Feb. 11, 1941. J. E. DORAN 2,231,058

MATERIAL HANDLING APPARATUS

Filed May 26, 1939 3 Sheets-Sheet 1

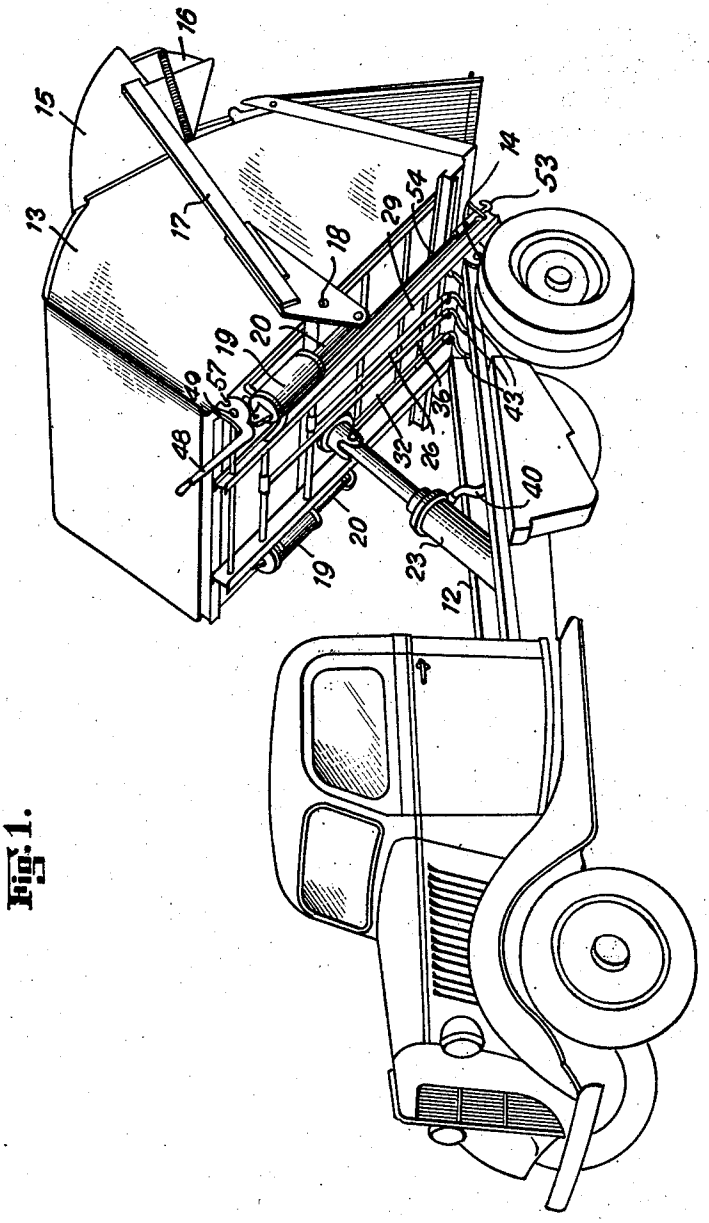


Fig. 1.

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MATERIAL HANDLING APPARATUS

Filed May 26, 1939 3 Sheets-Sheet 2

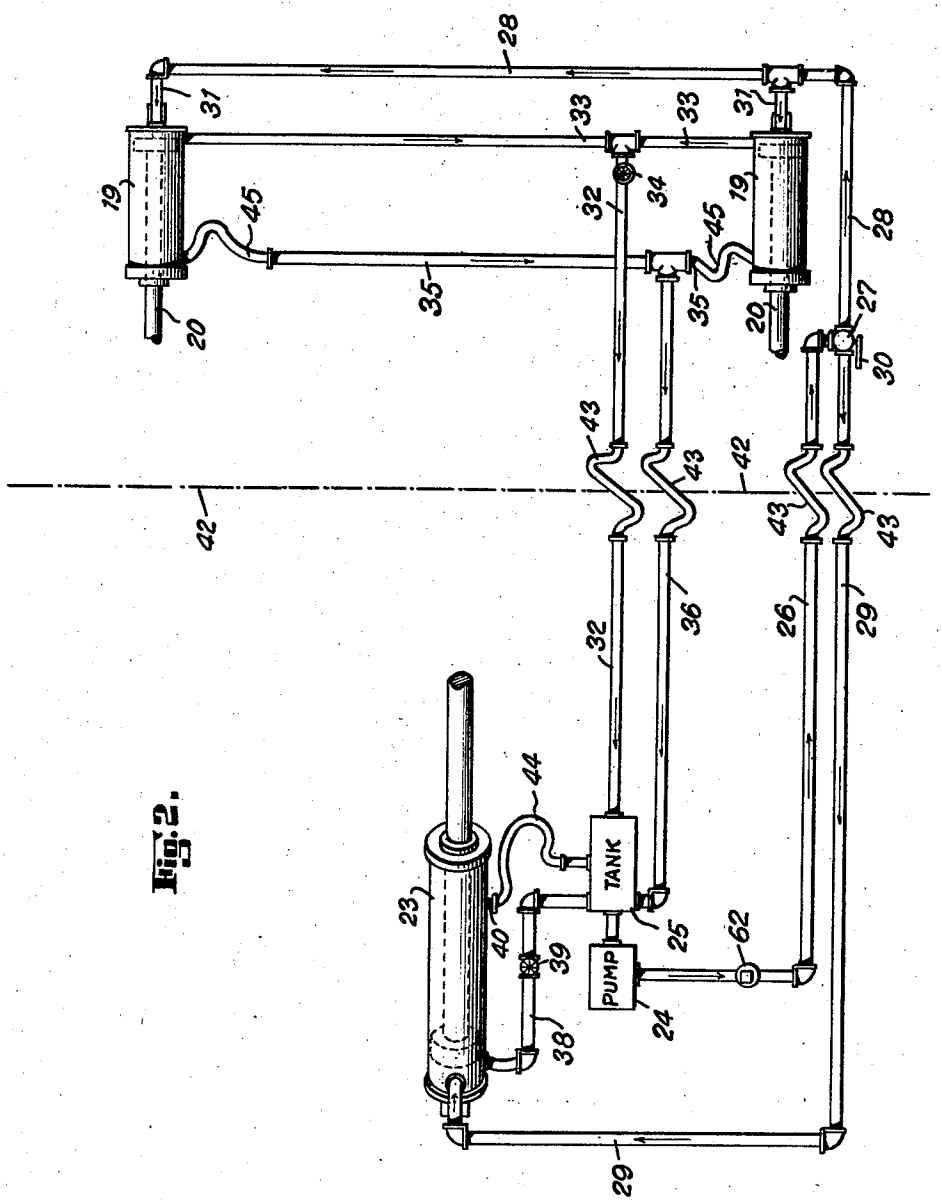


Fig. 2.

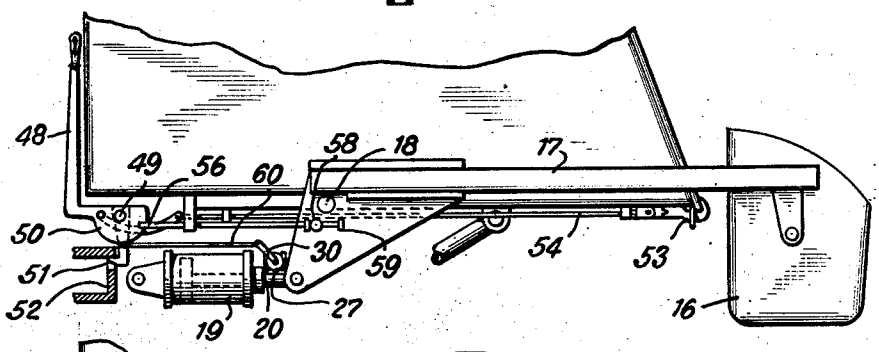
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Filed May 26, 1939 3 Sheets-Sheet 3

Fig. 3.



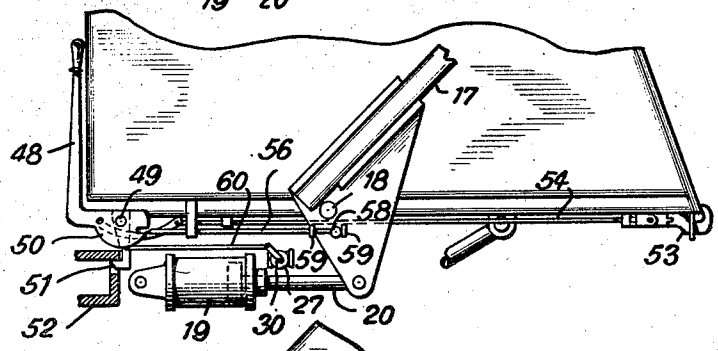


Fig. 4.

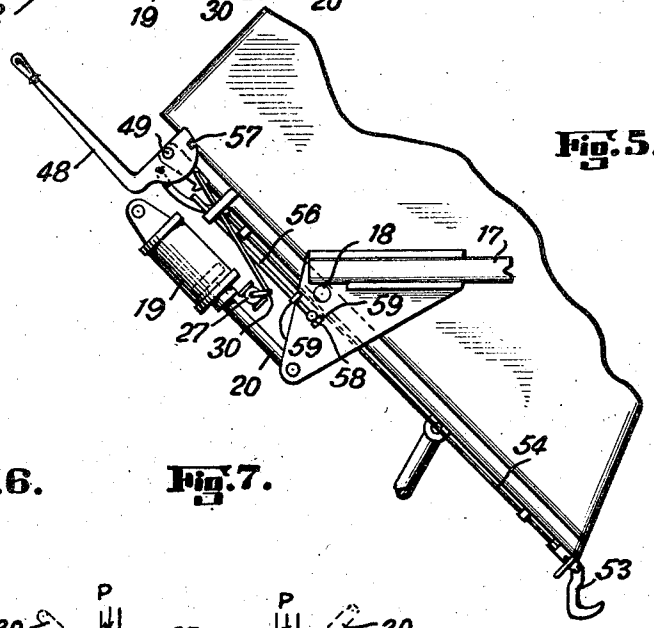


Fig. 5.

Fig. 6.

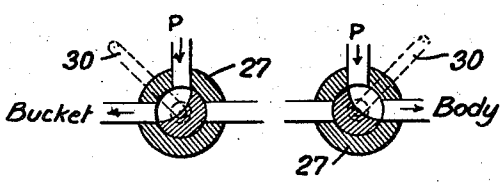


Fig. 7.

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UNITED STATES PATENT OFFICE

2,231,058

MATERIAL HANDLING APPARATUS

John E. Doran, Fairfield, Conn.

Application May 26, 1939, Serial No. 275,815

6 Claims. (Cl. 214—77)

This invention relates to material handling apparatus, particularly to motor vehicles for collecting and disposing of ashes, garbage and other refuse, and has for an object the provision of improvements in this art.

In the patent of William S. Howard, No. 2,101,067, there is disclosed a self-loading and dumping vehicle in which both the tilting of the body and the raising of the body loading bucket are controlled by a pair of long stroke pistons disposed in cylinders on each side of the vehicle body, the pistons moving through a given distance to operate the bucket and a greater distance in the same direction to operate the body.

According to the present invention the bucket operating and body operating functions are divided between separate sets of pistons, one set for operating the bucket and one set for operating the body. This permits the use of smaller pistons and cylinders and reduces the total cost of construction considerably. In addition, the invention provides safety mechanism for insuring that the bucket will be raised clear of the rear door of the body before the body can be dumped.

The invention will be best understood from a description of an illustrative embodiment thereof given with reference to the accompanying drawings, wherein:

Fig. 1 is a side perspective view of a self-loading dump truck embodying the present invention;

Fig. 2 is a schematic view of the hydraulic operating system;

Fig. 3 is a partial side elevation showing the interlocking control details, with the body and bucket in lower position;

Fig. 4 is a view similar to Fig. 3, showing the bucket in raised position;

Fig. 5 is a view similar to Fig. 3, showing both the bucket and body in raised position;

Fig. 6 is a cross-sectional view of a control valve in position for operating the bucket hoist; and

Fig. 7 is a similar view with the valve in position for operating the body hoist.

Referring to the drawings, a chassis 12 of a motor vehicle provided with power take-off mechanism has a closed collection body 13 mounted to tilt about aligned hinge journals 14 at the rear end.

The body is adapted to be loaded from the top and rear end and for this purpose is provided with a top opening which is normally closed by a cover 15 hinged at its front end and adapted to be automatically opened by a body loading bucket 16 when raised to dump material into the body opening.

The bucket 16 is carried by the rear ends of arms 17 hinged to the sides of the body at 18. The bucket arms are operated by fluid power devices or jacks 19 secured by pivots at the cylinder and piston ends to the body and to crank arms 20 of the bucket arms respectively. Interacting means are provided for opening the body cover 15 when the bucket is raised.

The body is raised about its hinges 14 by a fluid power device or jack 23 hinged at the cylinder end to the chassis and at the piston end to the body.

As best indicated in Fig. 2, a pump 24 and fluid storage tank or sump 25 are mounted on the chassis. The pump is driven when desired by power take-off mechanism from the truck drive motor or in any other convenient manner. The pump supplies fluid through a pipe 26 to a three way valve 27 by which it may be selectively supplied either to the bucket cylinders through a pipe 28 or to the body cylinder through the pipe 29. The valve 27 is provided with an operating arm 30 for control in a manner to be described presently.

The pipe 28 is provided with branches 31 leading into the head end of the bucket cylinders. A return pipe 32, provided with branches 33 connected to the head end of the bucket cylinders, leads to the storage tank 25. A hand valve 34, is placed in the pipe 32 for controlling the action of the bucket when fluid is directed to its operating pistons by the valve 27. When the valve is closed, fluid is retained in the cylinders until the pistons reach the end of their stroke to raise the bucket to its highest position. The pistons then uncover the ports of branches 35 of a relief return pipe 36, permitting fluid to flow through the cylinders back to the storage tank 25. When the valve 34 is opened, fluid is released at the head end of the cylinders and the bucket returns by gravity to its lower position.

The pipe 29 leads into the head end of the body cylinder. A return pipe 38 leads from the head end of the body cylinder to the storage tank 25. This pipe is provided with a hand valve 39 for controlling the action of the body when fluid from the pump is directed to its operating piston by the valve 27. When the valve 39 is closed, fluid is retained in the cylinders until the piston reaches the end of its stroke to raise the body to its maximum dumping position. The piston then uncovers the port of relief return pipe 40, permitting fluid to flow

through the cylinder back to the storage tank 25. When the valve 39 is opened, fluid is released at the head end of the cylinder and the body returns by gravity to its lower position.

As indicated in Fig. 2, the pipes 26, 29, 32, and 36 pass from the chassis to the body. Preferably they are extended back toward the hinge line of the body, represented by a broken line 42 in Fig. 2, and flexible connections 43 are placed in the pipes to accommodate the tilting movements of the body. Fig. 2 is drawn as if the body were turned completely upside down, i. e. through 180°, so as to present its nether parts uppermost in plan.

The outer ends of the body cylinders 23 and the bucket cylinders 19 also have considerable swinging movement. To accommodate this movement the relief return pipes 38 and 35 respectively thereof may be provided with flexible sections 44, 45, if desired.

Means are provided for operating the three-way valve 27 which selectively controls the flow of fluid from the pump to the bucket or body operating cylinders. The preferred means for operating the valve are shown in Figs. 3 to 5. This provides that the body cannot be tilted or the rear door opened until the bucket has been raised.

A latch operating handle 48 is mounted on a transverse shaft 49 at the front end of the body and carries disc sectors 50. The shaft 49 carries a body latch 51 by which the front end of the body is held down to a cross beam 52 of the chassis to prevent its tilting when empty by the over-balancing weight of a heavily loaded bucket.

Latches 53 for the rear door are connected to the disc sectors 50 by operating rods 54, the connection of the rods to the disc sectors being such that the parts pass over the shaft center 49 and lock in closed position.

To the crank arms 20 of the bucket arms 17 there is connected a detent latch rod 56, the end of which cooperates with a notch 57 in the disc sector 50. The pivot posts 58 on the arms 20 permit turning movement as necessary and stops 59 on the rods 56 produce the necessary movement of the rods as the bucket arms operate. The loose motion thus provided insures that the bucket is in fully raised position before the latch handle 48 and related parts are released.

After the detent latch rods 56 are withdrawn from the notches 57 the handle may be operated to release the door latches 53 and to operate the three-way valve 27 in a direction to stop the flow of pressure fluid to the bucket raising cylinders 19 and admit fluid to the body raising cylinder 23. This is accomplished by a rod 60 which is connected between the valve arm 30 and one of the body hold-down latches 51.

Since the return flow valve 34 for the bucket cylinders is closed, as it had to be to cause the bucket to be raised, fluid will be locked in the bucket cylinders when the three-way valve is turned to supply the body cylinder, and the bucket will thus be locked in its uppermost position. The valve 34 is raised with the body and is beyond convenient reach until the body is again lowered by opening the body cylinder fluid return valve 39, whereby accidental release of the bucket during dumping of the body is avoided. A check valve 62 may be placed in the supply line from the pump to prevent back-flow even if the pump is stopped, as it may be while the vehicle is travelling for considerable distances. It may be desirable to hold the bucket in upper position during such travel.

The operation will be undertsood from what has already been described.

While one embodiment of the invention has been described in detail in order to illustrate the principles of the invention, it is to be understood that the invention may have various embodiments within the limits of the prior art and the scope of the subjoined claims.

I claim as my invention:

1. Apparatus for handling material, comprising in combination, a chassis, a body tiltably mounted on the chassis, a loading bucket mounted on the body, a fluid operated power device mounted on the body for operating said bucket, a second fluid operated power device mounted on the chassis for operating said body, a three-way valve on the body for selectively supplying pressure fluid to said bucket or body operating devices, a shaft on the body for releasing a body latch and a body door latch and at the same time operating said three-way valve to shift the supply of pressure fluid from the bucket operating device to the body operating device, and interacting means for preventing the operation of said latch shaft until after the bucket has been raised to its upper position.

2. Apparatus for handling material, comprising in combination, a chassis, a body tiltably mounted on the chassis, a loading bucket mounted on the body, a fluid operated power device mounted on the body for operating said bucket, a second fluid operated power device mounted on the chassis for operating said body, a three-way valve on the body for selectively supplying pressure fluid to said bucket or body operating devices, a shaft on the body for releasing a body latch and a body door latch and at the same time operating said three-way valve to shift the supply of pressure fluid from the bucket operating device to the body operating device, and interacting means for preventing the operation of said latch shaft until after the bucket has been raised to its upper position, said means including a notched sector on said shaft and a detent rod therefor connected to the bucket operating parts.

3. Apparatus for handling material comprising in combination, a chassis, a body tiltably mounted on the chassis, a loading bucket mounted on arms pivoted to the sides of the body near the front end to operate between a lower position where it receives material and an upper position where it loads the material into the body, a fluid pressure jack on the chassis for operating the body, and a separate and independent fluid pressure jack mounted on the body near the lower front end for operating the bucket, and means for locking said bucket under fluid pressure in upper position on the body.

4. Apparatus for handling material comprising in combination, a chassis, a body tiltably mounted on the chassis, a loading bucket mounted on arms pivoted to the sides of the body near the front end to operate between a lower position where it receives material and an upper position where it loads the material into the body, a fluid pressure jack on the chassis for operating the body, a separate and independent fluid pressure jack mounted on the body near the lower front end for operating the bucket, and manual control means for selectively causing the application of power fluid to the bucket op-

erating jack for operating the bucket and for locking it in any position.

5. Apparatus for handling material comprising in combination, a chassis, a body tiltably mounted on the chassis, a loading bucket mounted on arms pivoted to the sides of the body near the front end to operate between a lower position where it receives material and an upper position where it loads the material into the body, a fluid pressure jack on the chassis for operating the body, a separate and independent fluid pressure jack mounted on the body near the lower front end for operating the bucket, manual control means for selectively causing the application of power fluid to the bucket operating jack for operating the bucket and locking it in any position, and manual control means for selectively causing the application of power fluid to the body operating jack.

6. Apparatus for handling material comprising in combination, a chassis, a body tiltably mounted on the chassis, a loading bucket mounted on a pair of arms hinged to the body so as to operate between a lower position where it receives material and an upper position where it loads the material into the body, a fluid pressure jack on the chassis for operating the body, a fluid pressure jack mounted near the lower front end of the body connected to an arm for operating the bucket, manual control means for selectively causing the application of power fluid to the bucket operating jack for operating the bucket and locking it in any position, manual control means for selectively causing the application of power fluid to the body operating jack, and interlocking manual control means for releasing fluid to said body operating jack when the bucket is in its uppermost position.

JOHN E. DORAN.