Nov. 23, 1948. G. M. RUMSBY 2,454,481

LIFTING MECHANISM FOR DUMP BODIES

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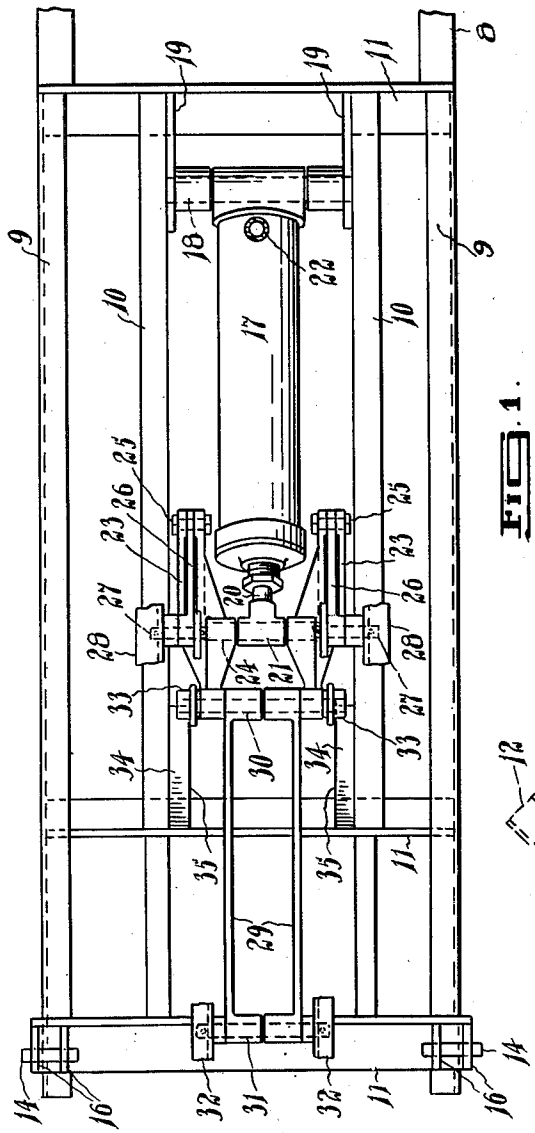


FIG. 1.

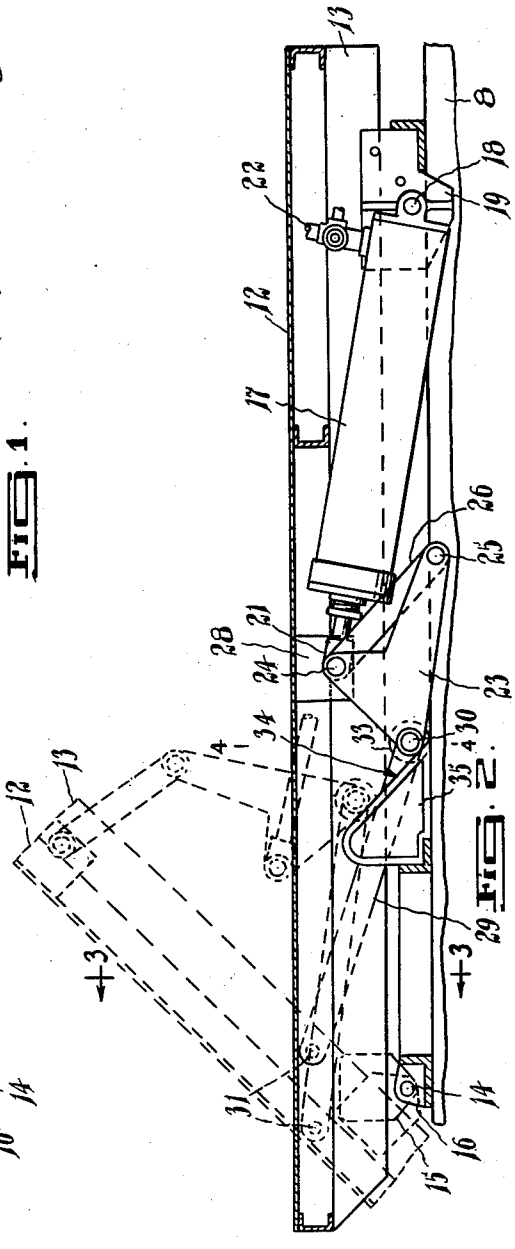


FIG. 2.

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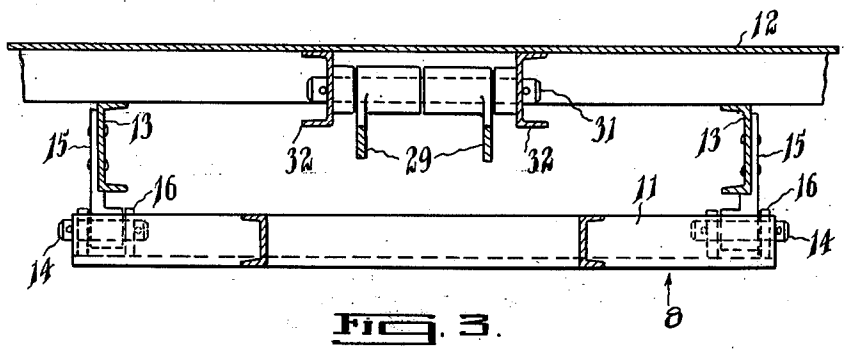


Fig. 3.

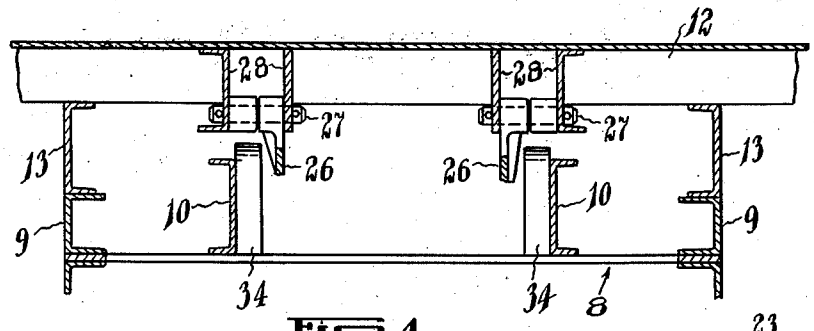


Fig. 4.

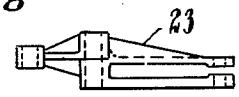


Fig. 6.

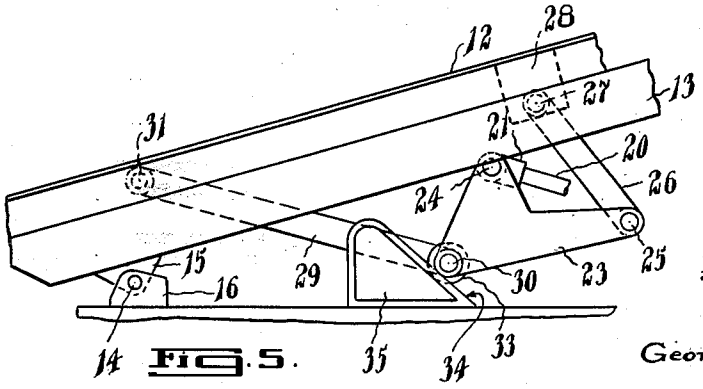


Fig. 5.

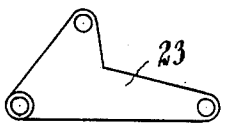


Fig. 7.

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Patented Nov. 23, 1948

2,454,481

UNITED STATES PATENT OFFICE

2,454,481

LIFTING MECHANISM FOR DUMP BODIES

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Application February 12, 1947, Serial No. 728,157

9 Claims. (Cl. 298—22)

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The invention relates to improvements in lifting mechanisms for dump bodies of power-driven trucks or other vehicles. More particularly the invention concerns a lifting mechanism utilizing a hydraulic cylinder extending approximately horizontally and one in which the structure is devised to provide adequate ground clearance.

The paramount object of the invention is to provide a more efficient and serviceable lifting mechanism for dump bodies by which a compound linkage is arranged to vary the mechanical advantage of the lifting mechanism smoothly and continuously during the lift operation whereby to bring into effect at the start a comparatively large lifting force which is progressively reduced in uniform manner until the dumping body reaches its predetermined dumping inclination.

A distinctive feature of the present invention is that the lift mechanism comprehends a novel compound linkage including a lift plate connected to link members and adapted to ride up an incline to advantage the linkage in the dumping action.

The present invention provides a sturdy lifting mechanism which is not expensive to manufacture and is adapted to be applied to a standard dump body of a power driven truck.

The invention resides in the novel construction and arrangement of the lifting mechanism as described in the ensuing specification and drawings and more particularly defined in the subjoined claims.

In the drawing:

Fig. 1 is a plan view depicting the lift mechanism of the invention mounted on the chassis of a motor driven truck and showing its connection with the dump body of which only fragments are illustrated.

Fig. 2 is a longitudinal section thereof.

Fig. 3 is a vertical section on line 3—3 of Fig. 2.

Fig. 4 is a vertical section on line 4—4 of Fig. 2.

Fig. 5 is a side elevation of the lift mechanism showing the dump body in slightly raised position.

Fig. 6 is a plan view of the lift plate which forms a part of the compound linkage of the lifting mechanism.

Fig. 7 is a side view thereof.

Referring to the drawings, the reference numeral 8 denotes a conventional chassis of a motor truck on which the outer sills 9 and the inner sills 10 of the hoist are rigidly united in a unitary frame structure as by the cross members 11. The tiltable load carrying body of the

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truck is indicated at 12 and this body is provided as usual with longitudinally extending channel members 13 at its bottom by which it rests on the chassis when in lowered normal position. Said body near its rear end portion is pivotally connected at 14 to said chassis as by means of the pivot brackets 15 and 16.

The improved lifting mechanism comprises a source of lifting force shown as a single hydraulic cylinder 17 of ordinary type extending approximately in a horizontal line and swingably connected at its rearward end to the chassis by a pivot shaft 18 bracketed at 19 to said members 10. At the forward end of the power cylinder the piston rod 20 thereof is fitted with a crosshead 21. The power cylinder is connected by piping 22 to a pump as usual for operation of its piston as will be well understood in the art and an ordinary valve mechanism is to control operation of the cylinder.

The crosshead 21 is connected to a parallel pair of lift plates 23 which are spaced and form a unit. Said lift plates extend vertically and the base portions thereof are substantially horizontally disposed when the dump body 12 is in its lowered position—see Fig. 2. The lift plates are of a general triangular outline and said base portions terminate in forward and rearward ends. The portion of the plate above the base portion may be conveniently termed an "apex." The connecting point of the crosshead is located at the apex of each of the lift plates 23 and the connection to said crosshead is effected by a pivot shaft 24. Said plates, which are longitudinally arranged, are each pivotally connected at 25 to the lower end of a link 26. The link connection is located at the forward ends of the plates. The links 26 are pivoted at their upper ends to the dump body 12 as by the pivot shafts 27. The pivot shafts 27 are shown as being carried by the spaced members 28 beneath the floor of the dump body as will best be seen from an inspection of Fig. 4. Desirably the pivots 27 are in alignment or substantially in alignment with the pivot connection 24 of the piston rod 20 when the dump body is in lowered position. When the piston rod actuates the lift plates the imparted movement is translated by the forward links 26 to the dump body.

The lift plates are also connected to an end of a pair of comparatively long links 29 by means of a pivot shaft 30. This pivot connection is located at the rear corners of the lift plates and the rearward links 29 extend rearwardly and upwardly to a pivot connection 31 with the dump

body above the pivot 14 on which it tilts. The pivot connection 31 is shown as a shaft pinned in the members 32 of the dump body.

Flanged rollers 33 are mounted on the rear ends of the lift plates 23 by means of the pivot shaft 30. These rollers are arranged to ascend inclined faces 34 of blocks 35 rigid with the chassis. The inclined faces or trackways slope upwardly and rearwardly on a fairly steep gradient. In the lowered position of the dump body the rollers 33 are disposed at the lower ends of the inclined faces.

In a dumping operation fluid acts on the piston of the cylinder to force it outwardly. The rear links 29 by reason of their angle of inclination and resistance present fulcrums for the lift plates 23 which preclude the rollers 33 ascending the inclined surfaces in the early part of the piston stroke. Consequently during this early part of the stroke the lift plates swing upwardly about their pivotal connections 30 at the rear corners and exert a powerful lifting force on the dump body through the medium of the frontal links 26. In this way the work of lifting the load through a substantial initial angle of movement of the dump body from the position of rest is accomplished by upward swing of the lift plates. In the continuation of the lifting operation the rear links 29 are caused to move in backward direction due to their pivotal connections 31 at a relatively small radius from the pivot 14 of the dump body. This induces the rollers 33 to ascend the inclined faces 34 of the inclined blocks 35 with the result that the swing of the lift plates is accompanied by bodily upward movement, as illustrated in Fig. 5, until the dump body reaches its predetermined dumping inclination shown in dash lines in Fig. 2.

The accompanying bodily climbing movement of the lift plates gradually increases the tilting speed of the dump body as resistance to tilting decreases. The dumping action is continuously smooth and has the desirable feature that it is carried out without any abrupt change in oil pressure. Actually there is little change in oil pressure and it remains substantially constant throughout the dumping operation. Moreover a high oil pressure is not required owing to the leverage obtained by mechanical arrangement of the structure.

Having fully described a selected embodiment of the invention it will be manifest that such changes and variations may be resorted to as come within the spirit and scope of the subjoined claims.

What I claim is:

1. In a lift mechanism for a dump body pivotally mounted on the rear end of a frame, a fluid cylinder pivotally mounted at its rear end on said frame to extend approximately in horizontal direction but forwardly of the pivot of the dump body, said cylinder including a piston rod for movement outwardly of the forward end thereof, a lift plate extending longitudinally of said frame for movement in a vertical plane and having a base portion substantially horizontally disposed in the lowered position of the dump body to terminate in a forward end and a rearward end, means pivotally connecting the lift plate to said piston rod at a point above said base portion, a link pivotally connecting said lift plate at its forward end to the dump body, a second link connecting said lift plate to the dump body, said second link being pivoted to said rear end of the lift plate and being pivoted to the dump body above the pivotal mounting thereof, and means providing an inclined face on said frame sloping upwardly and rearwardly from said rear corner of the lift plate and on which this end portion is adapted to slide, the arrangement being such that said second link forms a fulcrum for the lift plate to cause it to swing upwardly in the initial dumping movement and then permit it to ascend said inclined face.

2. In a lift mechanism for a dump body pivotally mounted on the rear end of a frame, a fluid cylinder pivotally mounted at its rear end on said frame to extend approximately in horizontal direction but forwardly of the pivot of the dump body, said cylinder including a piston rod for movement outwardly of the forward end thereof, a lift plate extending longitudinally of said frame for movement in a vertical plane and having a base portion substantially horizontally disposed in the lowered position of the dump body, a crosshead pivotally connecting the lift plate to said piston rod at a point above said base portion, a link pivotally connecting said lift plate at its forward end to the dump body, a second link connecting said lift plate to said dump body, said second link being pivoted to the rear end of the lift plate and being pivoted to the dump body above the pivotal mounting thereof, and means providing an inclined face on said frame sloping upwardly and rearwardly from said rear end of the lift plate and on which this end portion is adapted to slide, the arrangement being such that said second link forms a fulcrum for the lift plate to cause it to swing upwardly in the initial dumping movement and then permit it to ascend said inclined face.

3. In a lift mechanism for a dump body pivotally mounted on the rear end of a frame, a fluid cylinder pivotally mounted at its rear end on said frame to extend approximately in horizontal direction but forwardly of the pivot of the dump body, said cylinder including a piston rod for movement outwardly of the forward end thereof, a lift plate extending longitudinally of said frame for movement in a vertical plane and having a base portion substantially horizontally disposed in the lowered position of the dump body to terminate in a forward and a rearward end, means pivotally connecting the lift plate to said piston rod at a point above said base portion, a first link pivotally connecting said lift plate to the dump body, said link being attached to said forward end of the lift plate and extending upwardly therefrom at a rearward angle and pivoted to the dump body substantially in alignment with the pivotal connection of said means by which the lift plate is connected to said piston rod, a second link connecting said lift plate to the dump body, said second link being pivoted to the rear end of said lift plate and being pivoted to the dump body above the pivotal mounting thereof, and means providing an inclined face on said frame sloping upwardly and rearwardly from said rear corner of the lift plate and on which this end portion is adapted to slide, the arrangement being such that said second link forms a fulcrum for the lift plate to cause it to swing upwardly in the initial dumping movement and then permit it to ascend said inclined face.

4. In a lift mechanism for a dump body pivotally mounted on the rear end of a frame, a fluid cylinder pivotally mounted at its rear end on said frame to extend approximately in hori-

zontal direction but forwardly of the pivot of the dump body, said cylinder including a piston rod for movement outwardly of the forward end thereof, a lift plate extending longitudinally of said frame for movement in a vertical plane and having a base portion substantially horizontally disposed in the lowered position of the dump body to terminate in a forward end and a rearward end, means pivotally connecting the lift plate to said piston rod at a point above said base portion, a link pivotally connecting said lift plate at its forward end to the dump body, a second link, said second link being pivoted to the rear end of the base portion of said lift plate to extend rearwardly therefrom on somewhat of an inclination with its rear end pivoted to the dump body over the pivotal mounting thereof so as to swing thereover in the dumping operation, and means providing an inclined face on said frame sloping upwardly and rearwardly from said rear end of the lift plate and on which this end portion is adapted to slide, the arrangement being such that said second link forms a fulcrum for the lift plate to cause it to swing upwardly in the initial dumping movement and then permit it to ascend said inclined face.

5. In a lift mechanism for a dump body pivotally mounted on the rear end of a frame, a fluid cylinder pivotally mounted at its rear end on said frame to extend approximately in horizontal direction but forwardly of the pivot of the dump body, said cylinder including a piston rod for movement outwardly of the forward end thereof, a lift plate extending longitudinally of said frame for movement in the vertical plane and having a base portion substantially horizontally disposed in the lowered position of the dump body, means pivotally connecting the plate to said piston rod at a point above said base portion, a link pivotally connecting said lift plate at its forward end to the dump body, a second link connecting said lift plate to the dump body, said second link being pivoted to the rear end of the lift plate and being pivoted to the dump body above the pivotal mounting thereof, means providing a trackway on said frame sloping backwardly and upwardly from said rear end of the lift plate, and a roller on said rear end of the lift plate engaged with said trackway, the arrangement being such that said second link serves to fulcrum the lift plate for upward swinging movement about said roller during the early part of the tilting of the dump body and that said trackway serves to provide for an attendant bodily elevational movement of the lift plate in the continued tilting of the dump body.

6. A lift mechanism for a dump body pivotally mounted at its rear end to the chassis of a motor truck, said lift mechanism comprising the instrumentalities of a forward link and rearward link pivotally connected to the dump body at spaced points in advance of said pivotal mounting thereof, a longitudinally disposed lift plate movable in a vertical plane and having a base portion and an apex portion, the foremost end of said base portion being pivoted to said forward

link, the rearmost end thereof being pivoted to said rearward link, said lift plate being disposed with its base portion substantially horizontal in the lowered position of the dump body and said links being disposed at a forward inclination in such position of the dump body, a block providing an inclined face on said chassis sloping upwardly and rearwardly from said rearmost end of the lift plate, means on said rearmost end to enable the lift plate to climb said inclined face, and a power cylinder pivoted on said chassis and provided with a piston rod connected to said apex portion of the lift plate, the arrangement being such that said rearward link co-acts with said inclined face to cause the lift plate to swing upwardly about its rearmost end in the early part of the outward movement of said piston rod and then said rearward link permits the lift plate to ascend said inclined face with a continuation of said upward swing.

7. A lift mechanism as defined in claim 6, in which the means to enable the lift plate to climb the inclined face of the block consists of a roller having a pivot to which the rearward link is connected.

8. A lift mechanism as defined in claim 6, in which the rearward link extends on a slight upward angle to the dump body when this body is in a lowered position, and in which this link is connected to the body at a point approximately above the pivotal mounting thereof.

9. In a lift mechanism for a dump body pivotally mounted on the rear end of a chassis, a fluid cylinder pivoted to swing on said chassis and having its piston rod disposed to be projected in the general direction of the pivotal mounting of the dump body, a pair of lift plates extending longitudinally of said chassis for movement in a vertical plane, said plates being spaced apart and having an apex portion and a base portion, the base portion being disposed approximately horizontally when the dump body is in a lowered position, a pivot shaft connecting said apex portion to said piston rod, a pair of forward links pivotally connecting the front ends of the base portions of the lift plates to the dump body and having pivotal connection with the dump body substantially in alignment with said pivot shaft, a pair of rearward links pivotally connecting the rear ends of the base portions of the lift plates to the dump body and having pivotal connection with the dump body over the pivotal mounting thereof, blocks on said chassis providing trackways sloping upwardly and rearwardly, and rollers on the rear ends of the base portions of the lift plates, said rollers being engaged with said trackways, the arrangement of the linkage operating to initially prevent the rollers ascending the trackways in the dumping operation while the lift plates swing upwardly and then permitting a continuation of the upward swing with an accompanying bodily ascent of the lift plates.

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No references cited.