



PATENT SPECIFICATION

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A Trailer

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Introduction

5 This invention relates to a trailer and in particular to a live bottom and side trailer.

Background of the Invention

Live bottom trailers are used to transport a range of loose materials ranging from
10 construction or aggregate materials such as sand and gravel to agricultural crops
such as potatoes, apples and the like. In general, live bottom trailers employ a slat
or flap assembly or a continuous conveyor belt along the floor or bed of the trailer to
convey material from the trailer. Live bottom trailers also include walking floor type
trailers.

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A primary advantage of live bottom trailers when used for agricultural crops is that
live bottom trailers do not require tipping to remove crops from the trailer so that crop
damage is reduced. Nevertheless, damage to agricultural crops is still caused by
scuffing of crops against the sides of live bottom trailers during movement of the live
20 bottom. Scuffed agricultural produce such as vegetables and fruits is highly
undesirable as scuffed vegetables and fruits are unattractive to consumers.
Accordingly, scuffed produce must be separated from unscuffed produce with the
unscuffed produce being sold to consumers and the scuffed produce being
discarded or used for animal feed with the consequent financial penalties.

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An object of the invention is to overcome at least some of the problems of the prior art.

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Summary of the Invention

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According to the invention there is provided a trailer for transporting material comprising:

- a hopper including a bottom and two sidewalls upstanding from the bottom;
- an exit in the hopper for discharging material from the hopper wherein
- 10 at least one of the sidewalls comprises a conveyor for conveying material from the hopper to the exit.

Preferably, the bottom comprises a conveyor. More preferably, the two sidewalls comprise conveyors.

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Advantageously, the conveyors comprise conveyor belts.

Suitably, the hopper is mounted on a chassis. Advantageously, the chassis comprises wheels. Alternatively, the hopper is mounted on a skid.

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In a preferred embodiment of the invention, the exit is fitted with an exit ramp moveable between a closed position in which the exit is closed and an open position in which the exit is open for discharging material on the exit ramp.

Suitably, the exit ramp is hydraulically moveable between the closed and open positions.

Preferably, the exit ramp comprises a conveyor ramp. More preferably, the conveyor
5 ramp comprises a conveyor belt.

Advantageously, the conveyor ramp comprises a sensor to detect the presence of material on the conveyor ramp.

10 In one embodiment of the invention the trailer comprises an agricultural trailer for crops.

Brief Description of the Drawings

15 The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view from above and one side of an embodiment of a live bottom and side trailer in accordance with the invention with the crop exit ramp
20 in the closed position;

Figure 2 is an enlarged perspective view from above and one side of the exit ramp sensor of the live bottom and side trailer indicated by the circle marked II in Figure 1;

Figure 3 is a plan view from above of the live bottom and side trailer;

Figure 4 is a plane view from below of the live bottom and side trailer;

5 Figure 5 is a side elevation of the of the live bottom and side trailer;

Figure 6 is front elevation of the live bottom and side trailer at which the trailer can be attached to the three point linkage of a tractor;

10 Figure 7 is a rear elevation of the live bottom and side trailer with the exit ramp in the closed position;

Figure 8 is perspective view from the rear and one side of the live bottom and side trailer with the exit ramp in the closed position;

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Figure 9 is a perspective view from the rear and one side of the live bottom and side trailer with the exit ramp in the open position, and

Figure 10 is an exploded perspective view from above and one side of the live
20 bottom and side trailer.

Detailed Description of the Invention

As shown in the drawings, a live bottom and side trailer in accordance with the
25 invention is generally indicated by the reference numeral 1 and may be attached to

and detached from tractors and the like. The live bottom and side trailer 1 is suitable for use in conveying all loose materials such as aggregates and the like but is particularly suitable for use in harvesting and conveying agricultural crops including vegetables and fruits such as potatoes, apples, grapes and the like where damage to the crop from scuffing and bruising is to be avoided.

Accordingly, the following description describes the live bottom and side trailer 1 in relation to an agricultural crop such as potatoes for ease of reference. However, it will be appreciated by those skilled in the art that the described live bottom and side trailer 1 can be adapted for use in many other applications as outlined above.

The trailer 1 is supported with a chassis 2 mounted on wheels 3 in a conventional manner. The trailer 1 is made up of an elongate hopper 4 having an open top 5 for receiving potatoes e.g. during harvesting and an open bottom 6 provided with transverse support members 7. A bottom conveyor belt 8 is mounted in the open bottom 6 above the transverse support members 7 to form the floor of the hopper 4.

The hopper 4 is further defined by a first endless side conveyor belt 9 and an oppositely disposed second endless side conveyor belt 10 upstanding from each side of the bottom conveyor belt 8. The hopper 4 also has a fixed front wall 11 and a rear conveyor belt ramp 12 on which crop can be conveyed from the hopper 4 through a rear exit opening 13 defined between the first endless side conveyor belt 9 and the second endless side conveyor belt 10. As shall be explained more fully below, the rear exit opening 13 can be opened and closed by moving the ramp 12

between a closed position as shown in Figure 8 and an open position as shown in Figure 9.

The first and second endless side conveyors 9,10 are each provided with a support frame 14 upstanding from the chassis 2 about which the first and second endless side conveyors 9,10 travel to reinforce the first and second endless side conveyors 9,10 and provide structural integrity to the hopper 4.

A tractor mounting 15 for attaching the trailer 1 of the invention to the three point linkage of a tractor or similar projects forwards from the chassis 2 beneath the front wall 11.

A front drive mechanism 16 for the bottom conveyor belt 8 is located at the front wall 11 of the hopper 4. The front drive mechanism 16 is provided by a pair of oppositely disposed front sprockets or gears 17 made up of a driven sprocket or gear 18 and a passive sprocket or gear 19. The driven sprocket of gear 18 is powered by a motor 20.

The bottom conveyor belt 8 is also provided with a rear drive mechanism 34 also made up of a pair of oppositely disposed pair of rear sprockets or gears 21 mounted on the chassis 2. The pair of oppositely disposed rear sprockets or gears 21 is made up of a first driven sprocket or gear 22 with a motor 22a and a second driven sprocket or gear 23 also with a motor 23a.

The bottom conveyor belt 8 is driven by the motors 20,22a,23a along a path defined between a front upper roller 24 and a front lower roller 25 between the pair of front sprockets or gears 17 and a first rear roller 26 and second rear roller 27 between the pair of rear sprockets or gears 21. In the present embodiment of the invention, the bottom conveyor belt 8 travels between front and rear drums 40,41 respectively coupled to the motors 20,22a,23a located beneath the trailer 1 so that during unloading the bottom conveyor belt 8 is drawn rearwardly by rolling onto the rear drum 41. When the trailer 1 has been unloaded the rolling action is reversed so that the bottom conveyor belt 8 is rolled onto the front drum 40.

As will be appreciated by those skilled in the art, in an alternative embodiment of the invention an endless bottom conveyor belt 8 could be employed.

Each of the first and second endless side conveyor belts 9,10 is mounted between a front upright roller 28 upstanding from the chassis 2 and a rear upright roller 29 upstanding from the chassis 2. The front upright roller 28 and the rear upright roller 29 are each driven by respective front and rear upright roller motors 30,31 mounted on the front and rear upright rollers 28,29.

As will be appreciated by those skilled in the art, the front drive mechanism 16 and the rear drive mechanism 34 can be made up of any suitable gears and motors known in the art. For example, the motor 20 of the front drive mechanism can be an EPMS160 motor combined with a Berma RT160 gearbox while the two motors 22a,23a of the rear drive mechanism 34 can also be EPMS160 motors combined

with two Berma RT800 gearboxes. The front and rear motors 30,31 of the front upstanding rollers 28 and rear upstanding rollers 29 can be EPMS160 motors.

The crop exit conveyor ramp 12 is provided with a pair of hydraulic rams 32 to effect movement of the crop exit conveyor ramp 12 between the open and closed positions shown in Figures 8 and 9. The crop exit conveyor ramp 12 is also made up of an endless ramp belt 33 mounted between a pair of ramp rollers 35 which are in turn driven by a ramp motor 36 mounted at the ramp rollers 36. A suitable ramp motor 36 is an EPMS215 motor.

The crop exit conveyor ramp 12 is further provided with a crop sensor 37 so that when the crop exit conveyor ramp 12 is in the open position and the crop sensor 37 detects the presence of a crop on the crop exit conveyor ramp 12, the ramp motor 36 is activated to convey the crop from the crop exit conveyor ramp 12 so that crop build up, and hence scuffing, is avoided as crop is unloaded from the trailer 1. A suitable sensor is a Telemecanique XUXOARCTT16 sensor.

The trailer 1 of the invention is further provided with front and rear load level guides 38,39 respectively disposed over the open top 5 of the hopper 4 to indicate that the hopper 4 is at maximum capacity.

In use, the trailer 1 of the invention is attached to a tractor or similar at the tractor mounting 15 in conventional fashion. For the harvesting of a crop such as potatoes, the tractor is filled by the harvester in the usual manner and returned to a crop processing area typically when the hopper 4 is at maximum capacity. At the

processing area, a crop such as potatoes can then be unloaded or fed directly to a grading system or the like without tipping the hopper 4. More particularly, by actuating the various motors described above, the bottom conveyor belt 8 and the first and second side conveyor belts 9,10 gently convey the crop through the opened exit opening 13 as shown in Figure 9 onto the crop exit conveyor ramp 12 without scuffing or damage to the crop.

The crop sensor 37 on the crop exit conveyor ramp 12 also causes the ramp belt 33 to move in response to the presence of the crop to draw the crop from the hopper 4 in a measured and even manner to further ensure that no scuffing or crushing of the crop occurs during the unloading process.

The rate of discharge of crop from the trailer 1 can be controlled via the motors and the trailer 1 can be fitted with additional sensors if required to detect the presence of crop to control the rate of egress of crops and the like from the hopper 4. For example, with extremely delicate crops such as grapes or soft fruits, an extremely slow discharge rate may be desirable.

The trailer 1 of the invention can have any dimensions as required and can be formed from any suitable materials. Moreover, as indicated above, the trailer 1 can be used for a range of substances ranging from aggregates to agricultural crops and produce.

The advantages of the live bottom and side trailer of the invention are many. For example, when used with crops and the like, the crop can be unloaded without

scuffing due to the live sides and bottom of the hopper. Moreover, the crop exit conveyor ramp facilitates controlled discharge of product which further minimises damage thereby eliminating wastage and minimising financial losses in the harvesting of valuable crops.

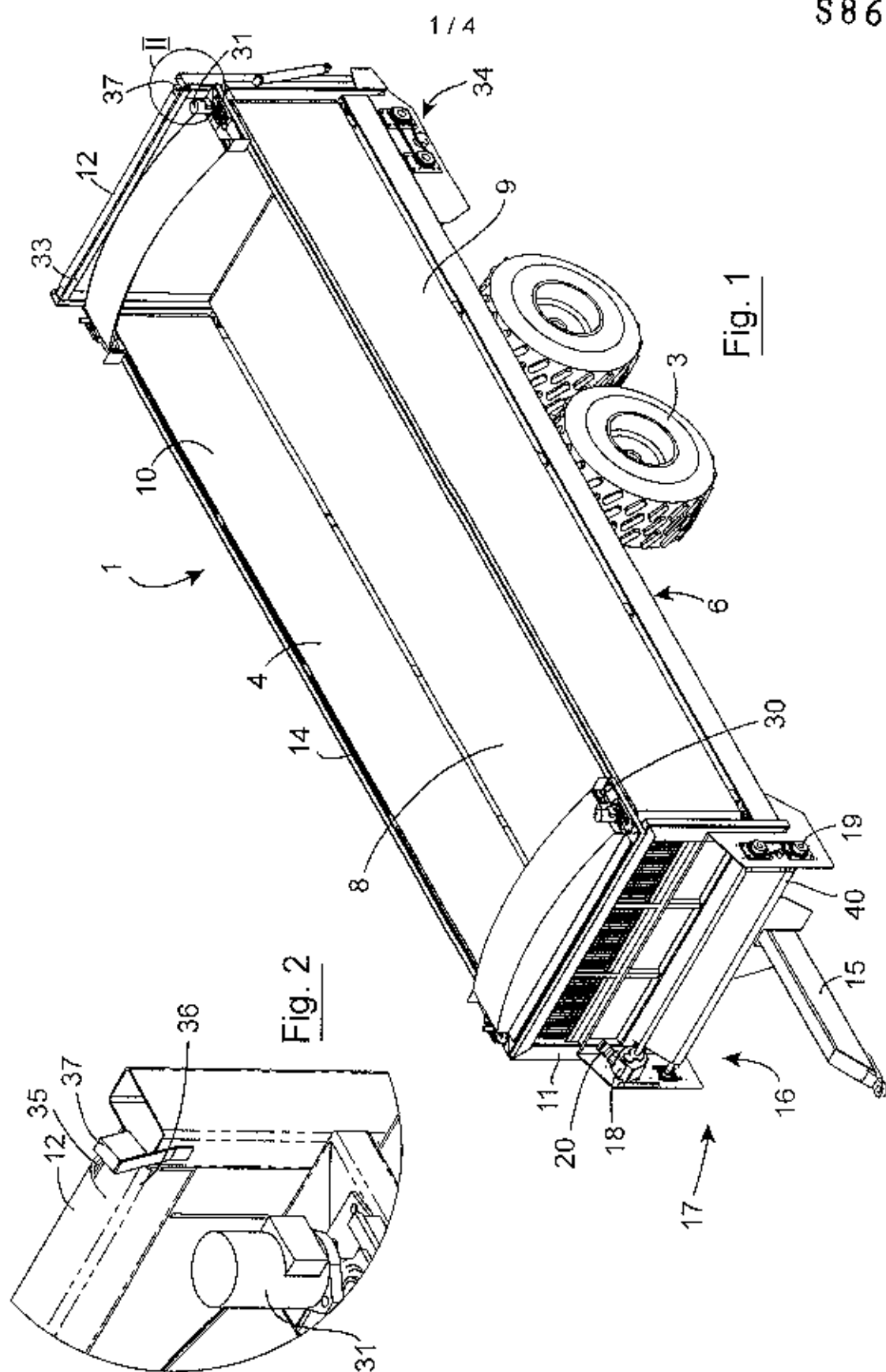
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The invention is not limited to the embodiments herein described which may be varied in construction and detail without departing from the scope of the invention.

Claims

1. A trailer for transporting material comprising:
 - a hopper including a bottom and two sidewalls upstanding from the bottom;
 - an exit in the hopper for discharging material from the hopper wherein at least one of these sidewalls comprises a conveyer for conveying material from the hopper to the exit.
2. A trailer according to claim 1 wherein:
 - the bottom comprises a conveyer; and/or
 - each of the two side walls comprises a conveyer.
3. A trailer according to any preceding claim wherein:
 - the conveyor(s) comprise a conveyer belt; and/or
 - the hopper is mounted on a chassis; and/or
 - the hopper is mounted on a chassis which comprises wheels or
 - the hopper is mounted on a skid.
4. A trailer according to any preceding claim wherein the exit is fitted with an exit ramp movable between a closed position in which the exit is closed and an open position in which the exit is open for discharging material on the exit ramp optionally wherein:
 - (a) the exit ramp is hydraulically movable between the closed and open positions; and/or
 - (b) the exit ramp comprises a conveyer ramp, for example comprising a conveyer belt;
 - (c) the conveyer ramp comprises a sensor to detect the presence of material on the conveyer ramp.
5. The trailer according to any preceding claim wherein the trailer is an agricultural trailer for crops.

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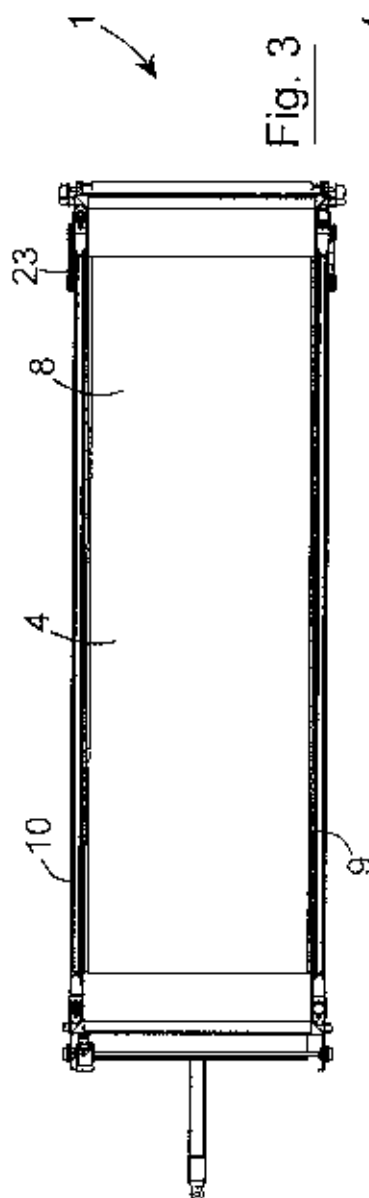


Fig. 3

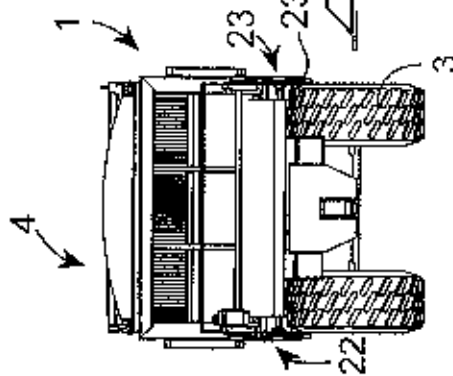


Fig. 6

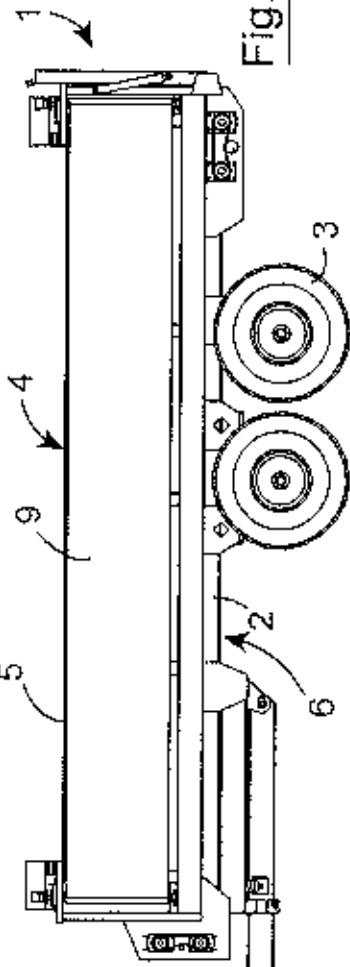


Fig. 5

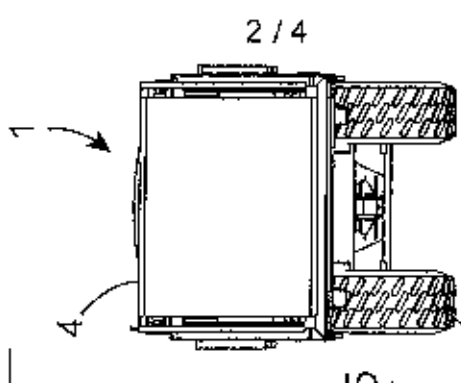


Fig. 7

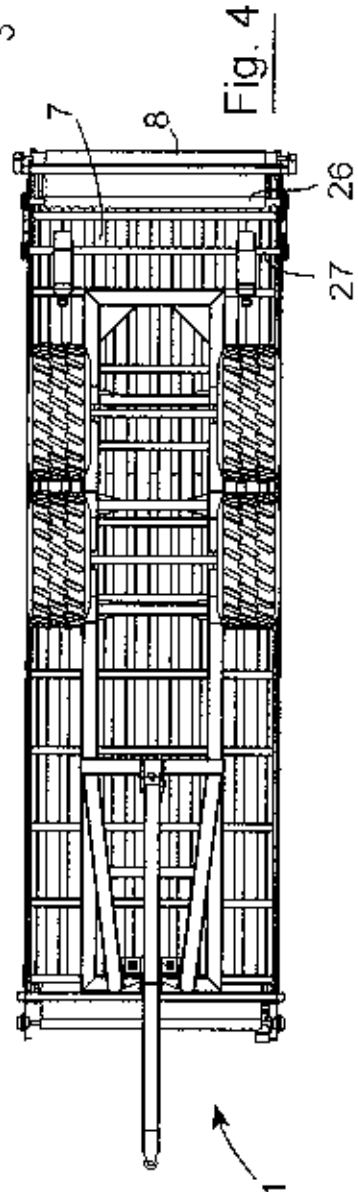


Fig. 4

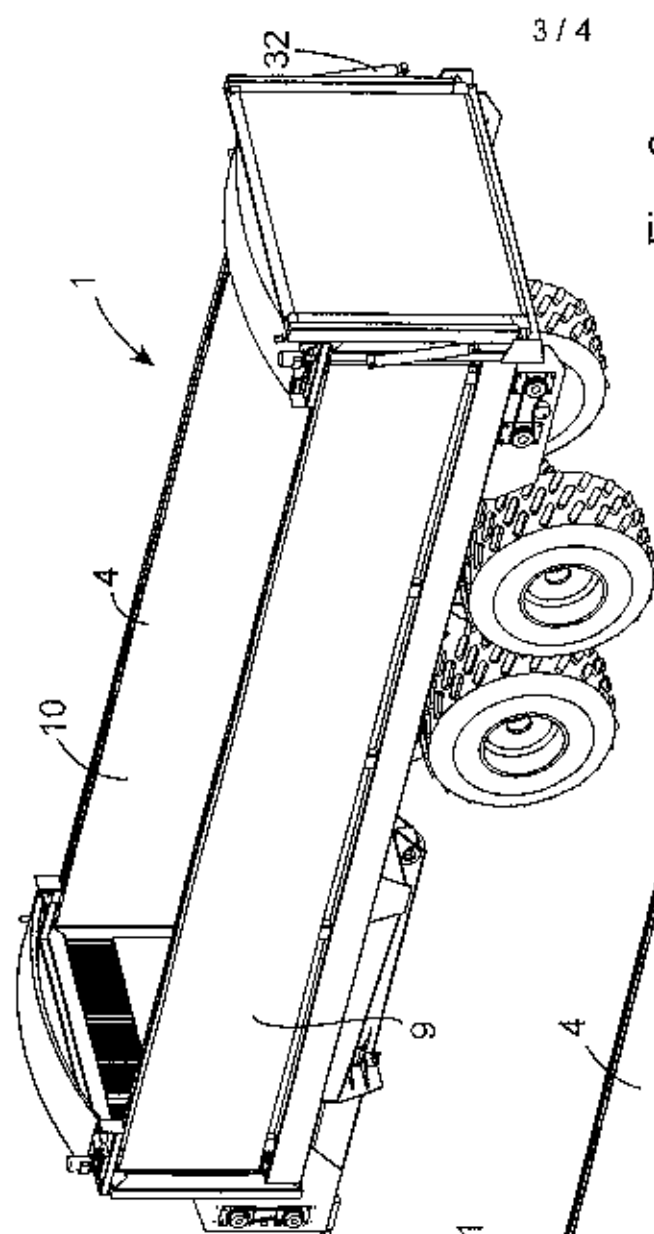


Fig. 8

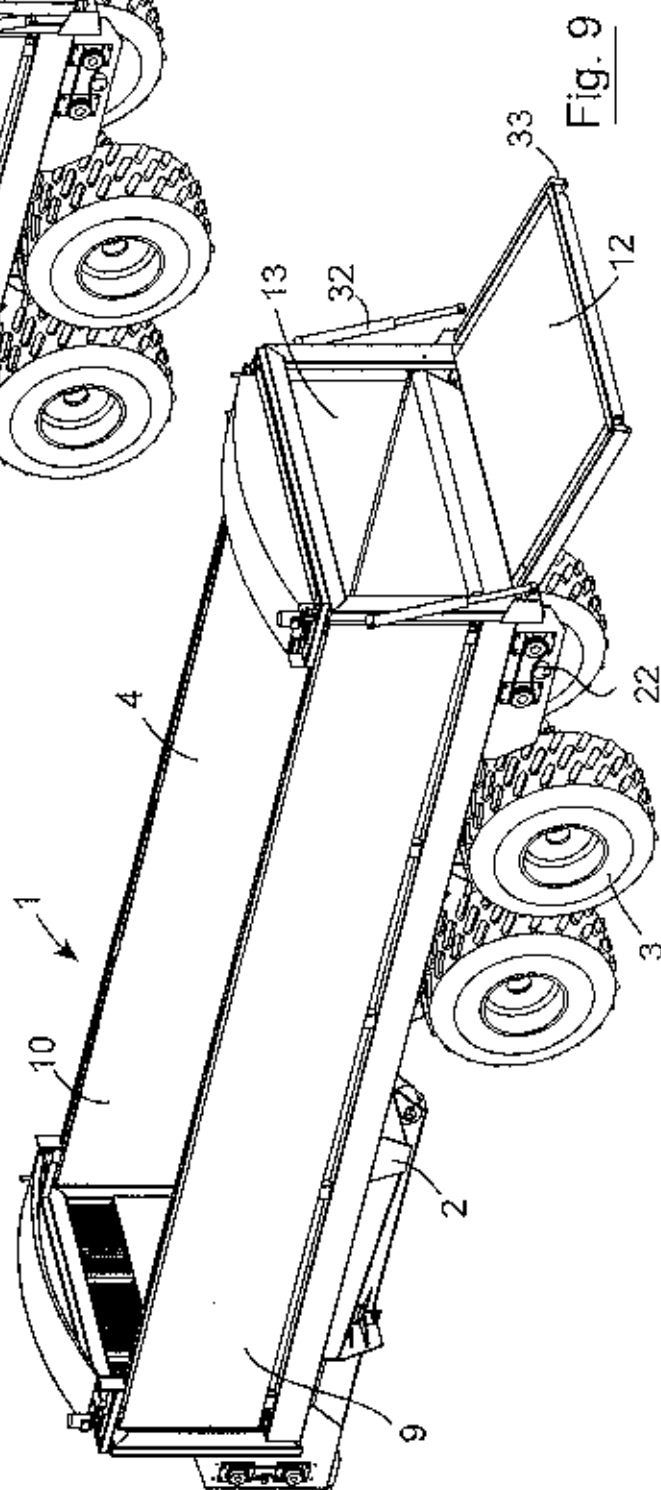


Fig. 9

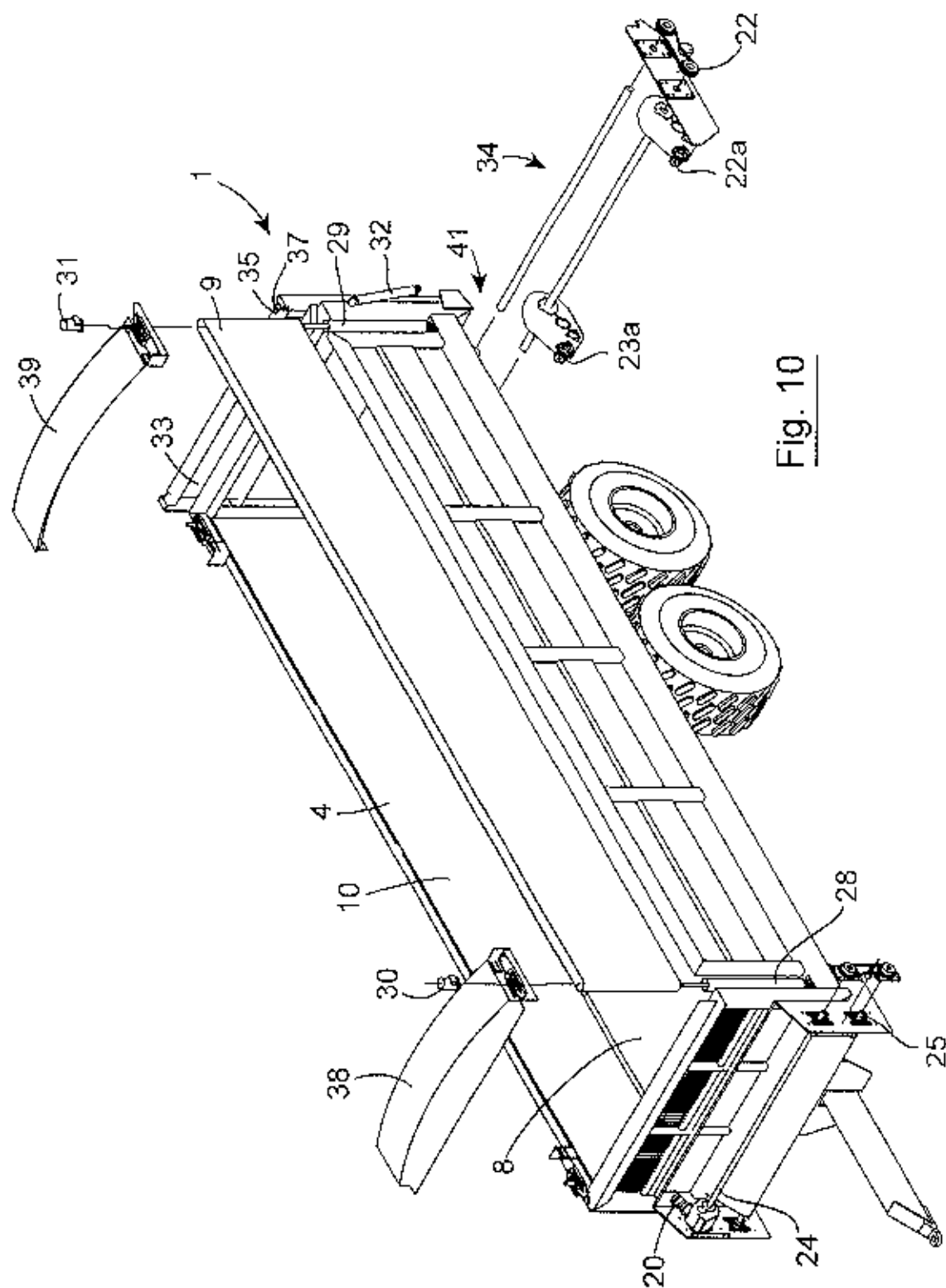


Fig. 10