Nov. 2, 1937. W. C. ANTHONY 2,097,555

TIPPING MECHANISM

Filed Aug. 12, 1936 3 Sheets-Sheet 1

Fig. 1.

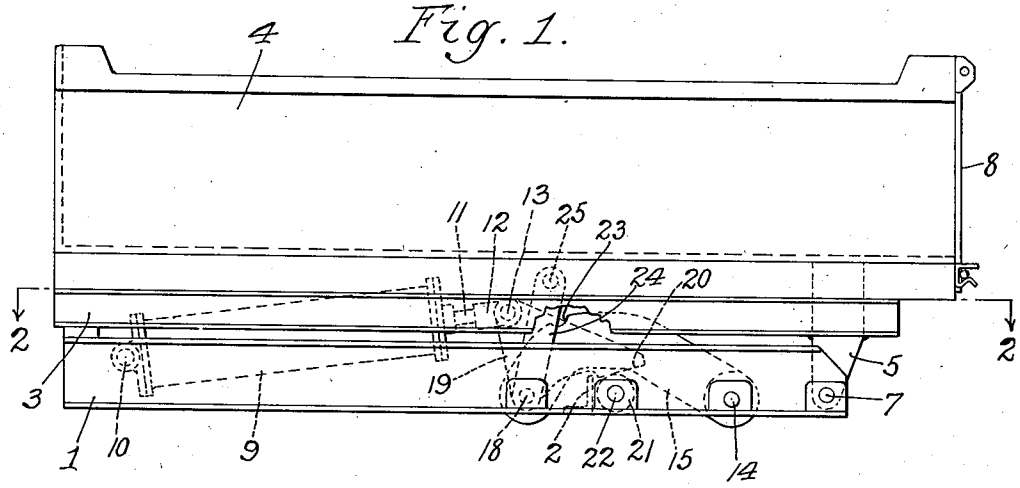
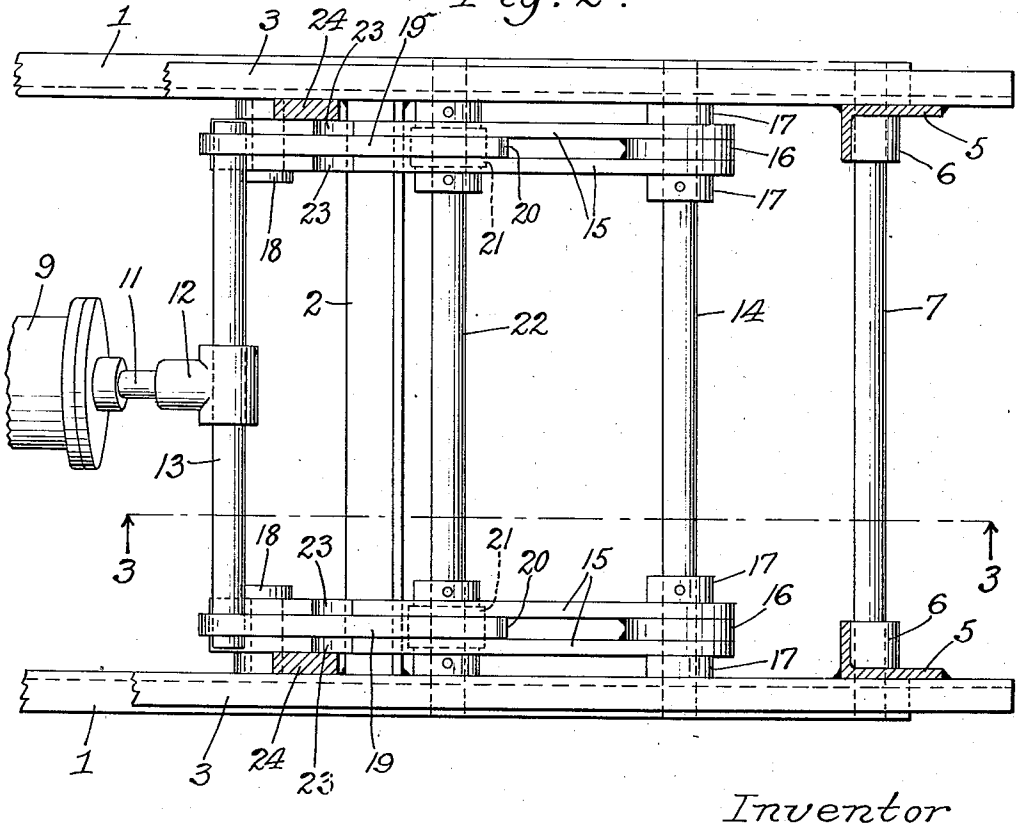


Fig. 2.



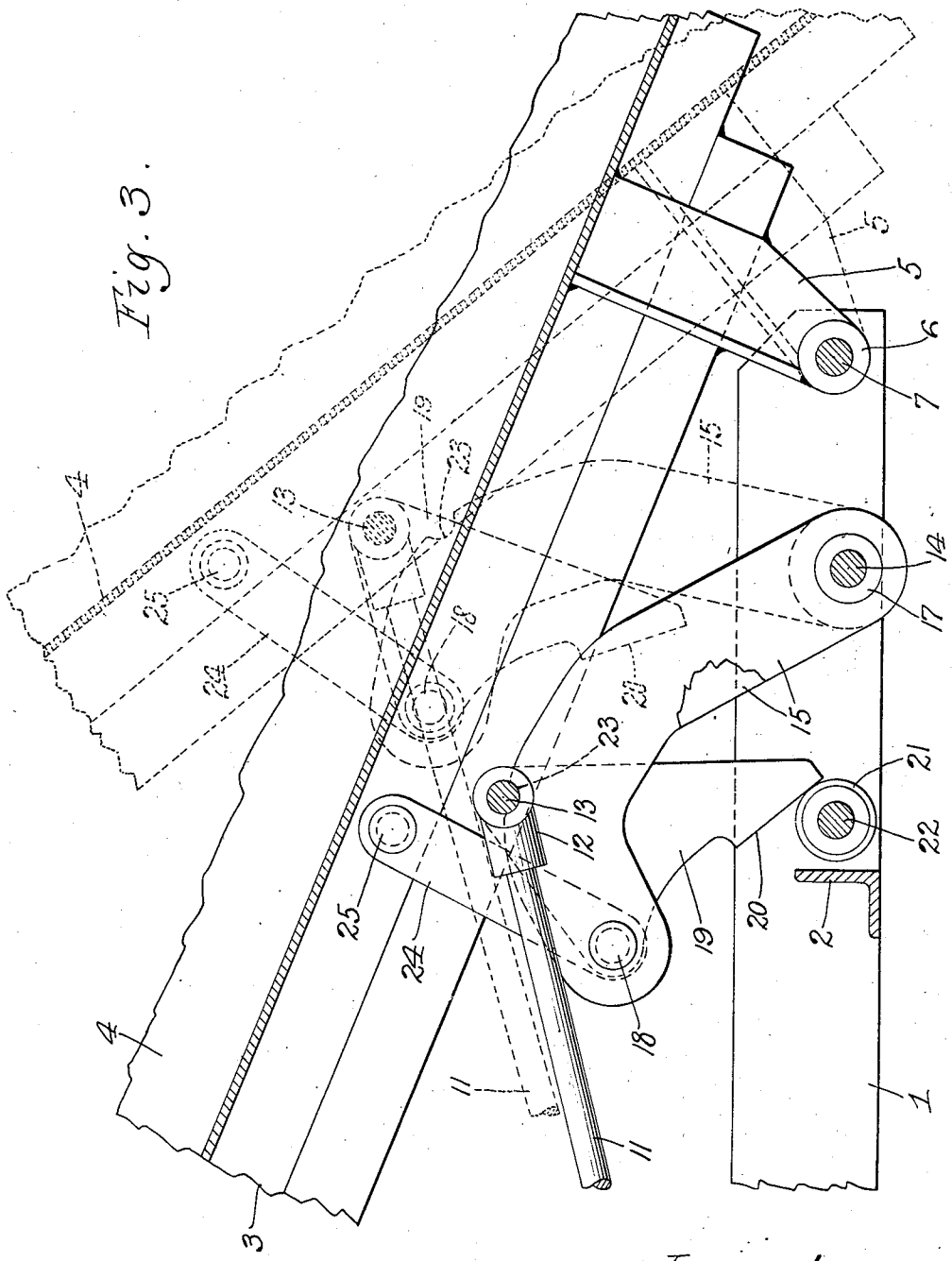
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Fig. 3.



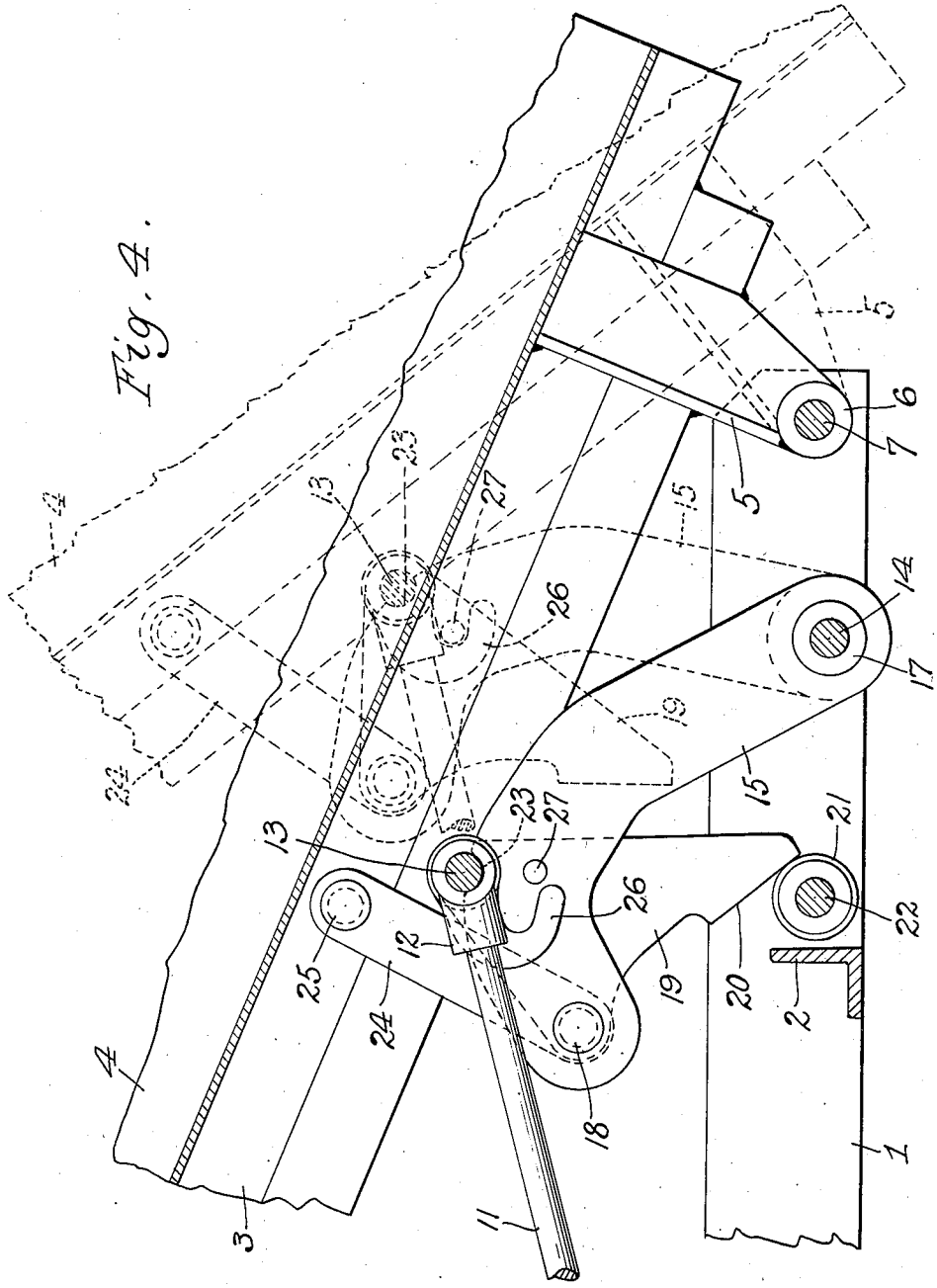
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Fig. 4.



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UNITED STATES PATENT OFFICE

2,097,555

TIPPING MECHANISM

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Application August 12, 1936, Serial No. 95,687

13 Claims. (Cl. 298—22)

This invention relates to a tipping, moving or hoisting mechanism and in the form illustrated herewith it is particularly applicable for use as a dumping or hoisting mechanism for a container, such as a dumping body of a vehicle, although the invention is not limited to this application.

One object of the invention is to provide a dumping or tipping mechanism of the type mentioned so arranged as to permit low pressures in a hydraulic actuating mechanism.

Another object is to provide in connection with such a mechanism means whereby a relatively large degree of travel of the hydraulic or other actuating means takes place with each movement in the dumping direction. Thus with one mechanism for a five degree dump the hydraulic piston might move two inches, while with the mechanism of the present invention, for a similar amount of dump, the movement of the hydraulic mechanism is much greater and thus lower pressures are possible within the hydraulic system.

Other objects will appear from time to time in the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:—

Figure 1 is a side elevation with parts broken away, showing by invention applied to a dumping body;

Figure 2 is a horizontal sectional view taken on an enlarged scale at line 2—2 of Figure 1, with parts omitted;

Figure 3 is a transverse vertical sectional detail taken generally at line 3—3 of Figure 2.

Figure 4 is a modification of the lever mechanism of Fig. 3.

Like parts are designated by like characters throughout the specification and drawings.

1, 1 are side frame members and may for example be the side frame or chassis members of a vehicle frame. They are joined by suitable cross members, one of which is shown as at 2. The particular details of the frame construction form no essential part of the present invention and are, therefore, not illustrated in detail. There will ordinarily be some frame upon which the dumping mechanism and the dumping body itself will be mounted.

A sub-frame is preferably provided for the dumping body. This may comprise side or longitudinal members 3, 3, of any desired shape and arrangement, and upon these is mounted a body 4. The body is of such size and shape as to contain the desired load. Depending downwardly from the frame members 3, preferably adjacent their rear ends are bracket members 5, which may carry bearing portions 6, trunnioned upon a transverse member 7 which in the particular form here shown is a rod secured at its ends to the vehicle frame members 1. The dumping body may have a tail gate 8 or any other closure or discharge member desired.

In the particular form here shown the power for the dumping or moving operation is furnished by hydraulic means. This hydraulic means or assembly includes, among other features, a cylinder 9, pivoted or otherwise mounted for tilting movement as at 10 and supported in or from the frame 1. A piston of suitable design is mounted within the cylinder to reciprocate. A piston rod 11 extends outwardly from the cylinder and is provided with an attachment member 12 which engages and preferably surrounds a transverse member 13. In the particular form here shown this member is a rod but might have any other desired shape.

Journaled on a transverse rod 14, which is mounted from or upon the side frame members 1, are a pair of links. As shown each pair comprises two parts 15, 15, which may be secured to a spacer 16, which are perforated to fit about the rod 14 and are held in proper spaced relation upon the rod by spacers 17, 17. The members 15 are as shown particularly in Figure 3 bowed, bent or cut away so that in the full lowered position of Figure 1 they may extend over and remain out of contact with the transverse frame member 2 and any other mechanism or parts of the assembly.

Between each pair of members 15, adjacent their free ends, is pivoted upon studs 18 an auxiliary lever member 19. As shown generally in Figures 1 and 2, and more particularly in Figure 3, this auxiliary lever member is irregularly shaped and adjacent its upper margin receives the transverse rod or member 13 which is secured through the part 12 to the piston rod 11. Pushing movement of the piston rod is thus effective upon the auxiliary levers 19. At its free end each lever 19 is provided with a roller contacting surface 20 which contacts rollers 21 supported for rotation upon a transverse rod or frame member 22. The upper edge of each of the members 15 may be notched or provided with a depression 23. Pivoted to the lower or free end of each of the members 15, upon or concentric with the studs 18, are links 24, which links are at their upper ends pivoted to the body frame 3 as at 25.

The form of Figure 4 is generally similar to that of Figure 3, but illustrates a modification which, for some purposes, is useful. The struc-

ture is the same as that shown in Figure 3, except for the addition of a hook member 26 which is carried by the attachment member 12 or the transverse member 13. One or more such hook members may be used if desired. For each hook member a projection or boss 27 is formed on the adjacent lever member 15 so arranged that during a certain part of the movement of the lever assembly the hook 26 will engage the boss 27. The purpose of this is to prevent counter-clockwise movement of the auxiliary lever 19 with respect to the main lever 15. When the boss and hook are engaged the transverse member 13 is held against the upper surface of the lever 15 or held seated within the depression 23, where such a depression is provided. For some installations the hook and boss are desirable, or they may be omitted.

It will be realized that whereas I have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of the parts without departing materially from the spirit of my invention and I wish, therefore, that my showing be taken as in a sense diagrammatic.

In particular the arrangement of bearings and transverse members might be almost infinitely varied. For example, the transverse members 7, 13, 14 and 22 might be rods or of any other shape. The trunnioning or supporting of the members 15 might be of any desired arrangement and the support for the rollers 21 might be otherwise than as shown.

The use and operation of my invention are as follows:

The dumping receptacle, whether it be mounted on a vehicle or not, is supported generally in the position shown in Figure 1, when it is to receive or contain a load. The power for dumping may come from the hydraulic cylinder as shown or from other means. If a hydraulic cylinder is used the pump may be mounted to pivot with the cylinder or may be otherwise mounted. Whatever the exact power source, when the body is to be tipped the power is so controlled that the piston 11 or its equivalent moves to the right from the position shown in Figure 1 toward the positions shown in Figure 3, thus bearing upon the transverse member 13 and through it upon the upper corners or edges of the auxiliary levers 19 and tending to rotate them downwardly about their pivots on the studs 18. Since the faces 20 of the levers 19 are in contact with rollers 21 they cannot rotate downwardly and the exertion of force upon the levers 19 tilts them upwardly, the levers being fulcrumed at some point of their faces 20 upon some point of the rollers 21. As the levers 19 tilt upwardly to this position they carry with them the free ends of the members 15 and correspondingly raise the body or tilt it through links 24 which are pivoted both to the body and to the members 15.

After a certain amount of travel has occurred the transverse member 13 normally contacts the upper surfaces of the members 15. These may be notched as at 23 if desired. The parts are so proportioned that the contact of the transverse member 13 with the upper surfaces of the members 15 occurs at or approximately at the point when the faces 20 of the levers 19 break contact with the rollers 21. When this occurs the auxiliary effect of the levers 19 is terminated and thereafter during the remainder of moving, or tilting movement, the members 15 act merely as levers rotating about their axes, that is to say, about the axes of the transverse member 14.

The position of the levers and associated parts as shown in full lines in Figure 3 is that which they assume at or approximately at the completion of the auxiliary effect of the auxiliary lever 19, where it leaves or is about to leave contact with the rollers 21. The dotted line position of the parts shown in Figure 3 is that which they assume at or approximately at the maximum movement for an assembly designed with the proportions shown. Obviously an assembly might be designed to have a greater or less maximum movement than that shown.

As the body and its associated parts move from the full line position of Figure 3 toward the dotted line position, the auxiliary levers 19 have no further lever action and serve merely as links to connect the free ends of the levers 15 to the transverse member 13 upon which the power source is acting. As the parts reach or approach their position of maximum movement the transverse member 13 may or may not lift slightly out of the notch 23. Whether or not this effect occurs depends upon the design of the parts and in particular upon the angular relationship between the parts and the hydraulic piston 11 or its equivalent. The location of the pivot point for the cylinder 9 largely determines whether or not the transverse member 13 lifts out of the notch or out of contact with the upper surface of the levers 15 or whether it remains in contact or in the notch.

Where the assembly includes the hook and boss mechanism of Figure 4, the counter-clockwise movement of the auxiliary lever 19 with respect to the main lever 15 is positively prevented, irrespective of the other features of design and irrespective of the angular relationship of the parts, or the angular disposition and movement of the hydraulic piston 11.

When the body is to be returned to its original position the driving mechanism is reversed and the parts move through the several positions in reverse order and return to the original position of Figure 1. Frequently the body will return by gravity alone without the action of any power upon it but if power is necessary a reverse movement of the driving means is utilized.

I claim:

1. In combination a load carrying and dumping assembly, including, a support and a member mounted on said support to be tilted, and means for tilting said member, comprising a leverage mechanism, said leverage mechanism including a lever pivoted on said assembly and carrying at one end an auxiliary lever, said auxiliary lever having two free end portions, a power source movably mounted within said assembly and means for connecting it to one of said free portions of said auxiliary lever, and a fulcrum member supported on said assembly, the other free portion of said auxiliary lever provided with a fulcrum face adapted to contact said fulcrum member.

2. In combination a load carrying and dumping assembly, including, a support and a member mounted on said support to be tilted, and means for tilting said member, comprising a leverage mechanism, said leverage mechanism including a lever pivoted on said assembly and carrying at one end an auxiliary lever, said auxiliary lever having two free end portions, a power source movably mounted within said assembly and means for connecting it to one of said free portions of said auxiliary lever, and a rotary fulcrum member

supported on said assembly, the other free portion of said auxiliary lever provided with a fulcrum face adapted to contact said fulcrum member.

3. In combination a load carrying and dumping assembly, including, a support and a member mounted on said support to be tilted, and means for tilting said member, comprising a leverage mechanism, said leverage mechanism including a lever pivoted on said assembly and carrying at one end an auxiliary lever, said auxiliary lever having two free end portions, a power source movably mounted within said assembly and means for connecting it to one of said free portions of said auxiliary lever, and a fulcrum member supported on said assembly, the other free portion of said auxiliary lever provided with a fulcrum face adapted to contact said fulcrum member, the auxiliary lever during the initial portion of the total movement contacting and fulcruming upon said fulcrum member, and being out of contact with said fulcrum member during a later portion of the tilting movement.

4. In combination a load carrying and dumping assembly, including, a support and a member mounted on said support to be tilted, and means for tilting said member, comprising a leverage mechanism, said leverage mechanism including a lever pivoted on said assembly and carrying at its free end an auxiliary lever, said auxiliary lever having two free end portions, one above the other, a power source movably mounted within said assembly and means for connecting it to the uppermost of said free portions of said auxiliary lever, and a rotary fulcrum member, mounted on said support, the lowermost free portion of said auxiliary lever provided with said fulcrum face adapted to contact a fulcrum member, the auxiliary lever during the initial portion of the total movement contacting and fulcruming upon said fulcrum member, and being out of contact with said fulcrum member during a later portion of the tilting movement.

5. In combination in a dumping mechanism, a support, a body mounted thereon for tilting movement with respect thereto, a lever mechanism mounted on said support to tilt the body, means for connecting said mechanism to said body, a power source on said support for moving said lever mechanism, said lever mechanism including a main lever mounted on said support, an auxiliary lever connected to said main lever, and a fulcrum member mounted on said support, said auxiliary lever provided with a contact face which is adapted to make a shifting contact with said fulcrum member.

6. In combination in a dumping mechanism, a support, a body mounted thereon for tilting movement with respect thereto, a lever mechanism mounted between the body and support to tilt the body, means for connecting said mechanism to said body, a power source carried by said support for moving said lever mechanism, said lever mechanism including a main lever pivoted on said support, and an auxiliary lever connected to said main lever, and a fulcrum member on said support, said auxiliary lever provided with a contact face which is adapted to make a contact with said fulcrum member during a portion of its movement and is held out of contact with it during another portion of its movement.

7. In combination a load carrying and dumping assembly, including, a support, a body mounted thereon for movement with respect thereto, a lever assembly mounted on said first assembly between the body and the support to move the body, said lever mechanism comprising a plurality of main levers pivotally mounted on said support and an auxiliary lever movably mounted upon each of said main levers, a fulcrum member supported on said assembly for each of said auxiliary levers mounted on said support, a power source movably mounted within said assembly and means for connecting the same to each of said auxiliary levers at a point separated from their point of connection with the main levers, each auxiliary lever provided with a contact face at a point separated from its attachment to the main lever and from its connection to the power source, each contact face contacting one of said fulcrum members.

8. In combination a load carrying and dumping assembly, including, a support, a body mounted thereon for movement with respect thereto, a lever assembly mounted on said first assembly between said body and said support to move the body, said lever mechanism comprising a plurality of main levers and an auxiliary lever movably mounted upon each of said main levers, a fulcrum member supported on said assembly for each of said auxiliary levers mounted below it, a power source movably mounted within said assembly and means for connecting the same to each of said auxiliary levers at a point above their point of connection with the main levers, each auxiliary lever provided with a contact face at a point below its attachment to the main lever and from its connection to the power source, each contact face contacting a fulcrum member during a portion of its movement and being held out of contact with said fulcrum member during another portion of its movement.

9. In combination a load carrying and dumping assembly, including, a support and a member mounted on said support to be tilted, and means for tilting it, comprising a leverage mechanism carried from said support and positioned generally between said support and said body, said leverage mechanism including a lever interposed between said body and support and carrying at one end an auxiliary lever, said auxiliary lever having two free end portions, a power source movably mounted within said assembly and means for connecting it to one of said free portions of said auxiliary lever, and a fulcrum member supported on said assembly and positioned below said auxiliary lever, the other free portion of said auxiliary lever provided with a fulcrum face adapted to form a moving contact with said fulcrum member, and means carried by said lever mechanism for latching the auxiliary lever against movement with respect to said first mentioned lever.

10. In combination a load carrying and dumping assembly, including, a support and a member mounted on said support to be tilted, and means for tilting said member, comprising a leverage mechanism, said leverage mechanism carried from said support and positioned generally between said support and said body including a lever interposed between said body and support and carrying at one end an auxiliary lever, said auxiliary lever having two free end portions, a power source movably mounted within said assembly and means for connecting it to one of said free portions of said auxiliary lever, and a fulcrum member supported on said assembly and positioned below said auxiliary lever, the other free portion of said auxiliary lever provided with a fulcrum face adapted to form a moving contact with said fulcrum member, and means for latch-

ing the auxiliary lever against movement with respect to said first mentioned lever, said latching means shaped and positioned to latch after the occurrence of a predetermined amount of relative movement of the two levers.

11. In combination in a tilting mechanism, a support and a member mounted thereon to be tilted, and means interposed between the two for tilting said member, said means comprising a leverage mechanism carried by said support, said leverage mechanism including a lever carrying at one end an auxiliary lever, said auxiliary lever having two free end portions, a power source carried by said support and means for connecting it pivotally to one of said free portions of said auxiliary lever, and a fulcrum member carried by said support, the other free portion of said auxiliary lever provided with a fulcrum face adapted to contact said fulcrum member, and means for latching the auxiliary lever against movement with respect to said first mentioned lever, said latch comprising a hook and projection.

12. In combination in a tilting mechanism, a support and a member mounted thereon to be tilted, and means interposed between the two for tilting said member, said means comprising a leverage mechanism carried by said support, said leverage mechanism including a lever carrying at one end an auxiliary lever, said auxiliary lever having two free end portions, a power source carried by said support and means for connecting it pivotally to one of said free portions of said auxiliary lever, and a fulcrum member carried by said support, the other free portion of said auxiliary lever provided with a fulcrum face adapted to contact said fulcrum member, and means for latching the auxiliary lever against movement with respect to said first mentioned lever, said latch comprising a hook and projection, the projection being upon the first mentioned lever and the hook being upon the connection between the power source and the auxiliary lever.

13. In combination, a load carrying and dumping assembly, including a support and a member mounted on said support to be tilted with relation thereto, and means for tilting said member comprising a leverage mechanism, including a lever pivotally supported in said assembly, and a power source movably mounted within said assembly and means for connecting it to said lever, and a fulcrum member supported on said assembly, a portion of said lever provided with a fulcrum face adapted to contact said fulcrum member, and means for holding said fulcrum face in contact with said fulcrum member during the initial stage of the lifting movement, said fulcrum face being out of contact with said fulcrum member during the final stage of the lifting movement.

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