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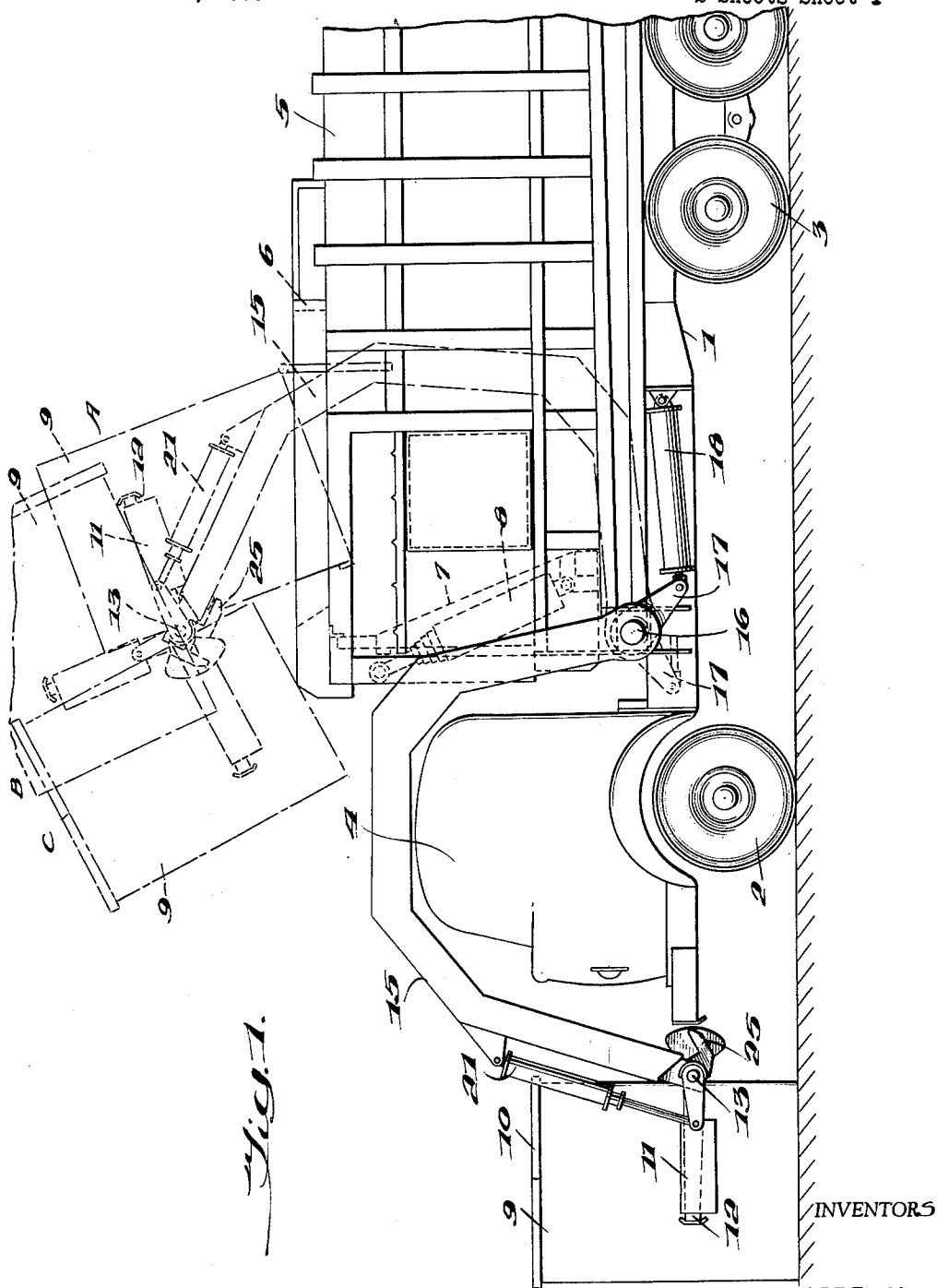
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HOISTING AND DUMPING MECHANISM FOR CONTAINERS

Filed Dec. 22, 1958

2 Sheets-Sheet 1



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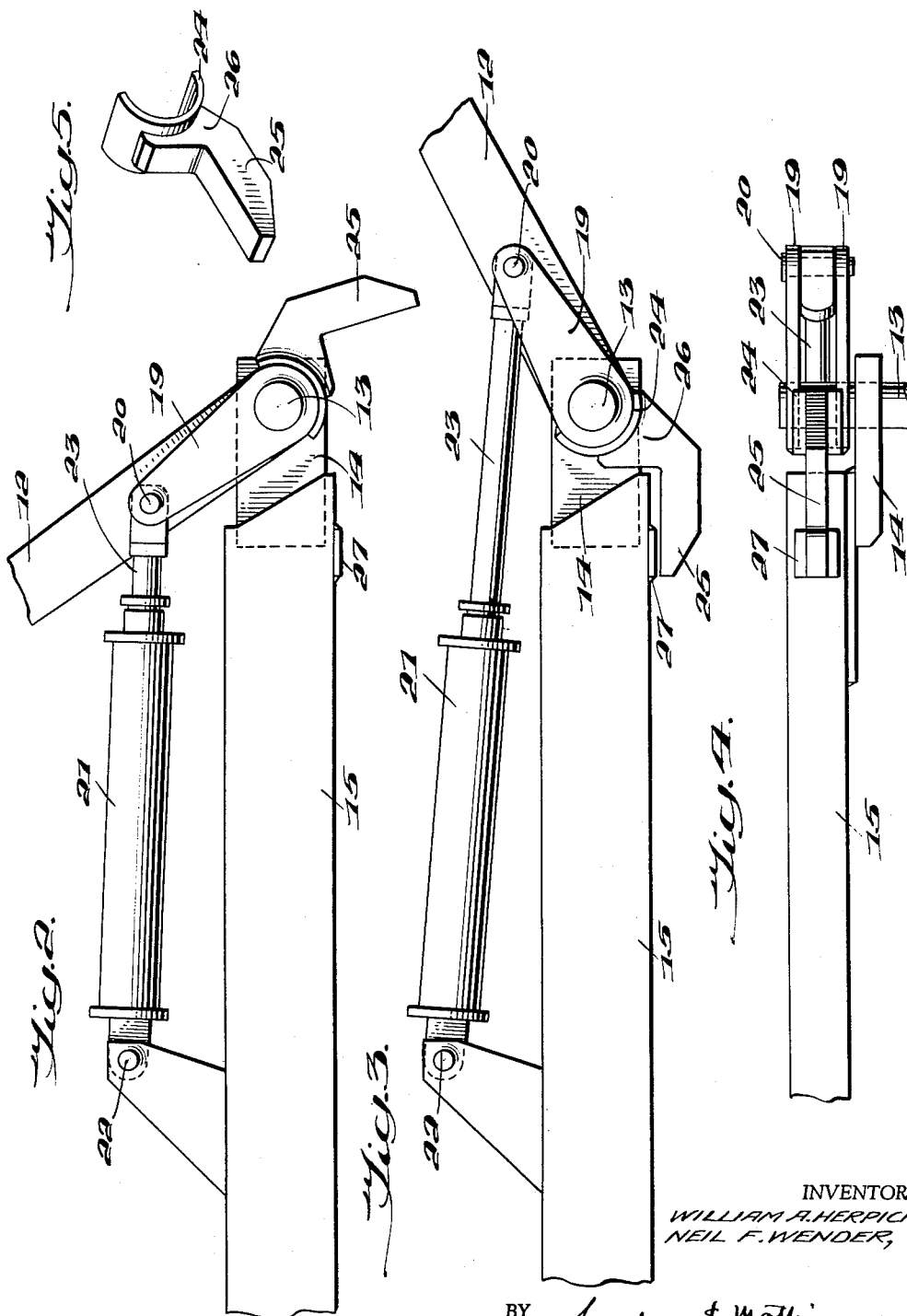
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HOISTING AND DUMPING MECHANISM FOR CONTAINERS

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This application is a continuation-in-part of applicants' prior application, Serial No. 662,252, filed May 28, 1957, now Patent No. 2,900,096.

This invention relates to improvements in hoisting and dumping mechanism for containers, and more particularly, for use with separable containers that are adapted to be filled on the ground and then lifted by the mechanism and dumped into a receptacle on the vehicle on which the mechanism is mounted.

It has been the practice heretofore to provide a body on a vehicle having an opening in the top thereof adapted to receive refuse, which may be compacted in the body until the latter is substantially filled. Where the hoist mechanism comprises a lifting frame, this may include a pair of lifting arms pivotally mounted on opposite sides of the vehicle and connected together at their free ends by a torque tube on which fork arms are mounted for detachable engagement with a container to lift the container to a dumping position. Power means is connected with the torque tube to rotate the latter for swinging the fork arms relative to the lifting frame or the arms thereof.

When the lifting arms are raised substantially to a dumping position, if there should be a failure at this point of the power cylinders either at the pins, tie rods or pistons, or the hydraulic system, there is danger that the container could rotate under its load and force the fork arms downward to such an extent that there would be danger of the container becoming disconnected from the fork arms and dropping onto the cab of the truck or onto the ground, where injury may be occasioned to any of these parts or to the operator or attendants.

One object of this invention is to minimize the possibility of such danger and to improve the construction of the hoisting mechanism.

Another object of the invention is to provide safety means, as a part of the hoisting mechanism, which will prevent accidental swinging of the fork arms to an abnormal position where these may be disengaged from the container when the latter is in an elevated position.

These objects may be accomplished, according to one embodiment of the invention, by the provision of safety stop means connected with the fork arms, so as to prevent undue movement of the latter in such relation as to allow for accidental release of the container therefrom. The safety stop means preferably comprises a stop bracket assembly connected with the fork lever and projecting into a position so as to allow freedom of swinging movement of the fork arms in one direction relative to the lifting arms, but to limit the movement of the fork arms in the opposite direction relative thereto. This safety stop bracket may be disposed in position for abutting engagement with a lifting arm upon movement of the connected fork arm to an extreme position and thus prevent further movement in that direction while allowing for freedom of swinging movement in the opposite direction.

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This embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of a vehicle with hoisting means thereon, to which the invention is applied;

Fig. 2 is a side elevation of a portion of one of the lifting arms and its connected mechanism, with the fork arm moved to one extreme position relative thereto;

Fig. 3 is a similar view, showing the fork arm moved to another extreme position relative thereto;

Fig. 4 is a bottom plan view thereof; and

Fig. 5 is a perspective view of the safety stop assembly detached.

Referring to Fig. 1, the invention is shown as applied to a motor vehicle chassis, generally indicated by the numeral 1, including front and rear wheels 2 and 3 supporting the frame of the chassis. The vehicle is adapted to be power driven by any suitable power means as usually provided in truck operation. A cab is shown at 4, which may enclose the operator of the vehicle and frequently also includes an enclosure for the engine, although this is optional, according to the character of the vehicle to which the invention is applied.

Mounted on the vehicle chassis 1 is a body 5, such, for example, as a compaction-type body, having an opening or hopper 6 in the top thereof adjacent the front through which refuse may be directed into the body. If the body is constructed of the compaction type, as described above, the compaction head 7 may be mounted in the body for movement to a position forwardly of the opening or hopper 6, in order to receive the refuse, and then propelled rearward of the body for compacting the refuse therein. A hydraulic cylinder 8 or other suitable power means may be used for moving the compaction head 7.

A suitable refuse container is indicated generally at 9 and preferably is separate from the hoisting mechanism on the vehicle. This container 9 should be somewhat elongated, with an opening in the top thereof for receiving and discharge of the refuse, which opening may be closed by one or more doors 10 that will open when the refuse is to be discharged therefrom. At opposite ends, the container 9 is provided with elongated channels or pockets 11 that extend transversely of the respective end walls of the container, adapted for engagement for picking up and dumping the container.

The hoisting means for the container 9, in this embodiment of the invention, comprises fork arms 12 arranged for embracing relation with the container and for engagement in the pockets or channels 11. The fork arms 12 are secured upon a torque tube 13 that extends transversely from side to side of the vehicle and is journaled for rotary movement, to impart swinging movement to the fork arms 12.

The opposite end portions of the torque tube 13 are journaled in bearing plates 14, secured upon the outer ends of lifting arms 15, as shown in Figs. 2, 3 and 4. The bearing plates may be applied to the lateral faces of the lifting arms 15 and welded thereto. Through this means, the torque tube and lifting arms constitute a hoisting frame which may be used for picking up and dumping the container 9.

At their opposite ends, the lifting arms 15 are pivotally supported at 16 on the chassis frame 1, for swinging movement to different positions with respect to the chassis frame and vehicle, generally as indicated in full lines and in dotted lines in Fig. 1. Lever members 17 are connected with the pivoted ends of the lifting arms 15 and are operatively connected with the main hydraulic cylinders 18, mounted on the vehicle chassis 1 for swinging the lifting arms to different positions forward and backward with respect to the vehicle.

Referring again to Figs. 2 to 4, it will be noted that

the opposite ends of the torque tube 13 have fork levers 19 fixed on the torque tube for swinging the respective forks 12. The fork levers 19 are connected at 20 with one end of a hydraulic power device, generally indicated at 21, the opposite end of which power device 21 is pivotally mounted at 22 upon the adjacent lifting arm 15.

It will be noted from Fig. 4 that a pair of fork levers 19 are secured in spaced relation at each end of the torque tube 13 and that the adjacent piston rod 23 of the power cylinder 21 extends between the lever 19 of the pair, being pivoted thereto at 20. This relation equalizes the force of the cylinder acting through the levers 19 to move the fork arms 12, but only one such power lever for each power device may be used, if preferred.

The normal positions of the parts for picking up a container 9 are illustrated in full lines in Fig. 1. The fork arms 12 are lowered substantially to their horizontal positions; to align with the pockets or channels 11 on the ends of the container 9, and the vehicle is moved forward until engagement of the fork arms 12 with the pockets or channels is effected. Then, the power cylinders 21 are operated to lift the fork arms 12 through a relatively small angle, sufficient to lift the container 9 off the ground. As an alternate operation, the hydraulic power devices 18 may be operated to raise the free ends of the lifting arms 15 until the container is lifted off the ground.

With the container thus elevated to the desired extent, the vehicle may be moved, if desired, or the dumping operation effected without movement of the vehicle. If the vehicle is not to be moved, the lifting arms 15 can be manipulated by the power cylinders 18 to raise the container 9 to a dumping position, substantially as indicated in the upper right-hand view by dotted lines in Fig. 1, which is here indicated at A. In such position, the container is turned upside down for discharging the contents therefrom through the opening or hopper 6 into the body 5.

In the course of this operation, if a failure of the mechanism should result at any time before the container reaches an inverted position as, for example, up to and including the position indicated at B, there is danger of injury or damage. If there should be a cylinder failure at this point, either at the pins, tie rods or pistons, or a hydraulic failure, the container could rotate under its load and dip on the forks 12 to the position indicated at C where it may become disengaged from the forks and drop onto the cab 4 of the vehicle, causing damage to the latter, or to the ground where damage may result to other parts of the vehicle or injury to workmen, operators, etc. This invention has provision for preventing such possibility of injury or damage should a failure of any kind occur in the mechanism.

According to the embodiment of the invention illustrated in the drawings, a safety stop assembly is provided including a base plate 24 and a stop block 25, which is elongated and has an offset end portion 26 in position to conform to the periphery of the base plate 24 and to provide a secure connection with the latter.

The base plate 24 is shown in Fig. 4 as conforming to the outside radius of the adjacent end of the fork levers 19, overlapping the latter transversely and preferably welded or otherwise secured thereto. The stop block 25 is in turn welded or otherwise rigidly fixed to the base plate 24 and thereby will be fixed rigidly to the levers 19.

With the fork arms 12 in their lowered or substantially horizontal positions, which is illustrated relatively in Fig. 3, the stop block 25 projects in underlying relation with the adjacent end portion with the lifting arm 15.

A contact pad 27 is shown as welded or otherwise secured rigidly on the adjacent arm 15 in position for abutting engagement by the end portion of the stop block 25 to limit the swinging movement of the latter during rotation of the torque tube 13. If preferred, the pad 27 may be secured directly on the free end of the stop block 25 and abut against the face of the arm 15 or against a pad provided thereon.

Since the position of the fork arm 12 will vary in its relation to the main arm 15, and likewise of the fork levers 19 relative thereto, according to the eye-to-eye adjustment of the hydraulic cylinder 21, the safety stop assembly should not be welded to the levers 19 until final assembly of the hoisting mechanism. This will insure of proper uniform operation. Then, when the parts are being assembled, the cylinder 21 is extended to a point where the maximum dip is provided of the fork levers 19. With those parts in such position, the stop assembly can be applied to the pivot end of the levers 19 and the base plate 24 of the stop assembly welded to the large ends of the levers 19. In such position, the stop block 25 should be spaced from the contact surface on the arm 15 as, for example, by the space shown in Fig. 3, between the face of the stop block 25 and the face of the adjacent pad 27. Thus, these parts will contact only when the forks 12 are under strain and have been moved to abnormal positions.

With this safety stop mechanism, it is apparent that should a failure occur at the position illustrated at B in Fig. 1 of any parts of the mechanism, such as the cylinders, hydraulics, mechanisms, etc., and there be a tendency for the container 9 to swing the forks 12 downward to the position shown at C, such downward swinging movement would be prevented by the engagement of the stop block 25 with the pad 27 before the container could be lowered to a point where it might accidentally become disengaged from the fork arms 12. Thus, the mechanism would assure that there would be no serious danger of disconnection or of dropping the container from its elevated position.

While the invention has been illustrated and described in one embodiment, it is recognized that variations and changes may be made therein, without departing from the invention as set forth in the claims.

We claim:

1. In hoisting mechanism of the character described, the combination with a vehicle including an operator's cab, of a lifting frame mounted on the vehicle and having fork arms adapted for detachable engagement with a container and pivotally mounted on the lifting frame for movement to positions over the cab, and means for swinging the fork arms relative to the lifting frame, of safety stop means operatively connected with the fork arms for movement of the latter in one direction relative to the lifting frame and for limiting swinging movement of the fork arms in the opposite direction relative thereto when said fork arms are in positions over the cab to prevent accidental disengagement of the container.

2. In hoisting mechanism of the character described, the combination with a vehicle including an operator's cab, of a lifting frame mounted on the vehicle and having fork arms pivotally mounted thereon for detachable engagement with a container to raise the container to an elevated position for dumping the contents therefrom, and power means operatively connected with the fork arms for swinging the fork arms relative to the lifting frame, of a safety stop assembly comprising means fixed relative to the fork arms for movement therewith and extending into the positions for engagement with the lifting frame when said fork arms are in positions over the cab to limit the swinging movement of the fork arms relative to the lifting frame in one direction.

3. In hoisting mechanism of the character described, the combination with a vehicle including an operator's cab, of a lifting frame mounted on the vehicle and including fork arms pivotally mounted on the lifting frame in positions for detachable engagement with a container to lift the container to an elevated position for dumping, and power means connected with the fork arms for swinging the latter relative to the lifting frame, of a safety stop mechanism including a stop member fixed relative to the fork arms and extending into position for abutting relation with the lifting frame upon swinging movement of

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the fork arms in one direction relative thereto when said fork arms are in positions over the cab.

4. In hoisting mechanism of the character described, the combination with a lifting frame including lifting arms adapted to be mounted on a motor vehicle for upward swinging movement relative thereto, a torque tube connecting together the free ends of the lifting arms, fork arms mounted on the torque tube, fork levers mounted on the torque tube for swinging movement relative to the lifting arms and fixed to the fork arms, power devices operatively connected with the fork levers for moving the latter to swing the fork arms relative to the lifting arms, of safety stop means fixed relative to the fork arms in positions for abutting relation against the lifting arms to limit the swinging movement of the fork arms in one direction relative thereto.

5. In hoisting mechanism of the character described, the combination with a lifting frame including lifting arms adapted to be mounted on a motor vehicle for upward swinging movement relative thereto, a torque tube connecting together the free ends of the lifting arms, fork arms mounted on the torque tube, fork levers mounted on the torque tube for swinging movement relative to the lifting arms and fixed to the fork arms, power devices operatively connected with the fork levers for moving the latter to swing the fork arms relative to the lifting arms, of safety stop means fixed relative to the fork arms in positions for abutting relation against the lifting arms to limit the swinging movement of the fork arms in one direction relative thereto, said safety stop means comprising base plates fixed to the fork levers, a stop block fixed to each base plate and extending into overlapping relation with the adjacent portion of the lifting arm in position for abutment thereagainst upon swinging movement of the fork arms to abnormal positions relative thereto.

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6. In hoisting mechanism of the character described, the combination with a vehicle including an operator's cab and a body, of a lifting frame mounted on the vehicle and having fork arms mounted thereon for swinging movement relative to the lifting frame and adapted for detachable engagement with a separable container, means for moving the lifting frame to raise the container on the fork arms respectively to positions over the cab and over the body, and means operatively connected with the fork arms and lifting frame for limiting the downward swinging movement of the fork arms relative to the lifting frame when the container is in a supported position on the arms over the cab.

7. In hoisting mechanism of the character described, the combination with a vehicle including an operator's cab and a body, of a lifting frame mounted on the vehicle and having fork arms mounted thereon for swinging movement relative to the lifting frame and adapted for detachable engagement with a separable container, means for moving the lifting frame to raise the container on the fork arms respectively to positions over the cab and over the body, and means operatively connected with the fork arms and lifting frame for limiting the downward swinging movement of the fork arms relative to the lifting frame in a direction only toward the cab while allowing freedom of swinging movement of the fork arms in a direction toward the body to dump the contents of the container therein.

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