

Dec. 13, 1938.

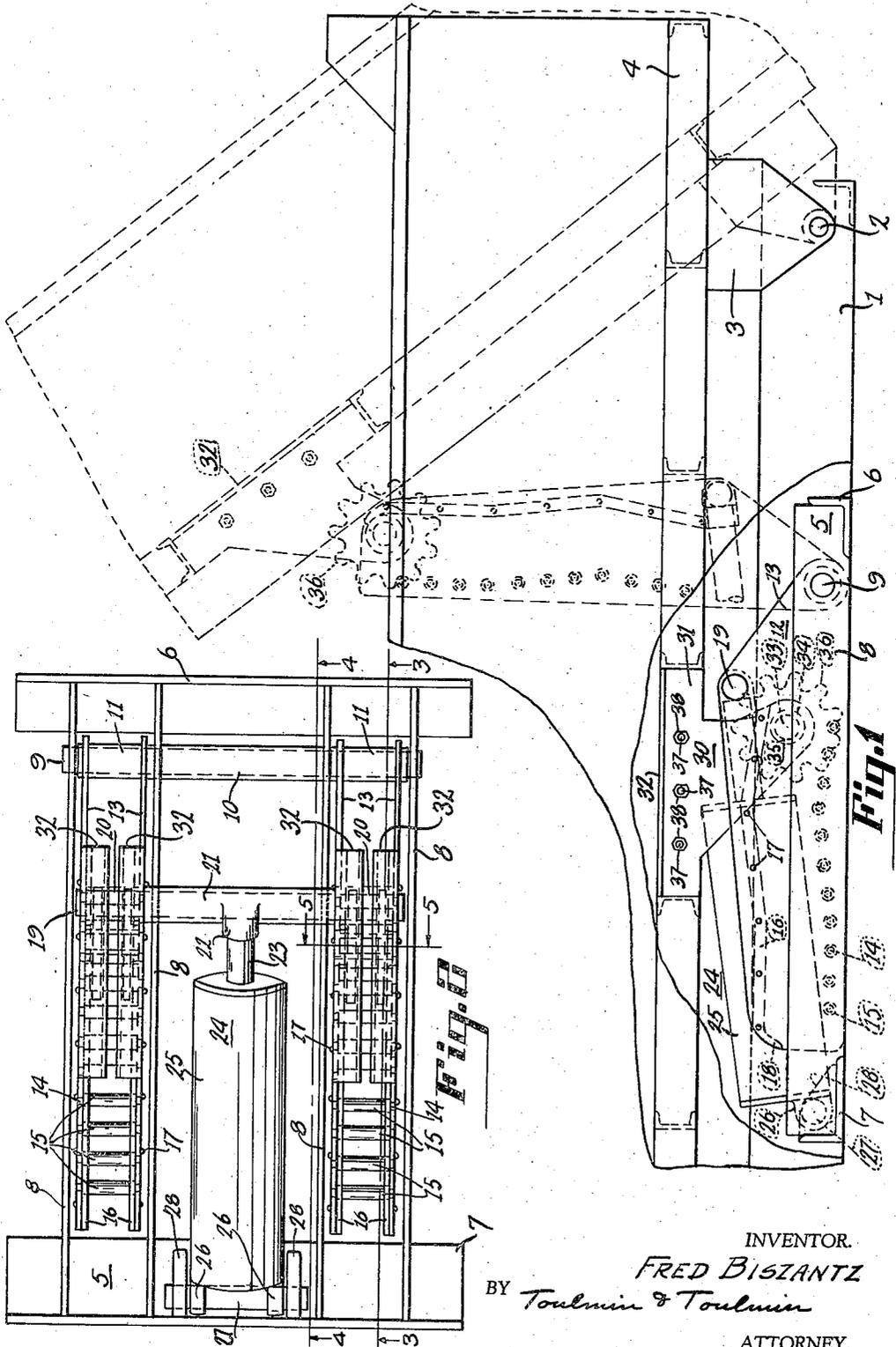
F. BISZANTZ

2,139,794

DUMP BODY LEVERAGE

Filed June 24, 1937

2 Sheets-Sheet 1



INVENTOR.  
**FRED BISZANTZ**  
BY *Toulmin & Toulmin*  
ATTORNEY.

Dec. 13, 1938.

F. BISZANTZ

2,139,794

DUMP BODY LEVERAGE

Filed June 24, 1937

2 Sheets-Sheet 2

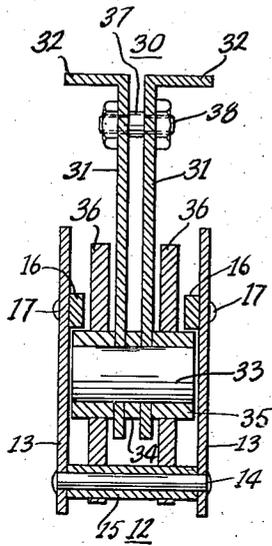


Fig. 5

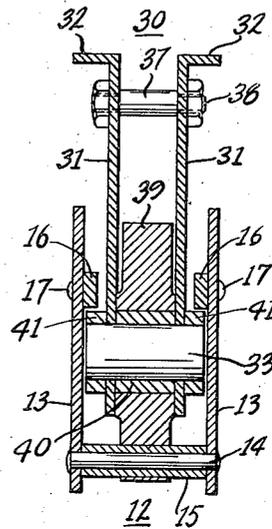


Fig. 6

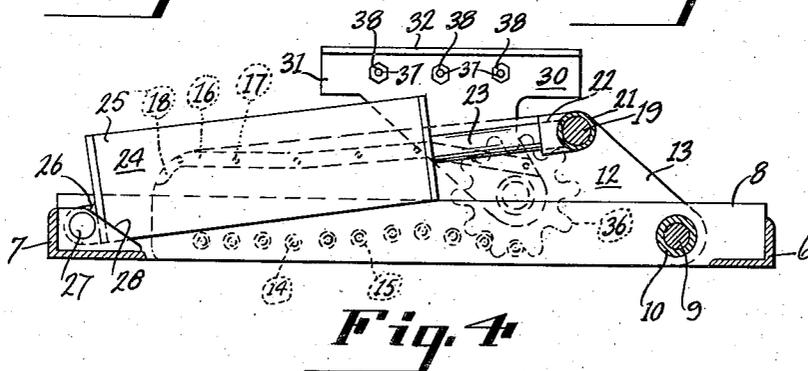


Fig. 7

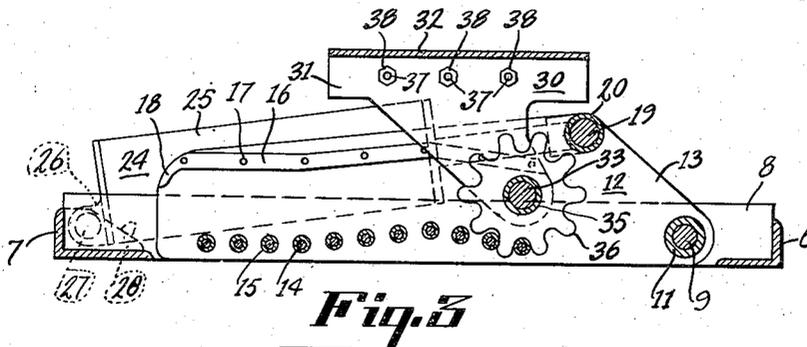


Fig. 8

INVENTOR.  
FRED BISZANTZ  
BY  
Toulmin & Toulmin  
ATTORNEY.

# UNITED STATES PATENT OFFICE

2,139,794

## DUMP BODY LEVERAGE

Fred Biszantz, Galion, Ohio, assignor to The  
Galion Metallic Vault Company, Galion, Ohio,  
a corporation of Ohio

Application June 24, 1937, Serial No. 150,155

7 Claims. (Cl. 298—19)

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, extremely efficient in operation, which is strong and 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 construction is utilized to progressively, during operation, alter or modify the mechanical advantage of the mechanism, or the effective lever arm thereof through which lifting force is applied in such manner as to apply a relatively great initial lifting force at relatively low lifting speed and automatically to increase the lifting speed progressively during the lifting operation when it becomes 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 members including cooperating lifting arms and lifting brackets provided with cooperating rack and gear 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 means 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 lifting or 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, wherein a single sprocket wheel is substituted for the pair of sprocket wheels illustrated in Figures 1 to 5 inclusive.

Referring to the drawings in detail, in which the structure of this invention has been illustrated as applied to a known form of dump body, I have shown, in Figure 1, a truck chassis frame designated 1, which is provided with suitable pivots 2, upon which are pivotally mounted the side brackets 3 of the truck body 4. Rigidly secured to the chassis frame 1, in any suitable manner, is a lift frame, generally designated 5, which comprises a rear transverse frame member 6 of angle form, a forward transverse frame member 7 of angle form and a plurality of longitudinal spaced frame plates 8 which are arranged in spaced pairs to accommodate the lift mechanism, as will hereinafter more clearly appear.

At their rear ends, the longitudinal frame plates 8 are provided with aligned apertures through which extends the transverse pivot rod 9 which is journaled in the tubular spacer 10 having each end thereof rigidly secured to a central longitudinal frame plate 8, and which transverse pivot rod has pivotally secured thereto, between each exterior spaced pair of longitudinal frame plates 8, a tubular lifting arm support 11. The lifting arms are each generally designated 12 and, in the embodiment illustrated, a pair of lifting arms is provided, one adjacent each side of the dump body 4. Each lifting arm comprises a pair of spaced parallel side plates 13 which are substantially triangular, each pair of which is connected at its rear end by the corresponding tubular lifting arm support 11 which is rigidly secured thereto, as described above.

Throughout a substantial portion of their lengths, the side plates are secured in spaced relation by means of the pintle members 14 which are beaded over at each end and which support the tubular members 15 which are disposed between the plates and which may be rigidly secured to the pintle pins 14 and/or spaced parallel side plates 13 or mounted for free rotation on the pintle pins 14. The tubular members 15, therefore, form bearing members which may be either stationary or freely rotatable on the pintle pins 14, as pointed out above. While the pintle pins 14 and supported bearing members

15 may, if desired, be arranged in a straight line substantially parallel to the lower edge of the side plates 13, they are preferably arranged, as illustrated particularly in Figures 1, 3 and 4, in a path having a substantially arcuate or undulatory portion. Each side plate 13 is provided with a guide rail member 16 rigidly secured thereto in any suitable manner as by means of screws or rivets 17. The lower surface of each guide rail 16 is parallel to the corresponding trackway or rack formed by the bearing members 15, and at the forward end of each guide rail 16 is a downwardly directed projection 18 which is adapted to operate as stop means, as will be hereinafter more clearly explained. The spaced bearing members 15 thus form, with the guide rails 16, a trackway in the form of an antifriction rack which is preferably curved, as shown in Figures 1, 3 and 4. Each side plate 13 is provided, adjacent its forward upper apex, with an aperture pivotally receiving the cross-head pivot rod 19 which extends therethrough, as shown in Figure 2.

Supported by the crosshead pivot rod 19, between each pair of side plates 13, is a spacer 20 having each end thereof secured to one of the side plates 13 in such manner as to form a means for securing to the upper rear portions thereof rigidly in spaced relation. Pivotally supported on the crosshead pivot rod 19, between the lifting arms, is a crosshead 21 having thereon an extension 22 adapted for rigid connection with the piston rod 23 of the fluid motor generally designated 24. The cylinder 25 (which includes a conventional piston secured to the end of the piston rod 23) is provided at its forward and lower ends with a pair of pivot brackets 26 formed integrally therewith or rigidly attached thereto. The pivot brackets 26 are provided with aligned apertures, through which extends the pintle member 27 having each end thereof supported in a pintle bracket 28 rigidly secured to the forward cross member or angle 7 of the lift frame 5.

When fluid pressure is released from the fluid motor 24, the dump body 4 takes a horizontal position, as illustrated in Figure 1, wherein the lower edges of the lifting arms 12 are substantially horizontal. When fluid pressure is introduced to the cylinder 25 of the fluid motor 24, the piston rod 23 is thrust rearwardly or to the right, as seen in Figures 1, 3 and 4, to swing the lifting arms 12 in clockwise direction about the transverse pivot rod 9, whereupon the parts take the position illustrated in dash lines in Figure 1. Upon release of fluid pressure from the cylinder 25 of the fluid motor 24, the parts will again assume the position illustrated in full lines in Figure 1.

It is, of course, to be understood that any suitable source of fluid pressure may be provided for operating the dump body lift mechanism and the preferred source of fluid pressure comprises a suitable fluid pump and reservoir mounted upon the chassis frame 1 with the pump capable of connection, for operation, to the source of motive power of the vehicle having the chassis 1.

Rigidly secured to the under side of the dump body 4 is a pair of lifting or thrust brackets, generally designated 30, which, in the form illustrated in Figures 1 to 5 inclusive, comprises a pair of bracket plates 31 which are substantially vertically disposed and each of which is provided at its upper end with a transverse flange 32 which is adapted for attachment to the under side of

the dump body 4. The bracket plates 31 are provided at their lower ends with aligned apertures adapted to receive the pintle member 33 which is surrounded by the spacer 34 which is disposed between the bracket plates 31 and which has each end secured rigidly to one of the bracket plates 31.

Rotatable on the pintle 33 at each side of each bracket plate 31 and disposed between each bracket plate 31 and a corresponding side plate 13 is a rotatable collar 35 having rigidly secured thereto a pinion or sprocket member 36. The teeth of the pinion or sprocket members 36 engage the tubular bearing members 15, as shown in Figures 1, 3 and 4, and the sprocket or pinion member 36 thus cooperates with the bearing members 15 to form, in effect, a rack and pinion. The collars 35 which are rigid with the pinion or sprocket members 36 cooperate with the lower edge of the corresponding guide rail 16 to retain the pinion or sprocket members 36 in engagement with the bearing members 15. The upper end portions of the bracket plates 31 are secured together in spaced relation by the interposed spacer collars 37 and the bolts 38 which extend therethrough. The flanges 32 of the bracket plates 31 may be bolted, welded or otherwise rigidly secured to the lower surface of the dump body 4.

In the modification illustrated in Figure 6, the spacing collars 37 and bolts 38 are of substantially greater length than in the form illustrated in Figures 1 to 5 inclusive and, instead of the pair of pinion members 36, a single pinion member 39 of substantially greater width than the pinion members 36 is interposed between the bracket plates 31, being attached rigidly to the bearing collar 40 which is rotatably supported by the pintle 33. Rotatably mounted on each end portion of the pintle 33, between each bracket plate 31 and the corresponding side plate 13 is a bearing collar 41 adapted to cooperate with the corresponding guide rail 16 to retain the sprocket member 39 in engagement with the trackway or rack formed by the tubular members 15.

Attention is particularly directed to the fact that, when the trackway formed by the bearing members 15, is provided with a curved portion, as illustrated in Figures 1, 3 and 4, the action of the lifting arms 12 is modified when compared to the situation existing when the trackway or rack formed by the members 15 is straight. In the latter case, when the rack or trackway is straight, the effective lever arm through which force is applied through piston rod 23 is progressively increased, while the parts are moving from the position illustrated in Figure 1 in full lines to that illustrated in that figure in dash lines. The effective lever arm is at first relatively small and progressively increases as the body 4 is inclined. Therefore, as the effective lever arm is initially slight and progressively increases with the angle of lift, the initial effective lifting force applied is substantially great and is progressively decreased during the lifting operation, while the speed of lift is progressively increased from minimum to maximum, when the parts move from the position illustrated in full lines to the position illustrated in dash lines in Figure 1.

When the rackway or trackway formed by the bearing members 15 is provided with a curved portion, as illustrated in Figures 1, 3 and 4, an additive differential effect is achieved, wherein the speed of lift and the effective lever arm increase progressively at an uneven rate which is at times greater and at times less than the rate

of increase where the rackway or trackway is straight. In other words, when force is applied through the crosshead pivot rod 19, as seen in Figure 3, the lifting arms 12 are swung to the right about the pivot rod 9 and the pinions 36 travel to the rear or leftwardly of the trackway formed by bearing members 15. The inclination of the four rearmost or rightmost bearing members 15 from the horizontal causes the increase in effective lever arm to be less than would occur if the trackway were straight. As soon, however, as the pinions engage and pass the fourth bearing member 15, the trackway formed by the fifth, sixth and seventh bearing members 15, which is inclined, increases the rate of speed of the effective lever arm and the angular speed of lift; and, when the foremost, last, or leftward four bearing members 15 are being traversed by the sprocket members 36, the speed of lift and the effective lever arm, through which force is applied, are progressively increased at a uniform rate. Thus, upon application of lifting force through crosshead pivot rod 19, the maximum force is initially applied through the least effective lever arm, and the increase of effective lever arm is retarded by the inclination provided at the first part of the trackway and then increased until the straight portion of the trackway is reached, at which time the increase in effective lever arm and the increase of lifting speed will occur at a constant rate.

It is, of course, to be understood that the trackway or rackway formed by the bearing members 15 may be substantially varied and made either straight or arcuate and that the acuteness of the arcuate portions thereof may be varied as desired.

It will be further understood that the above described structure is merely illustrative of the manner in which the principles of my invention may be utilized and that I desire to comprehend within my invention such modifications as come within the scope of 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 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 pivoted on said truck chassis, a sprocket on said lifting bracket, a lifting arm pivoted on said hoist frame, a rackway on said lifting arm comprising spaced pin means adapted to support said sprocket, and means supported by said hoist frame to apply tilting force to said lifting arm.

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

pivoted on said truck chassis, a sprocket on said lifting bracket, a lifting arm pivoted on said hoist frame, a curved rackway on said lifting arm comprising spaced pin means adapted to support said sprocket, and means supported by said hoist frame to apply tilting force to said lifting arm.

3. In lifting means adapted for use in a dump truck including a chassis frame and a dump body pivotally mounted thereon, a bracket arm having sprocket means thereon and adapted to be secured to the dump body, and a lifting arm adapted to be pivotally supported on said chassis frame and having thereon a trackway comprising a plurality of spaced pins adapted to support said sprocket.

4. In lifting means adapted for use in a dump truck including a chassis frame and a dump body pivotally mounted thereon, a bracket arm having sprocket means thereon and adapted to be secured to the dump body, and a lifting arm adapted to be pivotally supported on said chassis frame and having thereon a curved trackway comprising a plurality of spaced pins adapted to support said sprocket.

5. In lifting means adapted for use in a dump truck including a chassis frame and a dump body pivotally mounted thereon, a bracket arm having sprocket means thereon and adapted to be secured to the dump body, a lifting arm adapted to be pivotally supported on said chassis frame and having thereon a trackway comprising a plurality of spaced pins adapted to support said sprocket, and means on said lifting arm adapted to retain said sprocket in engagement with said trackway.

6. In lifting means adapted for use in a dump truck including a chassis frame and a dump body pivotally mounted thereon, a bracket arm having sprocket means thereon and adapted to be secured to the dump body, a lifting arm adapted to be pivotally supported on said chassis frame and having thereon a trackway comprising a plurality of spaced pins adapted to support said sprocket, and means on said lifting arm adapted to retain said sprocket in engagement with said trackway and to limit swingable movement of said lifting arm in one direction.

7. In lifting means adapted for use in a dump truck including a chassis frame and a dump body pivotally mounted thereon, a bracket arm having sprocket means thereon and adapted to be secured to the dump body, a lifting arm adapted to be pivotally supported on said chassis frame and having thereon a curved trackway comprising a plurality of spaced pins adapted to support said sprocket, and means on said lifting arm adapted to retain said sprocket in engagement with said trackway and to limit swingable movement of said lifting arm in one direction.

FRED BISZANTZ. 60