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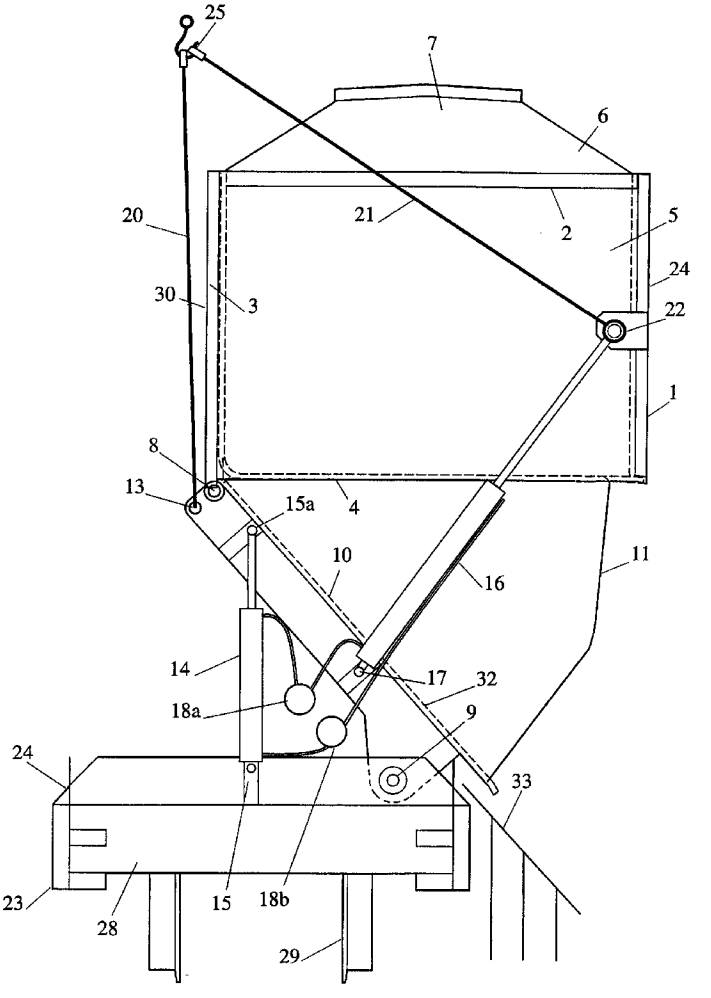
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(72) OSTERMEYER, Bernd, AU
(71) UNITED OSTERMEYER ENGINEERING PTY. LTD., AU

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(54) **VEHICULE PERFECTIONNE POUR TRANSPORTER DES PRODUITS EN VRAC**

(54) **IMPROVED BULK MATERIAL HANDLING VEHICLE**



(57) L'invention concerne un véhicule comprenant un châssis (28), porté par une pluralité de roues (29) pour le rendre mobile, un corps (30) pour porter une charge, supporté par le châssis (28) pour pouvoir se déplacer dans un sens vertical et dans un sens latéral, par rapport

(57) A vehicle comprising a chassis (28) supported on a plurality of wheels (29) to render it mobile, a load carrying body (30) supported on the chassis (28) for movement in a vertical direction and a lateral direction relative to the chassis (28), the body (30) having a

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au châssis (28). Le corps (30) a un passage d'évacuation pouvant s'ouvrir sélectivement pour décharger les produits par le fond du corps (30), latéralement vers un côté du châssis (28). Une structure de plancher (10) forme la majeure partie du fond du corps (30) et est montée pour pouvoir effectuer un mouvement de pivotement par rapport au restant du corps (30) depuis une position de fermeture du fond du corps jusqu'à une position inclinée vers le bas (23), depuis un côté du corps vers le côté opposé. Le plancher (10) forme ainsi une goulotte pour diriger le matériau par gravité depuis le corps (30) en descendant, sur un côté du véhicule. Une grue (25) peut être utilisée pour soulever le corps (30). Des ailes (11) peuvent être utilisées pour empêcher les pertes quand on évacue la charge du corps (30).

selectively openable discharge passage arranged to discharge material from the bottom of the body (30) laterally to one side of the chassis (28). A floor structure (10) forms the major portion of the bottom of the body (30), and is mounted for pivotal movement relative to the remainder of the body (30), from a position closing the bottom of the body to a position (32) downwardly inclined from one side of the body toward the opposite side. The floor (10) thereby forming a shute to direct material to gravity flow from the body (30) down the shute to be discharged to one side of the vehicle. A crane (25) may be used to raise the body (30). Wings (11) may be used to prevent spillage when discharging the load from the body (30).

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(71) Applicant *(for all designated States except US)*: UNITED OSTERMEYER ENGINEERING PTY. LTD. [AU/AU]; Lot 1802, Hardy Road, Berrimah, N.T. 0828 (AU).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: OSTERMEYER, Bernd [AU/AU]; Lot 1802, Hardy Road, Berrimah, N.T. 0828 (AU).

(74) Agent: WATERMARK; Durack Centre, 4th floor, 263 Adelaide Terrace, Perth, W.A. 6000 (AU).

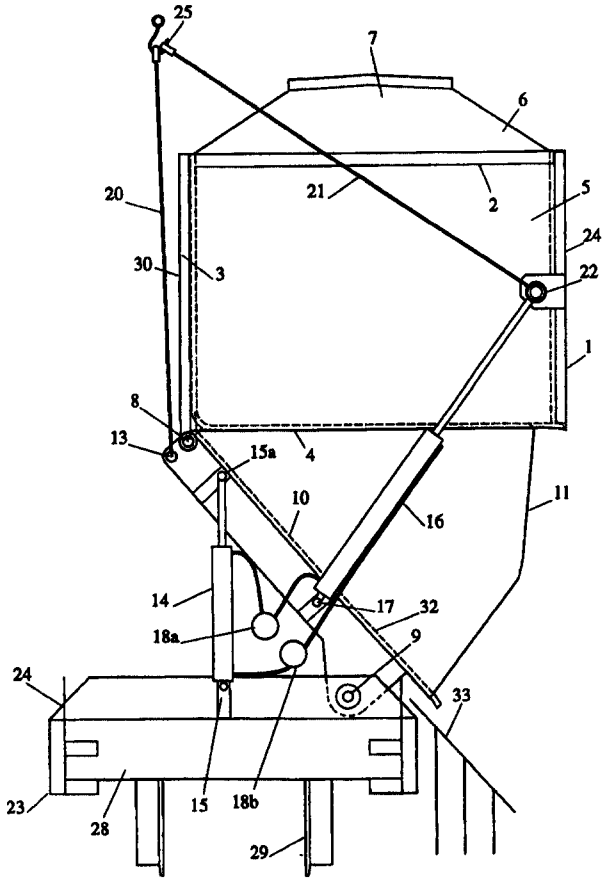
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(54) Title: IMPROVED BULK MATERIAL HANDLING VEHICLE

(57) Abstract

A vehicle comprising a chassis (28) supported on a plurality of wheels (29) to render it mobile, a load carrying body (30) supported on the chassis (28) for movement in a vertical direction and a lateral direction relative to the chassis (28), the body (30) having a selectively openable discharge passage arranged to discharge material from the bottom of the body (30) laterally to one side of the chassis (28). A floor structure (10) forms the major portion of the bottom of the body (30), and is mounted for pivotal movement relative to the remainder of the body (30), from a position closing the bottom of the body to a position (32) downwardly inclined from one side of the body toward the opposite side. The floor (10) thereby forming a shute to direct material to gravity flow from the body (30) down the shute to be discharged to one side of the vehicle. A crane (25) may be used to raise the body (30). Wings (11) may be used to prevent spillage when discharging the load from the body (30).



IMPROVED BULK MATERIAL HANDLING VEHICLE.

This invention relates to a vehicle for use in carrying bulk material such as coal, mineral ores, grain and like particulate materials in road or rail or other transport vehicles.

A wide range of constructions have been proposed and used in relation to vehicles for transporting bulk materials, such as those referred to about, and there is generally a conception that one of the principal requirements of such a vehicle, is the ability to be able to discharge the load in a manner which will enable the vehicle to remain substantially stable and yet will permit a rapid gravity induced discharge of the material from the vehicle. The problem of stability of the vehicle is of particular concern in relation to vehicles which run on a fixed track, commonly referred to as rail vehicles, as the width of the track is normally considerably less than that of the vehicle body of a conventional road vehicle. At the same time it is common for the rail vehicle to have a somewhat greater carrying capacity than the road vehicle, that is when considered on a single unit basis.

In known bulk material transport vehicles it is common to provide a material carrying body supported upon wheeled chassis for angular movement upon a fixed axis to an upwardly inclined discharge position. The axis about which the body tips is usually along one side of the chassis and hence a relatively high angle of tilt of the body is required to fully discharge the contents of the body. Also as discharge is normally affected over the upper edge of the body, a high angle of tilt of the body is required to commence discharge of the contents of the body. An even greater angle of tilt is required to achieve total discharge of all of the body content.

Examples of vehicles having a construction of the above described general type are described in the following prior published patent specification.

The most relevant material found was:

US 3799612	MORRISON ET AL
US 3687321	GOLDHART
US 5006039	NIEDERER
AU 66404/94	VINOCUROFF

Another common problem with the known constructions is the instability of the vehicle during discharge, and the consequential limit on the carrying capacity thereof. Also a problem arises from the fact that the dumped material is located close to the side of the vehicle and interferes with the passage of the vehicle into and out of the dump locations

It is therefore the object of the present invention to provide a load carrying vehicle of a construction which will enable rapid discharge of the vehicle load whilst maintaining substantial vehicle stability.

With this object in view, there is provided a vehicle comprising a chassis supported on a plurality of wheels to render it mobile, a load carrying body supported on the chassis, said body being operatively mounted on the chassis to be selectively movable relative thereto upwardly and laterally to a discharge position where the load can be discharged to the side of the chassis from the bottom of the body.

More specifically there is provided a vehicle comprising a chassis supported on a plurality of wheels to render it mobile, a load carrying body supported on the chassis for movement relative thereto in a vertical direction and a lateral direction relative to the chassis, said body including a selectively openable discharge passage arranged to discharge material from the bottom of the body laterally to one side of the chassis when the body is raised and laterally displaced.

Preferably the body has a floor structure forming the major portion of the bottom of the body, said floor structure being mounted for pivotal movement relative to the remainder of the body from a position closing the bottom of the body to a position downwardly inclined from one side of the body toward the opposite side to form in that position a shute to direct material to gravity flow from the body down the shute to be discharged to one side of the vehicle.

Conveniently, the body retains a substantially upright relation to the chassis as it is raised and moves laterally with respect to the chassis as it is raised to the discharge position. Preferably, the body incorporates a base or floor forming the bottom of the body, and is arranged to move relatively to the body, as the body is raised and moved laterally so as the base forms a

downwardly inclined shute extending from the body to the one side of the chassis, to occupy a discharge position. Conveniently, the base of the body is hingedly connected to the remainder of the body, along an axis parallel to the longitudinal edge of the body remote from the side of the chassis over which the contents of the body are discharged.

Preferably, the body has, along each of the respective lateral ends, a downwardly open pocket, and the corresponding lateral edges of the base have a respective wing that is located in the pocket when the base is in the position to close the bottom of the body in the normal transport position. Also, as the body is being raised and moved laterally to the discharge position, as previously described, the base pivots downwardly and the wings are drawn outwardly from the pockets to form extensions of the respective end walls of the body. This ensures that the contents of the body, during discharge, all move down along the inclined base of the body to be discharged from the side of the vehicle, and do not spill over the lateral edges of the base when downwardly inclined.

Conveniently, the wings may be made of an elastomeric material, such as a natural or synthetic rubber, that will resiliently stretch to form the wing as the base of the body is lowered to the downwardly inclined discharge position, and will resile as the body is returned to the horizontal normal transport position.

The combined effect of raising and laterally displacing the body, from its normal transport position on the chassis, to the discharge position, and the movement of the base to the downwardly inclined disposition as the body is raised, results in the ability to achieve a rapid and total discharge of the contents of the body whilst maintaining stability of the vehicle. Because the body is raised as well as laterally displaced, results in the base, when in the discharge position, having a substantial inclination to the horizontal, the contents of the body will be rapidly gravity discharged, and there will be a minimum or no material left in the body. In addition as the body and the base thereof are returned to the normal transport position on the vehicle, the lower end of the base is laterally withdrawn from the pile of material created by discharge from the body, thus further ensuring complete depositing of the full contents of the body.

Further as the material is discharged through the bottom of the body across the full cross-section of the body thereby achieving a very rapid dumping of the contents. Also the lateral displacement of the body results in the contents being deposited outwardly of the path of the vehicle wheels to not interfere with the passage of the vehicle wheels during entry and exit of the vehicle.

The invention will be more readily understood from the following description of one practical arrangement of the vehicle as illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side view of a rail vehicle incorporating the present invention;

Figure 2 is an end view of the vehicle as seen in Figure 1 with the body in the lowered transport position;

Figure 3 is a view similar to Figure 2, but wherein the body is raised to the discharge position.

Referring firstly to Figure 1 of the drawings, there is shown a side view of a rail truck incorporating the present invention and comprising a chassis 28 supported at the respective end by bogy wheel assemblies 29 and supporting a body 30, of generally rectangular cross section, suitable for carrying bulk particulate materials.

As can be seen in Figure 1, the body 30 is of a generally rectangular cross section with the top closed by a canopy 6 having a central longitudinal opening closed by a hinged door 7. Load of the vehicle is through the opening when the door 7 is open. The body 30 may be of a metal construction, such as steel or a suitable grade aluminium, the walls being either of a solid construction or a frame work with a liner of flexible material such as rubber or like synthetic material such as polyurethane.

The floor 10 of the body 30 is of a separate rigid construction and is pivotally connected to the one sidewall 3 of the body 30 to be pivotally movable from a closure position spanning the bottom of the body 30, as shown in Figure 2, to a downwardly inclined discharge position, as shown in Figure 3, forming a shute for the discharge of the contents of the body 30 to the right of the chassis

28 as shown in Figure 3. The floor 10 is pivotally connected about a fixed axis 9 to the vehicle chassis 28 to permit the floor 10 to pivot thereabout to form a downwardly directed shute as seen in Figure 3.

In order to effect the pivotal movement of the floor 10, the opposite end 5 of the floor 10 pivotably connected to the body 30 at 8 and is connectable at 13 to a first cable 20 of a crane (not shown). The crane is also connected by the second cable 21 to the opposite wall of the body 30 as indicated at 22.

A suitable crane (not shown) is connected to the container cables 20 and 21 at the common point 25 whilst the container is in the position as shown in Figure 2. Upon the crane raising, the cables cause the body 30 to be raised and thereby permit the floor 10 to pivot about back of the axes 8 and 9 and the upper end is displaced progressively towards the right as seen in Figure 3 until the fully raised position has been reached, as seen in Figure 3. At the same time the body 30 is displaced a significant distance to the right, and the floor 10 of the body 30 has pivoted downwardly and displaced outwardly to the position as indicated at 32 in Figure 3.

As can be seen in Figure 3, when the container is in the raised position, and the floor thereof downwardly inclined, there is a substantial area available for the flow of the contents down the inclined face of the floor 10 to be discharged from the lower end thereof, at a location laterally spaced from the wheels of the vehicle, or as indicated in Figure 3, may be discharged into a stationary bin, or alternatively onto a form of conveyor.

In order to avoid spilling of the material over the opposite edges of the floor when the floor is inclined, there is provided at each end of the body a wing 11, attached along the lower edge to the floor 10. The upper end of the wing, when the wing is in the lower most position of the floor, is located a short distance above the lower extremity of the body 30. The wings 11 prevents the material being discharged from passing spilling over the opposite edges of the container floor, and ensures that all of the contents are delivered over the lower end of the inclined floor.

The wing as shown are of a rigid construction such as sheet metal, attached to the floor, and a pocket is provided in the end wall of the container

body, into which the wing retracts when the container is in the lowered transport position. This pocket is of a rigid closed construction so that when the container is filled with the material being handled, such material will not enter the pocket and potentially interfere with the effective withdrawal and retraction of the rigid wing 11. When a wing of elastomeric material is used a pocket may also to provided to protect same as just described.

Alternatively, the wings may be made of a suitable elastomeric material such as high quality rubber or polyurethane which is anchored both to the end wall of the container and to the floor of the container, so that when the container and floor are in the normal mobile position, as shown in Figure 2, the rubber constituting the wing is in a low degree of tension. Thus, as the container is raised by the crane and the floor adopts the downwardly inclined disposition, the rubber material of the wing is stretched so that the wing performs the above discussed function when the floor of the container is in its maximum downwardly inclined position.

As seen in Figures 2 and 3, two hydraulic cylinders 14 and 16 are provided, cylinder 14 being pivotally connected at 15 to the vehicle chassis and at the upper end 15a to the floor 10 of body. The cylinder 16 is similarly pivotally connected to the bracket 22 on the side 24 of the body 30 which is also the anchorage point of the cable 21, and at the lower end to the container floor at 17. The two cylinders are interconnected by hydraulic lines 14a and 16a so that a closed circuit is formed between the two hydraulic cylinders whereby each remains full of pressurised fluid at all times, with the fluid transferring therebetween.

During the raising and the lowering of the container, by the use of a crane and the cables 20 and 21, the displacement of fluid from one end of each cylinder results in the delivery of fluid to the opposite end of the other cylinder thereby assisting in the lifting action and in maintaining the container in a stable upright position. Further the cylinder 16 prevent the opposite side wall 30 deflecting inwardly under the effects of the tension in the cable 21. The fluid flow between the cylinders 14 and 16 is reversed as the container is lowered by the crane to the closed position as shown in Figure 2.

The hydraulic lines interconnecting the cylinders 14 and 16 may each have a control valve 18a and 18b which may be selectively closed to lock the container in a selected position. It is desirable to close said valves where the container is fully lowered so that the container is locked in position during travelling.

The lifting of the container may be effected by other mechanisms as a substitute for the crane, one being to connect the hydraulic cylinder 14 and 16 to a suitable fluid pressure source, such as a pump. In such an arrangement the fluid would be delivered directly and independently to each of the cylinders. Also a mechanical mechanism may be used to effect the raising and lowering of the container.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A vehicle comprising a chassis supported on a plurality of wheels to render it mobile, a load carrying body supported on the chassis in an upright disposition, said body being operatively mounted on the chassis to be selectively movable relative thereto upwardly and laterally while maintaining said upright disposition to a discharge position where the load can be discharged to the side of the chassis from the bottom of the body.

2. A vehicle comprising a chassis supported on a plurality of wheels to render it mobile, a load carrying body supported on the chassis, said body being operatively mounted on the chassis to be selectively movable upwardly and laterally relative thereto to a discharge position while in an upright disposition where the load carried by the body can be discharged from the bottom of the body to the side of the chassis.

3. A vehicle comprising a chassis supported on a plurality of wheels to render it mobile, a load carrying body supported on the chassis for movement relative thereto in a vertical direction and a lateral direction relative to the chassis while in an upright disposition, said body including a selectively openable discharge passage arranged to discharge material from the bottom of the body laterally to one side of the chassis when the body is raised and laterally displaced.

4. A vehicle as claimed in claim 1, 2 or 3 wherein the body has a floor structure forming the major portion of the bottom of the body, said floor structure being mounted for pivotal movement relative to the remainder of the body from a position closing the bottom of the body to a position downwardly inclined from one side of the body toward the opposite side to form in that position a shute to direct material to gravity flow from the body down the shute to be discharged to one side of the vehicle.

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5. A vehicle as claimed in claim 4 wherein the body is arranged to be selectively raised relative to the chassis while maintaining the upright disposition and permit the floor structure to move to the position to form said shute.

~~maintaining an upright position and permit the floor structure to move to the position to form said shute~~.

6. A vehicle as claimed in claim 5 wherein the body is supported so that the body including the floor structure are displaced together to said one side of the chassis in unison as the body is raised.

7. A vehicle as claimed in claims 4, 5 or 6 wherein control means operably interconnect the chassis, body and floor structure so that in response to raising of the body relative to the chassis from a transport position the body is laterally displaced relative to the chassis and the floor structure is moved from the closed position to said downwardly inclined disposition, and are returned to the transport position on lowering of the body.

8. A vehicle as claimed in claim 7 wherein the floor structure is pivotally connected along one edge to the body for movement relative thereto about an axis extending longitudinally of the vehicle and along or adjacent to the opposite longitudinal edge to the vehicle chassis, whereby as the body is raised the body separates from said opposite longitudinal edge of the floor structure to permit discharge of material from the body.

9. A vehicle as claimed in claim 8 wherein said pivotal movements are created by lifting the body substantially vertically by means external of the vehicle.

10. A vehicle as claimed in claim 9 wherein the body is adapted for attachment to a crane whereby the body can be raised and lowered by operation of the crane.

11. A vehicle as claimed in any one of claims 7 to 9 wherein guide wings are attached to the opposite sides of the floor to move therewith as the floor is lowered and raised, said guide wings forming an extension of the adjacent wall

of the body to guide material down the inclined floor.

12. A vehicle as claimed in claim 11 wherein the guide wings are arranged to retract into respective pockets formed in the body when the floor is in the raised position.

13. A vehicle as claimed in claim 12 wherein the pockets are isolated from the interior of the body.

14. A vehicle as claimed in claim 11, 12 or 13 wherein the wings are made of a resilient material and are arranged to be stretched to accommodate at least part of the movement of the floor to the lowered position.

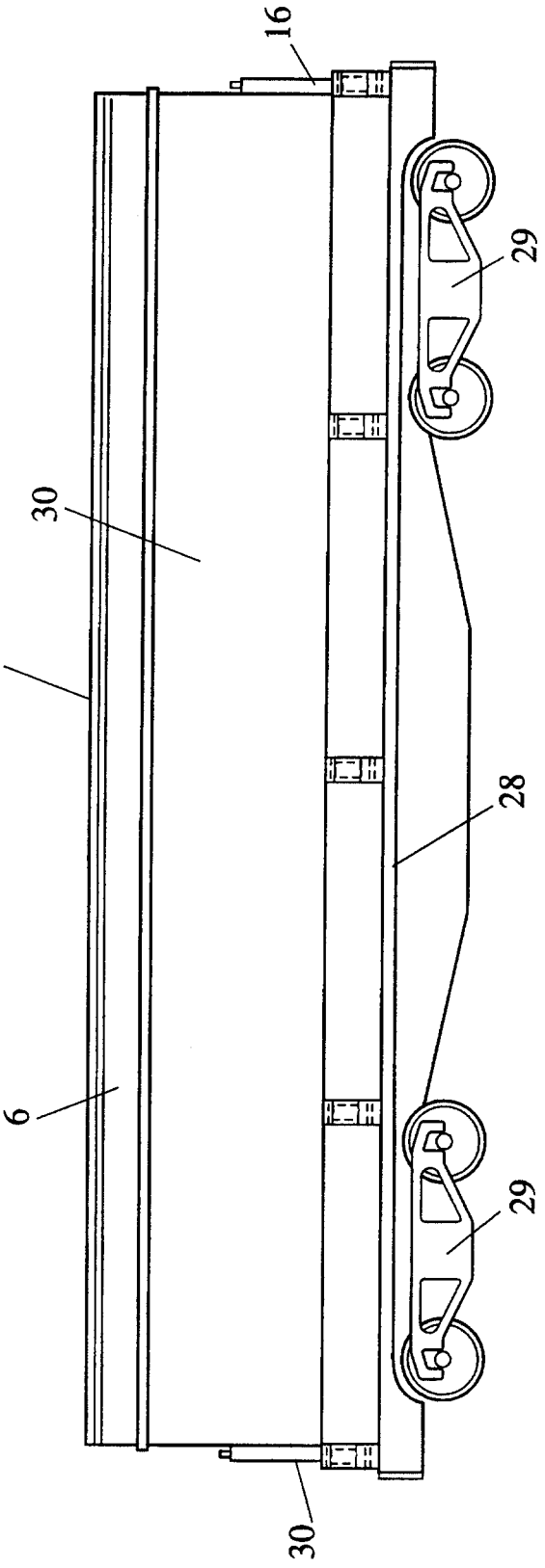


Fig 1.

Fig 2.

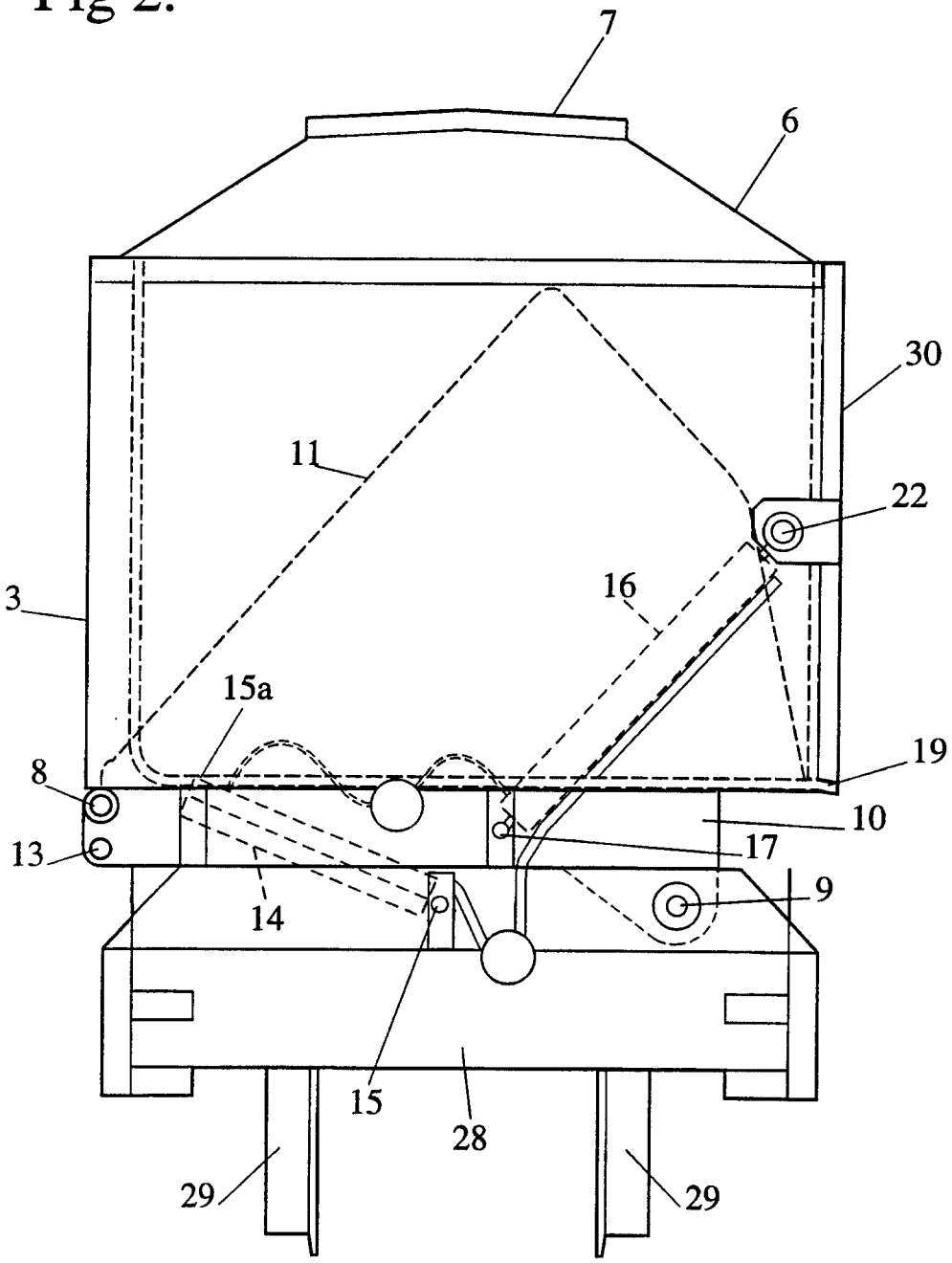
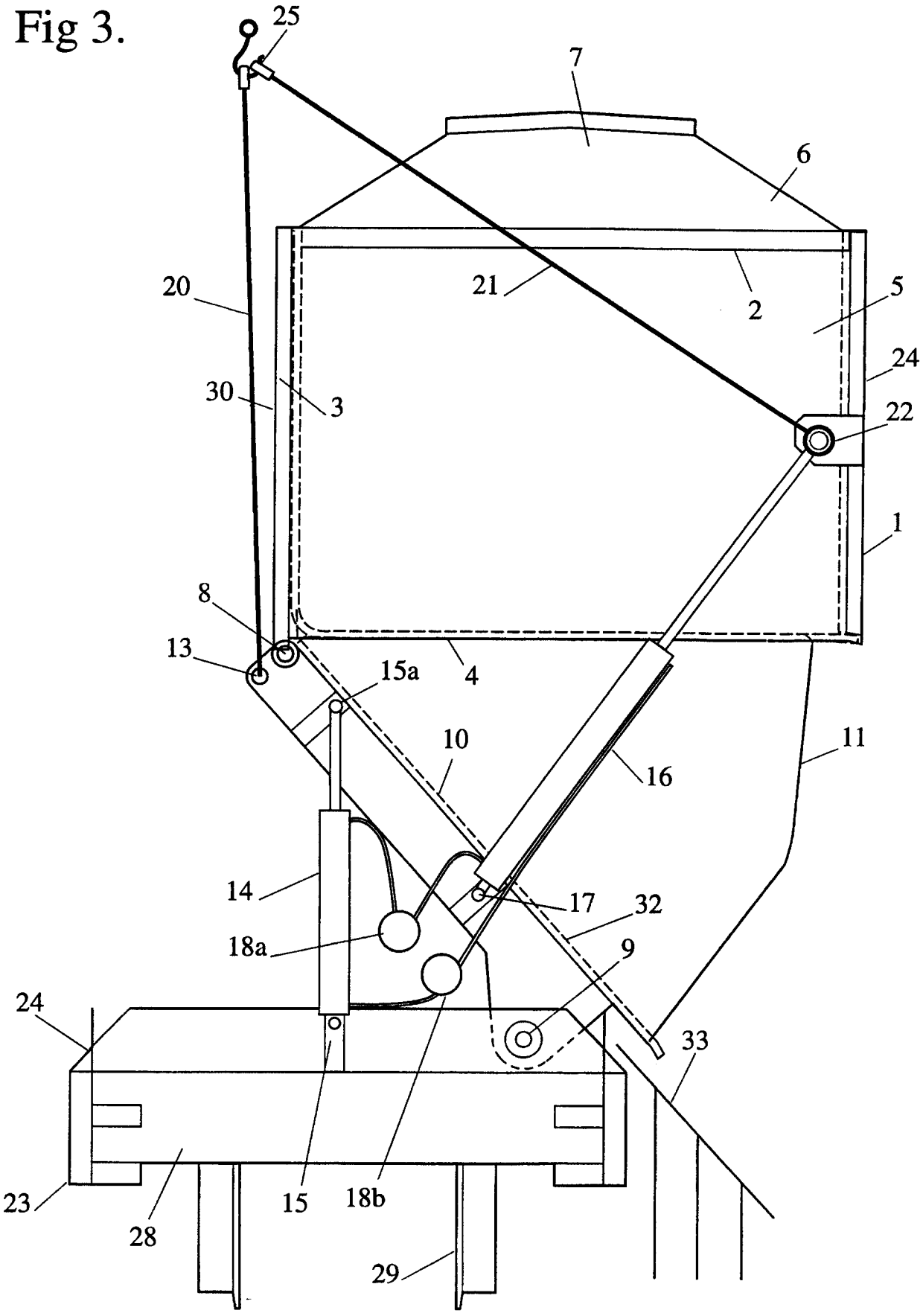
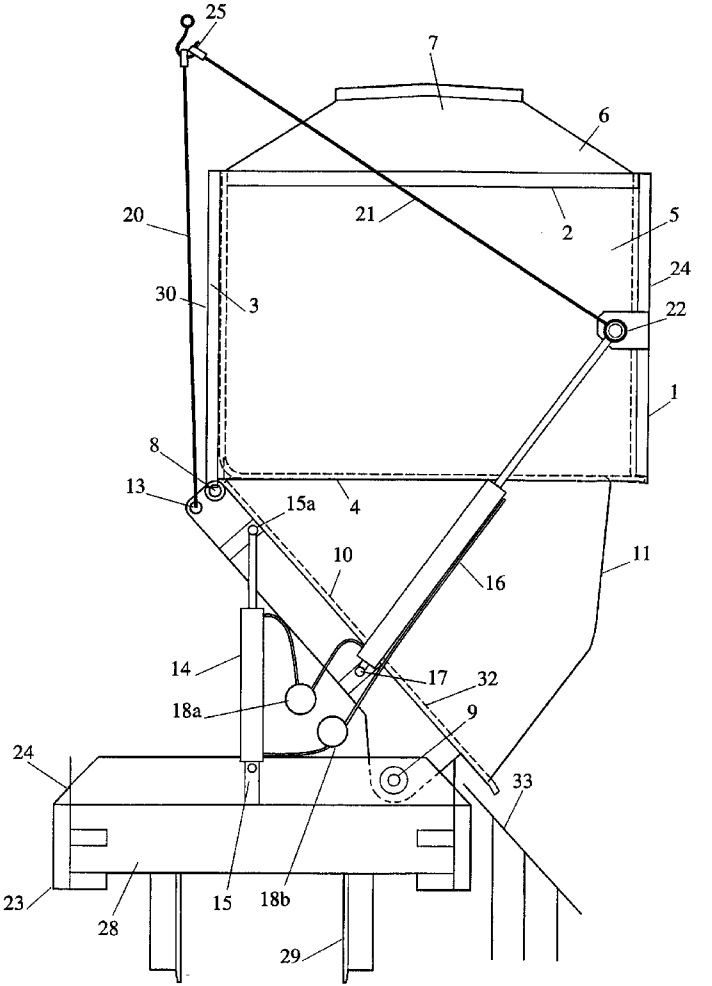


Fig 3.


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15a
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18a
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15
18b
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15a
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18a
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18b
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