

Dec. 13, 1938.

F. BISZANTZ

2,139,795

DUMP BODY

Filed Nov. 1, 1937

3 Sheets-Sheet 1

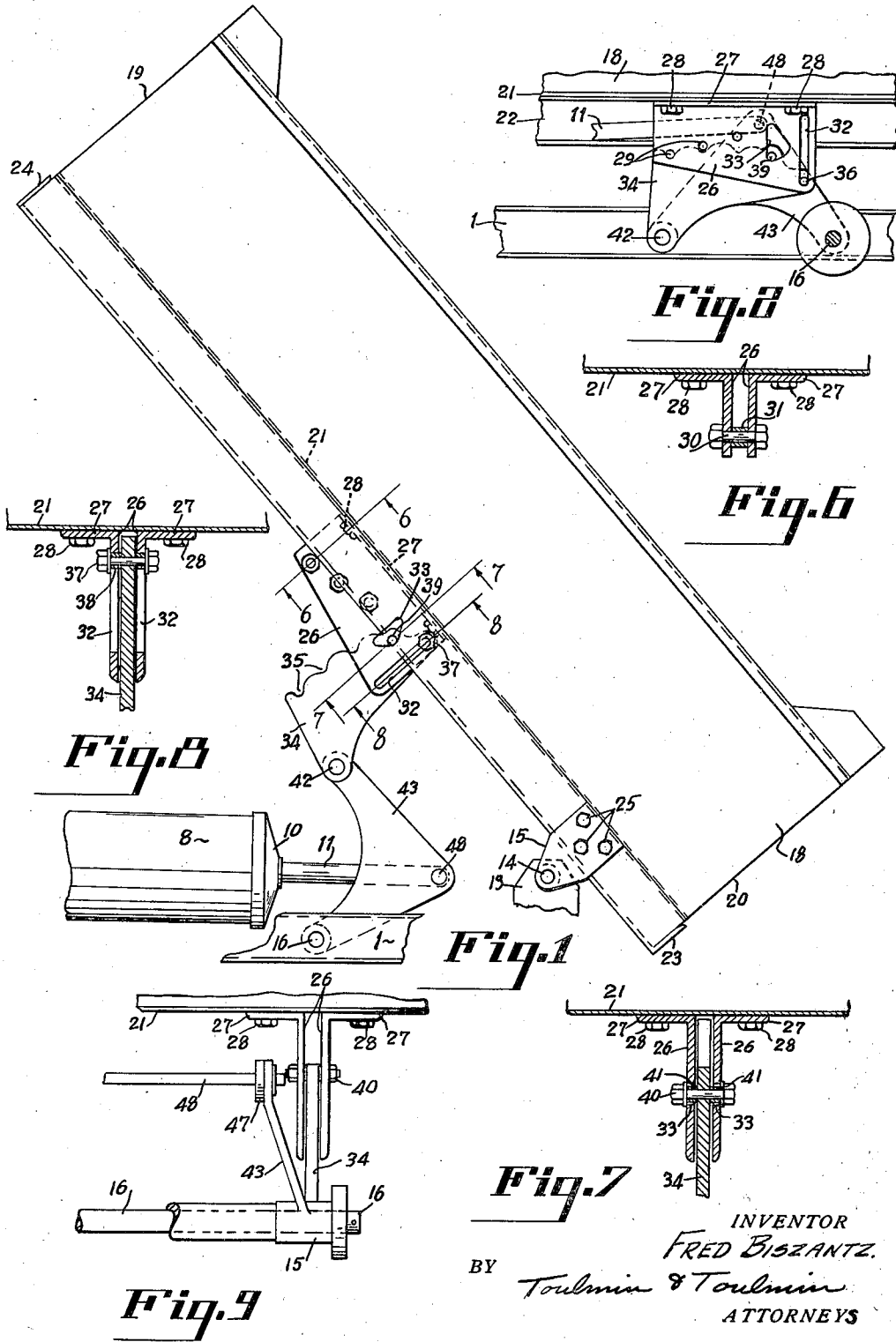


Fig. 2

Fig. 3

Fig. 4

Fig. 1

Fig. 5

Fig. 9

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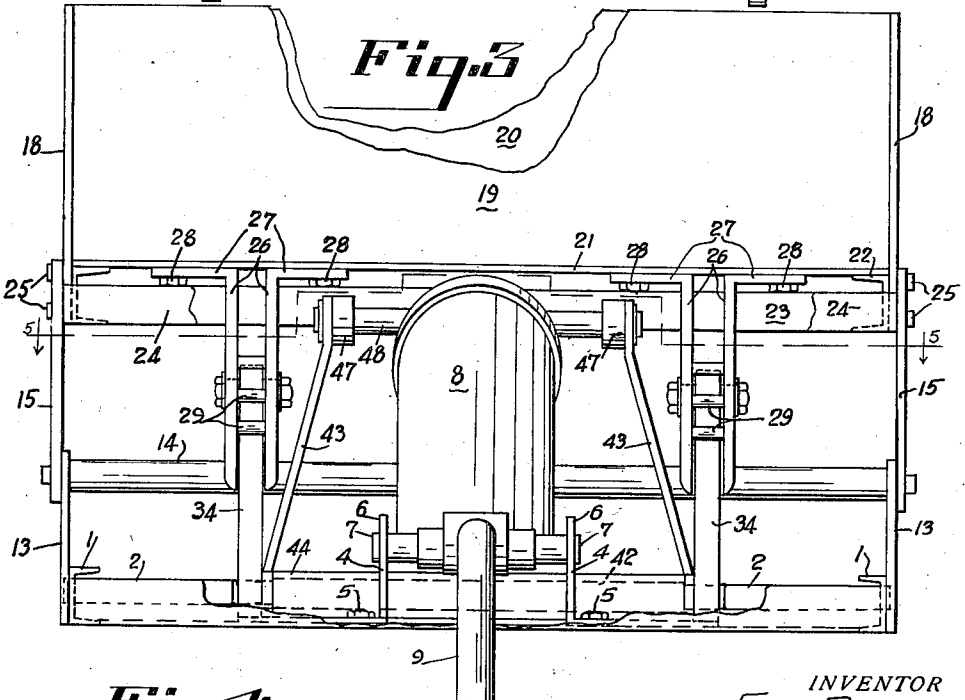
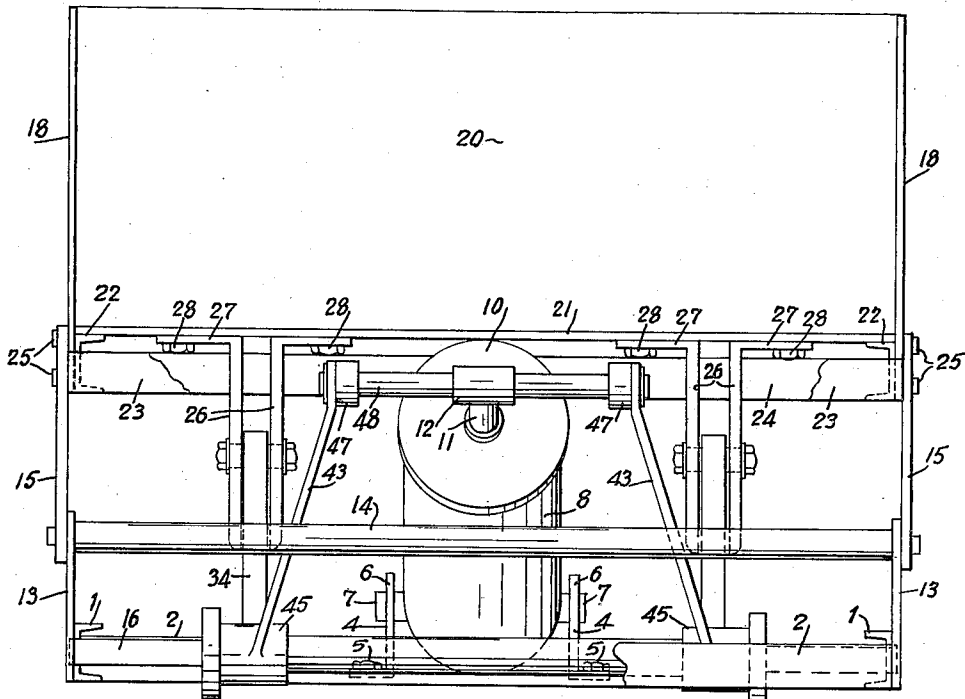


Fig. 2

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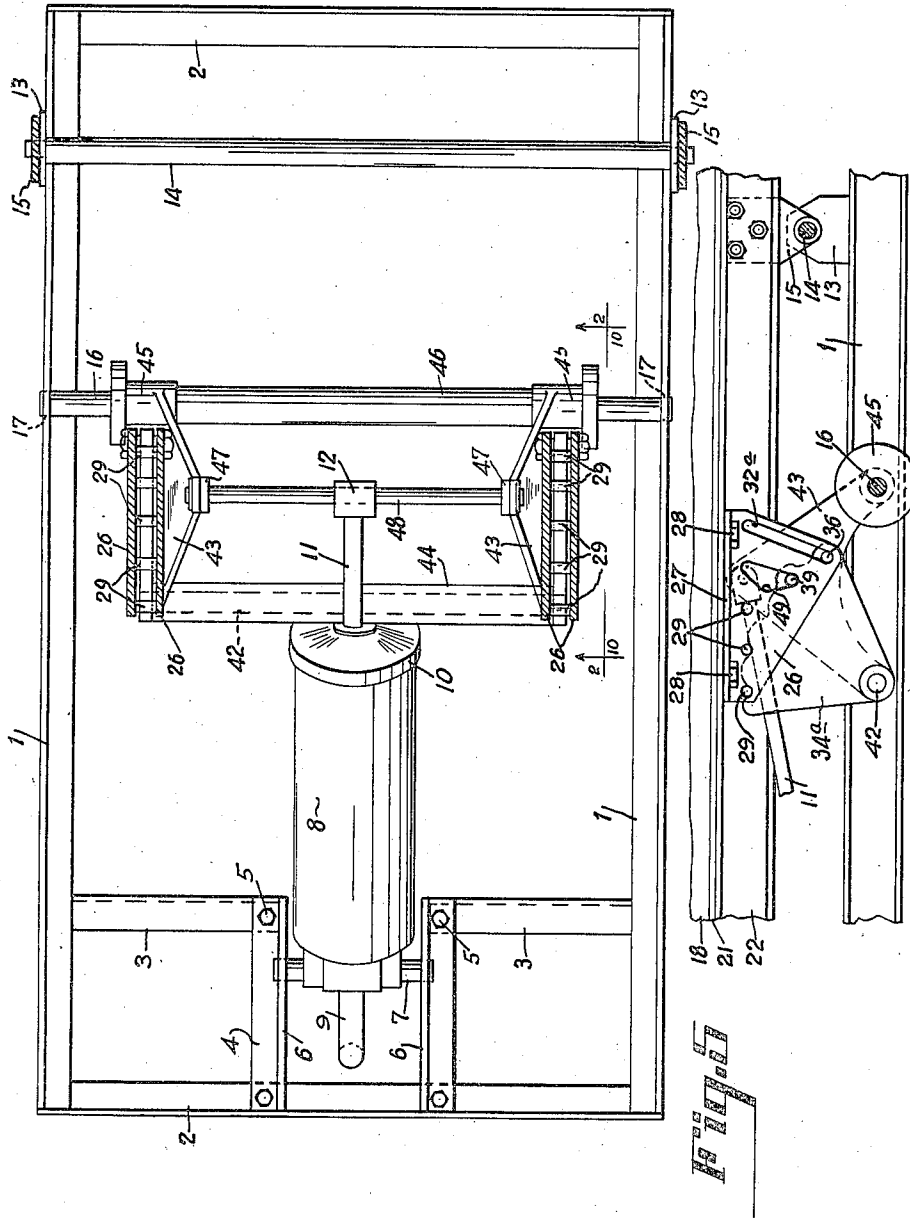
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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DUMP BODY

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

Application November 1, 1937, Serial No. 172,098

3 Claims. (Cl. 298—19)

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

It is an object of this invention to provide, in a dump body, a leverage or lifting mechanism which is extremely compact, when collapsed, which is strong, though of light weight, and extremely efficient in operation.

It is a further object of this invention to provide, in such mechanism, a leverage or linkage construction by means of which, lifting force may be applied to a swingable dump body through variable lever arms during upward swinging movement of the body.

It is a further object of this invention to provide such a mechanism wherein, during a lifting, or upward swinging movement of a dump body, the mechanical advantage of the leverage is progressively decreased while the speed of movement of the body is correspondingly progressively increased in such manner as to materially speed the lifting operation, while at the same time permitting the use of less power for the performance of the lifting operation than would be otherwise possible.

It is a further object of this invention to provide such a construction wherein the lifting force of a power operated reciprocatory member is applied initially through a relatively small effective lever arm to achieve a substantially great initial mechanical advantage which is subsequently automatically and progressively decreased with consequent increase of lifting speed.

It is a further object of this invention to provide such a mechanism wherein the force applied is automatically varied during a lifting operation and maintained proportional to the force necessary to overcome resistance to lift, which varies, during a lifting operation, due to the shift of weight upon variation in the angular position of the dump body with respect to its supporting means.

It is a further object of this invention to provide such structure wherein fluid engine means, or other conventional means of relatively low power, may be utilized for the lifting of relatively large loads.

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 of a dump truck equipped according to the principles of this invention, with the leverage mechanism in extended position;

Figure 2 is a fragmentary view of the leverage mechanism of Figure 1 in collapsed, or retracted, position;

Figure 3 is an end elevational view of a structure shown in Figure 2, as seen from the right of Figure 2, looking toward the left;

Figure 4 is a view similar to Figure 3, but showing the structure of Figure 2, as seen from the left of Figure 2, looking toward the right;

Figure 5 is a section taken substantially on the line 5—5 of Figure 4;

Figure 6 is a section taken on the line 6—6 of Figure 1;

Figure 7 is a section taken on the line 7—7 of Figure 1;

Figure 8 is a section taken on the line 8—8 of Figure 1;

Figure 9 is a fragmentary end elevational view of structure shown in Figure 2; and

Figure 10 is a view similar to Figure 2 of a modified structure constructed according to the principles of this invention.

Referring to the drawings in detail and with reference particularly to Figures 1, 3, 4 and 5, the sub-frame which is adapted for rigid attachment to the truck chassis comprises longitudinal side members 1 of channel form having transverse end members 2 of similar form rigidly secured thereto, in suitable manner, as by welding. A pair of transverse channel members 3 having their inner ends suitably spaced are likewise secured to the side members 1.

Secured to the top surface of the inner end of each transverse channel member 3 is one end of a channel member 4 having its other end rigidly secured to the adjacent end channel member 2. While the channel members 4 are shown as secured respectively to transverse channel members 3 and channel member 2 by means of bolts 5, it is, of course, to be understood that other suitable rigid attaching means, such as welding may be used for this purpose. Each channel member 4 has an upwardly extending flange 6. The flanges 6 are provided with suitable, aligned apertures for receiving the pin or pintle member 7, upon which is mounted the front end of the cylinder 8 of a suitable fluid engine which is provided with a suitable fluid supply pipe 9 at its front end, and a cap or head member 10 at the opposite end, which is suitably apertured to reciprocally support the piston rod 11 which extends therethrough and which is, of course, provided at its inner end with a suitable piston adapted for reciprocation in the cylinder 8 and at its forward end with a suitably apertured head 12.

Adjacent the rear end of the sub-frame formed by the side members 1 and end members 2 is a pair of upwardly directed bracket members 13 provided at their upper ends with suitable apertures for receiving the transverse rod member 14 which projects through the apertures in the bracket members and has, at each end, a reduced end portion adapted to pivotally engage a suitable aperture provided at the lower end of a bracket member 15, hereinafter more clearly described.

Forwardly disposed with respect to the transverse rod member 14 is a transverse pivot rod 16 having its opposite ends supported in suitable apertures 17 provided in the side members 1 of the sub-frame. This pivot rod 16 serves as a pivotal support for the lifting linkage or mechanism by means of which, power from the fluid engine, above described, is transmitted to the dump truck body.

The body comprises side plates 18, front end plate 19, rear end plate 20 and floor plate 21. The rear end plate 20 is shown in the form of a plate member rigidly secured to the floor plate and side plates of the body, but it is, of course, to be understood that any suitable tail gate construction may be applied to the body construction. Secured to the marginal lower surface of the floor plate 21 and to the lower inside surfaces of the side plates 18 are longitudinal channel members 22. The rear end of each channel member 22 and the lower portion of the rear end of each side plate 18 are secured together by a transverse bracing member 23 secured thereto and extending therebetween and a similar transverse bracing member 24 extends between the opposite ends of the channel members 22 and side plates 18. The side plates 18, front plate 19, floor plate 21 and channel members 22, as well as the transverse bracing members 23 and 24, are rigidly secured together into a single unit, preferably by means of welding.

The bracket members 15 are rigidly secured, in suitable manner, as by means of bolts 25, to the side plates 18 and channel members 22 in such manner that the above-described unit is supported for pivotal movement upon the transverse rod member 14. The means for tilting the dump body comprises a linkage or leverage system having connection with the transverse pivot rod 16 on the sub-frame, with the head 12 on the piston 11 of the fluid engine and with the floor plate 21 of the body.

This leverage or linkage mechanism comprises a pair of laterally spaced longitudinally disposed trackways, each of which has therein spaced pin or roller means adapted to cooperate with suitable notches provided in an arcuate sector member which is pivotally secured to one end of a substantially triangular thrust plate member having an opposite end or apex pivoted on the transverse pivot rod 16 and having pivotal connection with a cross rod connected to the head 12 of the piston rod 11. Each trackway comprises a pair of bracket members of angle form, having substantially vertically disposed webs 26 and outwardly directed flanges 27, each of which is rigidly secured to the floor plate 21 of the body in suitable manner, as by means of bolts 28.

The trackways which are formed between the webs or flanges 26 are formed by the spaced pin members 29 which are suitably spaced and located between the webs or flanges 26 and which may be in the form of pins having their opposite ends received in and riveted in suitable aper-

tures provided in the webs or flanges 26 or, if desired, these members may be made in the form of bolts 30 secured in apertures in the flanges or webs 26 and having cylindrical spacer members 31 surrounding the portion thereof intermediate the flanges or webs 26, as shown in Figure 6. The spacer members 31 may be formed of any suitable material for resisting friction and, if desired, they may be loosely mounted between the flanges 26 on the bolts 30 to form anti-friction rollers for engaging notches in the sector member, as hereinafter more clearly described.

Each web or flange portion 26 is provided, as shown in Figures 1, 2, 7 and 8, with an elongated slot 32 at its rear end which is disposed substantially vertically in the collapsed position of the leverage mechanism, as shown in Figure 2. A suitable guide pin means rigid with the sector member, hereinafter described, is adapted to be disposed in each pair of slots 32. Forwardly of the slots 32 are substantially triangular apertures 33 in each web or flange member 26. Each pair of apertures 33 is adapted to cooperate with suitable pin means on the above-mentioned sector member for a purpose which will hereinafter more clearly appear.

Disposed between each pair of webs or flanges 26 is a sector member 34 having an arcuate upper surface provided with suitable notches 35 adapted for engagement with the respective pins 29 or spacers 31 on bolts 30, as the case may be, which form the trackway between the flanges or webs 26. At its rear end, each sector member 34 is provided with a suitable guide pin 36 extending from opposite sides of the sector member 34, as shown in Figure 2, or with guide pin means comprising a bolt 37 extending through the sector member 34 and provided at opposite sides thereof with sleeve or roller means 38 which are adapted to engage the walls of the guide slots 32 in each web or flange 26. Suitably located forwardly of this pin means is stop pin means comprising either a pin 39 similar to pin 36, as shown in Figure 2, or stop pin means comprising a bolt 40 similar to bolt 37 and provided with sleeve or roller means 41 similar to the roller means 38 on the bolt 37, as shown in Figure 7.

Due to the cooperation of the pin means 29 or 30, 31 with the notches 35 in the sector member 34 and due to the cooperation of the apertures 33 with the stop pin means 39 or 40, 41 and the guide slots 32 with the guide pin means 36 or 37, 38, the application of upward force, to raise the sector 34, will be translated into relative swinging movement of the sector member 34 with respect to the trackway formed by pins 29 or 30, 31 in such manner that the distance between the lower, or pivoted, end of the sector and the point of application of upward force will be materially increased, as may be readily seen by comparison of Figure 2 with Figure 1.

The lower end of the sector member 34 is provided with a suitable aperture which is pivotally supported upon the connecting rod 42. Substantially triangular thrust plate members 43 are provided at their forwardly or upwardly disposed apex with suitable apertures for rotatable support on the connecting rod 42 inwardly of the sector members 34, and these ends of the thrust plate members 43 are rigidly secured in spaced relation by means of a cylindrical spacer member 44 disposed therebetween, as shown in Figure 4.

The lower or rearward apex of the thrust plate member 43 has thereon a suitably apertured bear-

ing boss 45 which is rotatably supported by the transverse pivot rod 16. The bearing bosses are rigidly secured in spaced relation by means of a cylindrical spacer member 46 interposed therebetween and surrounding the transverse pivot rod 16, as shown particularly in Figure 5. The remaining apex of each thrust plate member 43 is provided with a suitably apertured bearing boss 47 which is adapted to have the crosshead rod 48 extend therethrough, as shown in Figures 3 and 4. This crosshead rod 48 extends through the head member 12 on the piston rod 11 and is rotatable with respect thereto in such manner that extension of the piston rod 11 causes clockwise swinging movement of the thrust plate members 43 about the axis of the transverse pivot rod 16 from the position of Figure 2 to that of Figure 1.

Release of pressure in the fluid engine will permit the parts to return from the position of Figure 2 to that of Figure 1. As is particularly well shown in Figures 3, 4 and 5, the thrust plate members 43 are non-planar, being bent inwardly to permit of fullest possible collapse of the parts when in the retracted, closed or collapsed position, as shown in Figure 2.

As will be most clearly understood, the arc of the top surface of the sector members 34 which have the notches 35 therein may be substantially modified to achieve modification in the automatic variation of effective lever arm which is accomplished by the lifting mechanism during a lifting operation.

One of the preferable modifications is illustrated in Figure 10, wherein it will be seen that the sector member, designated 34a, is formed substantially as a segment of a circle with the arc of the top surface thereof, having the notches therein, substantially circular. The guide slots 32a in the webs or flanges 26 are substantially inclined from the horizontal, as may be seen by comparison of the structure illustrated in Figure 2, and, instead of the aperture 33, an aperture 49 is provided, which is suitably located in such manner that the parts may be extended from the position illustrated in Figure 10 in such manner that the body will take the position shown in Figure 1 with the guide pin 36 disposed at the top end of the guide slot 32a, while the stop pin 39 will be correspondingly disposed in the aperture 49.

The operation of the linkage or lifting mechanism is as follows: With the parts in the "at rest" position, as shown in Figures 2, 3, 4 and 10, introduction of fluid pressure to the cylinder 8 of the fluid engine will cause reciprocatory movement of the piston rod 11 to the right, as seen in Figures 2 and 10. This will cause the thrust plate members 43 to be swung in clockwise direction about the transverse pivot rod 16 in such manner as to impose an upward and rearward thrust upon the lower end of the sector member 34 through the connecting rod 42. This will cause relative counterclockwise rocking movement of the sector member 34 with respect to the trackway formed between the webs or flanges 26 and the guide and stop pin means in cooperation with their slots and apertures will prevent excessive relative movement between the tracks, the flanges 26 and sector members 34 in such manner that, when the parts have reached the position shown in Figure 1, they will be locked against further movement.

It will be noted that the effective lever arm between the thrust plate members 43 and the piston rod 11 will be progressively increased from the position shown in Figure 2 to an intermediate position wherein the cross rod 48 will be disposed sub-

stantially vertically above the transverse pivot rod 16. The application of this changing lever arm will be modified slightly by counterclockwise rocking or swinging movement of the sector member 34 with respect to the trackway.

As the cross rod 48 moves rearwardly, due to the arcuate nature of its path, it moves again downwardly, while at the same time the sector member 34 continues swinging in counterclockwise direction with respect to the thrust plate member 43, as well as its trackway in such manner as to greatly increase the distance between the transverse pivot rod 16 and the body. Thus, the lever arm through which force is applied by piston rod 11 through cross rod 48 is progressively decreased, while the distance between the transverse pivot rod 16 and the body is materially progressively increased during the latter portion of the travel of the cross rod 48 rearwardly past the transverse pivot rod 16. Thus, the speed of upward swinging movement of the body is materially increased as the angularity thereof is sufficiently increased to permit of the use of a substantially increased effective lever arm. This automatic change in the effective lever arm is accomplished automatically, because the advantage thereof is inherent in the structure illustrated.

In the meantime, the lifting force is being applied successively to the dump body at points progressively nearer the body pivot 14 as the body rises, starting with the extreme left-hand notch 35 engaging the extreme left-hand pin 29, and continuing notch-by-notch to the right toward the body pivot 14. This action decreases the leverage actually applied to the dump body as it rises, but increases the lifting speed, and in cooperation with the previously-mentioned varying lever arm effect of the piston rod 11 upon the lever 43 around its pivot 16, produces a differential lifting effect upon the dump body as the latter rises.

It will thus be seen that I have provided a construction wherein the utmost efficiency of operation, simplicity of construction, and compactness of parts, when collapsed, is achieved.

It will be 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 a dump body linkage for a dump body swingable around a pivot on a frame, a swingable thrust member pivotally supported by said frame; a trackway on said body including a pair of flanged bracket members and plural spaced pin means secured between the bracket flanges, and a sector member pivotally supported by said thrust member and rockable in said trackway, said sector member having therein notches engageable with said pin means.

2. In a dump body linkage for a dump body swingable around a pivot on a frame, a swingable thrust member pivotally supported by said frame; a trackway on said body including a pair of flanged bracket members and plural spaced pin means secured between the bracket flanges, a sector member pivotally supported by said thrust member and rockable in said trackway, said sector member having therein notches engageable with said pin means, at successively varying distances from said dump body pivot during the

swinging of said dump body, and means for guiding said sector member in said trackway including slot means in a bracket flange and guide pin means in said sector member extending into said slot means.

3. In a dump body linkage for a dump body swingable around a pivot on a frame, a swingable thrust member pivotally supported by said frame; a trackway on said body including a pair of flanged bracket members and plural spaced pin means secured between the bracket flanges, a sector member pivotally supported by said thrust plate and rockable in said trackway, said sector

member having therein notches engageable with said pin means, at successively varying distances from said dump body pivot during the swinging of said dump body, means for guiding said sector member in said trackway including slot means in a bracket flange and guide pin means in said sector member extending into said slot means, and means for limiting rocking movement of said sector member in said trackway including aperture means in a bracket flange and stop pin means on said sector member engageable with said aperture means.

FRED BISZANTZ.