H. S. MORTON.

TRUCK BODY LIFTING AND DUMPING APPARATUS.

APPLICATION FILED AUG. 17, 1920.

1,411,801.

Patented Apr. 4, 1922.

3 SHEETS—SHEET 1.

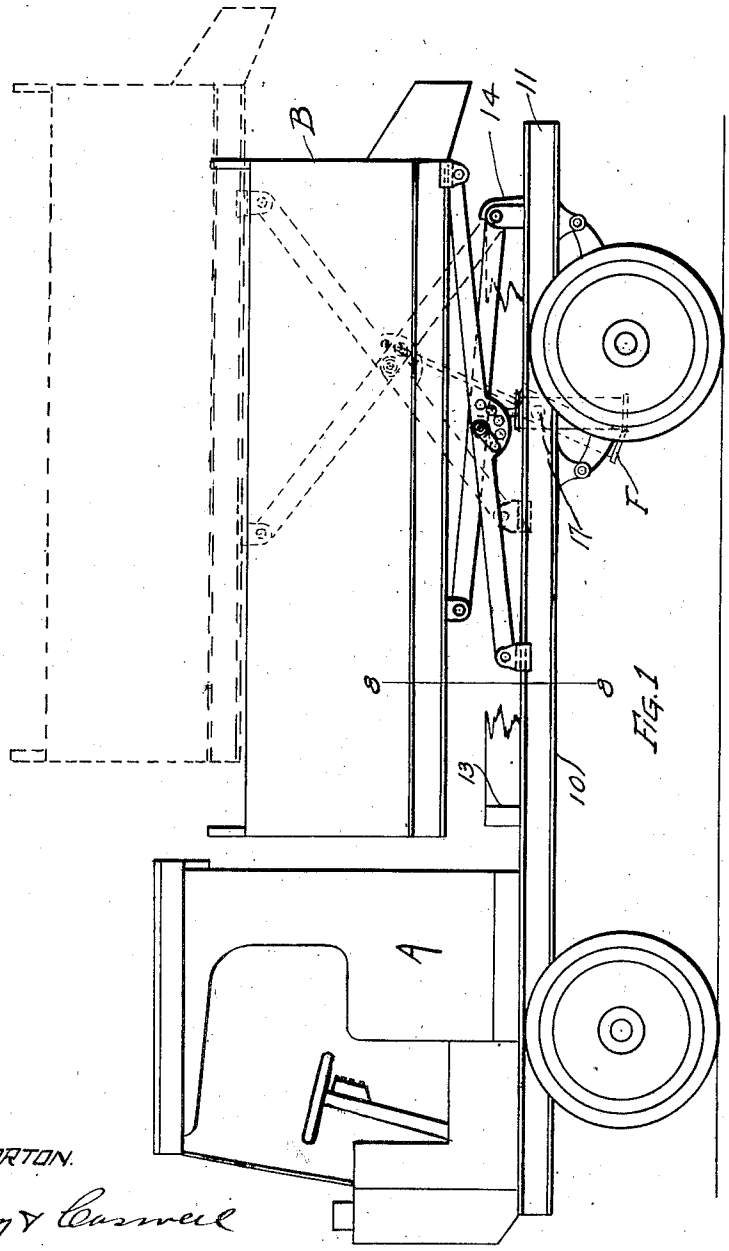


FIG. 1

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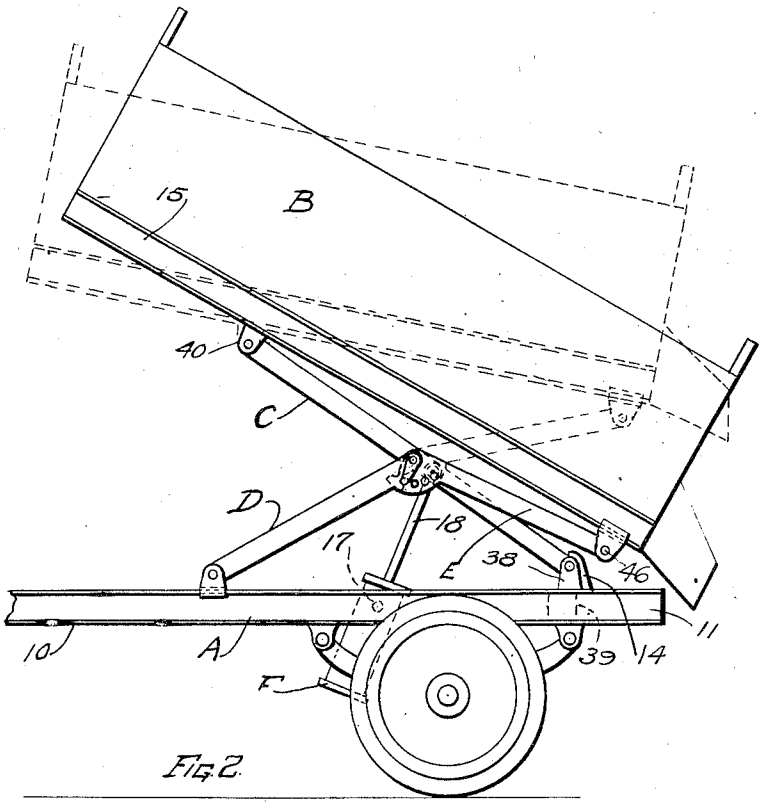


FIG. 2.

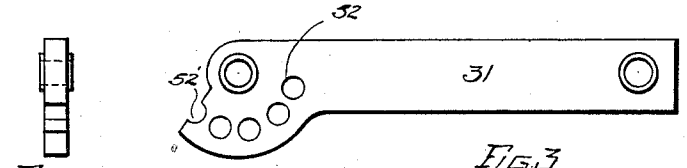


FIG. 3

FIG. 4.

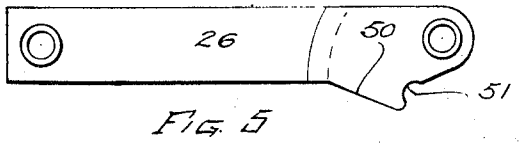


FIG. 5

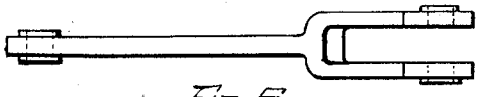


FIG. 6.

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1,411,801. **Patented Apr. 4, 1922.**

3 SHEETS—SHEET 3.

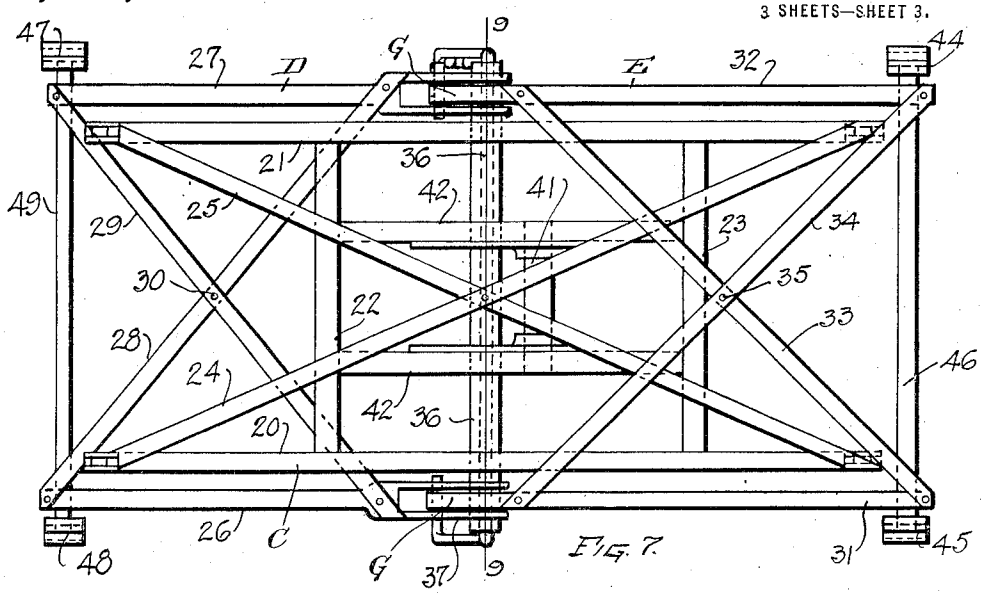


FIG. 7.

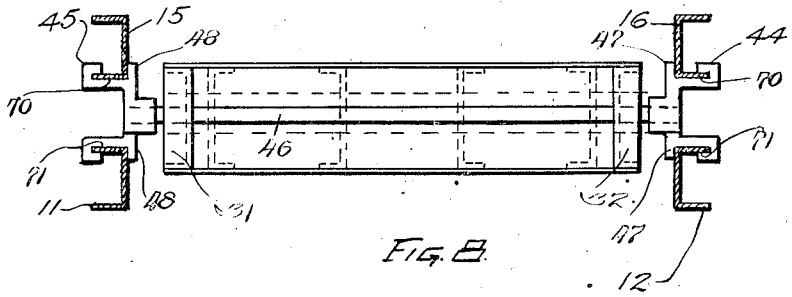


FIG. 8.

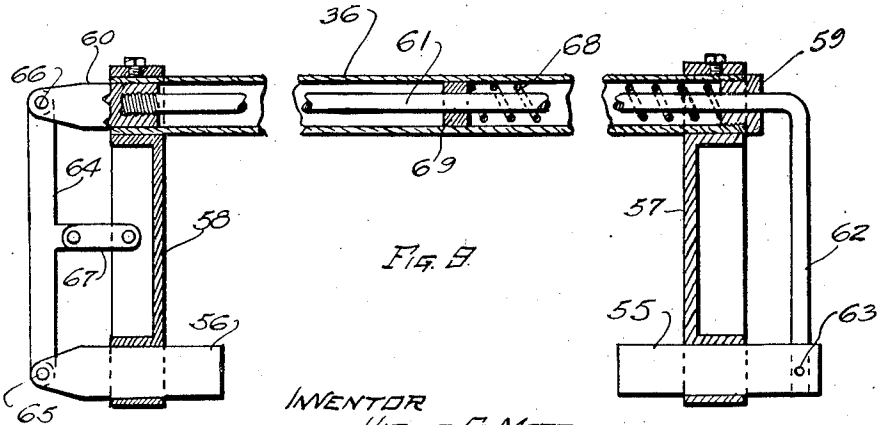


FIG. 9.

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UNITED STATES PATENT OFFICE.

HAROLD S. MORTON, OF MINNEAPOLIS, MINNESOTA.

TRUCK-BODY LIFTING AND DUMPING APPARATUS.

1,411,801. Specification of Letters Patent. Patented Apr. 4, 1922.

Application filed August 17, 1920. Serial No. 404,184.

To all whom it may concern:

Be it known that I, HAROLD S. MORTON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Truck-Body Lifting and Dumping Apparatus, of which the following is a specification.

My invention relates to that class of lifting and dumping apparatus in which the body is first tilted to predetermined angle and then raised to a predetermined elevation to facilitate dumping and distributing coal, gravel, sand or any other material carried by the body. More particularly the invention is designed to dump at any predetermined level of the body without materially affecting the stability of the vehicle upon which the body is mounted and causing the vehicle to overturn. The improved apparatus employed for accomplishing these results relates more particularly to a structure (for convenience termed a "linkage") interposed between the frame of the vehicle and the body, said frame being lifted or driven upwardly by any suitable ram, winch or elevating element, that employed not solely constituting my invention but cooperating therewith in a manner suitable to apply a lifting effort either automatically or partly by hand. Further objects and advantages attained and details of construction will be apparent to one skilled in the art to which this invention relates from the following description.

In the accompanying drawings, forming part of this specification, Fig. 1 is a side elevation of a truck equipped with my improvement, the dotted line position indicating one position the body is adapted to assume when fully raised but not tilted and the full line position indicating a position immediately after the body has started to elevate; Fig. 2 is a side elevation of a detail of the same mechanism shown in Fig. 1 in which the full lines indicate one tilting position the body may be made to assume and the dotted lines, another position; Fig. 3 is a side elevation of one of the lever arms of the linkage; Fig. 4 is an end view of the structure shown in Fig. 3; Fig. 5 is a side elevation of another one of the lever arms; Fig. 6 is a plan of the structure shown in Fig. 5; Fig. 7 is a plan of substantially the entire linkage separated from the vehicle frame and body; Fig. 8 is an end view of the structure illustrated in Fig. 7, and a cross section of the channel members of the vehicle frame and body, showing the method of slidably mounting the shoes of the linkage on said members; Fig. 9 is a vertical section taken on the line 9—9 of Fig. 7, showing the construction in detail of the adjusting structure, whereby the body may be made to lift and tilt at any predetermined elevation and angle.

The angle required to cause coal and other materials to flow freely on any inclined surface varies very greatly with the character of material, its size and preparation, and the amount of moisture in it. For this reason, my invention is designed to move the body containing the load of material from normal position into the following positions:

Elevation to the maximum height with the body level, and elevation to slightly lesser heights at the rear of the body with angles of inclination of any predetermined number of degrees desired. The invention comprises three distinct parts, namely: a power driven hoist for producing the thrust which is to lift the load; a system of links to which the thrust produced by the hoist is applied, and a box or body which is elevated and supported in various positions by the linkage or lifting and tilting structure. The invention does not concern itself in detail with the hoist, but simply requires a hoisting mechanism capable of delivering a maximum thrust through a sufficient distance to allow the linkage to fully function. In the drawings I have shown my invention applied to a truck A, which may be of any suitable form. This truck has the usual frame 10 or chassis which employs a pair of longitudinal channel members 11 and 12 in its structure (see Fig. 8). A body or box B is freely disposed above the frame of the truck and rests normally on supports 13 and 14 which are carried by the members 11 and 12. The body B is mounted upon a pair of longitudinal channel members 15 and 16 (see Fig. 8) and has a spout or chute at its back end through which the material may flow, all of which structure is of ordinary form. Arranged below the body, near its back end and carried by the truck frame, is a hoist F of usual construction, the cylinder of which is free to rock longitudinally of the truck and is mounted on a transverse axis by gudgeons

17 which are journaled in the truck frame. The piston of this hoist has its piston rod 18 extending upwardly a sufficient height and in a suitable position to connect with the linkage as will be hereinafter described.

The system of links by which the different positions of the body are obtained, consists of three principal units, which for convenience will be designated as the "main link" C, the "front link" D, and the "rear link" E. Each of the e links may be made up of steel channels (although any suitable material and form may be employed for the purpose desired) and comprises members for each side of the chassis, suitably braced together to form rigid units. The main link has a pair of side members 20 and 21 connected by the transverse members 22 and 23 and cross braced by the diagonal rods 24 and 25; the forward link has a pair of side members 26 and 27 cross braced by the diagonal rods 28 and 29 which are tied together at their intersection by the rivet 30 and the rear link has a pair of side members 31 and 32 cross braced by the diagonal rods 33 and 34 which are also tied together at their intersection by the rivet 35.

Arranged across the linkage is a tubular shaft 36 which passes across and through the side members of the main link, substantially midway between its front and rear ends and upon which the main link is free to turn as a fulcrum. The rear ends of the front link and the front ends of the rear link are also journaled upon the shaft 36, the sides of said front and rear links being freely positioned to tilt along the outer sides of the main link. Each side member of the front link is formed at its rear end with bifurcations 37 through which the shaft 36 passes and between which the front end G of a companion side element of the rear link is placed and journaled on said shaft. This structure assists in strengthening the linkage and holding its parts in position.

The main link is hingedly supported at its rear end by bearings 38 bolted or otherwise secured to the transverse member 39 of the truck frame 10 and is hingedly fastened at its front end by bearings 40 which are bolted or otherwise secured to the longitudinal supporting members 15 and 16 of the body B. The thrust of the hoist F is applied to the main link at a point a short distance back of its center and a considerable distance ahead of its rear bearings, through a short transverse shaft 41 mounted upon a pair of short longitudinal supporting arms 42 positioned closely and parallel and secured to members 22 and 23 being employed as a pivot to which the upper end of the thrust rod 18 is journaled.

The main link controls the motion of the front of the body. The motion of the rear end of the body is governed by the rear link which is hinged to the front link at its rear end in the manner described and is attached at its rear end by shoes 44 and 45 which are pivoted to the sides of the link E by a transverse shaft 46 and slidably secured in the guide grooves 70 which receive and their shoulders engage the lower sides of the channel members 15 and 16 of the truck body so that the rearward end of the link member E may slide longitudinally below the rear end of the body. The front end of the front link is slidably attached to the truck frame by means of shoes 47 and 48 which are coupled to the side members 11 and 12 by a transverse shaft 49 and which receive the upper sides of the side members 11 and 12 of the truck frame in engaging grooves 71.

The three links are thus movably coupled together, the movement thereof being controlled by a key element, in the following manner whereby the position the body assumes when raised is predetermined or adjusted. The mechanism for completing this operation consists of the following: The sides 26 and 27 of the forward link have their ends adjoining the shaft 36 formed with corresponding shoulders 50 in each of which is a pin receiving depression 51. (See Fig. 4). The sides 31 and 32 of the rear link have their ends adjoining the shaft 36 formed with co-operating series of pin openings 52 each arranged on an arc described from the center of shaft 36 and corresponding with the same arc on which the depression 51 is arranged. By inserting a pin in corresponding holes of each set in the rear link, the front link will govern and control the positions of the rear link during the raising operation. Changing the positions of the pins in the holes in the rear link controls the angle which can exist between the front and rear links. This, in turn, controls the height to which the rear end of the body is raised by the rear link. During this operation the main link controls the motion of the front of the body.

It will be noted the invention provides for simultaneous motion of pins 55 and 56 on opposite sides and also makes it impossible for the pins to be inserted in different holes on opposite sides. These pins slide outwardly and inwardly through the lower ends of a pair of guides 57 and 58. Said guides are hung from and attached to the opposite ends of shaft 36 which project through the links and to which the guides are attached. The pins are thus arranged to swing from the center of the shaft 36 through arcs intersecting the centers of the series of holes 52 so that the pins may be plunged through any one of said holes desired or withdrawn. Sliding longitudinally through a plug 59 in one end of the shaft 36 and attached by threaded connection to a sliding support 60

projecting from the other end of said shaft is a connecting shaft 61. One end 62 of this shaft is bent to form a radiating arm which is attached by the fastener 63 to pin 55. A lever 64 is pivotally attached at one end by the fastener 65 to pin 56 and by pin and slot connection 66 at the other end. A link 67 freely attached to guide 58 and to the median portion of the lever acts as a fulcrum for said lever. A helical expansion spring 68 in the shaft 36 and pressing against the plug 59 and a stop 69 on shaft 61 tends to urge the pins 55 and 56 inwardly but permits both pins to be withdrawn from the adjusting holes 52 and readjusted on opposite sides simultaneously. This construction makes it impossible for the pins to be inserted in different holes on opposite sides. All changes of adjustment are made when the truck body is down, consequently no strain is on any of the links except their own weight.

The holes for adjustment on the links may be as many as desired and their position may also be arranged to accommodate different positions sought to be attained for dumping purposes. The first hole marked 52' may be arranged so that when the pins are inserted before the load is lifted into dumping position the front and rear links are held so that the body is maintained in horizontal position during the entire lifting movement. If the pins are inserted in any of the remaining holes before starting the dumping operation the first movement will be to tilt the body to a prearranged angle according to which holes the pins are plugged into and the following movement after tilting will be to lift the body while inclined to superior position. The tilting movement is thus produced by a sectional lever cooperating with an unbroken lever, the parts of the sectional lever being tiltingly mounted by a pivot or fulcrum upon the unbroken lever and adjustably secured about the pivot or fulcrum to alter the length of travel at its power end and the time when it is made to lift the rear end of the body.

In accordance with the patent statutes I have described the principles of operation of my invention, together with the apparatus which I now consider 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 secure by Letters Patent is:

1. In combination with a vehicle having a chassis, a body carried by the vehicle, linkage interposed between the chassis and body, said linkage comprising a main link hinged near one end to the rear end of said chassis and near its opposite end to a portion of the body forward of its center of gravity, a forward link having its forward end slidingly mounted to travel longitudinally on the chassis and a rear link having its rear end slidingly mounted on the body to travel longitudinally, said forward and rear links being respectively secured by a common pivot connection on the median portion of the main link and being connected by a variable connection, whereby the angle at which the body will dump can be readily prearranged and means for imparting a lifting effort to the main link to tilt the latter upwardly on the chassis.

2. In combination with a vehicle having a chassis, a body carried by the vehicle, linkage interposed between the chassis and body, said linkage comprising a main link hinged near one end to the rear end of said chassis and near its opposite end to a portion of the body forward of its center of gravity, a forward link having its forward end slidingly mounted to travel longitudinally on the chassis, and a rear link having its rear end slidingly mounted to travel longitudinally on the body, said forward and rear links being respectively secured by a common pivot connection on the median portion of the main link, said forward and rear links being releasably secured together in selective radial position near said common pivotal connection, whereby the angle at which the body will dump can be readily prearranged, and means for imparting a lifting effort to the main link to tilt the latter upwardly on the chassis.

3. In combination with a vehicle having a chassis, a body carried by the vehicle, linkage interposed between the chassis and body, said linkage comprising a main link hinged near one end to the rear end of said chassis and near its opposite end to a portion of the body forward of its center of gravity, a forward link having its forward end slidingly mounted to travel longitudinally on the chassis and a rear link having its rear end slidingly mounted to travel longitudinally on the body, said forward and rear links being secured by a common pivotal connection on the median portion of the main link, means for imparting a lifting effort to the main link to tilt the latter upwardly on the chassis and means carried by said forward and rear links for regulating the length of arc through which they will swing during said upward movement, whereby the angle at which the body will dump can be readily prearranged.

4. In combination with a vehicle having a chassis, a body carried by the vehicle, linkage interposed between the chassis and body, said linkage comprising a main link hinged near one end to the rear end of said chassis

and near its opposite end to a portion of the body forward of its center of gravity, a forward link having its forward end slidingly mounted to travel longitudinally on the chassis, and a rear link having its rear end slidingly mounted to travel longitudinally on the body, all of said links comprising frames extending across the chassis and body, said forward and rear links being secured by a hollow pivot shaft on the median portion of the main link extending outwardly towards both sides of the vehicle, means for imparting a lifting effort to the main link to tilt the latter upwardly on the chassis and means carried by said forward and rear links for regulating the arc through which they will swing about said shaft during said upward movement comprising a variable joint about said shaft between said forward and rear links having engaging pins connected through said shaft for simultaneous outward and inward movement to lock or unlock the members of said joint.

5. In a link structure for lifting purposes, a main link and forward and rear links, said forward and rear links being secured together and to the main link by a hollow pivot and having overlapping pairs of sides formed with stop shoulders and series of pin receiving openings adapted to receive a pair of pins in selected positions against said shoulders on the opposite sides of the link structure, and means passing longitudinally through the opening in said shaft and connecting said pins for causing them to simultaneously withdraw from their openings or enter any selected pair of opposite openings.

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

HAROLD S. MORTON.