April 28, 1964 H. C. FRENCH ETAL 3,130,845

FRONT END LOADERS

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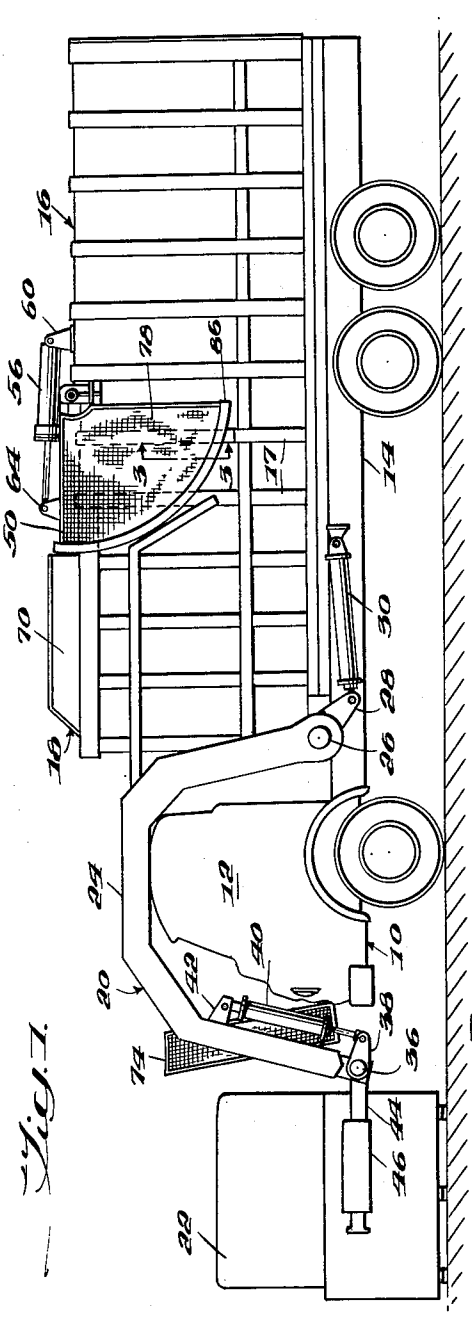


Fig. 1.

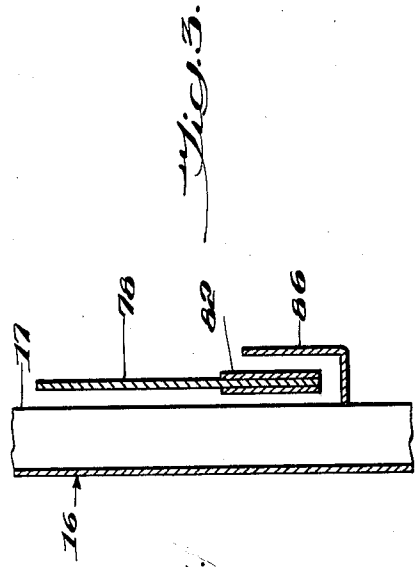


Fig. 3.

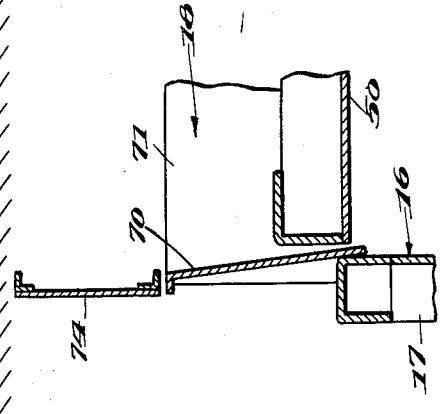


Fig. 4.

INVENTORS
HENRY C. FRENCH,
NEIL F. WENDER,

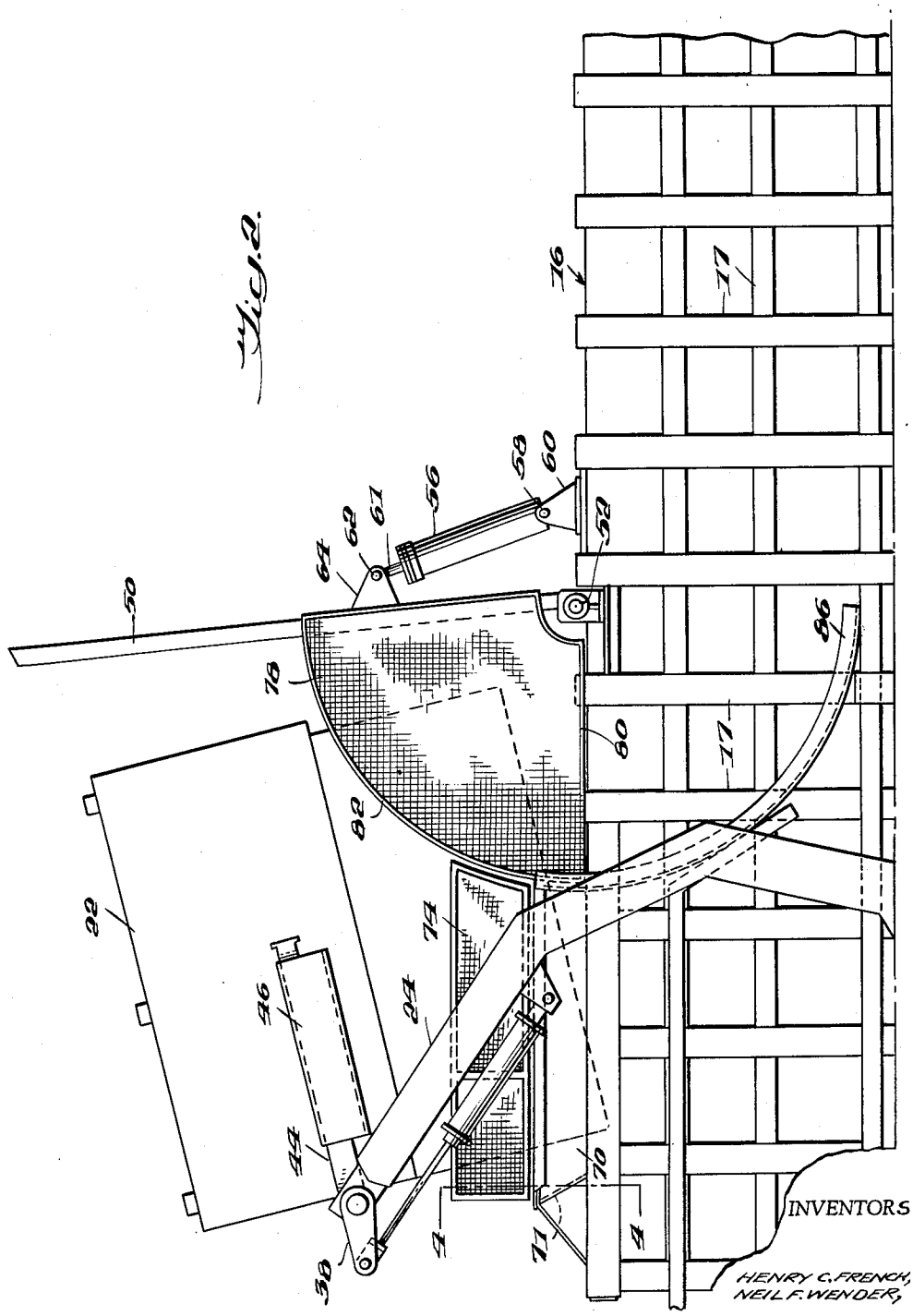
BY
Burns, Doane, Benedict, Luecker & Mather
ATTORNEYS

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Fig. 2.



BY

Burns, Doane, Benedict, Swecker & Mathis

ATTORNEYS

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FRONT END LOADERS

Henry C. French and Neil F. Wender, Knoxville, Tenn., assignors to Dempster Brothers, Inc., Knoxville, Tenn., a corporation of Tennessee

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This invention relates to improvements in front end loaders of the character used for picking up containers at the front of a motor vehicle and dumping the contents into the body of the vehicle.

In the past, loose material in large size containers has been handled conveniently by front end loaders or front end hoisting apparatus mounted on a motor vehicle. Front end loaders of this type generally include a pair of lifting arms pivotally mounted on the vehicle chassis by a rear torque tube for vertical swinging movement about an axis located behind the cab of the vehicle. The lifting arms extends to the front of the vehicle and are joined by a front torque tube journaled to the front end portions of the lifting arms. Fork arms are mounted on the front torque tube and may be operated to swing with respect to the lifting arms. These fork arms engage a container by sliding into sleeve assemblies mounted on the ends of the container. The lifting arms and the fork arms can be operated by suitable power devices to lift the container over the cab of the vehicle and into a dumping position above the body of the vehicle.

A hopper opening is provided in the top of the body at the front thereof and usually is of relatively large dimensions so as to be considerably larger than any container which may be handled by the hoisting apparatus. After a container has been hoisted into position above the hopper opening, the fork arms can be actuated to invert the container to dump the contents through the hopper opening into the body. This type of front end loader is illustrated and described in detail in Patent No. 2,900,096, issued August 18, 1959.

It is desirable, of course, that all of the material falling from the container pass through the hopper opening into the body. The front end loader, however, may be used with a variety of sizes of containers; and because of this, usually there are large spaces between the container and the vehicle body. Because of the nature of the hoisting apparatus, it is not practical or possible to extend the container all the way through the hopper opening, and therefore the container is suspended a distance above the hopper opening. Consequently, the material falling from the container might be blown away from the body if there is a strong wind or even a breeze. Also, loose material may drift away from the hopper opening.

One object of this invention is to provide shielding means for ensuring that the contents of a container will fall through a hopper opening during a dumping operation.

Another object of this invention is to provide structure for guiding material through a hopper opening, which structure is movable into and out of position as needed.

These objects may be accomplished by providing elongated shields fastened to each lifting arm of the container hoisting apparatus and carried by the arms into position along the sides of the hopper opening when the arms are raised to swing a container into dumping position. Also, a cover for the hopper opening is pivotally connected to the top of the body of the vehicle so as to be swingable to an upwardly extending position at the rear of the hopper opening. Sector-shaped side shields are fixed to the cover and movable therewith. When the cover is open, the side shields extend upwardly along the sides of the hopper opening and cooperate with the cover and the elongated shields on the lifting arms to provide a

shielding and guiding structure for ensuring that the contents of the container fall through the hopper opening and into the body of the vehicle.

A preferred embodiment of this invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevation view of a container and of a vehicle provided with front end loading equipment, and showing the shielding and guiding apparatus of this invention;

FIG. 2 is an enlarged side elevation view of a portion of the structure illustrated in FIG. 1, showing the shielding apparatus in container-dumping position;

FIG. 3 is a fragmentary section view taken along line 3—3 of FIG. 1; and

FIG. 4 is a fragmentary section view taken along line 4—4 of FIG. 2.

Front end loading equipment of the type to which this invention applies may be mounted on a motor vehicle of conventional form, as illustrated in FIG. 1 and represented by reference numeral 10. The motor vehicle 10 is self-propelled under the control of an operator located within a cab 12. A main chassis 14 of the vehicle 10 supports a body 16 which may be of any suitable or desired type for receiving therein the material to be handled. The body 16 may be strengthened throughout by suitable ribs 17. A hopper opening 18 is provided at the top and front of the body 16 and is of suitably large size for conveniently receiving material to be dumped into the body 16.

The hoisting apparatus is designated by numeral 20 and may be used in connection with a container 22 of the type illustrated in FIGS. 1 and 2, for example. Such a container 22 has suitable doors through which material may be deposited, and an opening in the top thereof through which material may be dumped out of the container. Containers of this type may be provided in a variety of shapes and sizes.

The hoisting apparatus 20 includes a pair of lifting arms 24 spaced apart a distance corresponding substantially with the width of the cab 12. The lifting arms 24 may be of gooseneck shape or inverted U-shape, for example, so as to extend over the top and downwardly in front and back of the cab 12, as illustrated in FIG. 1.

At the back of the cab 12, the lower ends of the lifting arms 24 are fixed on horizontal rear torque tube or rod 26 which extends substantially from one side of the vehicle 10 to the other. The rear torque tube 26 is journaled in bearing boxes which are fixed on the vehicle chassis 14. In this manner, the lifting arms 24 are pivotally mounted to the vehicle 10. Lever arms 28 are fixed on the torque tube 26 and extend downwardly therefrom. The free ends of each lever arm 28 are pivotally connected to a suitable power device 30, such as a conventional hydraulically actuated cylinder and piston device, which power device in turn is pivotally mounted on the vehicle chassis 14.

At the front of the vehicle 10 the lifting arms 24 are connected by a horizontal front torque tube or rod 36 which is journaled in bearing boxes secured to the forward ends of the lifting arms 24. On each outside end of the torque tube 36 there is fixed a pair of lever arms 38. A power device 40, for example a conventional hydraulically actuated cylinder and piston device, is mounted on each of the lifting arms 24 by a bracket 42 so that the power device 40 extends along the corresponding arm 24. The piston rod of the power device 40 is connected to the free end of the corresponding lever arms 38. A pair of fork arms 44 are rigidly mounted to the front torque tube 36 adjacent the lifting arms 24 and extend perpendicularly from the torque tube 36.

On each wall of the container 22 there is securely attached a sleeve 46. Each sleeve 46 extends generally

horizontally along an end wall of the container and may receive one of the fork arms 44 of the hoisting apparatus 20. In this manner, a detachable connection can be effected between the container 10 and the hoisting apparatus 20.

The hoisting apparatus 20 is operated as follows in order to dump the contents of the container 22 into the body 16. The power devices 40 may be actuated under the force of hydraulic pressure to rotate the lever arms 44 which in turn rotate the front torque tube 36 so as to properly align the fork arms 44 for entrance into the sleeves 46. The lifting arms 24 may be pivoted about the axis of the rear torque tube 26 by operation of the power devices 30. In order to complete a connection between the hoisting apparatus 20 and the container 22, while the container is on the ground or other supporting surface at the front of the vehicle 10, the vehicle is maneuvered into the proper position and then the power devices 30 and 40 are operated so that the fork arms 44 are at the proper angle with respect to the sleeves 46 so as to effect a suitable entrance of the fork arms 44 through the sleeves 46.

The power devices are operated further to swing the lifting arms 24 upwardly to lift the container 22 over the cab 12 and into dumping position at the top and front of the body 16, immediately above the hopper opening 18. Simultaneously, during the upward movement of the lifting arms 24, the fork arms 44 may be actuated by the power devices 40 to rotate slightly in a counterclockwise direction, with reference to FIG. 1, so that the container 22 may be kept tilted slightly toward the vehicle but substantially upright during its swinging movement above the body 16. Once the container 22 is above the hopper opening 18, the fork arms 44 may be actuated to rotate in a clockwise direction far enough so that the container 22 is inverted to dump the contents thereof through the opening 18 and into the body 16.

After the container 22 is empty, the power devices 40 may be actuated to rotate the fork arms 44 to return the container 22 to a generally upright position. The lifting arms 24 then may be lowered by proper actuation of the power devices 30 to return the container 22 to the ground in front of the vehicle 10.

The hopper opener 18 is provided with a cover 50 of suitable size and shape to seal off the opening when the cover is closed. The cover 50 is pivotally mounted at 52 to the top of the body 16 rearwardly of the hopper opening 18 so as to be swingable upwardly from a closed position to an open position, illustrated in FIG. 2.

Swinging movement of the cover 50 is effected by a power device 56, for example a conventional hydraulically actuated cylinder and piston assembly. One end of the power device 56 is pivotally mounted at 58 to brackets 60 which are fixed to the top of a body 16. The piston rod of the power device 56 is pivotally connected at 62 to a pair of brackets 64 which are fixed to the cover 50.

During the dumping operation of the container 22, the cover 50 is swung to its open position, illustrated in FIG. 2, before the lifting arms 24 have moved upwardly far enough to place the container 22 above the hopper opening 18. This is accomplished by timely actuation of the power device 56. After the lifting arms 24 have moved the container 22 away from the hopper opening 18, in the return of the container 22 to its position in front of the vehicle, the cover 50 may be closed by proper actuation of the power device 56.

Hopper side plates 70 are fixed to the top of the body 16 and extend upwardly along the sides of the hopper opening 18. An angled front plate 71 joins the plates 70. Elongated shield members 74 are fixed to each of the lifting arms 24 and are movable therewith. The elongated shields 74 are located on the lifting arms 24, in such a position that, after the lifting arms have moved the container 22 to its dumping position above the hopper opener 18, the elongated shields 74 extend generally horizontally immediately above the respective side plates 70, as illustrated in FIGS. 2 and 4.

Sector-shaped shields 78 are fixed to opposite sides of the cover 50 and extend along the outside of the body 16 when the cover 50 is closed, as illustrated in FIG. 1. The sector-shaped shields 78 are movable with the cover 50 and are dimensioned to have their free edge 80 adjacent the top of the body 16, next to the hopper opening 18, when the cover 50 is open, as illustrated in FIG. 2. A rigid frame around the shield, including a curved portion 82, strengthens the sector-shaped shield 78. Lateral movement of the shield 78 is prevented by an angle-shaped curved track 86, as illustrated in FIG. 3, and which is mounted to the ribs 17 of the body 16. The upper end of the curved track 86 extends upwardly above the top of the body 16 far enough to be in engagement with the curved frame 82 when the cover 50 is open. This ensures rigidity of the sector-shaped shield 78 when the cover 50 is open.

After the container 22 has been inverted, as illustrated in FIG. 2, one edge of the container normally will extend below the side plates 70 and the front plate 71. Generally, however, the container 22 will be suspended a distance above the body 16 and there will be spaces between the container 22 and the edges which form the hopper opening 18. The hoisting apparatus 20 may accommodate containers of various sizes; consequently, when small size containers are handled, the spaces between the container and the body 16 will be extensive.

Often containers, such as the container 22, are used to handle trash, or other loose material. In the past, a wind or breeze blowing across the top of the body 16 might carry material away from the hopper opening 18. In addition, loose material such as papers tend to drift sidewise rather than fall straight down. Conventional types of container handling equipment have not provided satisfactory means for guiding material into the body as it falls from the container. The apparatus described above, however, forms a simple and effective shielding and guiding structure.

After the container 22 has been moved to a dumping position above the hopper opening 18, the elongated shields 74, the sector-shaped shields 78, together with the cover 50 cooperate to form shielding and guiding structure around the rear and sides of the hopper opening 18. Material, as it falls from the container 22, will be guided by the shielding structure through the hopper opening 18 into the body 16. A wind or breeze will not be able to blow the material away from the hopper opening 18 as the material falls from the container 22. All such loose material will be guided into the body 16.

The elongated shield 74 and the sector-shaped shield 78 may be made of expanded metal or perforated sheet metal, for example. Whatever material is used it is desirable that the shields be lightweight. The shielding structure, including the elongated shield 74, the sector-shaped shield 78 and the cover 50 are positioned around the container 22 and the hopper opener 18 automatically during the dumping operation of the container 22. It is not necessary for the operator to direct his attention to the shielding structure.

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

We claim:

1. In container handling equipment including a body having an opening at the top thereof, and a pair of arms for moving a container over the opening, the combination of a cover for the opening, said cover being pivotally connected to the body along one end of the opening for swinging movement about a horizontal axis, sector-shaped shields attached to opposite sides of the cover and movable with the cover into position along opposite sides of the opening when the cover is open, and elongated shields

attached to each arm and positioned thereon to extend upwardly along said opposite sides of the opening in line with the sector-shaped shields after the arms move the container over the opening.

2. In container handling equipment including a body having an opening, and a pair of arms for moving a container over the opening, the combination of side plates fixed to the body and extending upwardly along opposite sides of the opening, a cover for the opening, said cover being pivotally connected to the body along one end of the opening between said opposite sides, shields attached to opposite sides of the cover for movement with the cover into alignment with the side plates when the cover is open, and elongated shields attached to each arm and positioned thereon to extend upwardly above the side plates after the arms move the container over the opening.

3. In combination, a vehicle having a body provided with an opening at the top; a front end loader mounted on the vehicle and including arm means for lifting a container above the body and the opening, and means for inverting the container to dump the contents through the opening and into the body; and means for guiding the contents into the body, said guiding means including a cover for the opening, said cover being pivotally connected to the body along one end of the opening and swingable to a raised position, side shield means movable with the cover into position to extend along opposite sides of the opening, elongated shield means on the arm means and movable with the arm means into alignment with the side shield means along said opposite sides of the opening to cooperate with the cover and with the side shield means to guide the contents into the body.

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