Jan. 10, 1939. L. WACHTER 2,143,291

TIPPING MECHANISM

Filed Sept. 25, 1936 4 Sheets-Sheet 1

Fig. 1.

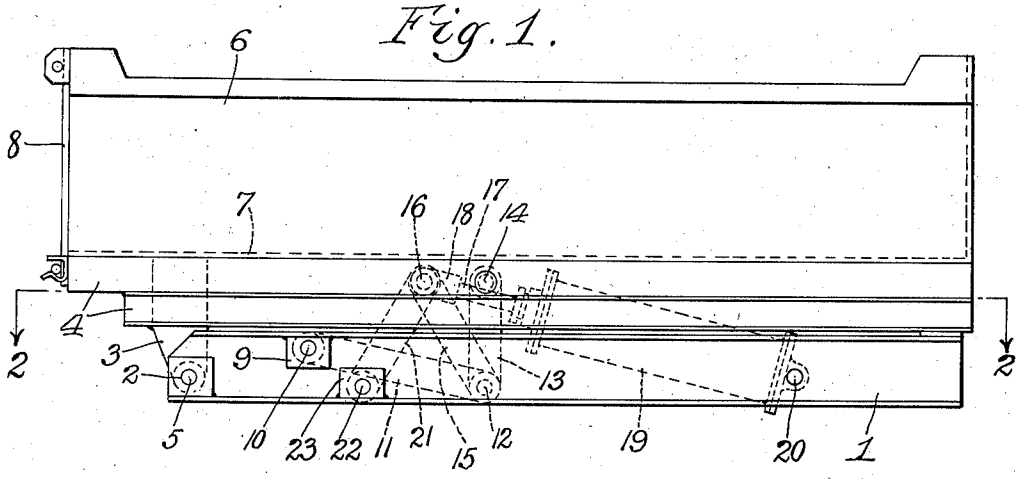
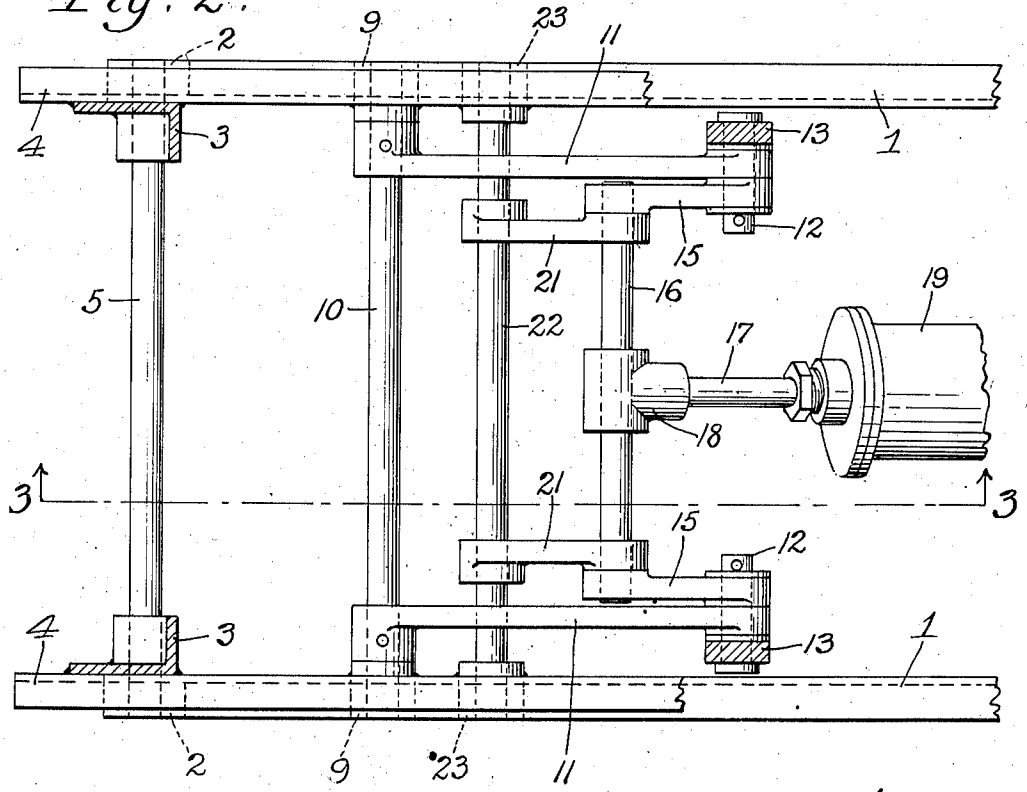


Fig. 2.



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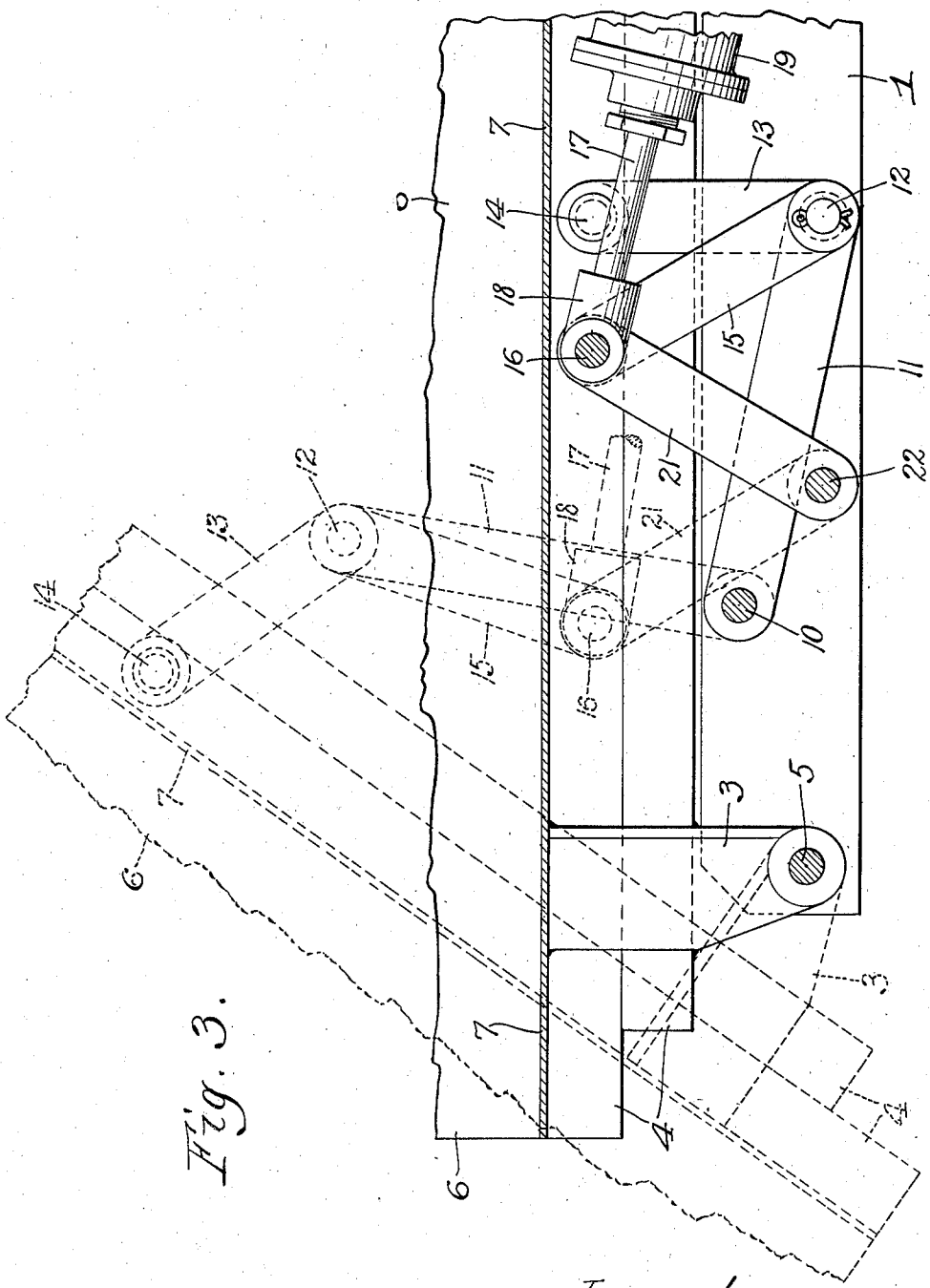


Fig. 3.

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TIPPING MECHANISM

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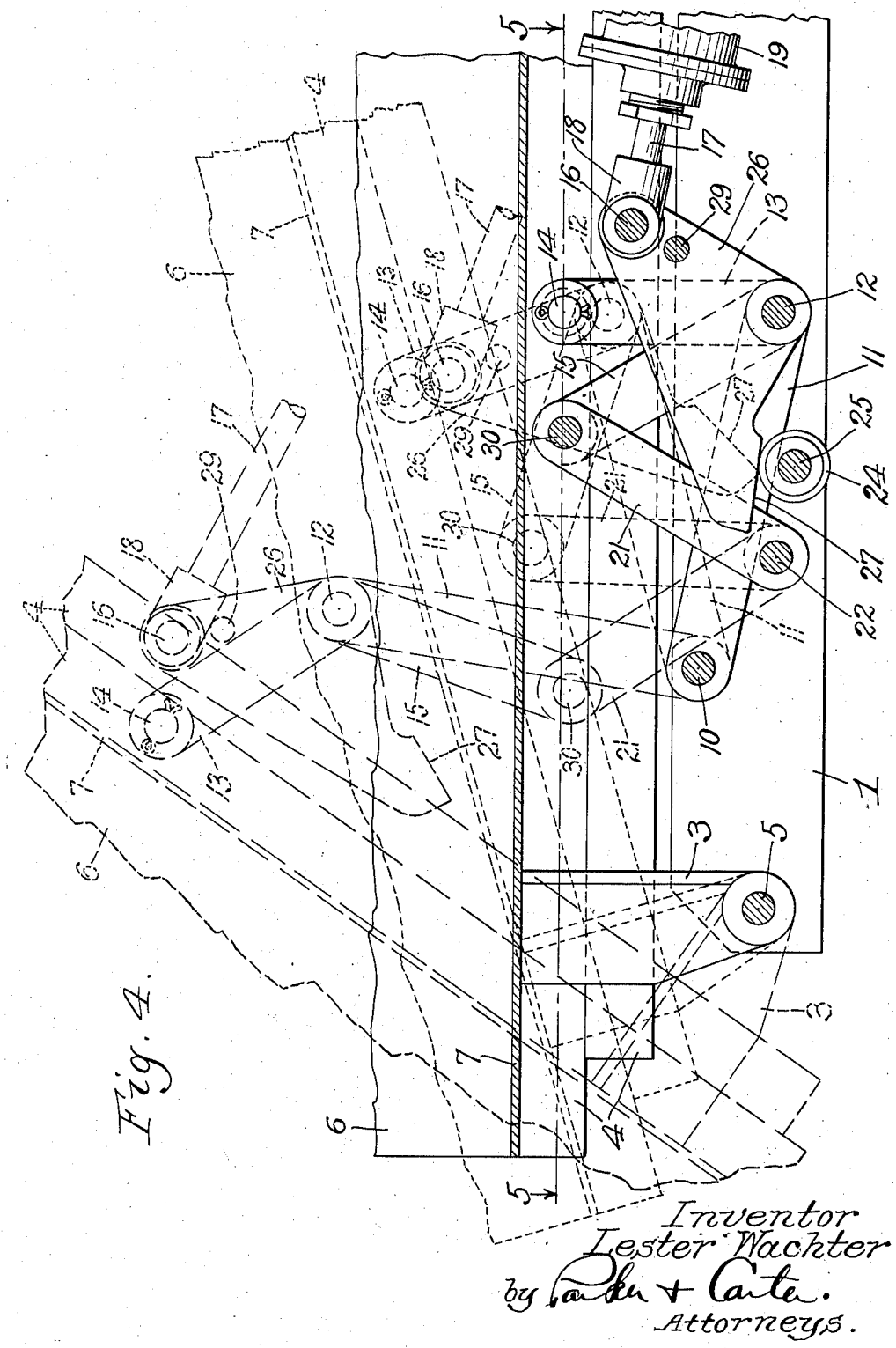


Fig. 4.

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TIPPING MECHANISM

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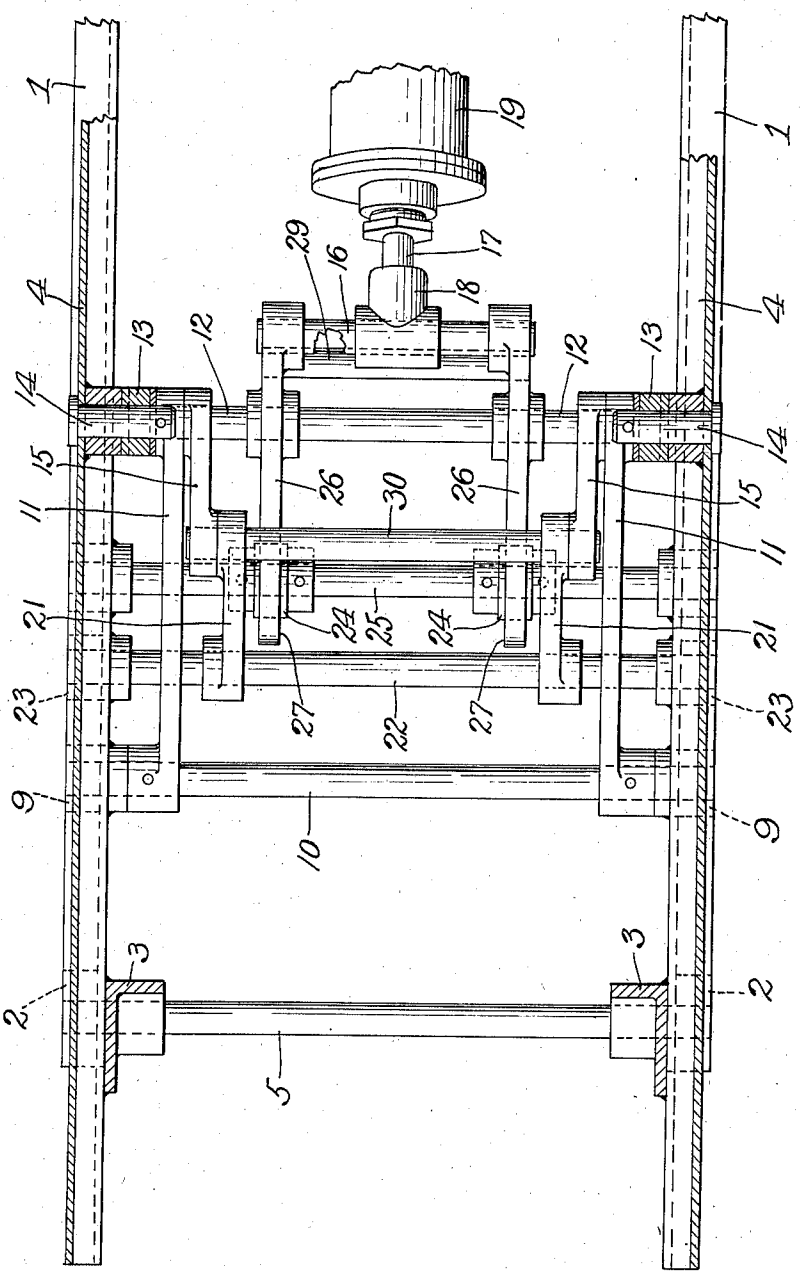


Fig. 5.

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UNITED STATES PATENT OFFICE

2,143,291

TIPPING MECHANISM

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Application September 25, 1936, Serial No. 102,608

9 Claims. (Cl. 298—22)

This invention relates to a mechanism for tipping containers and particularly to a mechanism for tipping the container portion of a dumping body suitable for mounting on a vehicle, although it is not limited to that association.

It has for one object 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 increment of movement of the power source in the dumping direction.

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:

Fig. 1 is a side elevation of the body and tipping assembly;

Fig. 2 is a generally horizontal sectional view taken at line 2—2 of Fig. 1, with parts omitted and parts broken away;

Fig. 3 is a transverse vertical section on an enlarged scale at line 3—3 of Fig. 2;

Fig. 4 is a side elevation generally similar to Fig. 3 showing a modified form; and

Fig. 5 is a sectional view with parts in plan and parts broken away, at line 5—5 of Fig. 4. It is generally similar to Fig. 2 but showing the form of Fig. 4.

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

The numeral 1 designates the side frame members of a sub-frame construction suitable for mounting on any base. It might be mounted for example on the frame of a vehicle. Pivoted upon it at 2 by means of a bracket 3 is a movable body frame 4. As shown the frame 1 and the frame 4 comprise side members and may also include transverse or cross members. At the pivot point 2 there may be inserted a shaft 5 which extends completely across the assembly, or short studs or trunnions may be substituted. 6 is a body having a floor 7. It may be provided with a tail gate 8. Pivoted in suitable bearings 9 in the side frame members 1 is a shaft 10 to which shaft are secured link members 11. At their free ends the link members carry pins or studs 12 to which are mounted links 13 which are pivoted as at 14 to the body, or the body frame members 4. Also pivoted at the pins 12 are relatively short arms or links 15. Pivotally mounted in these links is a cross rod 16 to which a piston rod 17 is secured by a member 18. The piston rod 17 extends into a hydraulic cylinder 19 which is preferably pivoted as at 20. A suitable piston is mounted on the rod within the cylinder and some pump or pressure means is provided for introducing fluid under pressure into the cylinder to cause the piston and rod to move outwardly or to the right from the position shown in drawings in Figures 1 and 2, and from the position shown in full lines in Figure 3 to the dotted line position of that figure. The details of the cylinder and pump are not shown as they form no essential part of the present invention and as any suitable pressure supplying means may be used.

Pivoted upon the cross rod 16 are links 21, which are themselves pivoted at their opposite ends upon a second cross rod 22 which is mounted in suitable bearings 23, which may be carried upon the side frame members 1.

In the modified form of Figures 4 and 5 the lever linkage is generally the same as that shown in Figures 1, 2 and 3, except that an additional lever member has been inserted.

24 designates a roller carried on a shaft or bearing 25. 26 is a fulcrum lever member which may be generally triangular and is pivoted at one corner upon the member 12. It has an extended face 27 arranged to contact the roller 24. At its other corner it is pivoted to the cross rod 16. 29 is a stop of which there may be more than one and which may be of any design and which may be located anywhere to produce the desired relative movement of the parts and to limit that movement within predetermined degrees. The link members 21 and 15, instead of being mounted upon the cross shaft 16, as shown in Figure 3 for example, are mounted upon an additional cross shaft or rod 30. Otherwise the form of Figures 4 and 5 is generally the same as that shown in Figures 1 to 3, inclusive.

As shown in Figures 4 and 5, instead of separate pins 12 as a means for joining the links 11 and 15, a continuous cross rod 12 may be used and when that is done it also furnishes a pivot for the fulcrum levers 26. Any other desired means for furnishing a pivotal support for these members might be used. The stop 29, as shown, is a rod which extends between the two members 26. It might be of any other desired form.

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 parts without departing from the spirit of the invention and I wish, therefore, that my showing be taken as in

a sense diagrammatic. In particular the stop 29 might be omitted.

The use and operation of my invention are as follows:

In the operation of this device, due largely to the lever linkage shown, during the early parts of the tipping operation a relatively large amount of piston travel occurs for a given amount of tip. Thus relatively low pressures are possible within the cylinder. After the early part of the tipping movement has been accomplished, a greater degree of tip is accomplished for a given amount of piston travel. Consequently one of the objects of the invention, namely, that of permitting a relatively low hydraulic pressure, is accomplished by the use of the lever linkage shown.

The parts are shown in the down or untipped position in Figures 1 and 2 and in full lines in Figure 3. With the parts in this position pressure is introduced into the cylinder. The piston is forced outwardly and causes the mechanism to move toward the dotted line position of Figure 3. During the early stages of the movement, piston travel is relatively long for a given degree of tip and the tipping movement is in effect controlled by the length of the relatively short link member 21. As this member moves toward the dotted line position of Figure 3, its upper or free end may move slightly upwardly and then slightly downwardly, carrying with it the link 15 and consequently raising the link 13 to raise the body. During subsequent increments of movement the tipping is controlled largely by the longer link member 11, which carries the link 13 and with it the body to the full tipped position. Thus the initial tipping force is exerted through a relatively short link arm and finally through a longer link arm so that when the greatest tipping force is required in the initial stages of tipping a relatively large amount of piston movement occurs for each angle of tip, and later, when a less force is necessary, a relatively shorter amount of piston movement occurs for each added degree of tip. This is due to the use of the shorter and longer links 21 and 11, respectively, and due to the fact that the short one controls the movement in the early stages of tipping and the longer one controls the movement in the later stages.

Whatever the exact dimensions of the linkage members, the tip is accomplished by the movement of the piston from the full line position of Figure 3 to the left, that is to say, to the dotted line position of that figure. A stop may be provided to limit the amount of tip or the tip may be continued until the links 21 contact the member 10, or other means for terminating the tipping movement may be used.

When it is desired to lower the body, pressure may be released from the cylinder to permit the body to return by gravity or the piston may be positively returned to lower the body positively. Ordinarily gravity return is effective and sufficient.

The use and operation of the device of Figures 4 and 5 is generally the same as that described above for the forms of the earlier figures. It differs, however, because the inclusion of the fulcrum member 26 controls the movement of the assembly as a whole during the earlier portion of the tip period. Thus the tipping thrust is exerted by the piston rod 17 onto the cross rod 16, upon which one or more fulcrum members 26 are pivoted. During the initial stages of tipping this fulcrum member is tipped upwardly from the full line position of Figure 4 to the dotted line position of that figure. During this stage of the movement the extended face 27 of the member 26 contacts the roller 24 and fulcrums about its shifting point of contact with the roller.

The parts as shown in the dotted line position of Figure 4 have aproximately reached the limit of this fulcruming movement. It will be noticed also that in the dotted line position the stop 29 is actually or approximately in contact with the member 18 and thus further rotation of the fulcrum member in a counter-clockwise direction is prevented by the stop which may, of course, be arranged to contact any desired part of the linkage to effect the desired limitation of its rotation.

As the parts move from the dotted line position of Figure 4 to the dash line position of that figure, further relative rotation of the fulcrum member 26 with respect to the piston rod 17 is prevented by the stop. The other parts of the linkage, however, continue their relative movement in the same manner as that in which the movement of these parts is carried out by the form of Figure 3 and the parts finally reach the full tipped position as shown in the dash line position of Figure 4. The return movement of the parts is substantially the same as that described in connection with Figure 3.

If the stop 29 is omitted as suggested above then the fulcrum lever 26 rotates farther than either of the positions shown in dotted lines or in dash lines in Figure 4 does. If the stops 29 were omitted the fulcrum lever 26 would pass under the pivot point 14 and would finally come to rest against the link or links 15. From that point on the movement of the links and the rest of the tipping mechanism would be approximately the same as that which occurs in the form of the device shown in Figure 3.

I claim:

1. In combination in a tipping mechanism, a base and a receptacle mounted thereon for tipping movement with respect thereto, a mechanism including a relatively short link and a relatively long link, the two being separately pivoted upon said base, and a third link joining the free ends of said links, and a fourth link pivoted to the free end of one of said first mentioned links, and pivoted to said receptacle, and a power means supported in said assembly and secured to the free end of said shorter link, adapted to rotate the same about its pivot point, the other links being carried with said first mentioned link when rotated by said power means and causing the body to tip.

2. In combination in a tipping mechanism, a base and a receptacle mounted thereon for tipping movement with respect thereto, a mechanism including a relatively short link and a relatively long link, the two being separately pivoted on said base, and a link joining the free ends of said first mentioned links, and a fourth link pivoted to the free ends of said relatively long link, and pivoted to said receptacle, and a power means supported in said assembly and pivoted to the free end of said shorter link, adapted to rotate the same about its pivot point, the remaining links being carried with said first mentioned link when rotated by said power means and causing the body to tip.

3. In combination in a tipping assembly, a base, a receptacle supported therefrom for tipping movement with respect thereto and means for causing said tipping, said means comprising

a relatively long link pivoted on said base, a second relatively shorter link movably secured to said base, and a third link joining the free ends of said links, a fourth link pivoted on said receptacle and pivotally secured to the free end of said longer link, and power means supported in said assembly and pivotally connected to said shorter link and effective when operated to rotate the same about its pivot on the base to effect tipping of the receptacle.

4. In combination in a tipping assembly, a base and receptacle mounted thereon for tipping movement with respect thereto, and means for causing said receptacle to tip, said means compriisng a pair of relatively short links pivoted upon said base, one adjacent each side thereof, a second pair of relatively longer links, one on each side of said base, a third pair of links, one on each side of said base, each securing the free ends of one of said longer links to one of said shorter links, a fourth pair of links, one on each side of said base, secured to the free end of said longer link and pivotally mounted on said receptacle, and a power means supported in said assembly and connected to said relatively short links and adapted to cause them to rotate.

5. In combination in a tipping assembly, a base and receptacle mounted thereon for tipping movement with respect thereto, and means for causing said receptacle to tip, said means comprising a pair of relatively short links pivoted upon said base, one adjacent each side thereof, a rod extending across said assembly, each of said links being pivotally mounted on said rod, a second pair of relatively longer links, one on each side of said base, a second rod mounted in said base, said second links being secured each at one end to said second rod, a third pair of links, one on each side of said base, securing the free end of said links together, a fourth pair of links, one on each side of said base, secured to the free end of said longer link, and pivotally mounted on said receptacle, and a power means, a third rod, said power means supported within said assembly and secured to said third rod, said third rod being secured to the free ends of said relatively shorter links.

6. In combination in a tipping mechanism, a base and a receptacle mounted thereon for tipping movement with respect thereto, a link mechanism including a relatively short link and a relatively long link, the two being separately pivoted on said base, and a link joining the free ends of said first mentioned links, and a fourth link pivoted to the free end of said shorter link, and pivoted to said receptacle, a fulcrum member pivoted to the free end of said longer link and a power member movably supported in said tipping mechanism and secured to said fulcrum member, adapted to rotate the same about its pivot point, the longer link and said last mentioned links being carried with said shorter link when rotated by said power means and causing the body to tip.

7. In combination in a tipping mechanism, a base and a receptacle mounted thereon for tipping movement with respect thereto, a link mechanism including a relatively short link and a relatively long link, the two being separately pivoted on said base, and a third link joining the free ends of said first mentioned links, and a fourth link pivoted to the free end of one of said first mentioned links, and pivoted to said receptacle, a fulcrum member pivoted to the free end of said longer link and a power member supported in said tipping mechanism and secured to said fulcrum member, adapted to rotate the same about its pivot point, the longer link and said last mentioned links being carried with said first mentioned shorter link when rotated by said power means and causing the body to tip, and a stop limiting the movement of said fulcrum member with respect to said power member.

8. In combination in a tipping mechanism, a base and a receptacle mounted thereon for tipping movement with respect thereto, a link mechanism including a relatively short link and a relatively long link, the two being separately pivoted each on said base, and a third link joining the free ends of said links, and a fourth link pivoted to the free end of said long link and pivoted to said receptacle, a fulcrum member pivoted to the free end of said longer link and a power member supported on said base and secured to said fulcrum member, adapted to rotate the same about its pivot point on said long link, the short link and said last mentioned links being carried with said short link when rotated by said power means and causing the body to tip, and a rotary fulcrum part supported on said base against which a portion of said fulcrum member bears during the initial tipping movement, and a stop on said fulcrum member limiting the movement of said fulcrum member with respect to said power member.

9. In combination, in a tipping assembly, a base, a receptacle supported therefrom for tipping movement with respect thereto and means for causing said tipping, said means comprising a link pivotally mounted upon said base, a second link movably secured to said base and a third link movably joining the free ends of said first and second links, a fourth link pivotally secured to the free end of said second link and to said receptacle, and a power source supported in said assembly and pivotally connected to said first link and effective when operated to rotate the same to effect tipping of the receptacle.

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