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1,459,209

E. B. HOUGH

DUMPING GEAR

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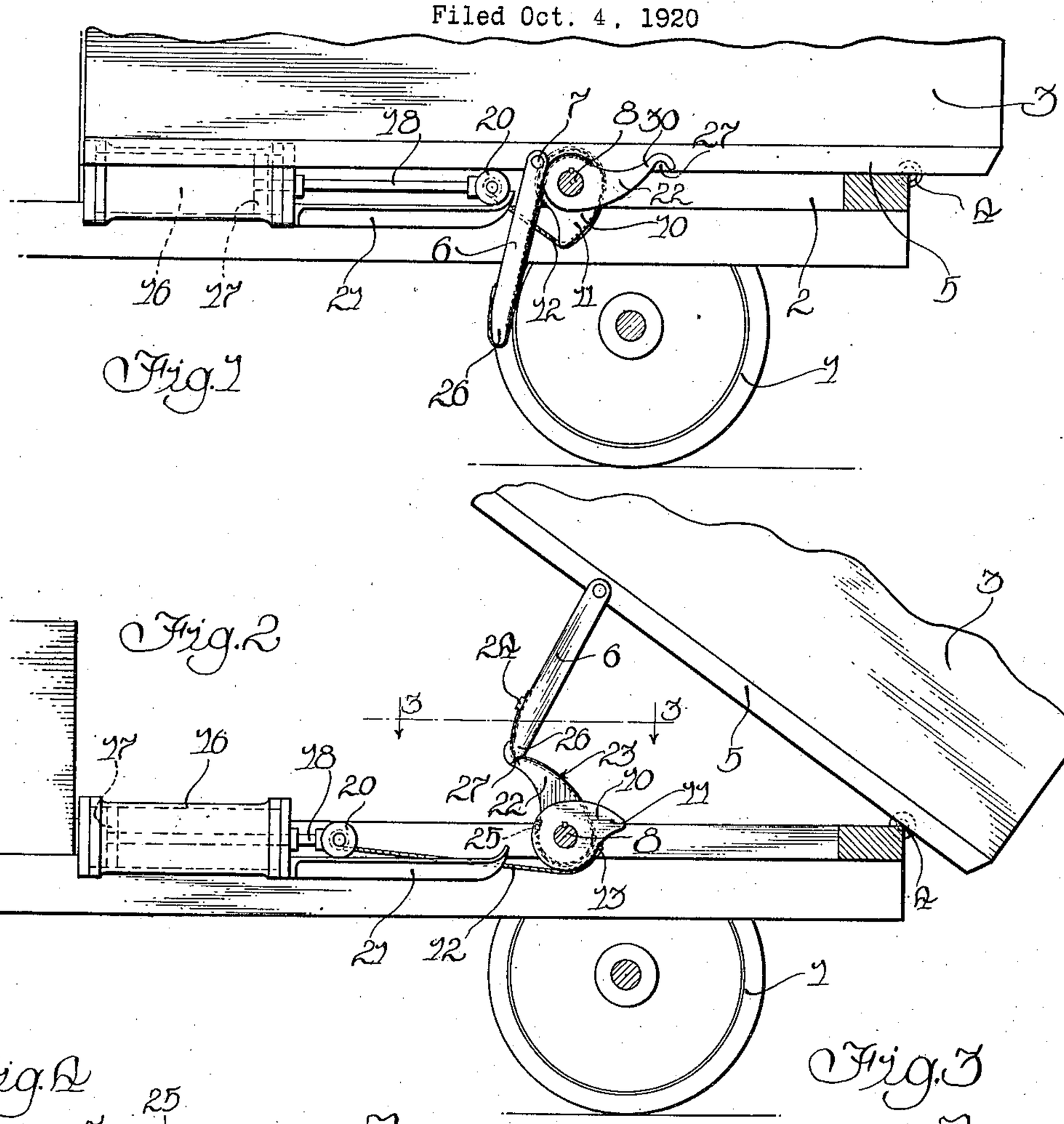


Fig. 1

Fig. 2

Fig. 4

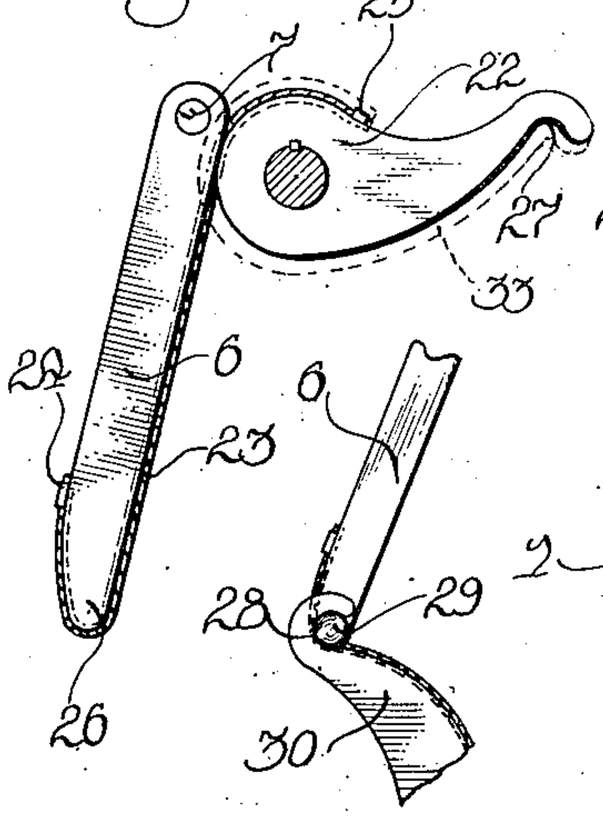
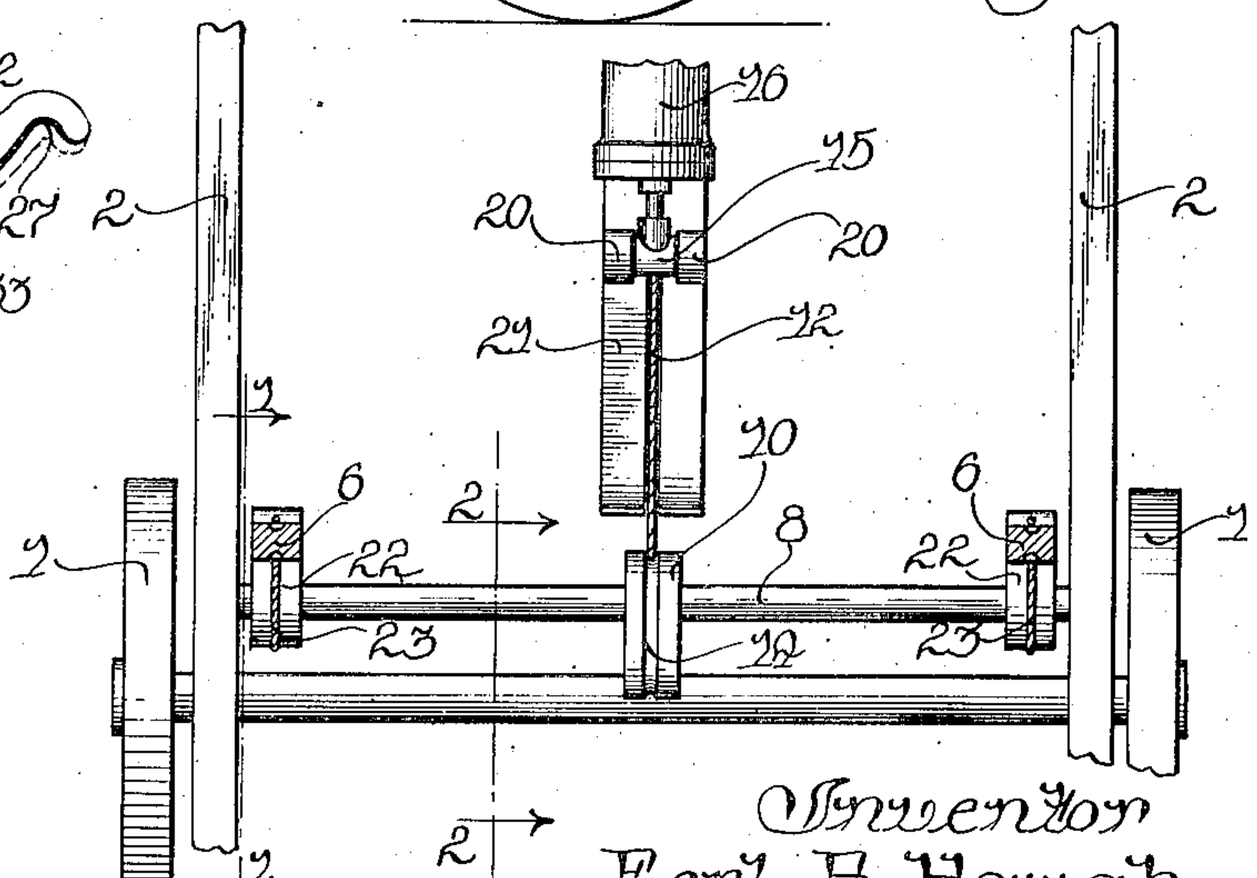


Fig. 5

Fig. 3



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UNITED STATES PATENT OFFICE.

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DUMPING GEAR.

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To all whom it may concern:

Be it known that I, EARL B. HOUGH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Dumping Gears, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to dumping gear for wagons, trucks and the like. The invention is particularly applicable to use in dumping of bodies of vehicles but I do not wish to limit the invention to such use only.

While the dumping gear is particularly adapted for use in connection with a compressed aid cylinder as I shall show later, it is not limited to an air cylinder for actuation. A hydraulic cylinder, a drum driven by gears or by a worm or by any other such means which is suitable to the purpose may be employed for providing the power to the gear.

The object of the present invention is to provide a simple and effective hoisting device suitable for dumping vehicle bodies.

The fundamental feature of novelty is the employment of a strut extending in one direction for taking the thrust of lifting the load, a cable for lifting the load, and a take-up or drum of varying diameter for taking up the cable at different effective leverages. In the preferred form of my invention I provide a strut attached to the bottom of the body, and a cable attached to the lower end of the strut, with a drum of varying diameter for winding up the cable at different effective leverages, and for finally engaging the end of the strut to form a knuckle or toggle. I also provide a drum of varying effective diameter for the application of power, so that I may use an air cylinder without causing the expansion of the air in the cylinder at the latter part of the stroke to throw the body violently upward.

The mechanism of my invention takes but little room, and may be disposed in space which does not conflict with the other requirements of a vehicle.

It will be apparent at once from a study of the drawings and specific description which I shall give later, that any desired ratio throughout the various stages of operation may be secured by suitably shaping the cams or drums.

In the accompanying drawings I have illustrated an embodiment of the invention.

Figure 1 is a vertical section taken on line 1—1 of Figure 3 showing the dumping mechanism in side elevation;

Figure 2 is a section taken on the line 2—2 of Figure 3 showing the power drum in full lines and showing the parts as moved to the dumping position;

Figure 3 is a section taken on the line 3—3 of Figure 2 showing the frame of the truck and the cams in plan view;

Figure 4 is a fragmentary detail elevation showing the arrangement of the strut and lifting cam or drum; and

Figure 5 is a similiar detailed view of a modification.

The vehicle or truck which has the usual running gear including the wheels 1 is provided with a frame which includes the sills or side frame members 2. This frame preferably though not necessarily comprises a part of the chassis of a vehicle. A separate frame might be provided, and this separate frame be secured on the chassis. The various operating parts are secured to the frame as will be apparent later. The dumping body 3 is hinged at 4 to the frame members 2 as is well understood by those skilled in the art. This dumping body 3 preferably has a sub-frame 5 to which are connected the struts 6, these struts being disposed preferably near the sides of the frame by suitable pivots 7 which may in practice comprise a single transverse shaft or separate shafts and saddles (not shown) as will be understood by those skilled in the art. A suitable cross shaft 8 is mounted on the frame 2 of the vehicle, this shaft being journaled in the side members 2 and if necessary provided with bearings adjacent its center portion (not shown). A power drum or cam 10 is keyed to the shaft 8, this drum or cam being of irregular shape to provide varying lever arms throughout the rotation of the shaft 8.

The drum or cam pin is provided with an extending nose 11 which is so placed with respect to the power applied thereto that a maximum of lifting effect for a given pull will be afforded when the body 3 is rest-

ing upon the frame 2, and before any tilting of the same has been caused. A cable or chain is trained over this drum or cam 10. I have shown a steel cable 12 as being secured at 13 to the body of the cam 10, this cable being adapted to lie in the groove 14 which is cut in the face of the drum or cam 10. The cable 13 in this case is connected to the cross-head 15 of an operating cylinder 16. The operating cylinder 16 is provided with a suitable piston 17 and piston rod 18, the piston rod being connected to the cross-head 15 and the cross-head having rollers 20 adapted to engage the guide 21, this guide in the present construction lying below the cross-head since the cable 13 is trained around the lower portion of the power cam 10.

A pair of lifting cams or drums 22 are keyed on the shaft 8 near the frame members 2 so as to register with the struts 6. A suitable flexible member such as the steel cable 23 is fastened at one end 24 to the strut 6 and at the other end 25 to the lifting cam 22. Cooperating grooves are formed in the struts 6 and cams 22 so that the cable may lie partly in each groove without being subjected to the crushing effect which would otherwise be sustained between these two members.

The purpose of the drums 22 is to serve as a take-up of different degrees of effectiveness or acting at different leverages for the cable 22, and also to serve as a positive connection with the end of the strut 6 at the end of the stroke.

The lower end of the struts 6 are rounded as shown at 26 and these rounded ends are adapted to engage in the corresponding sockets 27 formed on the ends of the lifting cams 22. The groove for the reception of the cable 23 which is trained over the lifting cam 22 and along the arm 6 extends around the lower end 26 of the struts 6 and across the face of the lifting cam 22.

Suitable means for limiting the throw of the lifting cam 27 may be provided. This is primarily taken care of by the length of the stroke of the piston 17, but since violent operation of the lifting mechanism might tend to disengage the bearing 26—27, I may provide a cable for limiting the extent of lift of the body 5 or may provide a hook on the socket 27 as shown at Figure 5, this hook 28 engaging over a pin or lateral extension 29 formed on the end 26 of the arm or strut 6.

The location of the pivot 7 of strut 6 and the center of shaft 8 is such as to maintain the struts 6 and the drums 22 tangent to each other, although this is not essential to the broad aspect of the invention. I may provide flanges, such as shown in dotted lines at 33, in Figure 4, for guiding the strut and drum together.

The operation of the device is as follows:

Normally when the body 3 is lying flat on the frame, the strut or arm 6 extends downward tangentially with respect to the cooperating lifting cam 22. The piston 17 is at the inner end of its stroke and the power cam or drum 10 is in such position that the extension 11 is tangent to the cable 12, whereupon, a maximum leverage is secured for turning the shaft 8. As fluid under pressure is admitted to the cylinder 16 it moves the piston 17 to the left. This tends to turn the shaft 8 through the power cam 10, the ratio of leverage as shown in this case being substantially two to one. As the load rises a point is reached where the lifting ratio is substantially one to one and thereafter the lifting ratio may become very much less somewhat in the nature of one to four as the strut 6 rolls along the extended part 30 of the lifting cams 22. The arm 6 always tends to roll tangentially with respect to the surface of the extension 30 until the projecting end 26 of the strut engages the socket 27, whereupon, the cable 23 is no longer under tension and a pure knuckle or leverage action is secured between the extension 30 and the arm or strut 6.

The shaft 8 may be rotated by means of a worm and worm wheel if desired, instead of employing the cable 12 and power drum or cam 10. In this case the lifting ratio will be controlled solely by the cam 22, but as previously explained, it may be made to vary between limits as great as above explained.

I do not intend to be limited to the details shown and described.

I claim:

1. In combination, a frame, a cross shaft on the frame, a load pivoted to the frame, a drum on the shaft, an arm pivoted to the load and lying tangential to the drum, and a cable connected to the drum and to the arm, said drum and arm having a registering groove for receiving the cable between them.

2. In combination, a frame, a shaft on the frame, a load pivoted to the frame, a drum of irregular contour on the shaft, an arm or strut pivoted to the load and lying tangential to the drum, said drum and arm having registering grooves for receiving a cable, and a cable connected to the drum and arm and lying in said groove, said drum and arm having cooperating members at their outer ends for pivotal engagement between the drum and the arm.

3. In combination, a frame, a cross shaft on the frame, a load pivoted to the frame, a drum on the shaft, an arm pivoted to the load and lying tangential to the drum, and a cable connected to the drum and to the arm, said drum and arm having registering grooves for receiving the cable between

them, and an irregularly shaped drum having a cable trained thereover for turning said shaft.

4. In combination, a frame, a shaft on the frame, a load pivoted to the frame, a drum of irregular contour on the shaft, an arm or strut pivoted to the load and lying tangential to the drum, said drum and arm having registering grooves for receiving a cable, and a cable connected to the drum and to the arm lying in said groove, said drum and arm having cooperating members at their outer ends for pivotal engagement between the drum and the arm, and power operated means for turning said shaft.

5. In combination, a frame, a body pivoted to the frame, a pair of cam members mounted together rotatable on said frame, said members comprising a power cam providing maximum leverage when the body is in lowered position and decreased leverage when the body rises or tilts, and a load cam providing a minimum length of arm when the body is in lowered position and increased length of arm when the body is raised or tilted.

6. In combination, a frame, a load pivoted on the frame, a shaft on the frame, a power drum of varying diameter providing maximum power arm where the load is greatest, a cable on said drum, means for pulling on said cable, a lifting drum of varying diameter providing minimum effective diameter when the load is greatest, a cable on said latter drum, and means for applying the pull of said latter cable to the load for tilting the same.

7. In combination, a frame, a load pivoted on the frame, a shaft on the frame, a power drum of varying diameter providing maximum leverage when the load is greatest, a cable on said drum, means for pulling on said cable, a lifting drum of varying diameter providing minimum effective diameter when the load is greatest, a cable on said lifting drum and a downwardly extending strut pivoted to the load and having its lower end connected to said latter cable.

8. In combination, a frame, a load pivoted on the frame, a shaft on the frame, a power drum of varying diameter providing maximum leverage when the load is greatest, a cable on said drum, means for pulling on said cable, a lifting drum of varying diameter providing minimum effective diameter when the load is greatest, a cable on said lifting drum and a downwardly extending strut pivoted to the load and having its lower end connected to said latter cable, said lifting drum having an extending portion adapted to engage the lower end of the strut when the load is tilted to substantially its greatest inclination.

9. In combination, a frame, a load pivoted on the frame, a shaft on the frame, a power drum of varying diameter providing maximum leverage when the load is greatest, a cable on said drum, means for pulling on said cable, a lifting drum of varying diameter providing minimum effective diameter when the load is greatest, a cable on said lifting drum and downwardly extending strut pivoted to the load and having its lower end connected to said latter cable, said lifting drum having an extending portion adapted to engage the lower end of the strut when the load is tilted to substantially its greatest inclination, and means for limiting the motion of the body to prevent disengagement of the strut and drum.

10. In combination, a truck frame, a body pivoted to the frame, a cross shaft on the frame, a power drum of variable effective radius on said shaft, a cable wrapped on said drum, a fluid operated piston for pulling on said cable, a load drum of variable effective radius connected to said power drum, a cable wrapped on said load drum and a strut member for transmitting the pull of the latter cable into an upward thrust on said body, said strut resting against the load drum.

11. In combination, a truck frame, a body pivoted to the frame, a cross shaft on the frame, a power drum of variable effective radius on said shaft, a cable wrapped on said drum, a fluid operated piston for pulling on said cable, a load drum of variable effective radius connected to said power drum, a cable wrapped on said load drum and a strut member for transmitting the latter cable into an upward thrust on said body, said strut resting against the load drum, said load drum having means at its greatest radius for engaging the strut directly.

12. In combination, a frame, a tilting body on the frame, a strut extending down from the body, and pivoted to the body, an eccentric take-up and flexible tension element attached to the strut and trained over the eccentric take-up, and means for rotating the take-up to raise the strut at varying effective leverages.

13. In combination, a body, a strut extending downwardly from the body, a transverse shaft, an eccentric take-up on said shaft, a flexible tension element secured to the lower end of the strut and trained over said take-up.

14. In combination, a tilting body, a strut secured to the body and extending downwardly, an eccentric drum journaled adjacent said strut, and a flexible tension element secured to the strut and trained over the drum, said drum being so positioned as to secure a maximum lifting effect during the initial stages of operation.

15. In combination, a tilting body, a strut secured to the body and extending down-

wardly, an eccentric drum journaled adjacent said strut, and a flexible tension element secured to the strut and trained over the drum, said drum being so positioned as to secure a maximum lifting effect during the initial stages of operation, and a contacting portion on the drum for engaging the lower end of the strut.

16. In combination, a tilting body, a strut secured to the body and extending downwardly, an eccentric drum journaled adjacent said strut, and a flexible tension element secured to the strut and trained over the drum, said drum being so positioned as to secure a maximum lifting effect during the initial stages of operation, and a contacting portion on the drum for engaging the lower end of the strut, said contacting portion and the lower end of the strut having means for preventing disengagement when the body is tilted.

17. In combination, a relatively stationary frame member, a relatively movable body member, a strut extending from one of said members, an eccentric drum to which said strut is tangent, and a flexible cable trained over the drum and connected to the outer end of the strut said drum providing greater leverage upon initial motion than upon final motion whereby a relatively great force can be applied between the frame and the body to start the movement of the body.

18. In combination, a relatively stationary frame member, a relatively movable body member pivoted thereto, a strut extending from one of said members, an eccentric drum to which said strut is tangent, and a flexible cable trained over the drum and connected to the strut adjacent its outer end, said drum having means for engaging the outer end of the strut directly to transmit thrust through the strut independently of the cable, said drum providing a relatively small radius for taking up the cable upon initial motion for starting the movement of the body upwardly.

19. In combination, a frame, a body mounted on the frame, a drum member on the frame, a strut member on the body, a cable trained over the drum member and connected to the strut member near its lower end, said members lying tangent to each other and said cable which is between the drum and the strut lying in a groove in one of said members and being guided thereby.

In witness whereof I hereto subscribe my name this 2nd day of Oct., 1920.

EARL B. HOUGH.