Aug. 14, 1928. 1,680,834

E. L. WOOD

DUMPING BODY HOIST

Filed Oct. 18, 1926 3 Sheets-Sheet 1

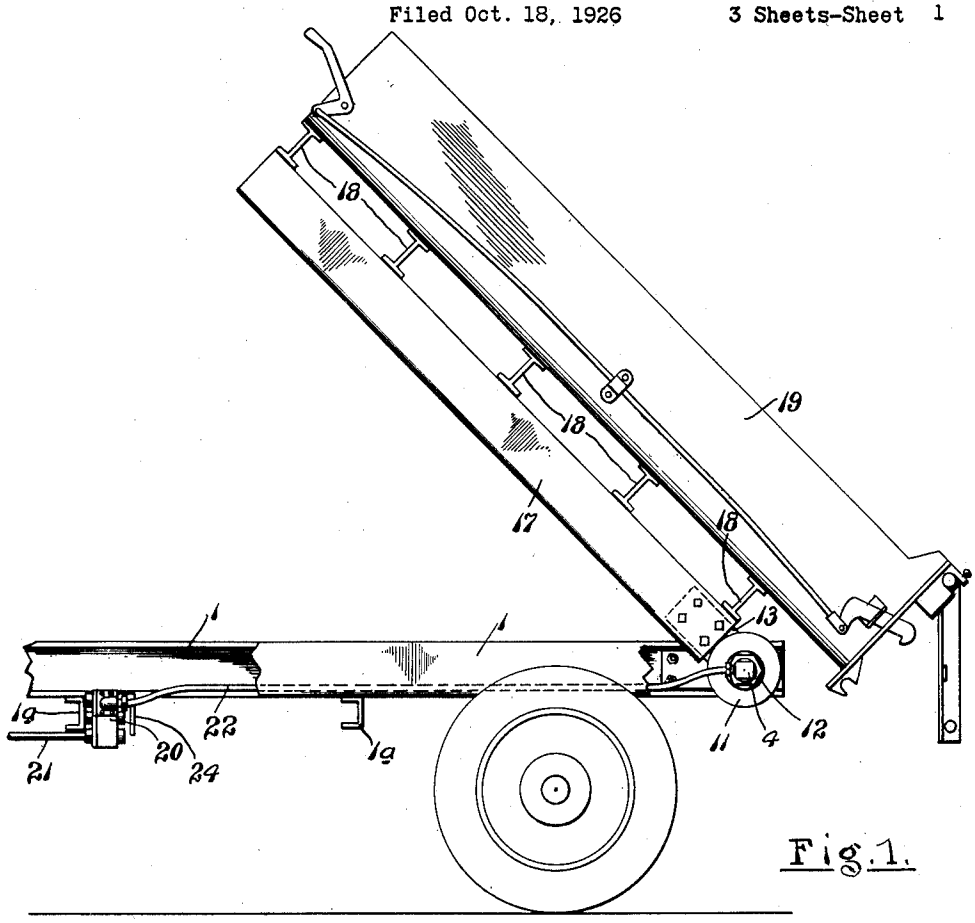


Fig. 1.

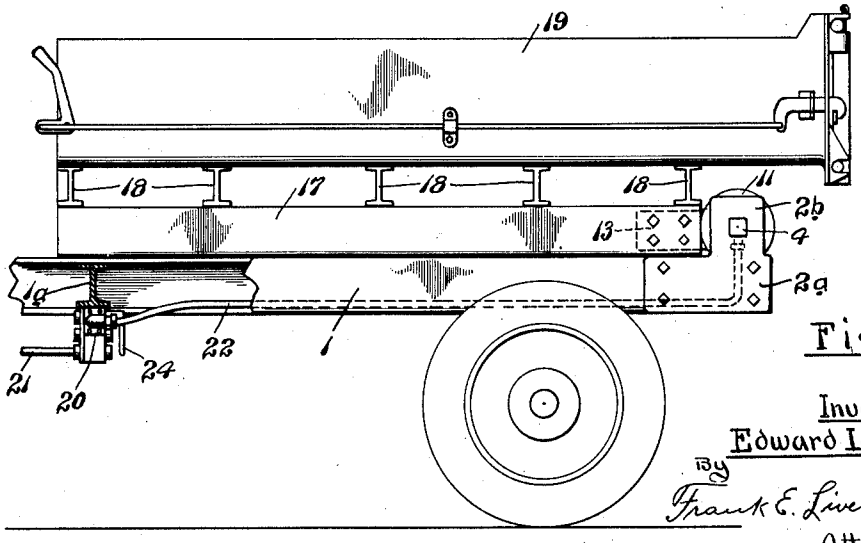


Fig. 2.

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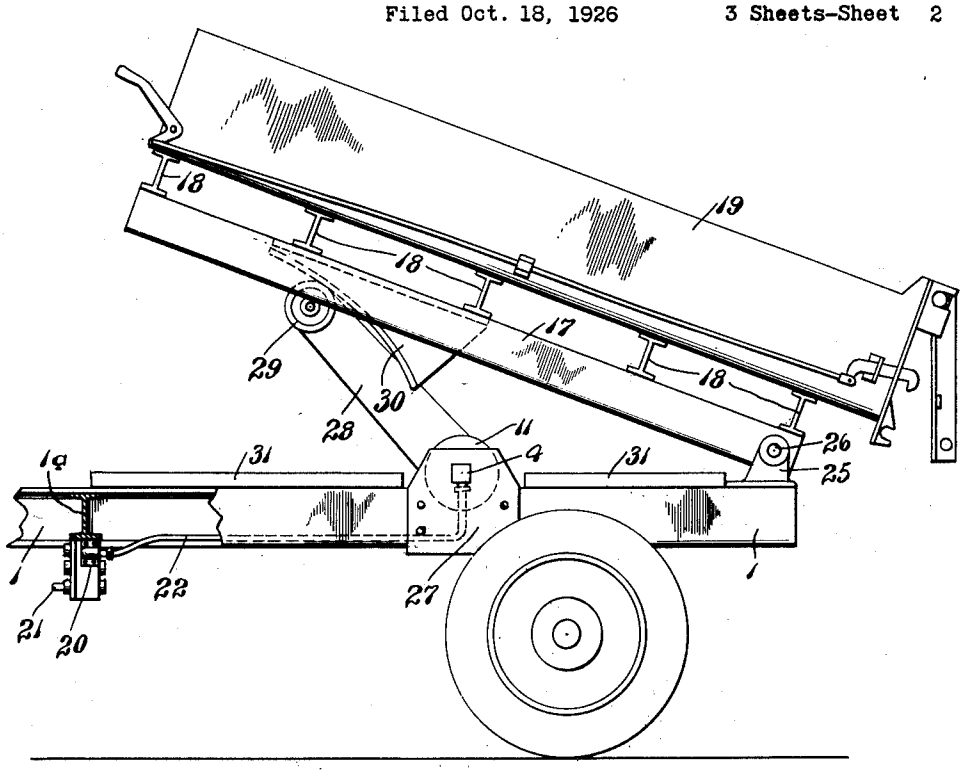
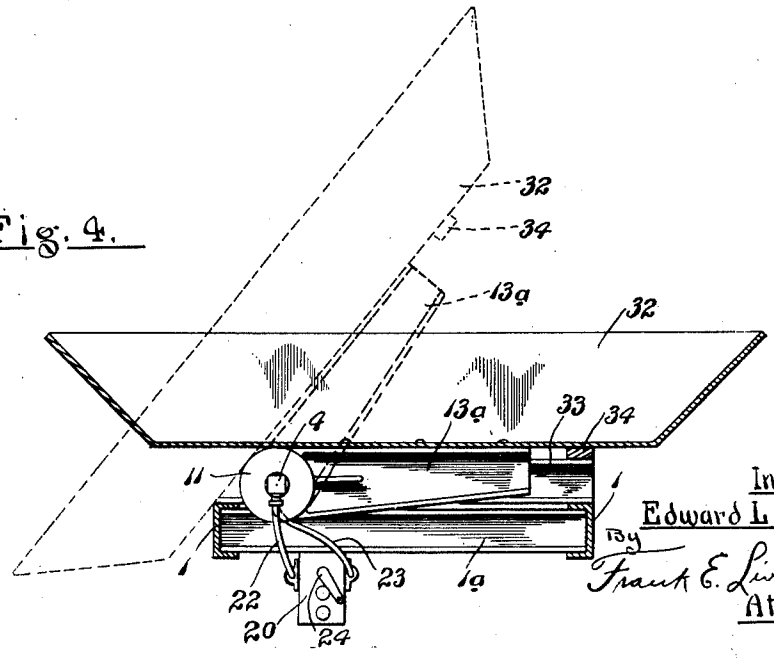


Fig. 3.

Fig. 4.



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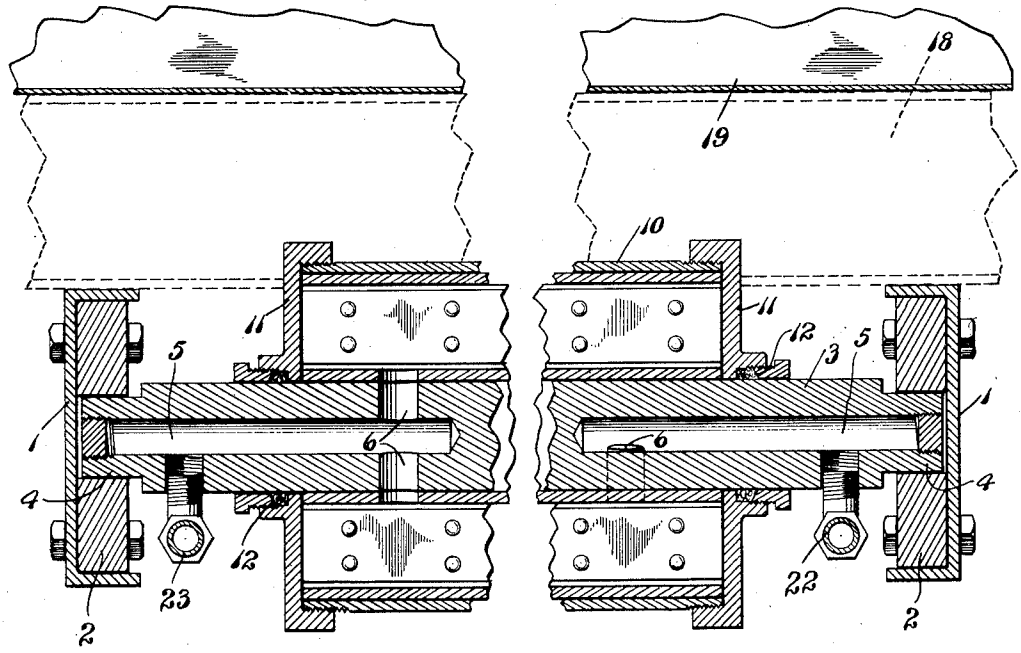


Fig. 5.

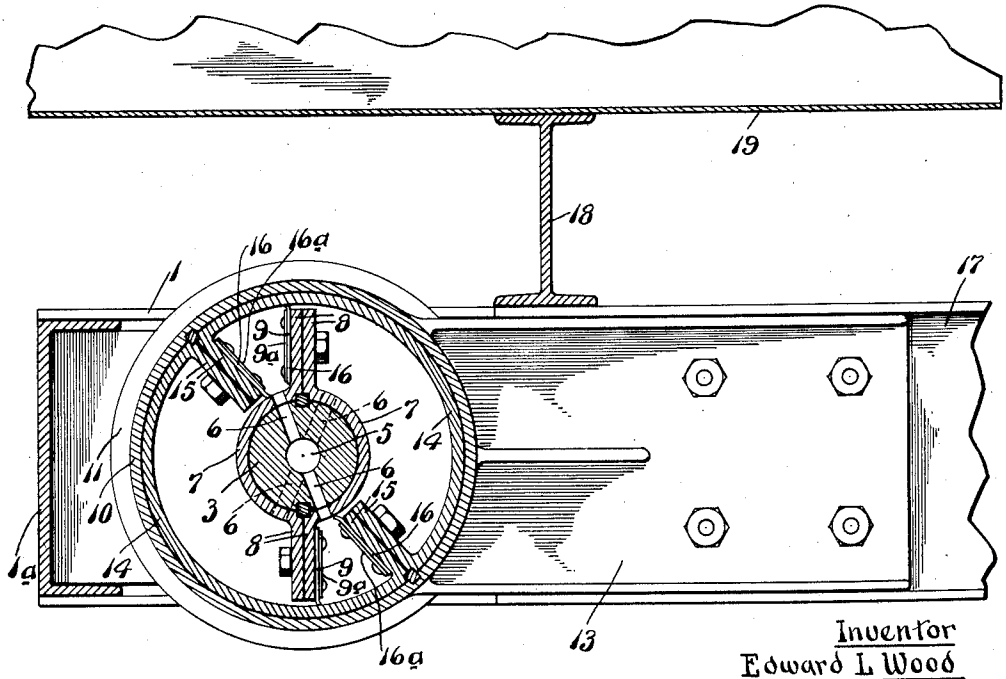


Fig. 6.

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UNITED STATES PATENT OFFICE.

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DUMPING-BODY HOIST.

Application filed October 18, 1926. Serial No. 142,244.

This invention relates to a hoist applicable to dumping bodies and in other relations and is particularly concerned with a simple and novel construction of hoist of this character by means of which a load carrying body mounted on a motor vehicle may be tilted so as to dump its contents; while in other applications of the hoist, the development and application of great force and power may be attained.

It is an object and purpose of the present invention to provide a hoist of simple and economical construction which occupies little space and permits the mounting of the tilting body at a low position on the motor vehicle frame, thus keeping the center of gravity of the load low with the result that the tendency toward tipping or swaying is lessened. A further object of the invention is to provide a hoist which is applicable to many types of construction, whereby the trucks of lighter construction which carry comparatively light loads may have the hoist applied in one manner, those of heavier capacity may have the same applied in a different manner, while for side dumping constructions it may be applied in yet a different manner, the hoist by reason of its novel construction being readily applied in the different ways to effect its purpose. A still further object of the invention is to provide a novel hydraulic lifting hoist which may be used not only to tilt a motor vehicle dumping body but may serve as the tilting mounting therefor with a resultant simplicity of construction. These objects and purposes and constructions for attaining the same, together with many others not at this time specifically stated, will appear as understanding of the invention is had from the following description taken in connection with the accompanying drawings, in which,

Fig. 1 is a fragmentary side elevation with some parts broken away and in section, illustrating my hoist applied to a dumping body, the body being shown in tilted position.

Fig. 2 is a view similar to that shown in Fig. 1, but illustrating a slight difference in construction in that the body is mounted at a plane somewhat higher than that shown in Fig. 1, the body being shown in lower horizontal position.

Fig. 3 is a side elevation similar to those shown in Figs. 1 and 2 illustrating the application of the hoist to heavy duty motor vehicles or trucks.

Fig. 4 is a transverse vertical section showing the hoist applied to a side dumping body.

Fig. 5 is an enlarged central longitudinal section through the hoist construction of my invention, and

Fig. 6 is a transverse vertical section through the construction shown in Fig. 5.

Like reference characters refer to like parts in the several figures of the drawings.

The hoist which I have devised, as one of its applications, is designed to be used for dumping the bodies tiltably mounted on motor vehicles. In the adaptation of the hoist shown in Fig. 1 the chassis side frame members of the vehicle are indicated at 1 and on the inner side and at the rear end portion of each of said chassis frame members, heavy metal blocks 2 are permanently secured substantially filling the space between the upper and lower flanges of the members 1. Of course, the side members of the chassis frame are connected in the usual manner by cross braces or bars 1^a.

In the construction shown in Fig. 1 and also illustrated in section in Fig. 5, a cylindrical shaft 3 is disposed between the blocks 2 previously described, at each end having squared portions 4 which fit in square holes made in the blocks 2 so that the shaft is rigidly held against rotation. This shaft is bored longitudinally from each end for a distance, making the passages 5. Passages 5 are closed at their outer ends by suitable plugs as shown, and near their inner ends ports 6 are made radially through the shaft 3 to the outside thereof. In the construction I have shown two diametrically opposed ports leading from the passages 5. This number, however, may be increased in different designs of the hoist in accordance with the number of chambers in the hoist to which the liquid is forced, as will later appear.

The shaft 3 at its intermediate portion has two members of metal attached thereto, each having an intermediate section 7 of semicircular form, from the edges of which wings 8 extend radially outward. The parts 7 of the members fit against the outer sides of the shaft 3 and the wings 8 come against each other and are permanently secured together by means of bolts thereby making two diametrically opposed and outwardly extending vanes. On one side of one of said vanes a packing 9 is located and permanently

secured by a sheet metal plate 9^a extending over the major portion thereof. The other vane is equipped with a similar packing held on by similar plate 9^a. The outer edges and ends of said packing extend beyond the outer edges and ends of the vanes made by the parts 8, as best shown in Fig. 6. Suitable keys, shown in Fig. 6, are used to key the structure securely to the shaft 3 so that it is permanent with respect thereto.

The shaft 3 with the vane structure described attached thereto is surrounded by a cylinder 10 closed at its ends by heads 11 secured thereto in any suitable manner. The shaft 3 passes through the heads and where the shaft thus passes stuffing boxes 12 are provided to preclude the escape of liquid used in the operation of the structure. The stuffing boxes are of conventional and well known construction and are fully illustrated in Fig. 5. The cylinder 10, near each end thereof, has an arm 13 extending radially therefrom, the purpose of which will later appear.

Within the cylinder 10 two linings 14 of metal are located, each being of semi-circular form and each having vane members 15 turned inwardly so that in assembling the linings 14 in the cylinder the vane members 15 lie against each other and may be bolted together. The linings 14 are likewise keyed securely to the cylinder 10 and the two vanes made by the members 15 are equipped with packings 16 held in place by sheet metal plates 16^a the inner edges and ends of the packings extending beyond the inner edges and ends of the vanes so as to contact with the semi-cylindrical sections 7, as shown in Fig. 6. The projecting outer edges and ends of the packings 9 bear against the inner surfaces of the linings 14. At their ends all of said packings bear against the heads 11. The ports 6 associated with one of the passages 5 communicate with openings made through the semi-cylindrical part 7 which openings are located between the vanes 8 and 15, as shown in Fig. 6, on the adjacent sides of which the packings 9 and 16 are disposed. The ports 6 associated with the other passage 5 communicate with the chambers between the vanes 8 and 15 located between the sides of such vanes as are not equipped with the packing.

When the hoist described is mounted between the rear ends of the side chassis members 1 of the truck, the arms 13 extend forward and are located between the side members 1 of the chassis frame. Bed rails 17 are attached at their rear ends to the arms 13 and extend forward lying between the side members 1 of the chassis frame. A plurality of spaced apart cross sills 18 are attached to and above the bed members 17, above which the body 19 is located and secured. This body may be of any conventional construction with pivoted tail gate and latching means therefor, none of which, as shown in the drawings, is any part of the present invention and it therefore will not be described.

A gear pump 20 of well known construction is mounted on one of the cross members of the chassis frame, it being driven by a shaft 21 connected in the well known and conventional manner with the transmission gearing of the motor vehicle. The pump has a pipe 22 leading therefrom to one end of the shaft 3 so as to communicate with one of the passages 5. A second pipe 23 is connected with the opposite end of shaft 3 communicating with the passage 5 at such end and leads back to the pump 20.

The pump, pipes 22 and 23, passages 5, ports 6 and the interior chambers within the linings 14 are filled with a liquid, usually oil. When the pump is operated, oil is forced through the pipe 22 to the passage 5 at one end of the shaft 3 and thence through the associated ports 6 so as to come to the chambers between the packing lined sides of the vanes 15 and 8. Because of the rigidity of the shaft 3 and of the vane members attached thereto, said vanes 8 serve as abutments against which the pressure of the oil forced into said chambers reacts, while the vanes 15 are moved away from the abutment vanes 8, thereby turning the cylinder 10, the attached arms 13 and the bed members 17 in an upward direction and tilting the body 19 about the axis of the shaft 3. The oil which is in the chambers between the sides of the vanes not equipped with the packings is forced out through the pipe 23 to the gear pump so as to supply the pump with oil that it may pump the same through the pipe 22. By reason of the length of the cylinder 10 and the corresponding length of the vanes within the same, together with the width of said vanes, a large area is provided against which the pressure of the oil may act. For example, if there are 120 square inches of vane surface in the vanes 15 and the pump pressure of the pump is 150 lbs. per square inch the pressure exerted on said vanes will be the product of the two, or 18,000 lbs. As a matter of actual practice the pump pressure which may be supplied from the pump is far above 150 lbs. per square inch. It can go as high as 1000 lbs. per square inch. It is evident therefore that an enormous force can be supplied to turn the cylinder to which the arms 13 and the mount for the body 19 are attached, about the axis of the shaft 3 so that although the lever arm of the applied force on the vanes 15 is relatively short, nevertheless a very heavy load can be tilted. The body may be tilted to any desired angle. The location of what may be termed the outlet ports 6 can be wherever desired and when the body has

tilted to a certain degree, so that the packings 16 come to and pass by the ends of such outlet ports, then the circulation of the oil will continue without further tilting the body. A very high tilting of the body may be obtained, this being very desirable for many reasons.

When a body has been tilted and the contents thereof dumped the turning of a lever 24 associated with the gear pump reverses the direction of flow of the liquid. The body thereupon returns to lower horizontal position. This is accomplished under the weight of the body, it not being necessary to drive the pump.

In Fig. 2 much the same construction is shown as is illustrated in Fig. 1. The difference consists in locating the supporting plates 2^a at the rear ends and outer sides of the chassis frame members 1 and providing said plates with upper extension 2^b through which the squared ends 4 of the shaft 3 pass. In this manner the bed members 17 are located above the chassis side frame members and not between the same and may also be spaced farther apart with a consequent lengthening of the cylinder 10 to produce greater lifting force. Inasmuch as trucks are not usually designed for the application of bodies but the dumping body and its mounting must be designed for trucks already built, this construction is usually necessary by reason of the fact that the cross members 1^a of the chassis frame are usually located in the same plane as the side chassis frame members 1 and it is necessary that the bed rails 17, if they are to lie horizontal, shall be located above the upper sides of said cross members. By dropping the cross members to a lower position the rails 17 may be located between the side frame members 1 of the chassis and thus lower the body as in Fig. 1. Either form of construction and mounting can be used with the hoist of my invention.

The construction shown in Figs. 1 and 2, where the hoist is located at the rear end of the rails 17 and the axis of tilting of the body is that of the shaft 3, it is evident that great force will be required to lift and tilt heavy loads. The construction shown in Figs. 1 and 2, accordingly, is best adapted for the lighter duty trucks. When a heavy duty truck is to be equipped with the invention it may be installed as shown in Fig. 3. In this case the rear ends of the rails 17 are pivotally mounted on brackets 25 attached to the rear ends of the frame members 1, a suitable rod 26 passing through the brackets and the rail 17. The supporting plates 27 which carry the hoist are attached to the frame members 1 of the chassis forward of the position that the plates 2 or 2^a occupy in the construction illustrated in Figs. 1 and 2. The arms 13 extending from the cylinder 10 are replaced by longer arms 28 at the free ends of which rollers 29 are mounted adapted to bear against the undercurved surfaces of cams 30 connected to certain of the cross sills 18 on which the body 19 is secured. With this construction, when the cylinder 10 is turned on operating the pump 20, the arms 28 are elevated and rollers 29 bear against the cams 30 tilt the body as shown in Fig. 3. The design of the under cam surfaces of the cams 30 is such that the tilting of the body at the beginning of its movement is slow, increasing as the body is further tilted. This is for the reason that the greatest power is required in the beginning when the body and the weight are located horizontally while after the same have been partially elevated and tilted less power is required. With this construction filler blocks 31 may be located above the side members 1 of the chassis frame on which the bed rails 17 rest when the body is in lower horizontal position.

In Fig. 4 the hoist is shown as applied to a side dump. The body 32 in this case is tilted sidewise, the hoist being mounted longitudinally to one side of the chassis frame with the arms 13^a extending transversely of the said frame, the body being permanently secured to said arms. A suitable support 33 for the opposite side of the body 32 is attached to the chassis frame on which a block 34 attached to the under side of the body may bear so that the body will be held horizontal when in its lower position. The method of tilting the body sidewise is evident and need not be further described.

As previously stated this hoist is of simple construction and can be very quickly and easily installed, is capable of developing great force and power and is very practical and efficient. It may be used in a great many relations and while the same has been shown primarily in connection with the dumping of tilting bodies the invention in no sense is limited to this one place of application. It is evident that numerous modifications in structure may be resorted to. For instance, while two pairs of vanes 8 and 15 are shown in the structure and the linings 14 each covers one half of the inner surface of the cylinder 10, it is evident that the number of vanes may be multiplied and the oil instead of being directed to two chambers may be directed to a larger number of chambers. The principle of operation, however, will remain the same. Many other changes in constructive detail may be resorted to without departing from the invention and and I, accordingly, do not wish to be limited other than is required by the terms of the appended claims defining said invention.

I claim:

1. In a construction of the class described, spaced apart supports, a shaft located between and held against rotation by said sup-

ports, said shaft having a longitudinal passage therein inwardly for a distance from each end, a cylinder surrounding the shaft at its intermediate portion for the greater portion of its length, heads around the shaft closing the ends of the cylinder, said shaft having a port from the inner end of each longitudinal passage therein to the outer side of the shaft, an abutment extending radially from the shaft to the walls of the cylinder, a vane extending radially inward from the wall of the cylinder to said shaft, one of said ports at one end of the shaft lying between the vane and abutment between adjacent sides thereof, the other of said ports at the opposite end of the shaft leading to the cylinder between the opposite sides of said vane and abutment, a pump for pumping liquid, and pipes leading from said pump to and connected with said shaft at opposite ends thereof so that liquid may be forced by the pump into the shaft at one end and return to the pump through the shaft at its opposite end.

2. In combination with a chassis truck frame, a shaft carried between the sides of the frame, a cylinder located around the shaft for the major portion of its length, the shaft at each end extending beyond the ends of the cylinder, heads closing the ends of the cylinder, lifting arms projecting from the cylinder adapted when the cylinder is turned to tilt a dumping body mounted on said truck frame, and means for hydraulically turning the cylinder about said shaft and lifting said arms.

3. In a construction of the class described, a chassis frame having spaced apart side frame members, a shaft carried between said chassis frame members and held against rotation, a cylinder surrounding the shaft, lifting arms projecting from the cylinder, a dumping body, and means for hydraulically turning said cylinder on the shaft, said arms being associated with the dumping body to tilt the same when the cylinder is turned.

4. In a construction of the class described, a chassis frame, a shaft horizontally mounted on said chassis frame and held against rotation, a cylinder around said shaft, lifting arms projecting from the cylinder, a dumping body attached to said arms, and means for hydraulically turning the cylinder so as to tilt the body about the axis of said shaft.

5. In combination with a truck frame, a shaft carried by and adjacent the rear ends of said truck frame, said shaft being held against rotation, a cylinder surrounding the shaft for the major part of its length between its ends, lifting arms extending forwardly from the cylinder, rails attached to and extending forwardly from said arms, a dumping body carried by and above said rails, and means on said shaft and cylinder coupled with means for forcing liquid between the means on the shaft and cylinder to thereby turn the cylinder about the axis of the shaft and tilt the body.

6. In combination with a truck frame having side frame members, heavy supporting plates attached to the rear ends of said side frame members, each having a non-circular opening therethrough, a shaft having ends formed to fit said openings located between the supporting plates, a cylinder surrounding the shaft between the supporting plates, heads around the shaft closing the ends of the cylinder, lifting arms extending forwardly from the cylinder, rails attached one to each lifting arm and extending forwardly therefrom, a dumping body carried on and above said rails, means for pumping liquid into the cylinder adjacent one end and for taking liquid away from the cylinder at the opposite end, and means enclosed by the cylinder attached to said cylinder and shaft whereby on operation of the pumping means the cylinder is turned about the shaft to thereby tilt the dumping body about the axis of the shaft.

7. In combination with a truck frame including side frame members, a shaft carried by and between the side frame members, said shaft being held against rotation, a cylinder surrounding the shaft, heads closing the ends of the cylinder and also located around the shaft, means within the cylinder attached to the shaft and cylinder whereby when liquid is pumped into the cylinder at one end and taken away therefrom at the opposite end, said cylinder will be turned about the shaft, a dumping body connected with the cylinder and elevated thereby on the cylinder turning in one direction, a pump carried by the truck frame, and pipes, one leading from the pump to supply liquid to the cylinder and the other leading to the pump to return oil from the cylinder, said pump being located in front of the cylinder and said pipes lying along opposite sides of the truck frame.

8. In combination, a horizontal shaft, a cylinder surrounding the shaft for the major portion of its length, the shaft at each end extending beyond the adjacent end of the cylinder, heads through which the shaft passes closing the ends of the cylinder, said shaft having a longitudinal passage centrally thereof at each end for a distance and said shaft within the cylinder having a plurality of ports radially formed therethrough from its outer side to the said passages, a plurality of metal abutment members having intermediate sections shaped to fit against the shaft and having outwardly extending radial abutment sections extending from the curved intermediate sections, said outwardly extending sections of contiguous

members lying against each other, means securing said outwardly extending sections together whereby radial fixed abutments are provided lying substantially the full length of the cylinder, an equal number of curved lining members located within the cylinder, each at its longitudinal edge being bent radially inward to form vane sections, the contiguous vane sections of adjacent members lying against and being secured together, said members being keyed to the cylinder and said members on the shaft being keyed to the shaft, the ports from the passage through the shaft at one end being adapted to deliver liquid pumped through said passage between the vanes and abutments at one side thereof, while the ports to the passage at the opposite end of the shaft carry liquid from between the vanes and abutments at their opposite sides whereby on forcing liquid into the cylinder at one end and carrying it away from the other by means of said passages and ports the cylinder is turned about the axis of said rod.

9. A truck comprising a frame, a shaft nonrotatably mounted thereon, a cylinder located around said shaft, a load-carrying body rigid with said cylinder, and means for forcing fluid into said cylinder through said shaft to cause the body to tilt, and means whereby when the body has been tilted a predetermined amount, the fluid is allowed to continuously circulate through said cylinder and thereby limit the tilting of the body.

In testimony whereof I affix my signature.

EDWARD L. WOOD.