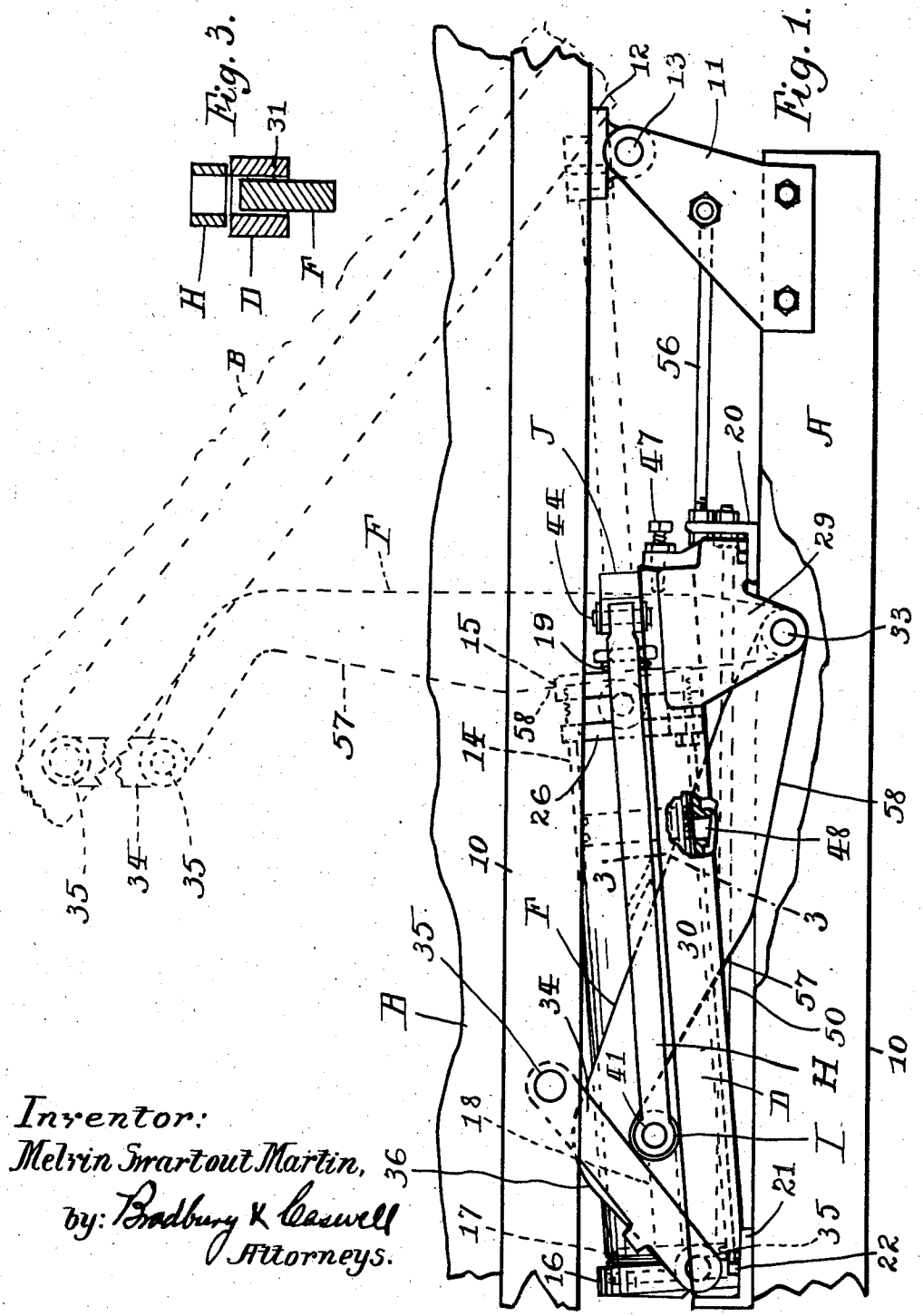
May 5, 1925. 1,536,959

M. S. MARTIN

HOIST FOR VEHICLE DUMP BODIES

Original Filed April 12, 1921 2 Sheets-Sheet 1



Inventor:
Melvin Smartout Martin,
by: Badbury & Caswell
Attorneys.

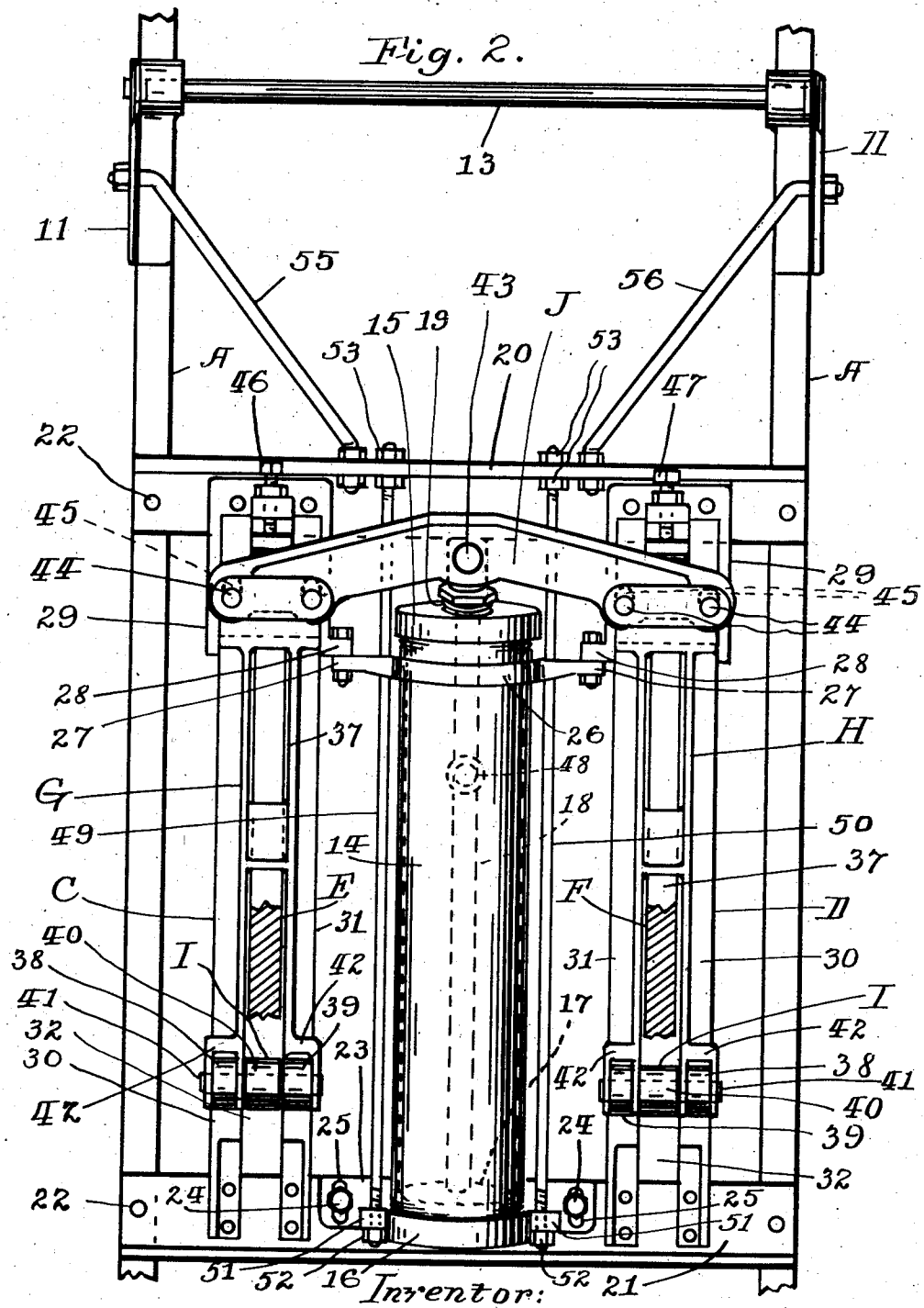
May 5, 1925. 1,536,959

M. S. MARTIN

HOIST FOR VEHICLE DUMP BODIES

Original Filed April 12, 1921 2 Sheets-Sheet 2

Fig. 2.



Inventor:
Melvin Smartout Martin,
By: Bradbury & Boswell Attorneys.

Patented May 5, 1925. 1,536,959

UNITED STATES PATENT OFFICE.

MELVIN SWARTOUT MARTIN, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO GRANT WALDREF, OF ST. PAUL, MINNESOTA.

HOIST FOR VEHICLE DUMP BODIES.

Application filed April 12, 1921, Serial No. 460,759. Renewed February 2, 1925.

To all whom it may concern:

Be it known that I, MELVIN SWARTOUT MARTIN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented new and useful Improvements in Hoists for Vehicle Dump Bodies, of which the following is a specification.

My invention relates to means for tilting the dump bodies of ordinary dump vehicles and in which the body is tilted to a predetermined angle to facilitate unloading and distributing coil, gravel, sand or any other material carried by the body. The means employed constituting my improvement includes in its mechanism a lever which is interposed between the frame of the vehicle and the body, said lever being swung upwardly to tilt the body by any suitable ram, winch or elevating element, that employed not solely constituting my invention but co-operating therewith in a manner suitable to apply a lifting effort either automatically or partly by hand. With the present improvement the lifting effort is applied by a powerful wedging action thereby minimizing the power required during the initial raising of the load and thereafter. This improvement further provides in its mechanism when a hydraulic ram is employed as the prime power element a lifting or tilting arm against which the wedging element functions so shaped as to equalize liquid pressure at all points of the lifting operation. In dump vehicles of ordinary construction which are at present in common use as the body or receptacle is tilted, its center if gravity is gradually being brought nearer to a vertical plane passing through the pintle which connects the receptacle with the vehicle frame, thus ordinarily the force necessary to tilt the parts and the compression of the raising fluid is continuously decreasing, whereas with my improvement this force remains substantially constant which is an advantage.

A further object of my invention is to provide compensation of the parts that will eliminate body and hoist strains when the load is greater on one side than on the other and particularly when the hoist is lifting.

A further object is to limit the travel of the tilting mechanism as desired and to provide ready adjustment of such limitation.

A further object is to unite the parts of the tilting mechanism into a single unit of construction whereby the device can be readily handled and applied to vehicles with a minimum amount of labor and expense.

A still further object is to support the parts adjustably so that when a hydraulic ram is employed as a prime lifting element the by-pass of the cylinder can be made to permit the escape of liquid immediately when desired and when the body reaches the desired angle of inclination in dumping position.

With these and other objects in view, my invention comprises the features of construction and combination of parts hereinafter described and claimed.

In the accompanying drawings forming part of this specification, Figure 1 is a side elevation of a portion of a vehicle frame having a portion of a dump receptacle pivoted thereto which is designed to be tilted by my improved mechanism, said mechanism and receptacle being shown in operating position in dotted lines and a portion of the mechanism being broken away and in section to show more clearly the by-pass in the cylinder wall of the ram; Fig. 2 is a plan of the structure shown in Fig. 1, the body or receptacle being removed and a portion of the levers broken away, and Fig. 3 is a section of a detail taken on the line 3—3 of Fig. 1.

In this specification of which the drawings form a part only so much of a vehicle frame or chassis and dump body or receptacle are illustrated as is required to show the application of my improved mechanism thereto, the general construction of dump vehicles being familiar to those skilled in this art. In the drawings, A designates the side bars of an ordinary vehicle chassis and B indicates a portion of the dump body or receptacle which is mounted upon the usual body supporting frame having side bars 10. The body B is hinged near its rear end by means of hinge plates 11 on the chassis, hinge fittings 12 on the body frame and a pintle shaft 13 passing through said plates and fittings.

My improved hoist is of unitary type,

that is it is so constructed that it can be bodily applied to any ordinary chassis under the body and its lifting member applied to the body to function in its prescribed manner, that is to tilt the body round about its pintle. This improved hoist has among its component parts a ram which as illustrated is of hydraulic type but it should be understood that a ram of any desired form may be employed such as of a mechanical, electrical or any other type. The ram shown has a hydraulic cylinder 14 disposed longitudinally of the chassis and provided with end caps 15 and 16 threaded thereon. Inside the cylinder is the usual piston 17 from which extends the thrust shaft 18, said shaft being adapted to slide through the gland 19 in the cap 15. The cylinder is mounted upon a frame of any suitable construction, that shown having two transverse angle bars 20 and 21 which are secured by bolts 22 or other suitable means to the side bars A of the chassis. The cylinder cap 16 is formed with a flanged base 23 which is secured upon the transverse angle bar 21 by bolts 24 or other suitable means passing through slots 25 in said base and which are disposed longitudinally of the chassis. Thus the cylinder can be fastened in selected longitudinal position on the chassis as desired. The forward end of the cylinder is slidably supported in the collar 26 which is formed with laterally extending wings or bosses 27 which are bolted or otherwise secured to bosses 28, said last mentioned bosses being formed on the sides of brackets 29 which in turn are bolted or otherwise secured to the angle bar 20. The brackets in addition to rigidly supporting the collar 26, receive and hold rigidly the ends of the channel track bars C and D, the opposite ends of said track bars not so held by the brackets 29 being rigidly secured to the angle member 21. The track bars are disposed on the opposite sides of the cylinder of the ram in parallelism and their upper track surfaces slant upwardly and rearwardly of the chassis in the same direction as is assumed by the cylinder. Each channel track member C and D has a pair of sides 30 and 31 spaced apart transversely of the chassis leaving a longitudinal channel 32.

The collar 26 permits the cylinder to turn freely about its axis, thus compensating for twisting movement of the chassis which might otherwise strain the cylinder or parts which support or are connected with the cylinder.

The body of the vehicle is tilted upwardly by a pair of lifting arms E and F, the arm E passing upwardly through the channel in track or guide rail C and the arm F passing upwardly through the channel in track or guide rail D. The lower ends of lifting arms E and F are pivoted at 33 in the brackets 29 below the track or guide rails. These lifting arms slant upwardly and forwardly of the chassis when in lowered position and their upper ends above the track or guide rails are secured to the side bars 10 of the body by links 34, the mode of attachment of the links to the bars and arms being by means of pivot connections 35. The upper ends 36 of the lifting arms are struck downwardly at an angle to accommodate the linkage and the linkage is employed to provide a freely movable connection between the lifting arms and the body frame.

Arranged above the pair of track or guide rails C and D is a pair of pull rods G and H, said rods being disposed longitudinally of the chassis and each rod being formed with a longitudinal channel 37 which registers over the corresponding channel in the track or guide rail immediately below. The forward end of each pull rod has a wedging element I, which is formed by a pair of antifriction rollers 38 and 39 bearing upon the upper surfaces of the sides of the track rails and disposed to roll longitudinally along said rails and an intermediate antifriction roller 40 which is disposed to roll along the under side of the companion lifting arm E or F. All of said antifriction rollers are freely journaled on a shaft 41 which is fitted into yoke frames 42 on the end of the lifting arm. Thus as the pull bars are pulled backwardly of the chassis a wedging action is imparted between the track rails and the lifting arms, causing the lifting arms to tilt upwardly and raise the vehicle body into the broken line position indicated in Fig. 1 of the drawings. The pulling movement described is imparted to the pull rods by means of the cross arm J which has its body portion intermediate of its ends pivotally attached at 43 to the outer end of the thrust shaft 18 of the ram. The outer extremities of this cross arm are freely connected to the rearward ends of the pull rods by means of the pin and slot connections 44 and 45, said connections together with the pivot attachment 43 providing compensation that will eliminate body strain when the load is greater on one side than the other.

The lifting movement of the arms E and F is defined and limited by means of stop screws 46 and 47 in the brackets 29, against which the lifting arms may strike. These screws may be adjusted and locked in adjusted position when desired. When so adjusted the upper limit of travel of the body is limited.

The cylinder is provided in its wall with a bi-passage 48 which is so arranged that when the piston reaches the end of its desired outer stroke the compression fluid is released and allowed to escape thus ceas-

ing to force the piston beyond its desired movement. To regulate the position of this bi-passage and of the consequent outward stroke of the piston the cylinder can be adjusted longitudinally by means of the pair of tie rods 49 and 50 which are disposed on the opposite sides of the cylinder. The tie rods are threaded into bosses 51 on the cylinder cap 16 and locked in regulated position by means of the lock nuts 52. These tie rods are also secured in regulated position in the angle bar 20 by means of the lock nuts 53. When regulating the cylinder as described the bolts 24 are first loosened and the slots 25 permit the regulating movement to transpire and after the cylinder has been regulated the bolts are again tightened. The tie rods 49 and 50 also create an equal strain on both front and rear bars 20 and 21 and also assist in transmitting equal strain upon the hinge plates 11 through the diagonal tension rods 55 and 56. All of these rods serve to prevent any possibility of the hoisting mechanism slipping on the chassis and reduce body, hoist and chassis strains. This is a particular advantage in the event of uneven loading of the body. The rods 55 and 56 are bolted to the hinge plates 11 and to the angle bar 20.

The lower surfaces of the lifting arms with which the wedging rollers contact and force the body up into tilting position are so shaped as to cause the pressure of the liquid in the cylinder of the ram to be equalized at all periods of the lifting operation. The shape shown provides a slanting portion 57 during the period of the stroke when the lifting arm first lifts the body, said portion gradually turning upwardly and merging into the portion 58 when the body finally approaches fully tilted or dumping position. This shape or a shape approaching it will cause the pressure of the liquid in the cylinder urging the piston outwardly to equalize at the various periods of the lifting operation.

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.

I claim:

1. In combination with a vehicle chassis having hinge elements near its opposite sides, a body mounted upon said hinge elements to tilt upwardly, a ram having its piston movably connected with the body to tilt the body upwardly, and having the outermost end of its cylinder movably mounted upon said chassis to turn, and tie rods coupled to the innermost end of the cylinder and to said hinge elements adapted to support a portion of the effort of the cylinder and relieve strain upon the chassis during the upward tilting movement of the body.

2. In combination with a vehicle chassis, a body hinged to swing upwardly upon said chassis, a pair of cross bars upon said chassis and a ram having its piston movably connected with the body to tilt the body upwardly and having its cylinder movably supported at its inner end upon one of said cross bars and secured by tie rods to the other of said cross bars, whereby part of the effort of the cylinder during the lifting movement of the ram is transmitted directly from one of the cross bars to the other to distribute the lifting effort of the ram more evenly over the chassis.

3. In combination with a vehicle chassis, a dump body hinged upon said chassis to swing upwardly, a lifting bar movably associated with said body and chassis for swinging said body upwardly, and a ram having its piston connected with said lifting bar for swinging said bar upwardly and its cylinder slidingly supported at one of its ends and adjustably secured by its other end on a cross bar on the chassis, whereby the position of said cylinder on the chassis may be regulated.

4. In combination with a vehicle chassis, a dump body movably mounted upon said chassis to tilt upwardly, a hoist associated with said body to tilt the latter upwardly, said hoist having a cylinder provided with a bi-pass in its wall and a piston reciprocable in the cylinder and adapted to uncover said bi-pass at the end of its stroke and the length of said stroke governed thereby, one of said hoist parts being mounted upon said chassis and the other connected with said body and said points of mounting and connection being variable so that the length of stroke of said piston will be governed according to said regulated position of said bi-pass.

5. Hoisting apparatus for vehicle bodies, comprising, in combination, a chassis, a vehicle body hinged to said chassis and adapted to swing upwardly into dumping position, a hoist having a hydraulic cylinder provided with a bi-pass in its wall and a piston reciprocable in the cylinder and connected with the body to tilt the latter by its thrust movement, said piston being adapted to uncover said bi-pass at the end of its outward stroke, a frame secured to the chassis and upon which the hoist cylinder is movably mounted, and adjusting means for securing said cylinder on said frame and whereby the position at which the piston uncovers the bi-pass is regulated.

6. In combination with a vehicle chassis, a dump body movably mounted upon said

chassis to tilt upwardly, a hoist associated with said body to tilt the latter upwardly, said hoist having a cylinder provided with a bi-pass in its wall and a piston reciprocable in the cylinder and adapted to uncover said bi-pass at the end of its stroke and the length of said stroke governed thereby, one of said hoist parts being mounted upon said chassis and means for regulating the position of said bi-pass so that the length of stroke of said piston will be governed accordingly.

7. In combination with a vehicle having a chassis, a body carried by the vehicle in hinged relation to said chassis, a lifting arm below the body hinged near one end to the chassis and movably coupled near its other end to the body whereby an upward swinging movement of the lifting arm on the chassis is adapted to transmit an upward swinging movement to the body, a track disposed in substantially an inclined plane longitudinally of the lifting arm towards the hinged end of the body, a wedge element movable along the track and below the median portion of the lifting arm adapted to swing the lifting arm upwardly on its connection and a hydraulic ram arranged so that its thrust element will move the wedge element along said track and beneath said arm, and said arm having a portion of its lower surface with which said wedge contacts against sloping downwardly from both ends so that the pressure of liquid in the ram remains substantially constant at various periods of the lifting operation.

8. In combination with a vehicle having a chassis, a body carried by the vehicle in hinged relation to said chassis, a lifting arm below the body hinged near one end to the chassis and movably coupled near its other end to the body whereby an upward swinging movement of the lifting arm on the chassis is adapted to transmit an upward swinging movement, to the body, a track disposed in substantially an inclined plane longitudinaly of the lifting arm towards the hinged end of the body, a wedge element movably disposed along the track and below the median portion of the lifting arm adapted to swing the lifting arm upwardly on its connection and a hydraulic ram arranged so that its thrust element will move the wedge element along said track beneath said arm having its surface against which said wedge presses so shaped as to equalize liquid pressure in the ram at various periods of the lifting operation.

9. In combination with a vehicle having a chassis, a body carried by the vehicle in hinged relation thereto, a lifting arm hinged to the chassis at one end and linked to the body near its opposite end, said arm slanting up from its hinged end, a pull rod having a wedging element on one end and formed with a longitudinal channel, a guide disposed longitudinally of the chassis and adjacent to said lifting arm and formed with a longitudinal channel aligned with the channel in said pull rod and a ram element to which the pull rod is coupled, said wedging element being disposed between said arm and guide and adapted by its wedging action to swing the lifting arm up and said lifting arm passing freely through said channels whereby more even distribution of the parts and of the strains incident thereto is produced.

10. In combination with a vehicle having a chassis, a body carried by the vehicle in hinged relation thereto, a guide bar disposed longitudinally of the chassis and resembling a channel iron, a pull rod also disposed longitudinally of the chassis and resembling a channel iron, said channel irons being set on edge one above the other, rollers on one end of said pull rod, part of which rest upon and are guided by said guide bar, a ram having a thrust element coupled to said rod to reciprocate the latter, and a lifting arm passing freely upwardly through said pull rod and guide bar and having its lower end hinged to the chassis and its upper end coupled to the body and resting between its ends upon part of said rollers, whereby the pull rod and part of said rollers act as a wedge to tilt the lifting arm upwardly when the lifting arm is subjected to the pulling action of the pull rod.

11. In combination with a vehicle chassis, a dump body hinged upon said chassis to swing upwardly, a lifting bar movably associated with said body and chassis for swinging said body upwardly, a ram upon said chassis having a piston adapted to exert a lifting force against said lever bar, and an adjustable stop against which said lever bar is adapted to strike in its swinging movement to regulate the angularity assumed by the body independently of the action of the piston.

12. In combination with a chassis, a dump body hinged upon said chassis to swing upwardly, a lifting bar movably associated with said chassis and linked to said body for swinging said body upwardly, a ram upon said chassis having a piston rod, a wedging element coupled to said piston rod adapted to exert a lifting force against the lifting bar, and a stop against which the lifting bar is adapted to strike in the upward swinging movement of the lifting bar to limit the swinging movement of the parts independently of the ram.

13. In combination with a vehicle having a chassis, a body carried by the vehicle in hinged relation thereto, a lifting arm hinged to the chassis at its lower end and having its upper end struck downwardly and linked to the body, a stationary guide rail disposed

substantially in an inclined plane longitudinally of the lifting arm and below a portion of the same, a pull rod having an anti-friction wedge interposed between the guide rail and the lifting arm whereby the lifting arm is adapted to be tilted up under the pulling action of the pull rod, and a ram having a thrust element to which the pull rod is coupled, said lifting arm having an irregular lever edge adapted to co-operate with the guide rail in causing the lifting effort of the ram equalizing at various periods of lift.

14. In combination with a chassis, a dump body hinged upon said chassis to swing upwardly, lifting bars hinged at the sides of the chassis and adapted to apply a lifting force to said body at either side thereof, a ram disposed longitudinally of the chassis between said lifting bars, said ram including a cylinder and a piston therein, a pair of wedging elements, one for each lifting bar, an equalizing bar pivoted medially thereof on said piston, a pull-rod joining one end of said bar with one wedge element and a second pull-rod joining the other end of said bar with the other wedging element, the joint between each link and said equalizing bar constituting dual pin and slot connections, whereby the leverage of said equalizing bar upon said pull-rods may shift to exert the stronger force against that pull-rod meeting the greatest resistance in the lifting of the dump body.

15. In combination with a chassis, a dump body hinged thereon to swing upwardly, a ram carried by the chassis and including a piston rod, a cross-bar pivoted medially thereof on said piston rod, pull-rods, one for each end of said cross-bar, means operatively associating said pull-rods, each with one side of the dump body, for swinging said body upwardly, said cross-bar having four similar slots therein, two at each end thereof and all aligned longitudinally of said cross-bar, but extending in length transversely of the same, and a pair of pins in each pull-rod, one for each slot in one end of said cross-bar, the pins in each pull-rod being adapted both to engage the ends of their respective slots under equal pulls on said rods and adapted severally to engage the ends of their respective slots under unequal pulls on said rods, whereby the thrust of the piston rod is equalized on the two pull-rods and said piston, in turn, protected against bending strains.

16. In combination with a chassis, a dump body hinged upon said chassis to swing upwardly, a ram carried by the chassis and including a piston rod, a cross-bar member pivoted medially thereof on said piston rod, pull-members, one for each end of said cross-bar member, means operatively associating said pull-members with opposite sides of said dump body for swinging said body upwardly, the connection between each end of said cross-bar member and its respective pull-member comprising a pair of slots in one member relatively arranged longitudinally of the cross-bar and a pair of pins secured to the other member and slidably fitted, one in each of said slots

MELVIN SWARTOUT MARTIN.