Nov. 8, 1938. F. BISZANTZ 2,136,231

DUMP BODY LEVERAGE

Filed June 21, 1937 2 Sheets-Sheet 1

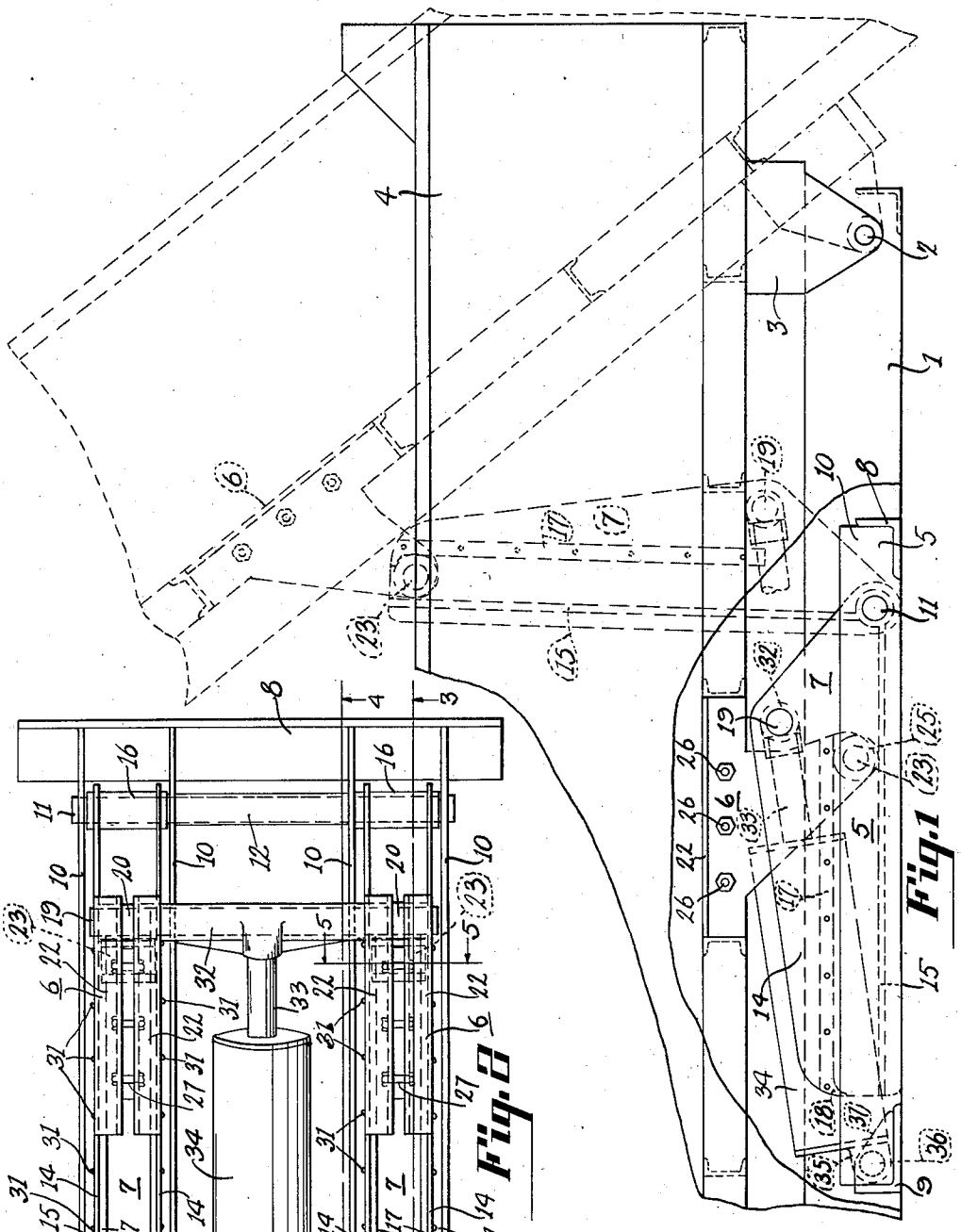

Fig. 1

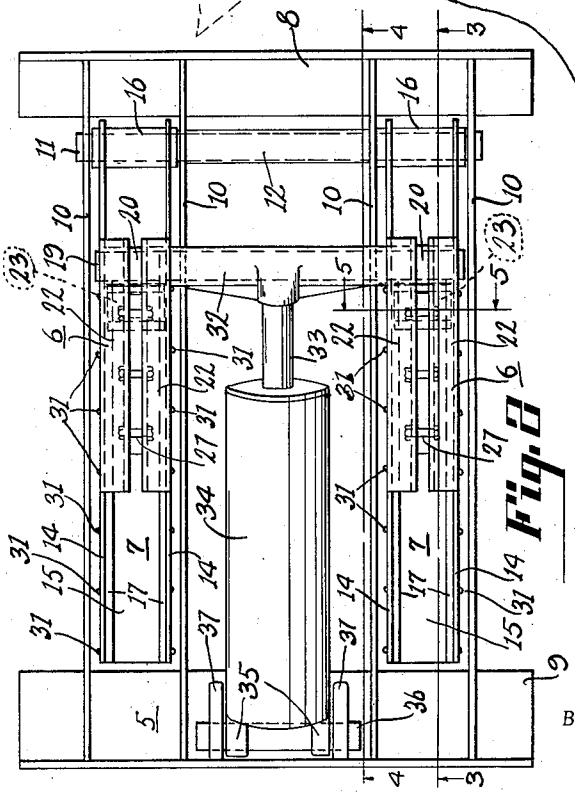

Fig. 2

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DUMP BODY LEVERAGE

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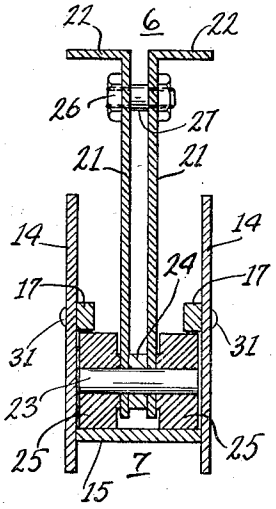

Fig. 5

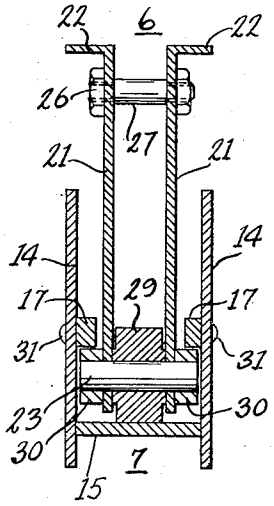

Fig. 6

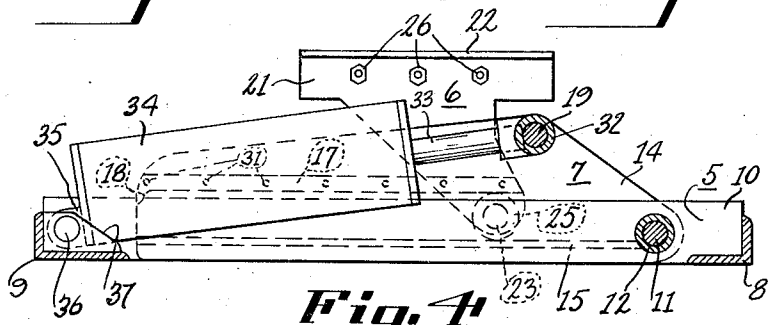

Fig. 4

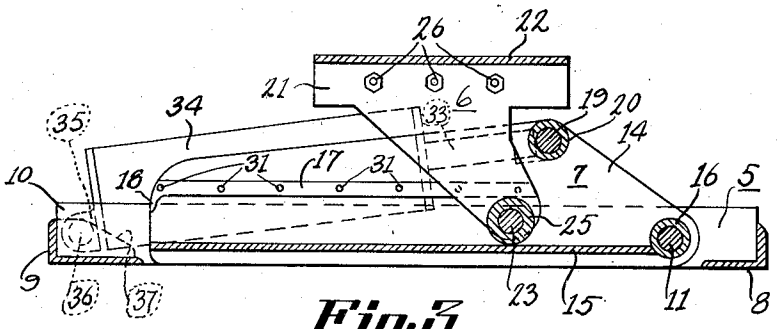

Fig. 3

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2,136,231

DUMP BODY LEVERAGE

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Application June 21, 1937, Serial No. 149,311

4 Claims. (Cl. 298—22)

This invention relates to dump bodies and, in particular, to dump body lift mechanisms.

It is an object of this invention to provide a dump body leverage which is simple in construction, efficient in operation, which is light in weight, and which is extremely compact.

It is a further object of this invention to provide a leverage for use in dump trucks, by means of which a simple leverage structure is utilized to alter the mechanical advantage of the mechanism, or the effective lever arm thereof through which lifting force is applied, during a lifting operation, in such manner as to apply a relatively large initial lifting force at relatively low lifting speed and automatically to increase the lifting speed progressively during the lifting operation when it is unnecessary, due to shift of weight, to maintain such a large lifting force as was initially applied.

It is a further object of this invention to provide a dump body leverage mechanism including a system of cooperating levers and antifriction means adapted initially to provide a relatively large effective lever arm which is progressively decreased during a lifting operation to progressively increase the speed of lift.

It is a further object of this invention to provide such a mechanism wherein, by utilizing a leverage providing a varying mechanical advantage throughout the lifting operation which corresponds to variation in load required to be lifted, a relatively small lifting force may be utilized to efficiently lift an extremely large load at progressively increasing speed.

It is a further object of this invention to provide such structure wherein a hydraulic motor of comparatively low power may be utilized.

These and other objects and advantages will appear from the following description taken in connection with the drawings.

In the drawings:

Figure 1 is a fragmentary side elevational view, partly broken away, of a preferred embodiment of this invention, as applied to the dump body of a truck;

Figure 2 is a top plan view of the lift and leverage mechanism illustrated in Figure 1;

Figure 3 is a section taken on the line 3—3 of Figure 2;

Figure 4 is a section taken on the line 4—4 of Figure 2;

Figure 5 is a section taken on the line 5—5 of Figure 2; and

Figure 6 is a view similar to Figure 5, but illustrating a modification of the structure illustrated therein.

Referring to the drawings in detail, while the illustrated structure of this invention may be applied to dump bodies of widely varying constructions, I have shown, in Figure 1, the application of a preferred form of the structure of this invention to a conventional dump body structure, in which the truck or vehicle frame is designated 1 and is provided with suitable pivots at 2, upon which are pivotally mounted the brackets 3 attached to the under side of the rear portion of the body 4. The hoist frame is generally designated 5 and is adapted to be rigidly secured in any suitable manner to the frame 1, preferably in a position such as is illustrated in Figure 1.

Secured to the under side of the body 4 at each side and in transverse alignment with one another is a pair of lifting brackets, each generally designated 6, which each cooperates with a lifting arm, generally designated 7, in such manner that, when force is applied to the lifting arms and they are swung from the full line position shown in Figure 1 to the dotted line position shown in that figure, the forward portion of the dump body is swung upwardly from the full line position to the dotted line position, as seen in Figure 1.

The hoist frame which is generally designated 5 comprises a forward transverse angle member 8 of L-section and a rear transverse angle member 9 of L-section, which are connected by the longitudinal vertical frame plates 10 which are rigidly secured therebetween in spaced relation, as shown in Figure 2, in any suitable manner, as by welding. At their forward ends, each longitudinal frame plate 10 is provided with an aperture, which apertures are all in alignment and which support the transverse pivot rod 11 which extends therethrough and is rigidly secured in position in any suitable manner, as shown in Figure 2.

The inner adjacent longitudinal frame plates 10 have additional rigidity imparted thereto by the central spacer member 12 which surrounds the pivot rod 11 and which has each end rigidly secured in any suitable manner to one of the adjacent central longitudinal frame plates 10. The details of the lifting arms, generally designated 7, are shown in Figures 2 to 6 inclusive and each lifting arm comprises a pair of substantially triangular plate members 14 having rigidly secured therebetween, in any suitable manner, as by welding, the longitudinal plate member 15 and

also the cylindrical spacer and bearing member 16, each of which surrounds and engages one end portion of the pivot rod 11.

Rigidly secured to the inner side of each plate member 14 is a retainer bar or plate 17 having the main portion thereof substantially parallel to the upper surface of the longitudinal plate member 15, as shown particularly in Figures 3, 5 and 6. At their rear ends, each retainer bar or plate 17 is provided with a downwardly directed projection 18 which performs a function which will be hereinafter more clearly explained. Adjacent their forward upper corners, each plate member 14 is provided with an aperture adapted to rotatably receive the crosshead rod 19 which extends transversely therethrough, as shown in Figure 2.

Disposed between each pair of plate members 14 and surrounding the apertures and the rod 19 is a bearing spacer member 20 having each end suitably secured to one of the plate members 14. The adjacent plate members 14 are thus rigidly secured together in spaced relation by the interposed longitudinal plate member 15, the spacer member 16, which is also a bearing member, and the spacer member 20 which is likewise a bearing member for the crosshead rod 19. The longitudinal plate member 15 cooperates with the retainer bars or plates 17 to form a trackway, as will be hereinafter more clearly described.

The lifting brackets each comprise a pair of bracket plates 21 which are vertically disposed and each provided at its upper end with an outwardly directed flange 22 which is adapted to be rigidly secured to the under side of the dump body 4 in any suitable manner. Each bracket plate 21 is provided at its lower end with an aperture adapted to receive a roller support pin 23 and, in the embodiment illustrated in Figures 1 to 5 inclusive, a central spacing member 24 is secured between adjacent bracket plates 21 surrounding the roller support pin 23, as shown in Figure 5. A roller 25 is rotatably supported upon each end portion of each roller support pin 23, being disposed between the outer surface of a bracket plate 21 and the inner surface of a plate member 14 of a lifting bracket 6. Each roller 25 is supported by the longitudinal plate member 15 of each lifting arm 7 and is retained at all times closely adjacent thereto by the retainer plates or bars 17, the rearward projection 18 of each of which limits the rearward movement of the respective rollers 25 with respect to the lifting arms 7, as shown in Figure 1. At their upper ends, beneath the flanges 22, the bracket plates 21 are provided with suitably spaced apertures, each pair of which is adapted to receive a clamping bolt 26, about which is disposed, between the inner surfaces of the bracket plates 21, a cylindrical spacer member 27 which secures the bracket plates 21 in predetermined spaced relation.

In the embodiment illustrated in Figure 6, the construction of the lifting arms 7 and the bracket plates 21 is similar to that illustrated in Figure 5, but the spacer members 27 and bolts 26 are substantially longer than in the construction shown in Figure 5 in order to provide for a wider spacing of the bracket plates 21. The roller support pin 23, which extends through the apertures at their lower ends of bracket plates 21, supports the roller 29 which is rotatable thereon and disposed between the lower ends of the adjacent bracket plates 21 of each lifting bracket 6. At its outer ends, the roller support pin 23 rotatably supports the cylindrical bearing collars 30 which are adapted, at certain times, to engage the under edge of each adjacent retainer plate or bar 17. The roller 29 is supported by the longitudinal plate member 15 of the lifting arm in the same manner in which the rollers 25 are supported thereby in the construction illustrated in Figure 5.

Excessive endwise movement of the roller support pins 23 is prevented in each embodiment by the plate members 14. The retainer plates or bars 17 are illustrated as rigidly secured to the plate members 14 by rivets 31, but it is, of course, to be understood that screws or bolts may be used as desired, or other means such as welding may be utilized.

Rotatably supported by the central portion of the crosshead rod 19 is the crosshead 32 which has the piston rod 33 of a conventional fluid or hydraulic motor rigidly attached thereto. The casing or cylinder of the hydraulic motor is designated 34 and has bearing brackets 35 rigidly secured thereto or integrally formed therewith at its lower, or rear, end. These bearing brackets 35 are rotatably supported by the transverse pintle or pivot pin 36 which is secured between the brackets 37 which are rigidly secured to both legs of the rear angle member 9. Each bracket member 37 is provided with a suitable aperture for supporting an end portion of the pintle or pivot rod 36.

When the parts are in the position illustrated in full lines in Figure 1, the trackways in the lifting arms are substantially horizontal and the rollers are disposed in the rear portion of the trackway, as shown in Figure 1. When it is desired to tilt the dump body 4 of the dump truck to which the leverage mechanism is applied, fluid pressure is introduced to the cylinder 34 whereby to thrust the piston rod 33 to the right, as seen in Figures 1 and 2, in order that the lifting arms 7 may be swung in clockwise direction about the pivot rod 11. The rollers 25 move rearwardly and upwardly in the trackways of the swinging lifting arms, which trackways are defined by the longitudinal plate members 15 and the retainer plates or bars 17. The projection 18 on the retainer plates or bars 17 limits the movement of the rollers in the trackways, as shown in the dotted line position in Figure 1. The fluid motor means, as illustrated, is conventional and it is, of course, to be understood that any other suitable conventional means may be substituted therefor.

While the longitudinal plate members 15 and associated retainer plates or bars 17 are illustrated as defining a straight trackway or pathway for the rollers, it is, of course, to be understood that the plates 15 may be curved, either regularly or irregularly, and the shape of the lower edge of the retainer bars 17 modified accordingly to form a curved pathway which is either regular or irregular. The antifriction means provided by the rollers substantially reduces the drag and the amount of power necessary to raise the dump body. The necessity for the provision of only two pivotal connections in the leverage, namely, the pivotal connection of the lifting arms to the hoist frame and the pivotal connection of the crosshead to the lifting arms is an important feature of the invention, and a further important feature is the simplicity of the construction wherein the leverage in the main comprises a hoist frame adapted for attach-

ment to the frame of a dump truck, a pair of lifting arms having trackways therein and pivoted to the hoist frame, a pair of lifting brackets adapted to be secured to the dump body which is pivoted on the dump truck frame and the antifriction means on these brackets for engaging the trackways in the lifting arms. Likewise, the provision of the expansible power means pivotally connected to and supported by the hoist frame and having pivotal connection with the lifting arms is a further important feature of the invention, as it leads to the utmost compactness of the structure when the dump body is in horizontal position.

It will be understood that the above described structure is merely illustrative of the manner in which the principles of my invention are utilized and that I desire to comprehend within my invention such modifications as come within the claims and the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a leverage for use in dump trucks including a vehicle frame having a dump body pivotally secured thereto; a stationary hoist frame secured to the vehicle frame, a lifting arm pivoted at one end to said hoist frame for swinging movement about a transverse axis and having a longitudinal trackway therein, a lifting bracket rigidly secured to the under side of the dump body, roller means on said lifting bracket and retained for longitudinal rolling movement in said trackway, a crosshead directly pivoted to said lifting arm, and power means supported on said hoist frame for applying thrust to said crosshead to swing said lifting arm and cause relative rolling movement between the trackway thereof and the roller on said lifting bracket to cause said dump body to be swung about its axis on the vehicle frame.

2. In leverage mechanism for a dump truck, a hoist frame adapted to be rigidly secured to a truck chassis, a lifting bracket adapted to be rigidly secured to the under side of a dump body, a lifting arm pivoted on said hoist frame, a trackway in said lifting arm, antifriction means on said lifting bracket adapted to be retained for longitudinal movement in said trackway, and means supported by said hoist frame directly pivoted to said lifting arm in fixed location relatively thereto to apply tilting force to said lifting arm.

3. In a dump truck, a chassis frame, a hoist frame thereon, a dump body pivoted on said chassis frame, a lifting arm pivoted on said hoist frame, a lifting bracket on said dump body, antifriction means on said lifting bracket, a longitudinal trackway in said lifting arm adapted to retain said antifriction means for longitudinal movement with respect to said lifting arm, and power means supported by said hoist frame having a cross head directly pivoted to said lifting arm for swinging said lifting arm with respect to said hoist frame.

4. In a dump truck including a chassis frame having a dump body pivoted thereon for movement about a transverse axis, a lifting bracket on said dump body, roller means at one end of said lifting bracket, a hoist frame fixed to said chassis frame, a lifting arm pivoted at one end to said hoist frame, a trackway in said lifting arm for receiving said roller means, and fluid pressure means having a direct pivotal connection with said lifting arm and mounted on said hoist frame for causing swinging movement of said lifting arm to apply lifting force to said dump body truck through a progressively increasing effective lever arm, said pivotal connection having a location on said lifting arm which remains substantially fixed during the swinging thereof.

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