Oct. 20, 1953 A. F. FOOTE 2,656,058

TRUCK LOADING AND UNLOADING MECHANISM

Filed April 10, 1948 2 Sheets-Sheet 1

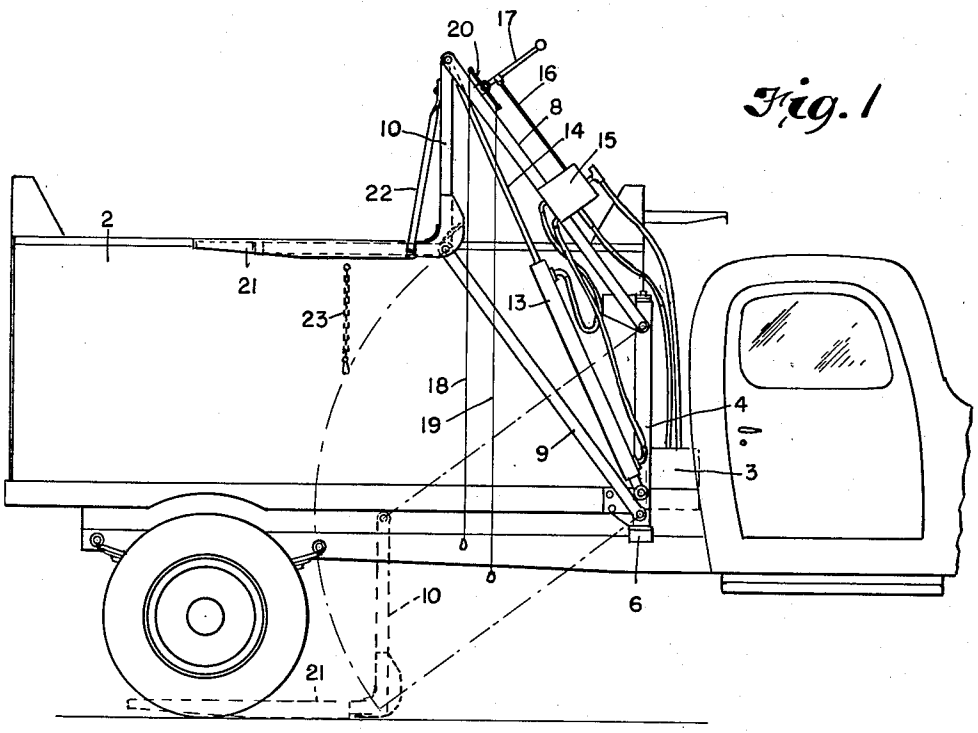

Fig. 1

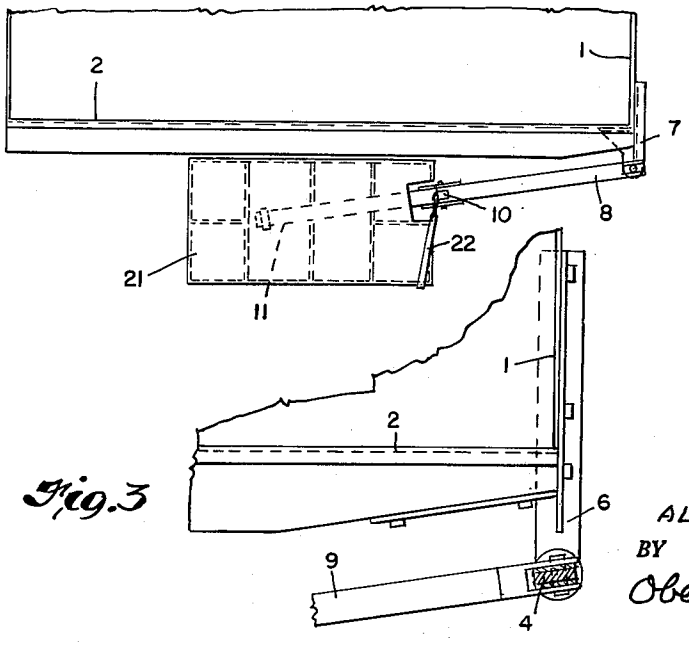

Fig. 2

Fig. 3

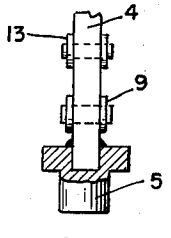

Fig. 4

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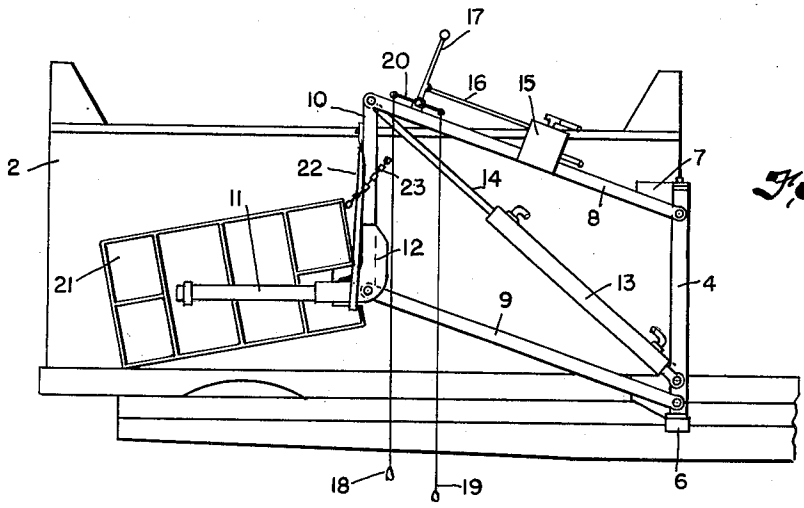

Fig. 5

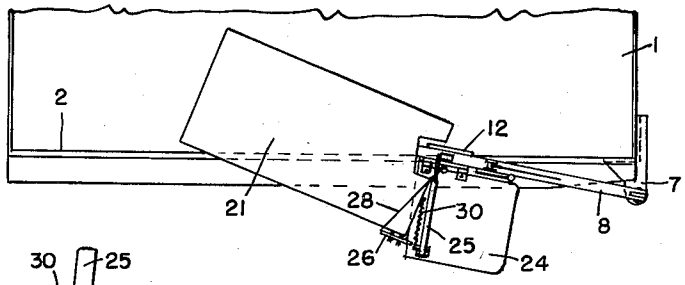

Fig. 6

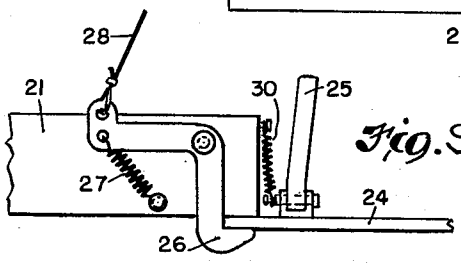

Fig. 9

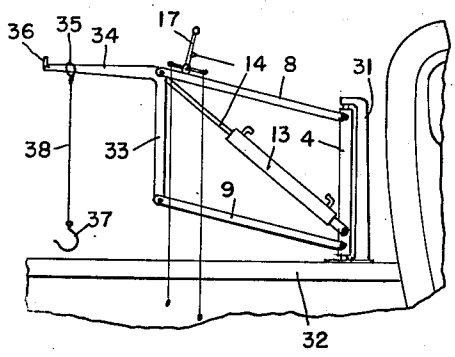

Fig. 7

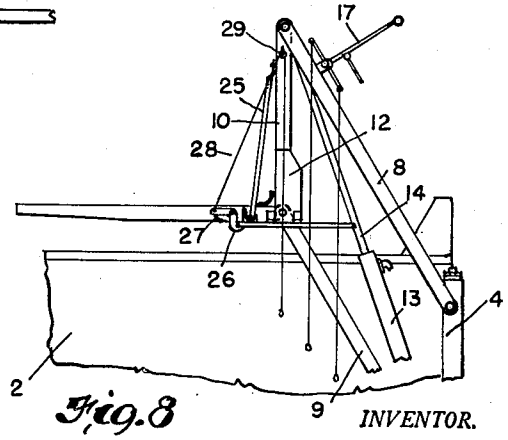

Fig. 8

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TRUCK LOADING AND UNLOADING MECHANISM

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Application April 10, 1948, Serial No. 20,264

17 Claims. (Cl. 214—77)

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This invention relates, as indicated, to loading and unloading mechanism and more particularly to means adapted to be mounted on a truck or like vehicle for lifting loads to the level of the deck, or above, and for lowering the same.

In order to expedite the handling of heavy loads and at the same time avoid likelihood of damage thereto or injury to workmen, there has been an increasing tendency to mount small cranes or lifts on trucks, usually at the rear end. Such cranes may employ a winch or be of the pivoted boom type provided with a hydraulic cylinder for raising and lowering the same. A tail gate which may be raised and lowered by hydraulic means when in horizontal position has also been developed.

There are, however, a large number of situations where such presently available lifting means are far from suitable. An example is the case of the large garbage dump truck of the type employed to haul garbage to pig farms. Here, the tail gate must be kept closed and sealed during collection of the garbage. A crane to hoist the heavy buckets is too slow and requires the presence of another operator to empty the buckets when the latter have been raised high enough. Various conveyor and skip-hoist means have been devised but have the disadvantage of very high initial cost. They are also generally not adapted to be mounted on standard vehicle bodies.

Most loading devices which bring the load in over the tail end of the truck then require the operator to drag the load to the forward end of the body. Where cranes are used, there must be two operators or else a single operator must be continually climbing in and out of the truck.

Certain trucks, such as milk trucks, regularly load at the side, and this has an added advantage of rendering it unnecessary for the truck to obstruct traffic when at a loading dock.

It is often desirable to raise a load well above the deck when loading a truck, as when several rows of boxes are to be stacked upon each other, and it is also sometimes necessary to elevate a load during unloading, as when sacks of grain are to be discharged into a grain elevator.

It is, therefore, a primary object of my invention to provide a load lifting device particularly adapted to be mounted on vehicles such as trucks for loading and unloading the latter at the side.

Another object is to provide a loading device adapted to be controlled by a single operator.

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Another object is to provide such device having a platform adapted to carry both load and operator.

Another object is to provide fluid-pressure operated lifting means, the load-carrying element of which will automatically be maintained level in all positions.

Still another object is to provide means whereby a load may be discharged into a truck dump body or the like.

A further object is to provide a loading device of the type indicated which, while very efficient in use, will nevertheless be inexpensive of manufacture and readily adaptable to installation on existing vehicles.

Other objects of my invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is a side elevational view of one embodiment of my invention mounted on a large dump truck;

Fig. 2 is a top plan view of the device of Fig. 1;

Fig. 3 is a fragmentary detail view showing the lower bracket support for such device;

Fig. 4 is a fragmentary detail view of the lower bearing support for such device in such bracket;

Fig. 5 is a side elevational view similar to Fig. 1 but showing the platform turned in a vertical plane for traveling;

Fig. 6 is a top plan view similar to Fig. 2 but showing a modified form of my new device adapted to dump a load within the truck body;

Fig. 7 is an elevational view showing my device adapted for use as a crane;

Fig. 8 is an elevational view of the form of my device shown in plan in Fig. 6; and

Fig. 9 is an enlarged fragmentary view of the platform locking means shown more generally in Fig. 8.

Referring now more particularly to such drawing and especially Figs. 1–5 inclusive, there is illustrated one preferred embodiment of my invention mounted upon the body of a large dump truck. While it will be understood that my device is adapted to be mounted upon a

wide variety of vehicles, it is here shown attached to the right front corner of the dump body formed by the intersection of the front wall 1 and side wall 2 of such body. It will be understood that such truck may be provided with the usual hydraulic lifting means for tipping the body to discharge a load from the rear end thereof, such lifting means being operated by a pump 3 driven by the engine of the truck (not shown).

As best shown in Figs. 1 and 5, my device comprises a pantograph arrangement including a vertical column 4 having a bearing 5 at its lower end journalled in bracket 6 mounted at the lower right front corner of the dump body. The upper end of column 4 is provided with a stud pivotally engaged in upper bracket 7 similarly mounted on such body.

Pivotally secured to column 4 for oscillation in the same vertical plane are upper link member 8 and lower link member 9, such links being of equal length. The outer ends of such links are pivotally connected by a vertical link 10 of a length equal to the distance between the points of pivotal attachment of links 8 and 9 on column 4. Such links may all desirably be formed of steel tubing of square cross-section. A tubular member 11 extends horizontally from a braced bracket support 12 mounted at the lower end of link 10. It will therefore be seen that such member 11 will always be maintained in a horizontal position at any degree of elevation.

Means for raising and lowering such member is provided in the form of a fluid operated piston cylinder assembly comprising a cylinder 13 and a piston 14. The outer end of piston 14 is pivotally secured at the point of pivotal connection of link members 8 and 10 and the end of cylinder 13 is pivotally mounted on column 4 adjacent the point of pivotal attachment of link 9 thereon. Such piston cylinder assembly therefore comprises a diagonally disposed extensible link within the parallelogram formed by column 4 and links 8, 9 and 10. While such piston cylinder assembly may be of either the double acting or single acting type, the latter form will ordinarily be satisfactory and a slide valve 15 is mounted on upper link member 8 to control the passage of hydraulic fluid thereto, fluid pressure lines leading from pump 3 to such valve and from the valve to the respective ends of cylinder 13. A valve shifting rod 16 is pivotally attached to hand lever 17 pivotally mounted on link 8. Spring means (not shown) within valve 15 normally holds such valve in neutral position preventing passage of fluid pressure to the lower end of cylinder 13 or escape of fluid therefrom. To elevate the mechanism, lever 17 will be moved to shift rod 16 to connect the lower end of cylinder 13 to pressure. To lower the device, lever 17 will be shifted to connect the lower end of cylinder 13 to exhaust. Hand lines 18 and 19 are attached to a cross member 20 rigidly secured to lever 17 so that the latter may be rocked by remote control, if desired, to operate valve 15.

In the embodiment shown in Figs. 1, 2, and 5, a platform 21 is pivotally mounted on horizontal tubular member 11 at a slight diagonal so that it may be approximately parallel to the side 2 of the truck body when in the position illustrated in Fig. 2. A rigid brace leg 22 is provided pivotally attached to link 10 adjacent the upper end of the latter and adapted to be releasably secured to the outer side of platform 21, thereby holding the latter in a horizontal plane. When it is desired to travel on the road such brace 22 may be disengaged and platform 21 turned until it is in a vertical plane whereupon the entire mechanism will lie close against the side 2 of the truck body and may be secured in such position by means of a chain 23 attached to such side and one corner of the platform.

A modified construction is illustrated in Figs. 6 and 8, the platform being there designed for dumping a load within the body of the truck. A small auxiliary platform 24 sufficiently large to carry an operator standing thereon is hingedly mounted on the outside of bracket member 12. A brace leg 25 corresponding to brace 22 is provided to support such platform 24 in horizontal position. A portion of platform 21 overlies platform 24 and is adapted to rest thereon. To prevent platform 21 from tipping in the other direction on its pivotal supporting member 11, a hook 26 is pivotally mounted on the outer side of platform 21 adapted to engage the under side of platform 24. A spring 27 acts on such hook to normally hold the same in locking engagement with platform 24. A trip cord 28 passing over pulley 29 is operative to disengage hook 26 from platform 24 and thereupon permit platform 21 to be overbalanced to discharge its load into the body of the truck. Platform 21 may then be returned to horizontal position, either manually or by means of a spring 30 attached to platforms 21 and 24. Upon releasing brace leg 25 from platform 24, both platforms may be folded against the side of the truck as above described.

Referring now to Fig. 7 of the drawing, in the modification there illustrated column 4 is shown pivotally supported at its upper and lower ends by a vertical mast 31 firmly mounted on the bed 32 of a truck. Instead of link 10, a corresponding link member 33 is provided having an integral horizontal boom member 34 extending from the upper end thereof. It will be seen that such member 34 will similarly to member 11 always be maintained in a horizontal position irrespective of the height to which it may be elevated by actuation of the piston cylinder assembly. A ring 35 is supported on boom 34 and is adapted to be slid therealong toward and away from member 33. An upstanding lug 36 serves to prevent such ring from accidentally escaping from the end of the boom. A hook 37 may be suspended from such ring by means of a cable 38.

The foregoing description and annexed drawings serve to illustrate various modifications of the basic principles of my invention. Since column 4 is enabled to pivot about its vertical axis, platform 21 may be extended laterally of the vehicle either at ground level or at an elevation high above the body of such vehicle. There is usually no necessity for driving the vehicle into an exactly predetermined position for loading. A single operator may ride with the load or one operator may place the boxes, etc. on the platform at ground level and control the action of the lift by means of lines 18 and 19 while a second worker in the body of the truck removes and stacks the goods.

Due to the mounting of member 11 and boom 34 at right angles to link members 10 and 33 respectively, they will always be maintained level irrespective of the height to which the fluid pressure actuated pantograph mechanism may elevate the same. This not only makes the use of platform 21 and sliding ring 35 feasible but also provides a very rigid structure capable of carry-

ing heavy loads. A brace leg of the type commonly employed to rest on the ground and support the body of the vehicle on the side toward the load may also be provided if desired.

Brackets 6 and 7 supporting column 4 extend sufficiently from the side of the vehicle to permit platform 21 to be swung partially over the side 2 of the body (Fig. 6) to facilitate the discharge of a load into such body. It will, of course, be appreciated that instead of a flat platform 21 various types of containers, buckets, and the like may be substituted to handle an appropriate load. When the platform is turned flat against the side of the body, the entire device will project very slightly, if at all, beyond the side of the driver's cab.

Lanyard 28 not only serves to disengage hook 25 but a continued pull thereon will tip platform 21 to discharge the latter's contents into the body of the vehicle. If the center of gravity of the load is toward the inner side of the platform it will, of course, tip automatically when hook 26 is thus disengaged.

In the Fig. 7 form the lower pivot for column 4 is above the level of the bed of the truck so that lower link 9 may readily clear the bed when swung thereover. The position of mast 31 and column 4 may either be central of the width of the bed for loading from either side or adjacent one side of the bed for loading from that side only. This form of device is very convenient for loading plows and other farm implements which are ordinarily very awkward and even dangerous to handle.

Due to the structural conformation of the mechanism which imparts a maximum of strength and rigidity thereto, the component members may be of relatively lightweight tubing and the like to avoid excessive reduction of pay load of the vehicle on which it may be mounted. The cost of manufacture is also very low for this reason and as a result of the simple construction which facilitates rapid assembly from stock While shown mounted on a truck body, it is readily apparent that the device is adapted to be mounted upon a great variety of vehicles.

The fluid pressure means for operating the piston-cylinder assembly may be either hydraulic or pneumatic but the former is preferred. It will be apparent that such piston-cylinder assembly, which serves as a diagonal cross brace as well as the lifting means, could alternatively be disposed on the other diagonal of the parallelogram formed by the link members. Fluid pressure would then require to be employed to retract the piston, rather than extend the same, to elevate a load.

Instead of the type of platform shown, a pallet lift fork or the like may be provided.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. Lifting mechanism comprising a vertical column pivotally mounted for rotation about its vertical axis, spaced parallel link members of equal length pivotally secured to said column for movement in the same vertical plane, a third link pivotally connecting the outer ends of said spaced link members, said third link being of a length equal to the distance between the points of pivotal attachment of said spaced link members to said column, whereby said links and column define a parallelogram, a piston-cylinder assembly pivotally mounted substantially diagonally on said parallelogram structure, fluid pressure means operative to move such piston to elevate said third link relative to said column, a load-supporting platform carried by the lower end portion of said third link for pivotal movement about a horizontal axis lying in the same plane as said links, means adapted releasably to secure said platform in horizontal position, an auxiliary platform carried by said third link and adapted to support an operator, and means carried by said mechanism within reach of an operator riding on said auxiliary platform for regulating said fluid pressure means and for releasing and tipping said load-supporting platform.

2. Lifting mechanism comprising a vertical column pivotally mounted for rotation about its vertical axis, spaced parallel link members of equal length pivotally secured to said column for movement in the same vertical plane, a third link pivotally connecting the outer ends of said spaced link members, said third link being of a length equal to the distance between the points of pivotal attachment of said spaced link members to said column, whereby said links and column define a parallelogram, a piston-cylinder assembly pivotally mounted substantially diagonally on said parallelogram structure, fluid pressure means operative to move such piston to elevate said third link relative to said column, a platform mounted on said third link for pivotal movement about a horizontal axis lying in the same plane as said links, means adapted releasably to secure said platform in horizontal position and in a position turned into a vertical plane substantially that of said parallelogram structure, and hand-controlled regulatory means for said fluid pressure means carried by said mechanism within reach of an operator riding on said platform.

3. Lifting mechanism comprising a vertical column pivotally mounted for rotation about its vertical axis, spaced parallel link members of equal length pivotally secured to said column for movement in the same vertical plane, a third link pivotally connecting the outer ends of said spaced link members, said third link being of a length equal to the distance between the points of pivotal attachment of said spaced link members to said column, whereby said links and column define a parallelogram, an extensible brace member pivotally mounted substantially diagonally on such parallelogram structure, fluid pressure means operative to vary the length of said brace member to elevate said third link, a platform mounted on said third link for pivotal movement about a horizontal axis lying in the same plane as said links, and means adapted releasably to secure said platform in horizontal position and in a position turned into a vertical plane substantially that of said parallelogram structure.

4. Lifting mechanism comprising a pantograph structure disposed in a vertical plane, one side member of said structure being adapted to be pivotally mounted in a vertical position to serve as a supporting column, an extensible brace member pivotally mounted substantially diagonally on said structure, fluid pressure means operative to vary the length of said brace member to elevate the vertical pantograph member parallel and opposite to said column, and a horizontal, load-supporting platform mounted on such vertical elevatable member and adapted to turn into a vertical plane substantially that of said pantograph structure.

5. Lifting mechanism comprising a pantograph structure disposed in a vertical plane, one side member of said structure being adapted to be mounted in a vertical position to serve as a supporting column, an extensible brace member pivotally mounted substantially diagonally on said structure, means operative to vary the length of said brace member to elevate the vertical pantograph member parallel and opposite to said column, and a horizontal, load-supporting platform mounted on such vertical elevatable member and adapted to turn into a vertical plane substantially that of said pantograph structure.

6. Lifting means comprising a single pantograph structure mounted on the side of a vehicle in a vertical plane generally parallel to and closely adjacent such side, said structure including a pair of spaced parallel pivotally mounted links of equal length, and a vertical member pivotally connecting said links and maintained thereby in a vertical position in all positions of said links, means operative to raise and lower said member, a pivotally mounted load supporting platform carried by said member, and means adapted selectively to secure said platform in horizontal load supporting position and in a position turned into a vertical plane substantially that of said pantograph structure.

7. Lifting means comprising a single pantograph structure mounted on the side of a vehicle in a vertical plane generally parallel to and closely adjacent such side, said structure including a pair of spaced parallel links of equal length mounted on such vehicle for pivotal movement about horizontal axes, and a vertical member pivotally connecting said links and maintained thereby in such vertical position in all positions of said links, means operative to raise and lower said member, and a horizontal load-supporting platform rigidly secured to said vertical member, said pantograph structure being mounted for swinging movement as a unit about a vertical axis.

8. In combination with a vehicle having a load-carrying body, load-lifting mechanism mounted thereon comprising a vertical column pivotally mounted adjacent a corner of such body for rotation about its vertical axis, two vertically spaced parallel links of equal length pivotally secured to said column for movement in the same vertical plane, a vertical link member pivotally connecting said first-named links and being of a length equal to the distance between the points of pivotal attachment of said links to said column, a horizontal support member secured to said vertical link member and extending in the plane of said links, a platform supported generally centrally by said support member for pivotal movement about an axis lying in the same plane as said links, means adapted releasably to secure said platform selectively in horizontal position and turned in a vertical plane substantially that of said links, a piston cylinder assembly pivotally mounted substantially diagonally on the parallelogram structure formed by said links, and fluid pressure means operative to move such piston to elevate said vertical link member and platform carried thereby.

9. In combination with a vehicle having a load-carrying body, load-lifting mechanism mounted thereon comprising a vertical column pivotally mounted adjacent a side of such body for rotation about its vertical axis, two vertically spaced parallel links of equal length pivotally secured to said column for movement in the same vertical plane, a vertical link member pivotally connecting said first-named links and being of a length equal to the distance between the points of pivotal attachment of said links to said column, a horizontal support member secured to said vertical link member adjacent the lower end thereof and extending in the plane of said links, a platform supported generally centrally by said support member for pivotal movement about a horizontal axis lying in the same plane as said links, means adapted releasably to secure said platform selectively in horizontal position and turned in a vertical plane substantially that of said links, and power means operative to raise and lower the parallelogram structure and platform carried thereby.

10. In combination with a vehicle having a load-carrying body, load lifting mechanism mounted thereon comprising a pantograph structure mounted adjacent a side of such body for swinging movement about a vertical axis, said structure including a pair of spaced parallel links of equal length pivotally mounted for vertical swinging movement, a vertical link member pivotally connecting said parallel links and maintained thereby in vertical position in all positions of the latter, a horizontal support member secured to said vertical link member and extending in the plane of said links, a platform supported generally centrally by said support member for pivotal movement about a horizontal axis lying in the same plane as said links, means adapted releasably to secure said platform selectively in horizontal position and turned in a vertical plane substantially that of said links, and power means operative to raise and lower the parallelogram structure and platform carried thereby, said support member extending obliquely relative to the side of said platform adjacent such body and diverging from such side of said platform in a direction away from such point of mounting of said pantograph structure whereby said platform is permitted to lie closely adjacent to such body when in horizontal position.

11. In combination with a vehicle having a load-carrying body, load-lifting mechanism mounted thereon comprising a pantograph structure mounted adjacent a side of such body for swinging movement about a vertical axis, said structure including a pair of spaced parallel links of equal length pivotally mounted for vertical swinging movement, a vertical link member pivotally connecting said parallel links and maintained thereby in vertical position in all positions of the latter, a horizontal support member secured to said vertical link member and extending in the plane of said links, a rectangular platform supported generally centrally by said support member for pivotal movement about a horizontal axis lying in the same plane as said links, means adapted releasably to secure said platform selectively in horizontal position and turned in a vertical plane substantially that of said links, and power means operative to raise and lower said pantograph structure and platform carried thereby, said support member extending somewhat diagonally of said platform and diverging from the side of the latter adjacent such body in a direction away from such point of mounting of said pantograph structure whereby said platform is permitted to lie closely adjacent to such body when in horizontal position.

12. In combination with a vehicle having a load-carrying body with vertical sides, load-lift-

ing mechanism mounted thereon comprising a vertical column pivotally mounted adjacent a side of such body for rotation about its vertical axis, two vertically spaced parallel links of equal length pivotally secured to said column for movement in the same vertical plane, a vertical link member pivotally connecting said first-named links and being of a length equal to the distance between the points of pivotal attachment of said links to said column, a horizontal support member secured to said vertical link adjacent the lower end thereof and extending in the plane of said links, a platform supported generally centrally by said support member for pivotal movement thereabout, said support member lying closely parallel to the plane of said platform and extending obliquely relative to the side of the latter adjacent such side of such body and diverging from such side of said platform in a direction away from said column, whereby said platform is permitted to lie closely adjacent to such side of such body when in horizontal position, means adapted releasably to secure said platform selectively in horizontal position and turned in a vertical plane substantially that of said links, and means operative to raise and lower said pantograph structure and platform carried thereby.

13. Lifting means comprising a single pantograph structure mounted on the side of a vehicle for swinging movement about a vertical axis, said structure including a pair of spaced parallel pivotally mounted links of equal length, and a vertical member pivotally connecting said links and maintained thereby in a vertical position in all positions of said links, means operative to raise and lower said member, a horizontal support member secured to said vertical member and extending in the plane of said pantograph structure, a platform supported generally centrally by said support member for pivotal movement thereabout, said support member lying closely parallel to the plane of said platform and extending obliquely relative to the side thereof adjacent such vehicle and diverging therefrom in a direction away from such point of mounting of said pantograph structure on the side of said vehicle, and means adapted selectively to secure said platform in horizontal position and in a position turned into a vertical plane substantially that of said pantograph structure.

14. Lifting means for use in the side loading of a vehicle comprising a lifting structure mounted in a vertical plane on a side of such vehicle, means operative to raise and lower such structure, support means carried by the lifting structure and maintained thereby in a horizontal plane at all times during the raising and lowering of such structure, a work supporting platform pivotally mounted on said support means, and means selectively operative to secure said platform in horizontal load supporting position and in a vertical plane adjacent the side of such vehicle whereby the platform may be held flat against the vehicle side when not in use.

15. Lifting means for use in the side loading of a vehicle comprising a lifting structure disposed in a vertical plane generally parallel to and closely adjacent a side of such vehicle, mounting means pivotally securing such structure to such vehicle to permit outward swinging movement thereof relative to the vehicle, means in the same vertical plane as the lifting structure operative to raise and lower such structure, a support element extending from one side of the lifting structure and maintained thereby in a horizontal plane at all times during raising and lowering of such structure, a work supporting platform tiltably mounted on said support element, and means adapted selectively to secure such platform in horizontal load supporting position and in a vertical plane substantially that of said lifting structure whereby the platform may be disposed flat against the side of the vehicle when not in use.

16. Lifting means for use in the side loading of a vehicle comprising a lifting structure disposed in a vertical plane generally parallel to and closely adjacent a side of such vehicle, mounting means pivotally securing such structure to such vehicle to permit outward swinging movement thereof relative to the vehicle, fluid pressure means in the same vertical plane as the lifting structure operative to raise and lower such structure, a support element extending from one side of the lifting structure and maintained thereby in a horizontal plane at all times during raising and lowering of such structure, a work supporting platform tiltably mounted on said support element, and means adapted selectively to secure such platform in horizontal load supporting position and in a vertical plane substantially that of said lifting structure whereby the platform may be disposed flat against the side of the vehicle when not in use.

17. Lifting means for use in the side loading of a vehicle comprising a lifting structure disposed in a vertical plane generally parallel to and closely adjacent a side of such vehicle, means pivotally securing such structure to the vehicle on a vertical axis adjacent a front corner of the load carrying body thereof, fluid pressure means in the same vertical plane as the lifting structure operative to raise and lower such structure, a support element extending from one side of the lifting structure and maintained thereby in a horizontal plane at all times during raising and lowering of such structure, a work supporting platform tiltably mounted on said support element, and means adapted selectively to secure such platform in horizontal load supporting position and in a vertical plane substantially that of said lifting structure whereby the platform may be disposed flat against the side of the vehicle when not in use.

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