not intended that the mechanism be limited specifically to a reversible pump, but that this term shall be construed to mean a pump that is reversible to cause a reversal in direction of flow of liquid or any valve devices or other equipment in connection with a pump, that can be adjusted in a manner to cause a reversal of flow of liquid.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters-Patent is:—

A device of the character described, comprising a closed cylinder, a rotary piston coaxially thereof, an abutment fixed in the cylinder having passages therein opening into the cylinder at opposite sides of the abutment and leading to the exterior of the cylinder, a fluid pressure medium filling the cylinder between the abutment and opposite sides of the piston, a reversible pump having pipe connections with the outer ends of said passages of the abutment and operable to cause a forcible delivery of the pressure medium from one side to the other of the piston to actuate it accordingly, and valve plates mounted by the piston in position to close over the inner end of the suction passage at the end of movement of the piston in either direction.

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