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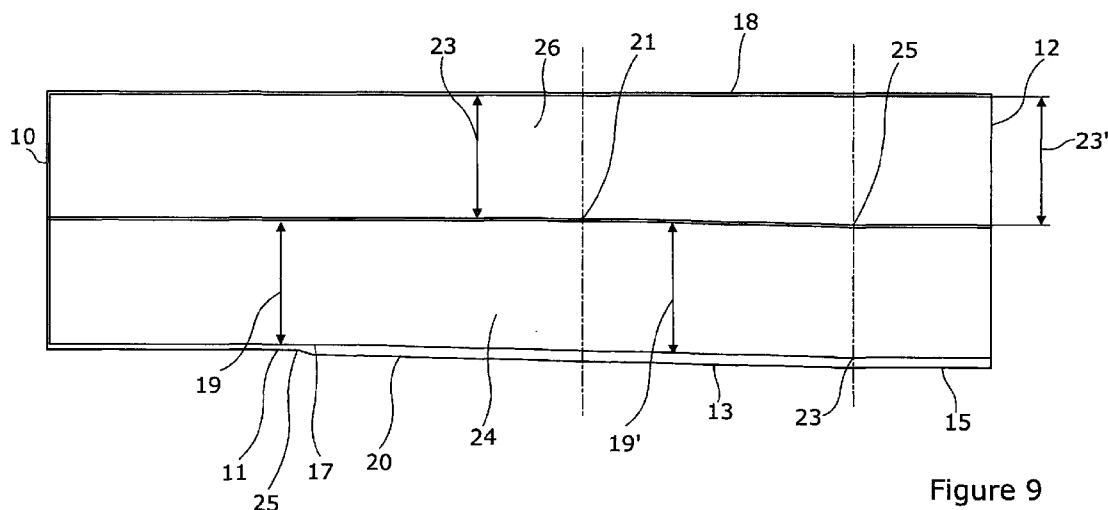


Figure 9

(57) Abstract: The invention relates to apparatus for transport with goods located therein and in one embodiment is provided in the form of a trailer which can be part of an articulated vehicle or can be provided as a fixed body of a vehicle. The trailer includes a goods storage cavity which is split into two portions, a first portion between the first, base floor and a second floor spaced above the first floor, and a second portion between the second floor and roof of the trailer. The angled configuration of the floors is fixed and/or can be adjusted in use so that the height of one or both of the respective portions increases towards the rear of the trailer. A door assembly is also provided which provides improved access to the respective floors when the door assembly is open.



Improvements to goods movement apparatus

The invention to which this application relates is to improvements to goods movement apparatus and, in particular, although not necessarily exclusively, to apparatus for use in the movement of goods via the road network. Goods are typically moved along the road network via articulated vehicles which include a tractor unit which includes an engine and the driver cab and which is connected to and tows a trailer and within the trailer there is defined a storage cavity into which the said goods are placed and transported.

As each trip of the vehicle incurs cost in terms of driver time, fuel, maintenance costs, wear on the vehicle and trailer, there is a need to be able to maximise the use of the cavity space within the trailer so that, wherever possible, the trailer is full of goods to a maximum capacity for each trip.

Despite this need, there are conventionally several restrictions which mean that very often, the trailer is not in fact full to capacity in a trip thereby representing inefficient usage of the same.

One solution to these problems is disclosed in the applicant's patent GB2532839 which provides first and second vertically spaced floors in the trailer which define two separate cavity portions into which goods can be loaded into and unloaded from a rear opening into the trailer and, furthermore, both floors have a front part which is substantially parallel with the roof and then, towards the rear, the floors respectively diverge from each other and also diverge from the roof. This configuration allows goods and in particular, goods which are carried on roll cages, to be moved from the rear to the front and thereby allow all of the

space in the cavity to be filled with roll cages and therefore used.

The rear opening of the trailer is required to be movable between a closed condition for security in transport of the goods and first and second open configurations, a first open configuration allowing access to the lower cavity portion of the trailer and a second open configuration allowing access to the higher cavity portion of the trailer. The Applicant's co-pending patent application EP2732999 discloses a suitable door arrangement which allows this to be achieved.

Despite the advantages which are obtained by a trailer of this type, it has been identified that there are further potential advantages in terms of the use and efficiencies which can be achieved and the aim of this invention is to provide apparatus in a suitable form which allows these to be achieved.

In a first aspect of the invention, there is provided a goods movement trailer, said trailer including a goods storage cavity defined by side walls, a front end wall, a rear end wall in which an access opening is formed, a roof, and first and second vertically spaced floors which define two portions of the said cavity and a door assembly is provided at the access opening, to allow access, when open, to at least one of the said portions of the said cavity, said trailer formed with a plurality of sections, at least a first section extending from the front end wall towards the rear end wall and a second section between the first section and the rear end wall and wherein the first, lower floor of the trailer includes a change in angle so as to increase the height between the said first floor and second floor in part of the said first section.

In one embodiment the second floor includes a change in angle so as to increase the height between the said second floor and the roof.

In one embodiment the change in angle of the second floor is located closer towards the rear end wall of the trailer than the change in angle of the first floor. Alternatively the change of angle is located vertically above the change of angle in the first floor.

In one embodiment the trailer includes a third section which extends from the second section to the rear end wall.

In one embodiment in the second and third sections the first and second floors are substantially parallel.

Typically the first and second floors are parallel with the roof in the third section.

Typically the second floor is parallel with the roof in the first section.

In one embodiment the change in angle is provided across the width of the respective first and second floors and along a line which is substantially parallel with the end walls of the trailer.

Typically the opening at the rear end wall in to the respective first and second portion cavities are substantially the same size.

Typically the first section extends from the front end wall of the trailer to the line of change of angle on the second floor, the second section extends from that change of angle line to further change of angle lines on the first and second floors and the

third section extends from the further change of angle lines to the rear end wall.

In one embodiment the said further change of angle lines are located on the respective first and second floors and are at substantially the same distance from the rear end wall.

In one embodiment the trailer door assembly includes first and second portions which are selectively movable between a closed configuration and first and second open configurations to allow access to the said first and second cavity portions respectively and wherein the door assembly includes a portion which can be moved between extended and retracted conditions.

In one embodiment the said portion of the door assembly is an extendable portion which is movable between the extended and retracted conditions and this movement is achieved by movement of at least one of the door portions and typically, movement of one of the door portions relative to the other door portion.

In one embodiment the expandable portion is formed in a concertina fashion and is attached to one of the said door portions.

Typically, the expandable portion is attached to an end of one of the door portions and the opposing end of the expandable portion is selectively contacted with the other of the door portions so that the relative movement of the door portions causes the expandable portion to move between retracted and expanded conditions.

Typically, the relative movement of the said door portions cause the relative movement of the expandable portion between the expanded and retracted conditions.

Typically, the door assembly, when in a closed configuration, has the expandable portion in an expanded condition so as to fully enclose the opening into the trailer.

Typically, the expandable portion is permanently attached to one of the door portions and the opposing end of the expandable portion is selectively locatable by the other of the door portions such that when the door assembly is in the closed configuration, the expandable portion contacts both door portions and when in a retracted condition, the expandable portion is only in contact with one of the door portions. In one embodiment the expandable portion is attached at or adjacent to the top edge of the bottom door.

In alternative embodiment the said portion of the door assembly is located at the base of the door assembly and can be pivotally or slidingly movable between an extended position and a retracted position.

The door assembly in accordance with one embodiment of the invention allows the door assembly, in the open configuration, to have a reduced area so as to allow increased access space into the particular cavity portion defined between either the first, base, floor and the second, higher floor or the second, higher floor and the roof whilst still allowing the door assembly to be of a size to fully close the opening when the door assembly is in the closed condition. In one embodiment it is most important that the increased access space is provided at the opening into the lower cavity portion so as to allow space for the loading and unloading of goods onto and from the second floor when it has

been lowered to lie above the first base floor and so the expandable portion allows the depth of the two floors, one on top of the other, to be accommodated.

In one embodiment, at least a portion of the second floor is movable with respect to the roof and base floor and, most typically, is movable from a raised position in which goods are supported thereon, to a lowered position closer to the base floor to allow goods to be moved from and onto the said second floor from external loading apparatus.

This therefore allows the trailer to be used with fixed loading apparatus and at which there is no lift or movable platform so that all of the goods are loaded onto and unloaded from the trailer at substantially the same level.

In one embodiment the second floor and the first, base, floor have front portions which are substantially parallel and portions which extend from the front portions towards the rear which diverge. In one embodiment the said portions which extend towards the rear diverge from each other and from the roof.

In one embodiment the said front portion of the first, base floor and at least part or all of the front portion of the second floor are fixed in position and it is the remainder of the second floor which extends to the rear of the trailer which is movable in height.

In one embodiment, the configuration of at least the movable portion of the second floor can be retained in the raised and lowered positions and in positions during movement between the same.

By providing the door assembly in the form described in which the assembly has one closed position and two open positions, one of which allows access to the lower cavity portion and the other of which allows access to the higher cavity portions so, even if the powered movement of the second floor fails and the floor is stuck at the raised position, then access can still be gained to the second floor in the raised position to allow goods to be removed therefrom. This is not possible in shutter door systems as the shutter mechanism at the top of the opening prevents access to the higher cavity portion with sufficient space as to allow the removal of roll cages so that the same are trapped on the second floor until the drive means for movement of the second floor are fixed.

In one embodiment the width of the second floor is at least 2450mm.

In one embodiment any variation in angle of the path of one or both of the floors of the trailer is confined to the floors. This therefore means that it does not affect the shape of the side walls of the trailer.

In a further aspect of the invention there is provided a goods movement trailer, said trailer including a goods storage cavity defined by side walls, a front end wall, a rear end wall, an access opening, a roof, and first and second vertically spaced floors which define two portions of the said cavity and a door assembly is provided at the access opening, to allow access, when open, to at least one of the said portions of the said cavity, said trailer formed with a plurality of sections, at least a first section extending from the front end wall towards the rear end wall and a second section between the first section and the rear end wall and wherein in the first section there is a first height between the first floor and the second floor and a first

height between the second floor and the roof and in the second portion at the rear end wall there is provided a second height between the first floor and the second floor and second height between the second floor and the roof and at least one of the said second height values is greater than the said first height values.

In one embodiment both the second height values are greater than the respective first height values.

In one embodiment the said second height values are the same.

In one embodiment the said first height values are in the range of 1760-1780mm and the second height values are in the range of 1850-1870mm.

In a further aspect of the invention, there is provided a goods movement trailer, said trailer including a goods storage cavity defined by side walls, a front end wall, a rear end wall in which an access opening is formed, a roof, and a first base floor and a second floor which define two portions of the said cavity and a door assembly is provided at the access opening, and wherein at least portion of the second floor is movable vertically between a lowered position for loading and unloading goods onto and from the same, and a raised position thereby allowing said trailer to be used with a loading bay which is provided at a fixed height and a loading bay which has a vertically movable platform.

In one embodiment the said portion of the second floor is angularly movable between a position in which the same is substantially parallel with a base floor and/or roof and a second position in which the said portion is angularly offset to the roof and/or base floor.

In one embodiment the said portion is located towards the rear end wall of the trailer.

In one embodiment the said portion comprises the entire second floor.

In one embodiment the trailer door assembly includes two portions which are selectively movable in a vertical direction to allow the same to be moved to a first open position to allow access to be gained to a cavity portion defined between the second floor and the roof and a second open position to allow access to be gained to a cavity portion defined between the base floor and the second floor.

In a further aspect of the invention there is provided a goods movement trailer, said trailer including a goods storage cavity defined by side walls, a front end wall, a rear end wall in which an access opening is formed, a roof, a first, base, floor and a second floor located above the first floor which define two portions of the said cavity and a door assembly is provided at the access opening, and wherein the second floor is provided so as to be angularly offset with respect to the roof such that the distance between the upper surface of the second floor and the inner surface of the roof progressively increases from the front end wall towards the rear end wall.

In one embodiment drive means are provided to allow the second floor to be moveable between a transport position and a loading/unloading position and the distance of the second floor from the roof when in the loading/unloading position is greater than when the second floor is in the transport position.

Typically the angular offset of the second floor is maintained at and during movement between the loading/unloading and transport positions.

In one embodiment the base floor is formed such that there is provided a portion towards the front end wall which is substantially parallel with the roof and a portion towards the rear which is angularly offset from the roof towards the rear end wall.

In one embodiment the chassis of the trailer includes a kink which extends across the width of the same which is located substantially at the transition between the first and second portions of the base floor so as to define the same. Typically the kink reflects and allows the change in angle of the first floor from the front end to the rear end so as to increase the height between the first and second floors towards the rear end wall.

In a further aspect of the invention there is provided a goods movement trailer, said trailer including a goods storage cavity defined by side walls, a front end wall, a rear end wall in which an access opening is formed, a roof, a first, base, floor and a second floor located above the first floor which define two portions of the said cavity and a tail lift provided at the access opening, wherein said tail lift is operable in a first mode to have an external platform which is movable upwardly and downwardly along at least part of the height of the access opening and in a second mode in which to have a platform located externally and internally of the trailer which is movable upwardly and downwardly along at least part of the height of the access opening.

In one embodiment the movement of the said platform is substantially vertically in both modes.

In one embodiment, in the first mode the platform is formed by an externally mounted portion and in the second mode the platform is formed by the said externally mounted portion and a portion of one of the floors, typically the second floor of the trailer. Typically the portion of the floor includes the rear edge of the floor.

Typically the range of movement of the platform when it is in the first mode is different to the range of movement when the platform is operating in the second mode. Typically the respective ranges overlap.

Typically the externally mounted portion is also movable between an in use position in which the same extends outwardly from the rear end wall of the trailer and a storage position in which the same lies substantially in line with the rear end wall.

Typically the tail lift apparatus includes drives means to allow for the powered movement of the platform in first and second modes.

Typically the available space for goods on the platform is greater when the platform is in the second mode.

Typically the particular mode of operation of the tail lift apparatus is selected in dependence upon the particular loading/unloading requirements at a particular location of the trailer and this may be any or any combination of the type of goods, whether the goods are provided on roll cages or not, whether there is a warehouse adjacent to the trailer or not, the level of the warehouse floor, and/or whether there is a movable platform provided as part of separate apparatus in relation to which the apparatus is located.

In one embodiment the remainder of the second floor is provided to be fixed and locking means are provided to locate the portion of the second floor at substantially the same height as the remainder of the second floor when the portion is not used as part of the second mode of operation of the tail lift.

In one embodiment the second floor includes at least a portion which is angularly offset to the roof towards the rear of the trailer.

In whichever embodiment the cavity in which the goods are located is typically a confined space by the base, roof, side walls and end walls, with one of the walls selectively openable via a door assembly. In one embodiment the base, roof and walls are substantially rigid.

In one embodiment the second floor is substantially parallel with the roof along its length and first floor diverges from both the floor and roof from the front end wall to the rear end wall.

It should be appreciated that although the invention is described herein with respect to a trailer which is connectable and separable from a tractor or drive unit in which the driver sits, to form an articulated vehicle, the inventive features described herein may be incorporated in a vehicle with a fixed body with a cavity for the storage of goods therein and will provide the same advantages. Furthermore, although the vehicle will typically be a road vehicle, the vehicle may alternatively be provided as a train, a ship or parts thereof.

Specific embodiments of the invention are now described with reference to the accompanying drawings; wherein

Figures 1a-c illustrate views of the a tractor and trailer in accordance with one embodiment of the invention;

Figures 2a-d illustrate a loading sequence for goods onto a trailer in accordance with one embodiment of the invention;

Figures 3a-e illustrate one embodiment by which goods can be loaded and unloaded onto and from the trailer in accordance with the invention;

Figures 4a-c illustrate another embodiment by which goods can be loaded and unloaded onto and from the trailer in accordance with the invention;

Figures 5a-d illustrate side elevations of a door assembly in different positions in accordance with one embodiment of the invention;

Figure 6 illustrates a trailer in accordance with another embodiment of the invention;

Figure 7 illustrates a trailer in accordance with a further embodiment of the invention;

Figure 8 illustrates a further embodiment of a trailer in accordance with the invention; and

Figure 9 illustrates a further embodiment of a trailer in accordance with the invention.

Referring firstly to Figures 1a-c there is illustrated a trailer 2 and tractor unit 4 combination in accordance with one embodiment of the invention. The trailer and tractor unit can be selectively coupled for transport as shown in Figures 1a-b or

decoupled as shown in Figure 1c. In either arrangement goods can be loaded onto and unloaded from the trailer via an opening 6 at the rear which is selectively closed by a door assembly 8.

In the interior of the trailer there is provided a cavity which is defined by front end 10, rear end 12, side walls 14, 16, a roof 18, a first, base floor 20 which is lower than a second, intermediate floor 22. The second floor 22 splits the interior into a lower cavity portion 24 and a higher cavity portion 26.

The chassis of the trailer can include a kink 25 which extends across the width of the same which is located substantially at the transition between the first and second portions 11,13 of the base floor so as to define the same. Typically the kink reflects and allows the change in angle of the first floor from the front end to the rear end so as to increase the height between the first and second floors towards the rear end wall. The kink 25 in the different embodiments of trailer described herein.

Referring now to Figure 9 there is shown one embodiment of the trailer floor arrangement. In this case the trailer is formed with three sections, a first section 11 which extends from the front end wall 10, a second section 13 which extends from the first section towards the rear end wall 12 and a third section 15 which lies between the second section and the rear end wall 12. The first, lower floor 20 of the trailer includes a change in angle at line 17 so as to increase the first height 19 (in this embodiment 1772mm) between the said first floor 20 and second floor 22 to a second height 19' (in this embodiment 1860mm) by the end of the said first section from which the second height remains the same to the rear end wall 12. The second floor 22 in this embodiment also includes a change in angle at line 21 so as to increase the first height 21 (in this embodiment 1772mm) between the said second floor 22 and the

roof 18 and the change in angle 21 of the second floor 22 is located closer towards the rear end wall 12 of the trailer than the change in angle line 17 of the first floor and changes the first height 23 to a second height 23' (in this embodiment 23') in the third section 15 and which continues to the rear end wall 12. In an alternative embodiment (not shown) the change of angle lines 7,21 are located vertically above each other.

The third section 15 is provided such that the first and second floors are substantially parallel and are substantially parallel with the roof 18. In the second section 13 the first and second floors 20,22 are substantially parallel but diverge from the roof 18 and the second floor 22 is parallel with the roof 18 in the first section 11.

The lines 17,21 at which the change of angle occurs extend across the width of the trailer and the lines 17,21 are substantially parallel with the end walls 10, 12 of the trailer.

Typically the opening at the rear end wall into the respective first and second portion cavities 24, 26 are substantially the same heights 19' 23' and size.

In the embodiment shown the first section 11 extends from the front end wall of the trailer to the line 21 of change of angle on the second floor, the second section 13 extends from that change of angle line 21 to further change of angle lines 23, 25 on the first and second floors 20, 22 respectively and the third section 15 extends from the further change of angle lines 23,25 to the rear end wall 12. The said further change of angle lines 23,25 are located on the respective first and second floors 20,22 at substantially the same distance from the rear end wall.

Referring now to the Figures 1c -4c there is provided a further embodiment of a trailer in accordance with the invention and in this case the second floor 22 is movable by powered means such as a hydraulic ram, guide means and elongate members which are located at the side walls 14,16. The second floor can be moved from the transport location 22 shown in full lines to a loading position 22'. A barrier 28 is provided at the sides of the second floor for the safety of operators loading and unloading goods.

In one embodiment the base floor 20 and second floor 22 are each provided with a front portion 30, 32 respectively and these portions are substantially parallel with each other and, typically, the roof 18. From each front portion there is a further portion 34, 36 respectively which extend towards the rear 6 and which diverge from each other and also diverge from the roof 18. This arrangement enables roll cages 38 in which goods are stored to be moved and stored at all locations on the first and second floors as there is provided sufficient height on both floors, and thereby maximises the usage of the interior of the trailer, raising the capacity significantly in comparison to a conventionally formed trailer. Alternatively while the base floor 20 can be provided with the front portion 30 and further portion 34, the second floor can be provided such that the entire floor is angularly offset with respect to the trailer roof 18 as shown in Figure 7 and the angular offset is provided such that the distance X towards the front end of the trailer between the upper surface 37 of the second floor 22 and the inner surface 39 of the roof 18 is less than the distance Y between the upper surface 37 of the second floor 22 and the inner surface 39 of the roof 18 towards the rear of the trailer. Typically in this arrangement the angle of offset Z is substantially constant along the length of the second floor 22.

In Figure 6 an alternative embodiment of the trailer in accordance with the invention is shown, again with the side wall 14 removed for clarity of illustration. The parts of the trailer formed in the same manner as the trailer of Figures 1a-c are provided with the same reference numerals. However in this case the second floor 22 is physically split into the front portion 32 and the rear portion and are split at the interface 33. In this case the front portion 32 is fixed in position and it is only the rear portion 34 with barrier 28 which is movable vertically as indicated by arrow 35. This allows the rear portion and barrier to be lowered to the positions 34', 28' shown in broken lines and at which location goods from an external fixed height loading bay 39 can be moved onto and from the portion 34' which can then be raised to allow the loading of the goods onto the base floor 20 for transport.

Figures 2a- d illustrate the trailer 4 with side wall 14 removed for ease of illustration of the loading of the interior of the trailer.

Figure 2a illustrates the trailer in an empty condition with the floors 20,22 located in their transport positions and with the door assembly 8 in a first open condition so as to allow access to be gained to the lower cavity 24. In this loading arrangement the second floor 22 is then lowered down to rest at the base floor 20 as shown in Figure 2 and a ramp, not shown can be used to allow roll cages 38 to be moved along the second floor 22 as indicated by arrow 40 to allow all of the same to be filled with the same. When this has been achieved the second floor 22 is raised as indicated by arrow 42 back to the transport position as indicated in Figure 2c and this then allows the lower cavity 24 to again be empty and allow roll cages 38 to be moved into position as indicated by arrow 40. to fill that floor and hence the trailer can be completely loaded as indicated in Figure 2d and at

which point a portion 44 of the door assembly 8 can be moved downwardly as indicated by arrow 46 to move the door assembly 8 to the closed position. And the trailer is ready for transport. This loading arrangement is repeated in the Figures 3a-e and the same reference numerals are used. In this embodiment it will be seen that the roll cages are moved onto the floors of the trailer from a loading bay dock 48 with, if required a ramp portion 50 provided and which may be movable to marry with the heights of the second floor 22 and the base floor 20 as required.

Figures 4a-c illustrate a further loading arrangement and in this case the trailer 4 is shown having been manoeuvred into an abutting relationship with lifting apparatus 52 which has a platform 54 which is movable between raised and lowered positions as indicated by arrow 56. The goods roll cages 38 which are to be moved into the trailer are therefore first collated or moved across the platform 54 and then passed onto the floor of the trailer via a bridging ramp portion 58. In this case, as the platform 54 can be raised and lowered, the second floor 22 can be maintained in the transport position as shown in Figures 4a-c.

In this case at least a portion of the roll cages required to be moved onto the base floor 20 are moved onto the platform 54 as shown in Figure 2a and the platform 54 is then moved to be at the height of the base floor 20 and the door assembly 8 is at the first open position and the roll cages 38 can be moved onto the base floor 20 from the platform 54 as shown in Figure 2b and as indicated by arrow 60. This movement of the platform to receive more cages 38 can be repeated until the floor 20 is filled. When the base floor 20 is filled, the platform 54 is again lowered to receive more roll cages and the door assembly 8 is moved to a second open condition to allow access to be gained to the upper cavity 26. The platform 54 is then raised to the height of the

second floor 22 and the roll cages 38 can be moved onto that floor to fill the same as indicated in Figure 4c by arrow 62.

It should be appreciated that the loading sequences indicated in these Figures can be repeated in reverse to allow unloading to be achieved.

With regard to the door assembly 8 this can be moved between a closed condition shown in Figure 5a, a first open condition shown in Figure 5b and a second closed position shown in Figure 5c.

In order to enable the loading and unloading of goods to and from the trailer cavity portions and, in particular, goods which are provided in the form of roll cages which are of a certain height and which are required to be rolled onto or from the floors of the trailer, it is necessary that the access height into each cavity portion is sufficient so as to allow firstly, the height of the cage to pass there through and also to be of sufficient height to allow an operator who is pushing or pulling the cage to have ease of access. In the current invention, this problem is exacerbated by the fact that the second floor is movable to a lowered position for certain loading and unloading requirements with the fixed height loading bays 39 in which the same is located on top of the base floor, as shown in Figure 6 in broken lines. This therefore means that the effective floor height when the floor is in this arrangement, is higher and therefore the space between the bottom edge of the door assembly when in the position shown in Figure 5b and top of the lowered second floor 22, if the door assembly was provided in a conventional form, would be too small if each of the door assembly portions was provided to have a height which is just greater than half the height of the opening 6. In order to avoid this problem, and in accordance with the invention, the door assembly is provided

with a portion 70 which is extendible and retractable along a vertical axis and the particular retraction or expansion of the said portion is dependent on the respective location of the door portions 72, 74 of the door assembly 8.

This portion 70 allows the access height into the lower cavity portion, when the second floor is lowered, to be of a sufficient height to allow access for operators and roll cages by reducing the required height of the door portion 72, 74 of the door assembly and the portion 70 extends when the door assembly is in the closed position and as shown in Figures 5a and d to extend across the gap between the adjacent edges of the door portions 72, 74 and thereby close the opening 6 fully. This extension of the portion is achieved by the location of engagement means 76 on the extendable portion 70 and engagement means 78 on the lower edge of the door portion 74 as shown in detail in Figure 5d such that continued movement of the door portions apart to the fully closed position cause the door assembly to move the fully closed position of Figure 5a.

Thus, when the lower door portion 72 is moved to the raised position as shown in Figure 5b so as to provide the access through the opening 6 into the lower cavity, the portion 70 is moved to the retracted position but, when the lower door portion is moved to a lower position so as to close the opening, the said portion is moved to an extended position such that the two door portions 72, 74 and the extendable portion 70, in combination, extends across the height of the opening 6 to close the same.

As an alternative door assembly without the extendable portion 70, it is possible that a barrier portion is provided at the lower edge of the opening 6 and which can be selectively moved between a position in which the same is substantially in line with

the door assembly 8 and a position in which the same is withdrawn so as to allow increased access to the opening. In one embodiment, the retractable portion is retracted by pivotal movements or sliding movement.

An alternative loading/unloading arrangement is now described with reference to Figure 8. In this Figure there is shown an elevation of a trailer 2 on a surface 80 and the trailer has a base floor 20 and second floor 22 and roof 18. In this embodiment at the rear end wall 12 access opening there is provided a tail lift apparatus 82 which is operable in a first mode to have an external platform 84 which is movable upwardly and downwardly along at least part of the height of the access opening and below the access opening down to the surface 80 and possible positions of the same are shown as 84' and 84''. The apparatus is also operable in a second mode with a platform formed from the external portion 84 located externally and a portion 86 located internally of the trailer and in this mode the platform which is formed can be moved upwardly and downwardly within the height between the second floor and the base floor access opening, examples of which are shown at 86' and 86''.

Typically the portion 86 is a portion of one of the floors 20, 22 which could be a portion of the second or first floors and the portion 86 is engaged with the portion 84 to be movable therewith and the drive is typically provided in the same manner as that for a conventional tail lift with control means which limit the movement of the platform depending on the mode in which the same is being operated at that time. It will therefore be appreciated that in the first mode goods can be loaded and unloaded from the level of the surface 80 such as road surface and in the second mode goods can be unloaded/loaded with a greater capacity platform to the second floor without the need for the whole of the second floor to be powered for movement

and during transport the portion 86 can be positioned as shown to form part of the second floor 22 so that the capacity of that floor is maintained. Also, for storage during transport the external portion 84 can be moved to a position 90 by pivotal movement as indicated by arrow 88.

It will therefore be appreciated that the invention as described herein, allows the full closure of the opening into the trailer as and when required, allows the accommodation of a second floor, at least part of which can be moved to a lower position while still allowing access to the lower cavity of the trailer to be of a sufficient height to allow roll cages, operators and the like to be moved into and from the same.

Claims

1. A goods movement trailer, said trailer including a goods storage cavity defined by side walls, a front end wall, a rear end wall in which an access opening is formed, a roof, and first and second vertically spaced floors which define two portions of the said cavity and a door assembly is provided at the access opening, to allow access, when open, to at least one of the said portions of the said cavity, said trailer formed with a plurality of sections, at least a first section extending from the front end wall towards the rear end wall and a second section intermediate the first section and the rear end wall and wherein the first, lower floor of the trailer includes a change in angle so as to increase the height between the said first floor and second floor in part of the said first section.
2. Apparatus according to claim 1 wherein the second floor includes a change in angle so as to increase the height between the said second floor and the roof.
3. Apparatus according to claim 2 wherein the change in angle of the second floor is located closer towards the rear end wall of the trailer than the change in angle of the first floor.
4. Apparatus according to claim 2 wherein the change in angle of the second floors is located vertically above the change in angle of the first floor.
5. Apparatus according to claim 1 wherein the trailer includes a third section which extends from the second section to the rear end wall.

6 Apparatus according to claim 5 wherein in the second and third sections the first and second floors are substantially parallel.

7 Apparatus according to claims 5 or 6 wherein the first and second floors are substantially parallel with the roof in the third section.

8 Apparatus according to any of the preceding claims wherein the second floor is substantially parallel with the roof in the first section.

9 Apparatus according to any of the preceding claims wherein the change in angle is located across the width of the trailer and along a line which is substantially parallel with the end walls of the trailer.

10 Apparatus according to any of the preceding claims wherein the openings at the rear end wall into the respective first and second portion cavities are substantially the same size.

11. Apparatus according to claim 5 wherein the first section extends from the front end wall of the trailer to the line of change of angle on the second floor, the second section extends from that change of angle line to further change of angle lines on the first and second floors and the third section extends from the said further change of angle lines to the rear end wall.

12. Apparatus according to claim 11 wherein the said further change of angle lines are at substantially the same distance from the rear end wall.

13 Apparatus according to any of the preceding claims wherein said door assembly includes first and second portions which are

selectively moveable between a closed configuration and first and second open configurations to allow access to the said first and second cavity portions respectively.

14 Apparatus according to claim 13 wherein the door assembly includes a portion which can be moved between extended and retracted conditions.

15 Apparatus according to claim 14 wherein the movement is achieved by movement of at least one of the door portions relative to the other door portion and/or trailer body.

16 Apparatus according to claim 13 wherein an expandable portion is formed in a concertina fashion and attached to one of the said door portions.

17 Apparatus according to any of claims 13-16 wherein the expandable portion is attached to an end of one of the door portions and the opposing end of the expandable portion is selectively contacted with the other of the door portions so that the relative movement of the door portions causes the expandable door portion causes the expandable portion to move between a retracted and expanded conditions.

18. Apparatus according to claim 17 wherein the expandable portion is permanently attached to one of the door portions and the opposing end of the expandable portion is selectively locatable by the other of the door portions such that when the door assembly is in the closed configuration the expandable portion contacts both door portions and when in the retracted condition the expandable portion is only in contact with one of the door portions.

19 Apparatus according to any of the preceding claims wherein at least a portion of the second floor is moveable with respect to the roof and first floor.

20 Apparatus according to claim 19 wherein the second floor is moveable from a raised position in which goods are supported thereon, to a lowered position closer to the first floor to allow goods to be moved from and onto the said second floor from external loading apparatus.

21 Apparatus according to any of the preceding claims wherein the said first and second floors include sections which extend towards the rear end wall and diverge from each other and also from the roof.

22. Apparatus according to claim 21 wherein the said front portion of the first floor and at least part or all of the front portion of the second floor are fixed in position and the remainder of the second floor which extends to the rear of the trailer is moveable in height.

23 Apparatus according to claim 22 wherein at least the moveable portion of the second floor is retained in the raised or lowered positions during movement of the trailer.

24. Apparatus according to any of the preceding claims wherein any variation in angle of the path of one or both of the floors of the trailer is confined to the floors.

25. A goods movement trailer, said trailer including a goods storage cavity defined by side walls, a front end wall, a rear end wall, an access opening, a roof, and first and second vertically spaced floors which define two portions of the said cavity and a door assembly is provided at the access opening, to allow access,

when open, to at least one of the said portions of the said cavity, said trailer formed with a plurality of sections, at least a first section extending from the front end wall towards the rear end wall and a second section between the first section and the rear end wall and wherein in the first section there is a first height between the first floor and the second floor and a first height between the second floor and the roof, and at the rear end wall there is provided a second height between the first floor and the second floor and a second height between the second floor and the roof and at least one of the said second height values is greater than the said first height values.

26 Apparatus according to claim 25 wherein both the second height values are greater than the respective first height values.

27 Apparatus according to claim 26 wherein the said second height values are the same.

28 Apparatus according to any of claims 25-27 wherein the said first height values are in the range of 1760-1780mm and the second height values are in the range of 1850-1870mm.

29 A goods storage trailer, said trailer including a goods storage cavity defined by sidewalls, a front end wall, a rear end wall in which an access opening is formed, a roof, and a first base floor and a second floor located above the first floor which define two portions of the said cavity and a door assembly is provided at the access opening, and at where at least a portion of the second floor is moveable vertically between a lowered position for loading and unloading goods onto and from the same, and the raised position thereby allowing the said trailer to be used with a loading bay which is provided at a fixed height and a loading bay which is a vertically moveable platform.

30. Apparatus according to claim 29 wherein the said portion of the second floor is angularly moveable between a position in which the same is substantially parallel with the base floor and a roof and a second position in which the said portion is angularly offset to the roof and/or base floor.

31. Apparatus according to claim 29 wherein the said portion is located towards the rear end wall of the trailer.

32 Apparatus according to claim 29 wherein the said portion comprises the entire second floor.

33 Apparatus according to claim 29 wherein the trailer door assembly includes two portions which are selectively moveable in a vertical direction to allow the same to be moved to a first open position to allow access to be gained to a cavity portion defined between the second floor and the roof and a second open position to allow access to be gained to a cavity portion defined between the base floor and the second floor.

34. A goods movement trailer, said trailer including a goods storage cavity defined by sidewalls, a front end wall, a rear end wall in which an access opening is formed, a roof, a first, base floor, and a second floor located above the first floor, which define two portions of the said cavity and the door assembly is provided at the access opening and wherein the second floor is provided so as to be angularly offset with respect to the roof such that the distance between the upper surface of the second floor and the inner surface of the roof progressively increases from the front end wall towards the rear end wall.

35 Apparatus according to claim 34 wherein drive means are provided to allow the second floor to be moveable between the transport position and a loading/unloading position and the

distance of the second floor from the roof when in loading/unloading position is greater than when the second floor is in the transport position.

36 Apparatus according to claim 34 wherein an angular offset of the second floor is maintained during movement between the loading/unloading and transport positions.

37 Apparatus according to claim 34 wherein the base floor is formed such that there is provided a portion towards a front end wall which is substantially parallel with the roof and a portion towards the rear which is angularly offset from the roof.

38 Apparatus according to claim 34 wherein the chassis of the trailer includes a kink which extends across the width of the same and which is located substantially at the transition between the first and second portions of the base floor.

39 A goods movement trailer, said trailer including a goods storage cavity defined by sidewalls, a front end wall, a rear end wall in which an access opening is formed, a roof, a first, base floor and a second floor located above the first floor and which define two portions of the said cavity and a tail lift provided at the access opening wherein the said tail lift is operable in a first floor to have an external platform which is moveable upwardly and downwardly along at least part of the height of the access opening and in a second load in which to have a platform located externally and internally of the trailer which is moveable upwardly and downwardly along at least part of the height of the access opening.

40 Apparatus according to claim 39 wherein the movement of the platform is substantially vertically in both modes.

41. Apparatus according to claim 39 wherein in the first mode the platform is moved by an externally mounted portion and in the second mode the platform is formed by the said externally mounted portion and a portion of one of the floors of the trailer.

42. Apparatus according to claim 39 wherein the range of movement of the platform when it is in the first mode is different to the range of movement when the platform is operating in the second mode.

43. Apparatus according to claim 42 wherein the respective ranges of movement overlap.

44 Apparatus according to any of the preceding claims wherein the trailer is provided as part of an articulated vehicle.

45 Apparatus according to any of claims 1-44 wherein the trailer is mounted on a body of a vehicle to form a fixed part thereof.

46. Apparatus according to any of the preceding claims wherein the chassis of the trailer includes a kink which extends across the width of the same.

47 Apparatus according to claim 46 wherein the kink is located substantially at the transition between first and second sections of the base floor so as to define the same.

48 Apparatus according to claims 46 or 47 wherein the kink reflects and allows the change in angle of the first floor from the front end to the rear end so as to increase the height between the first and second floors towards the rear end wall.

49. Apparatus according to any of the preceding claims wherein the second floor is substantially parallel with the roof along its length and first floor diverges from both the floor and roof from the front end wall to the rear end wall.

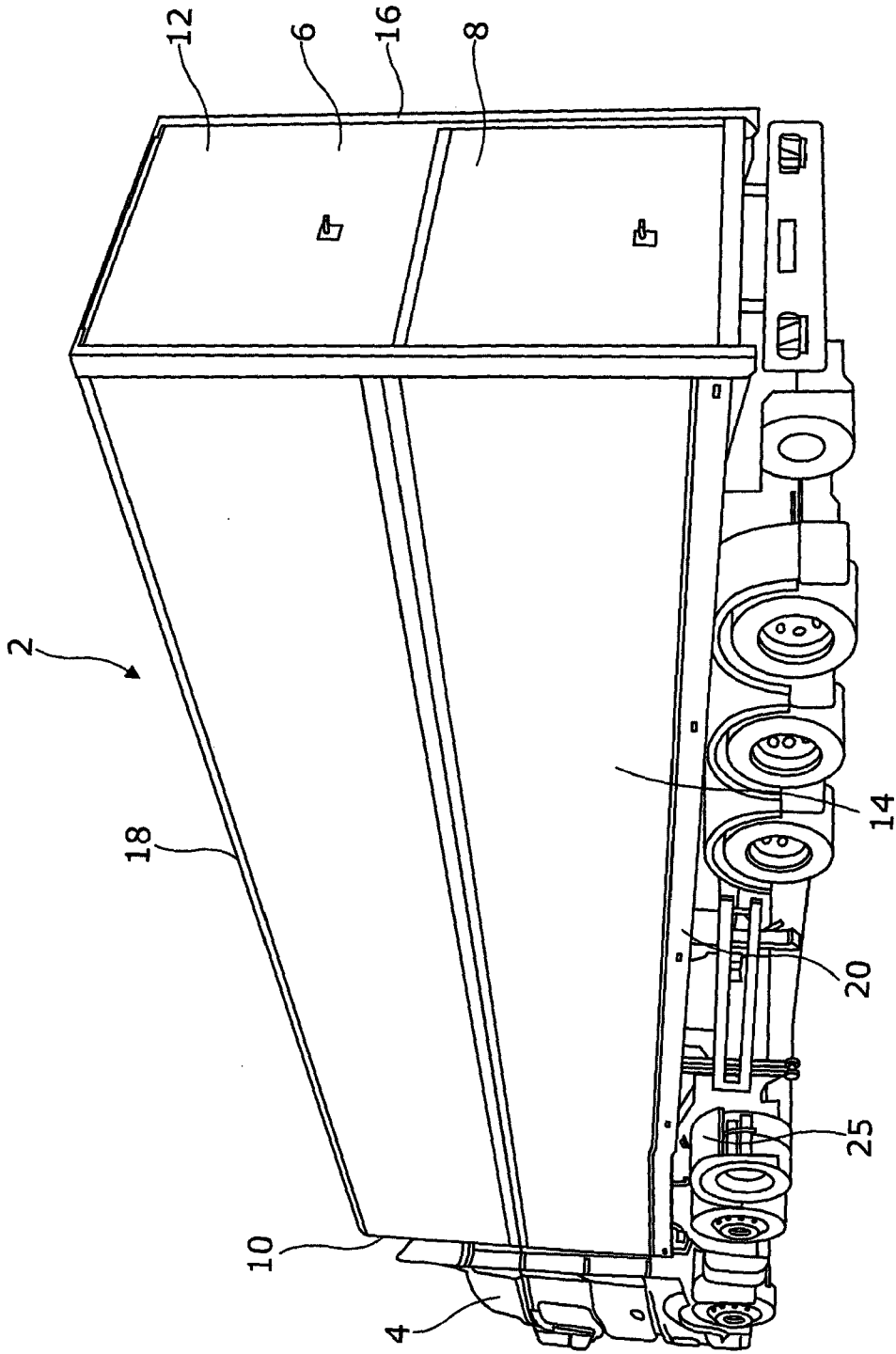


Figure 1a

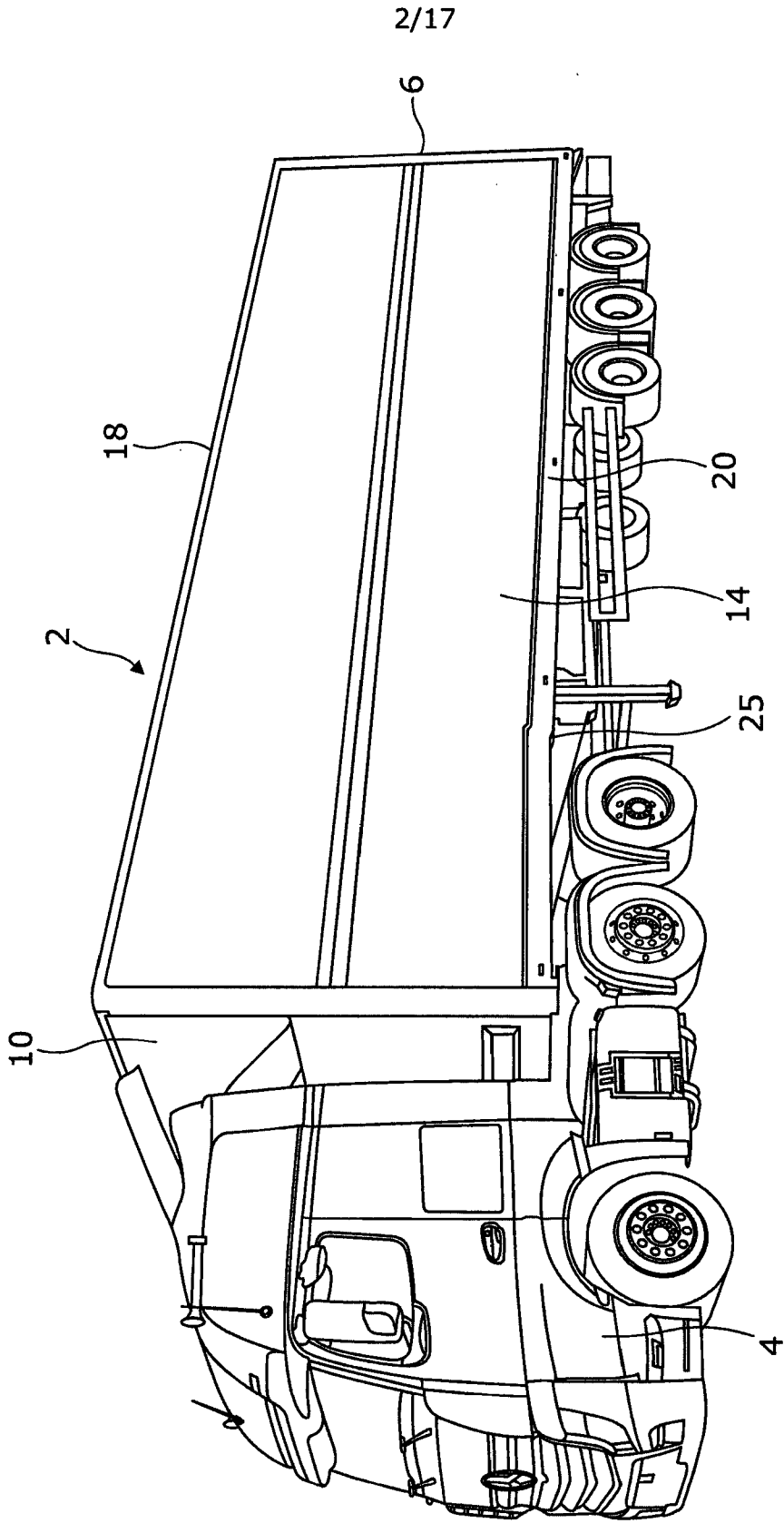


Figure 1b

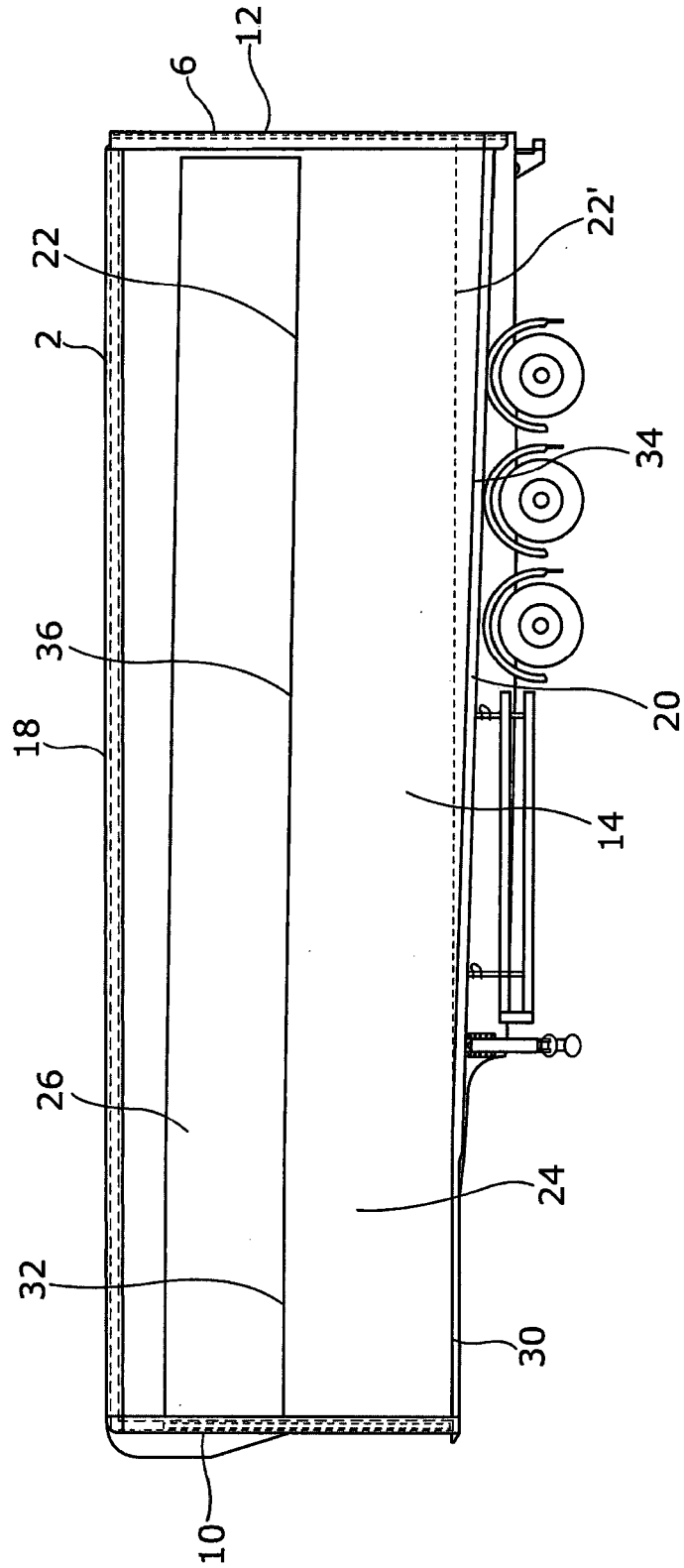


Figure 1c

4/17

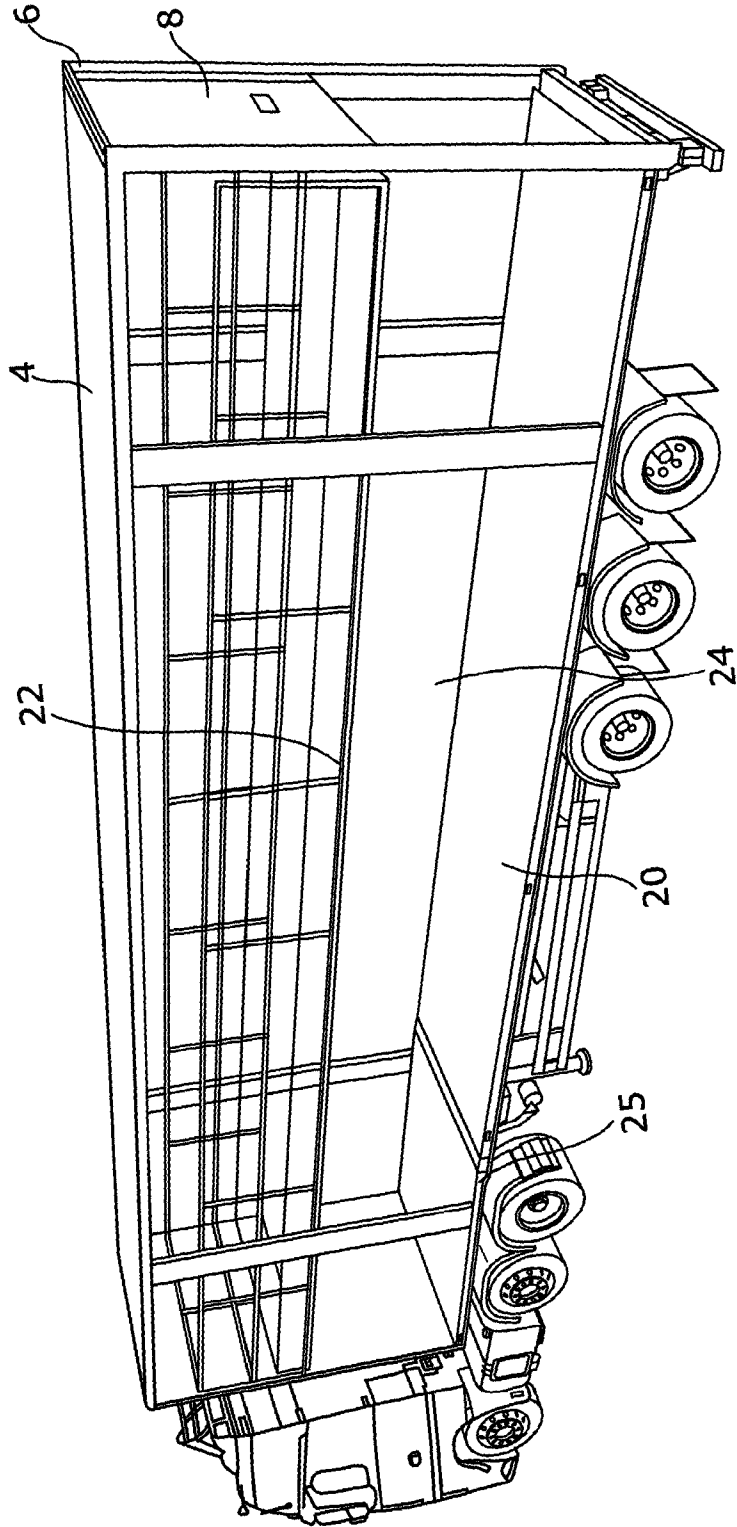


Figure 2a

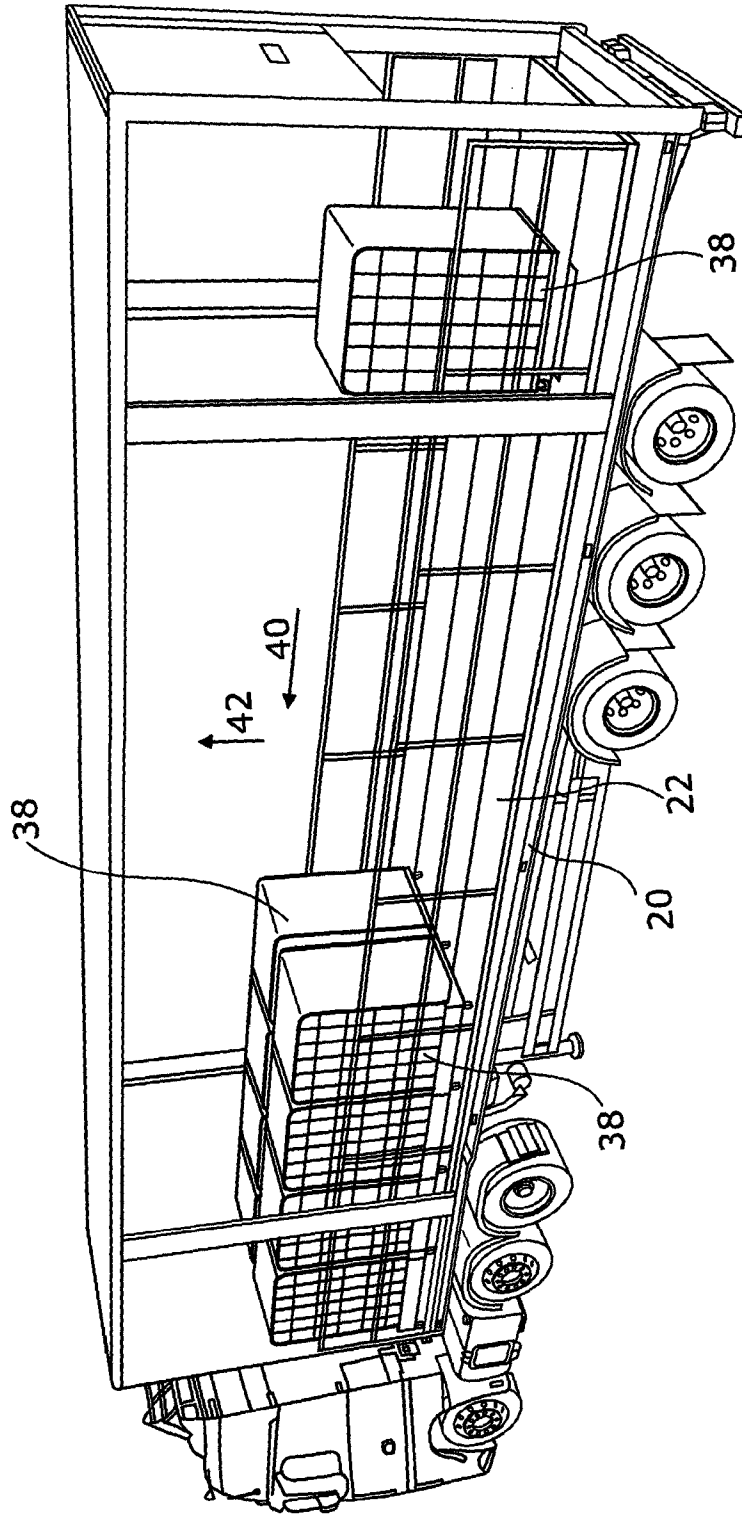


Figure 2b

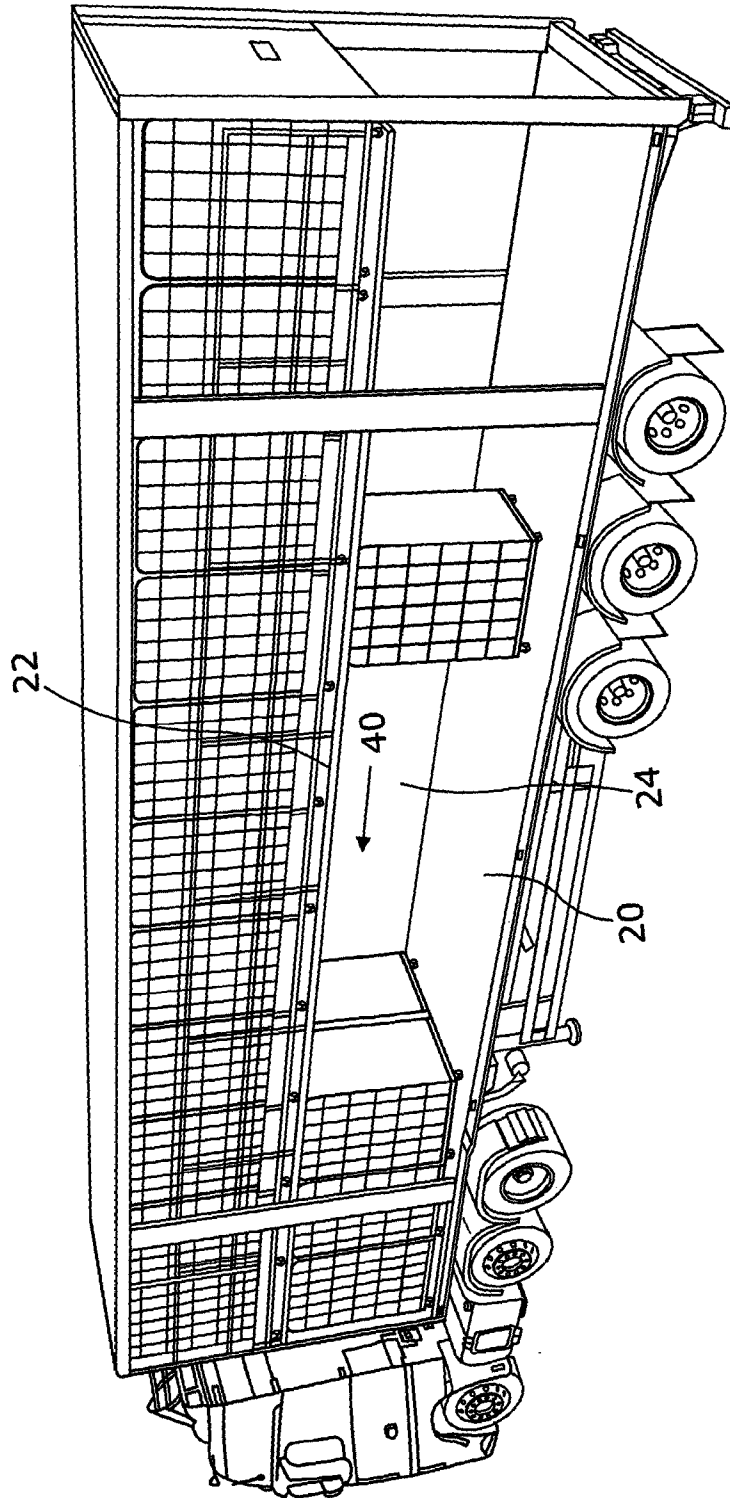


Figure 2c

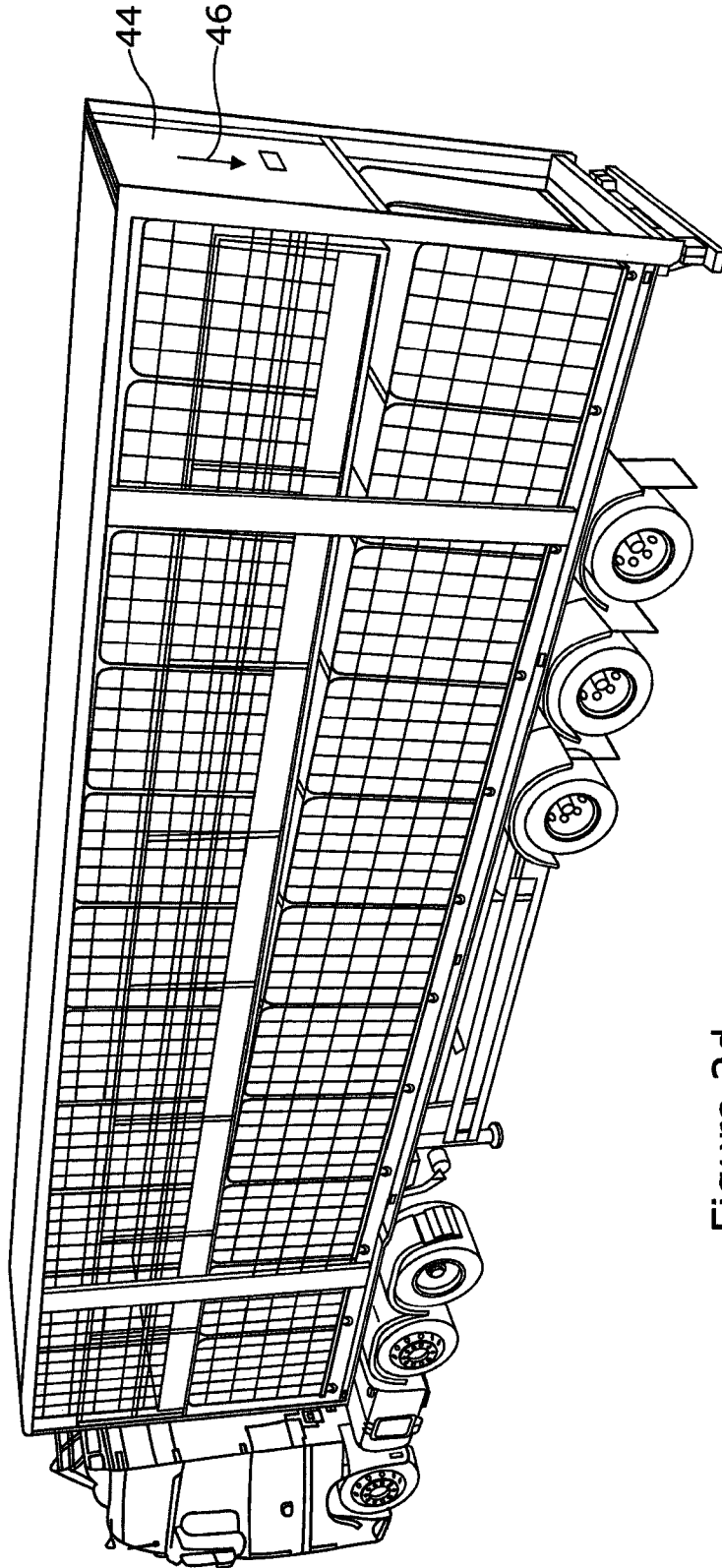
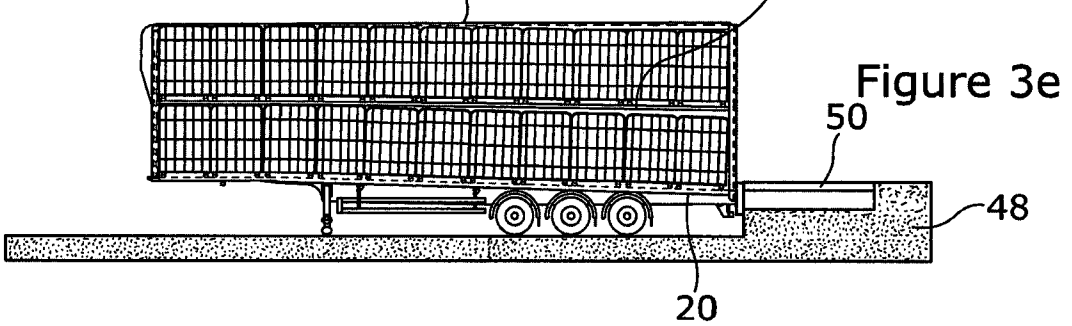
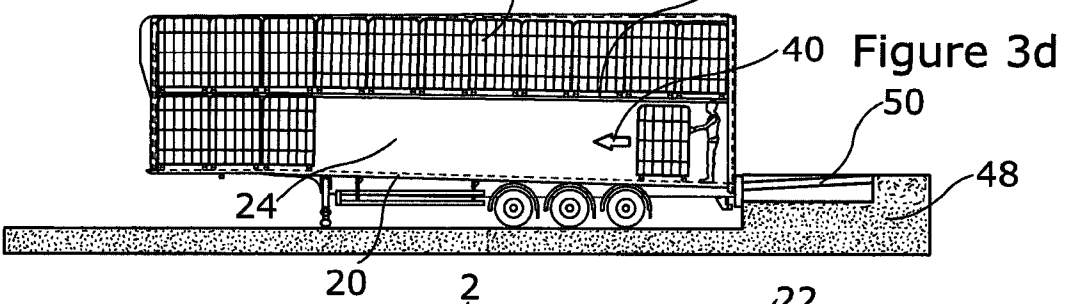
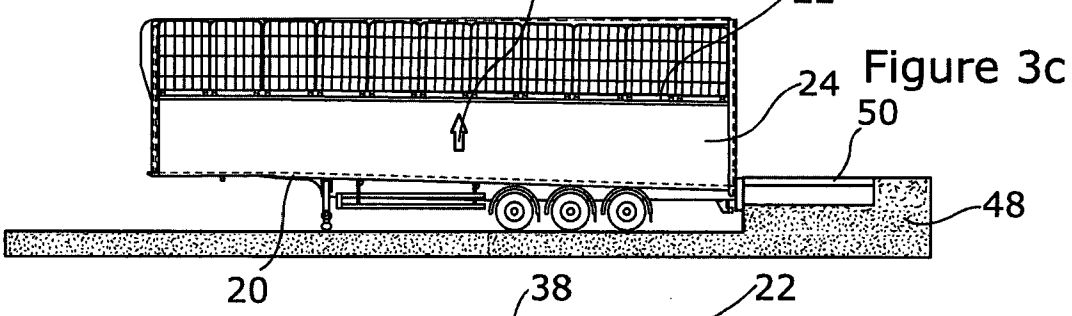
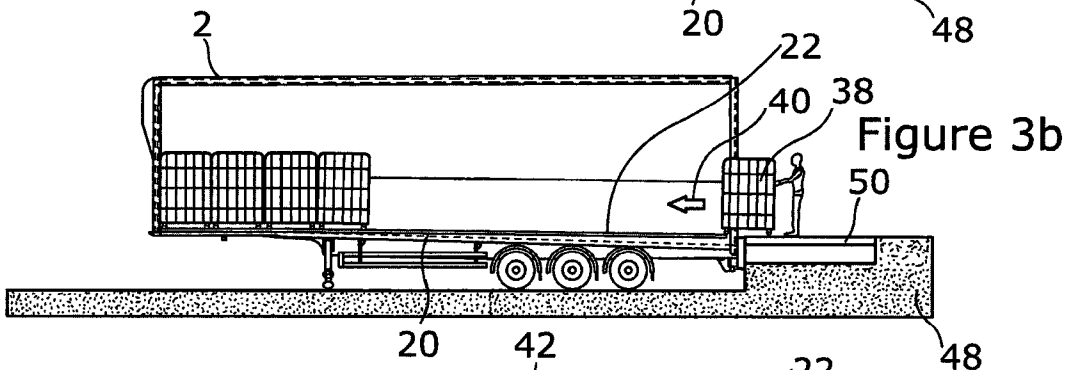
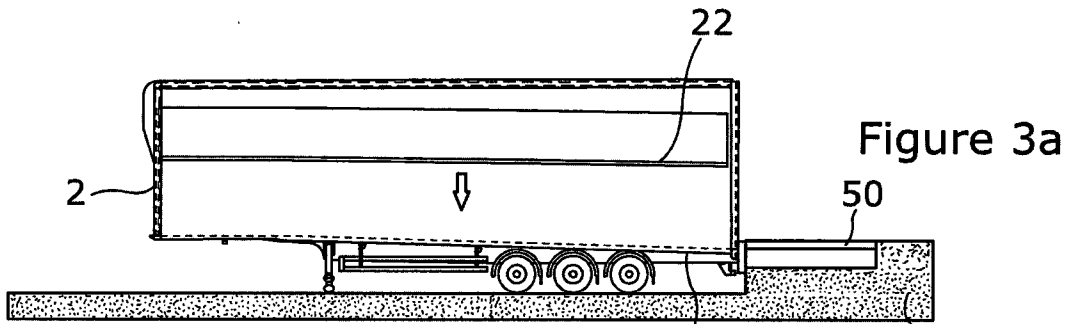


Figure 2d



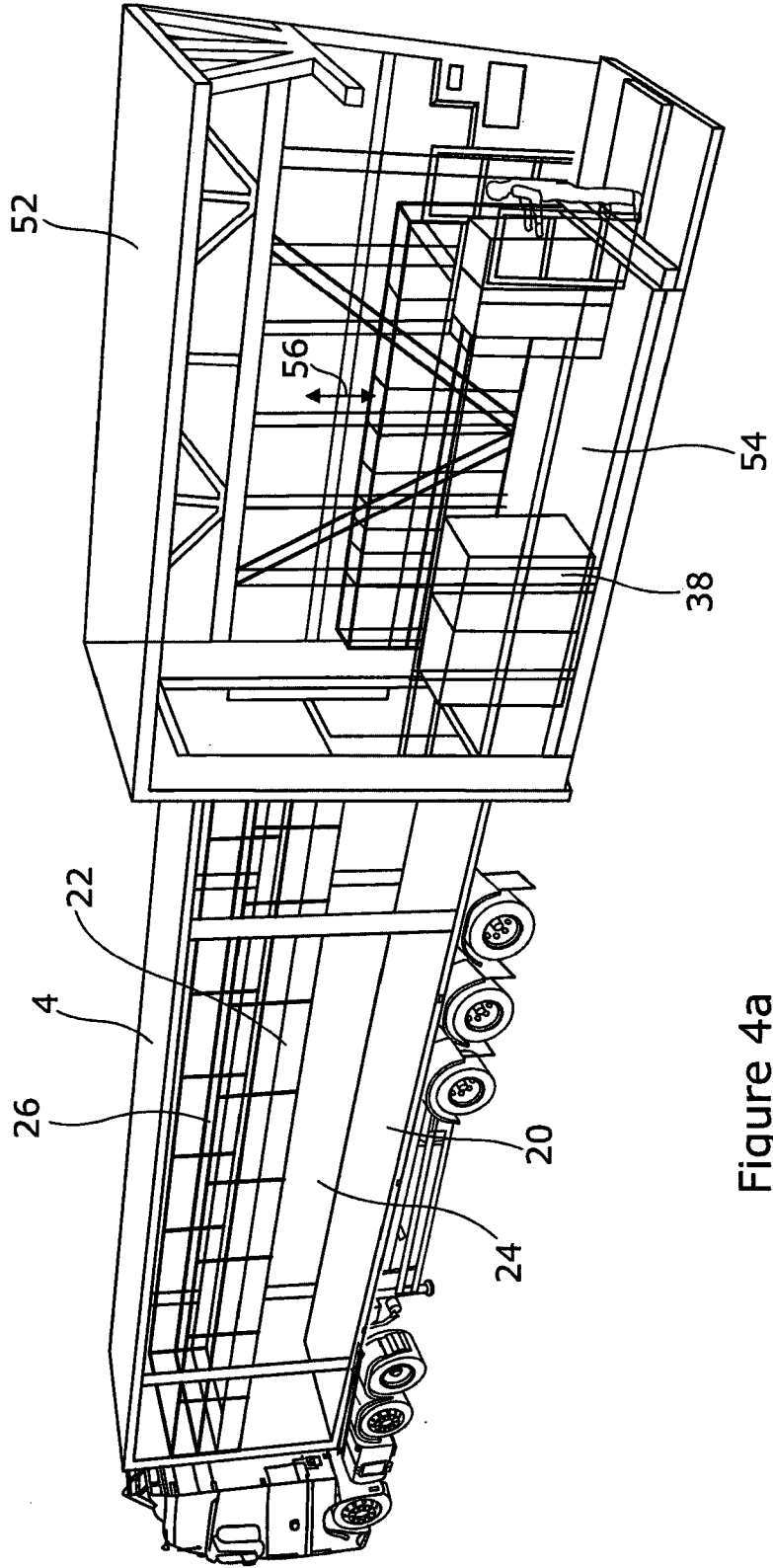


Figure 4a

10/17

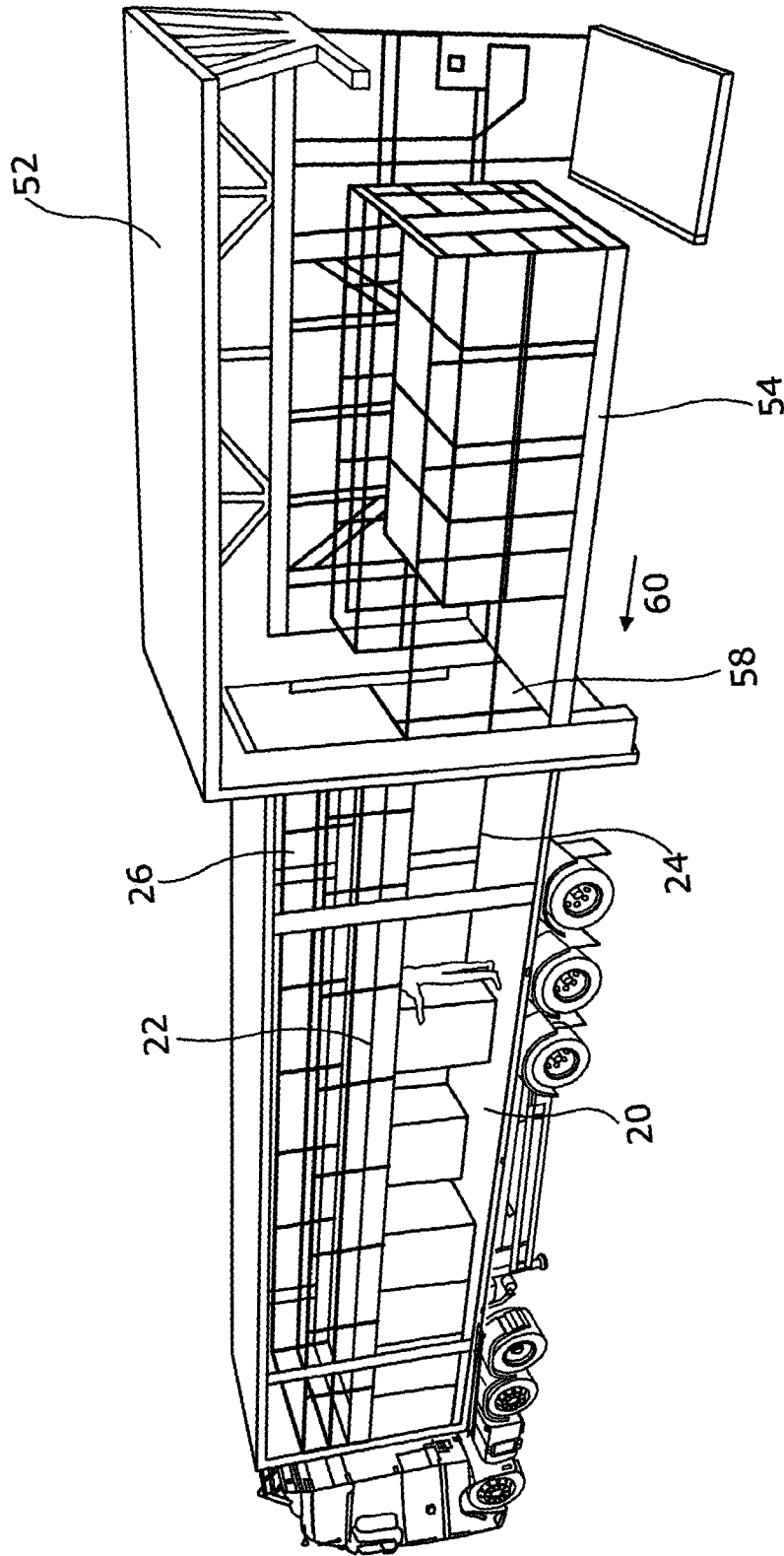


Figure 4b

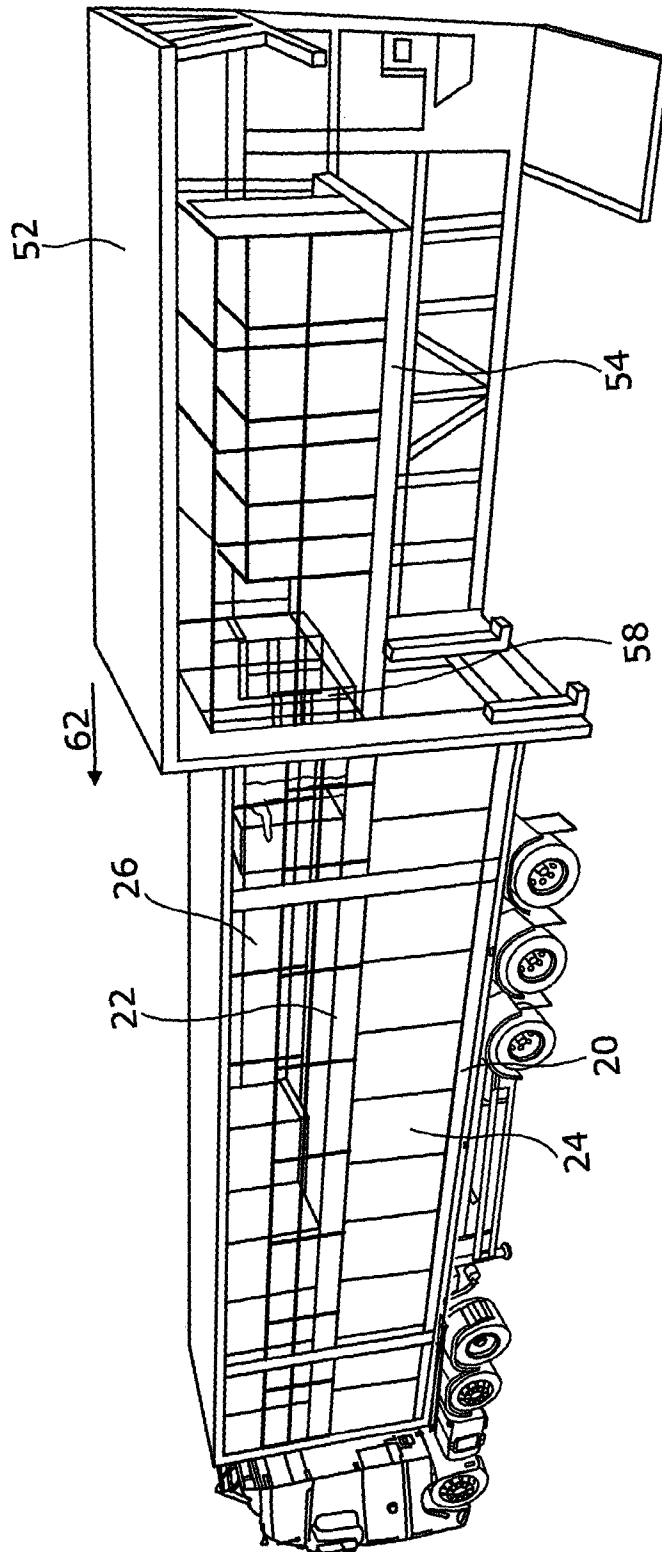


Figure 4c

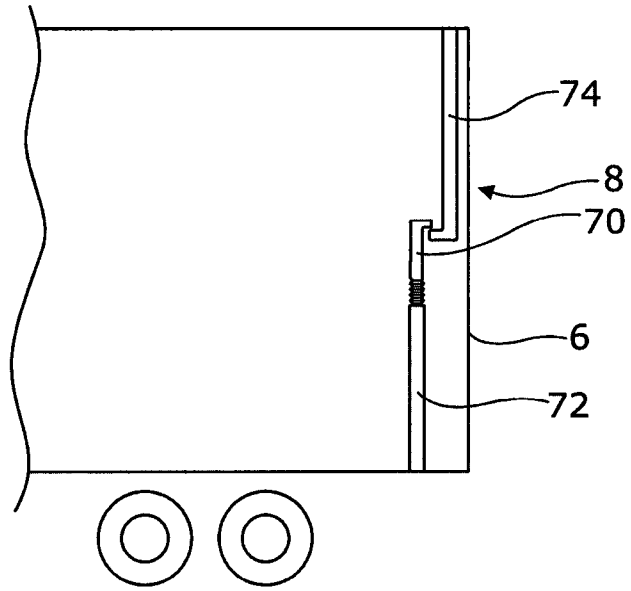


Figure 5a

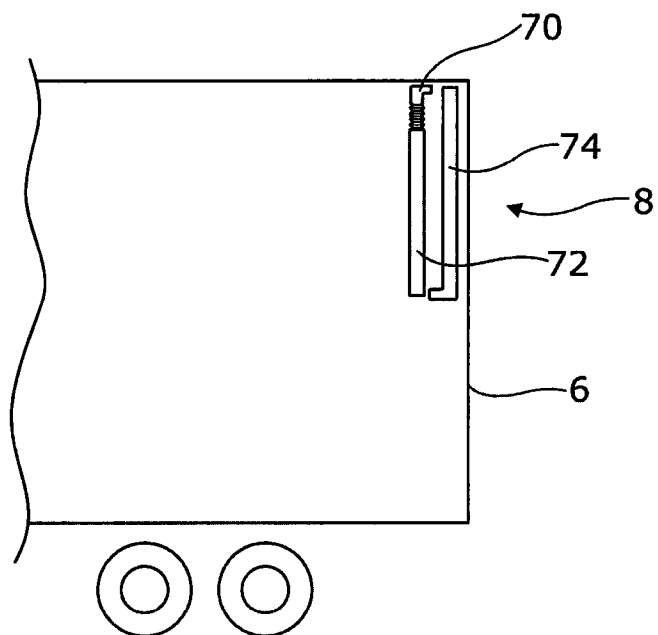


Figure 5b

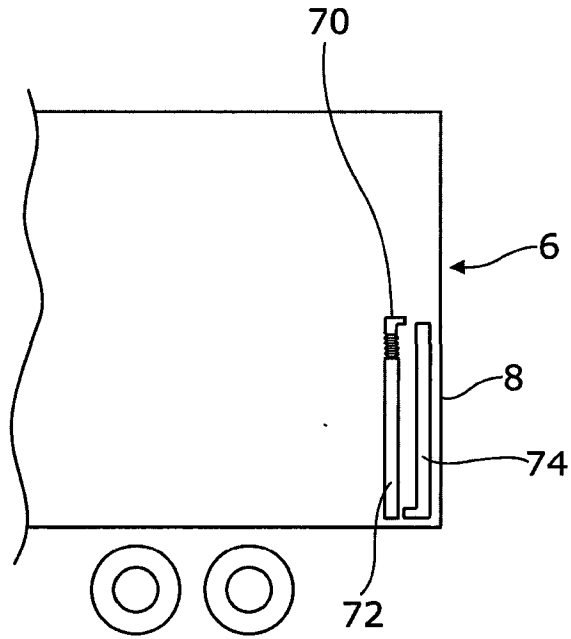


Figure 5c

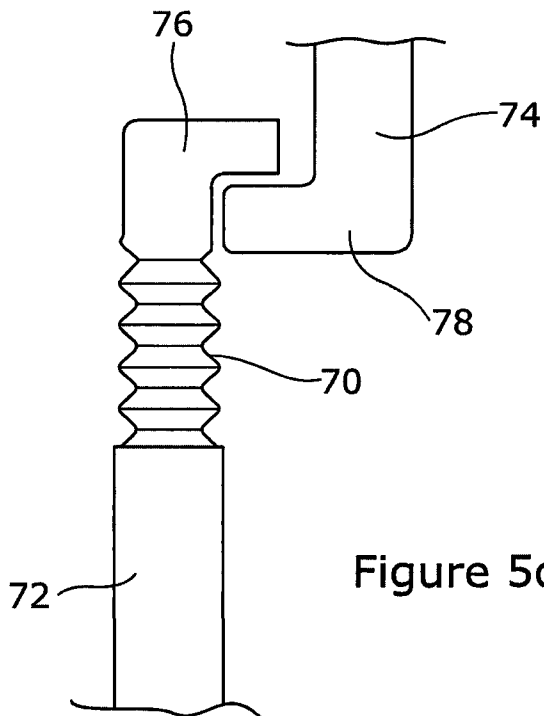


Figure 5d

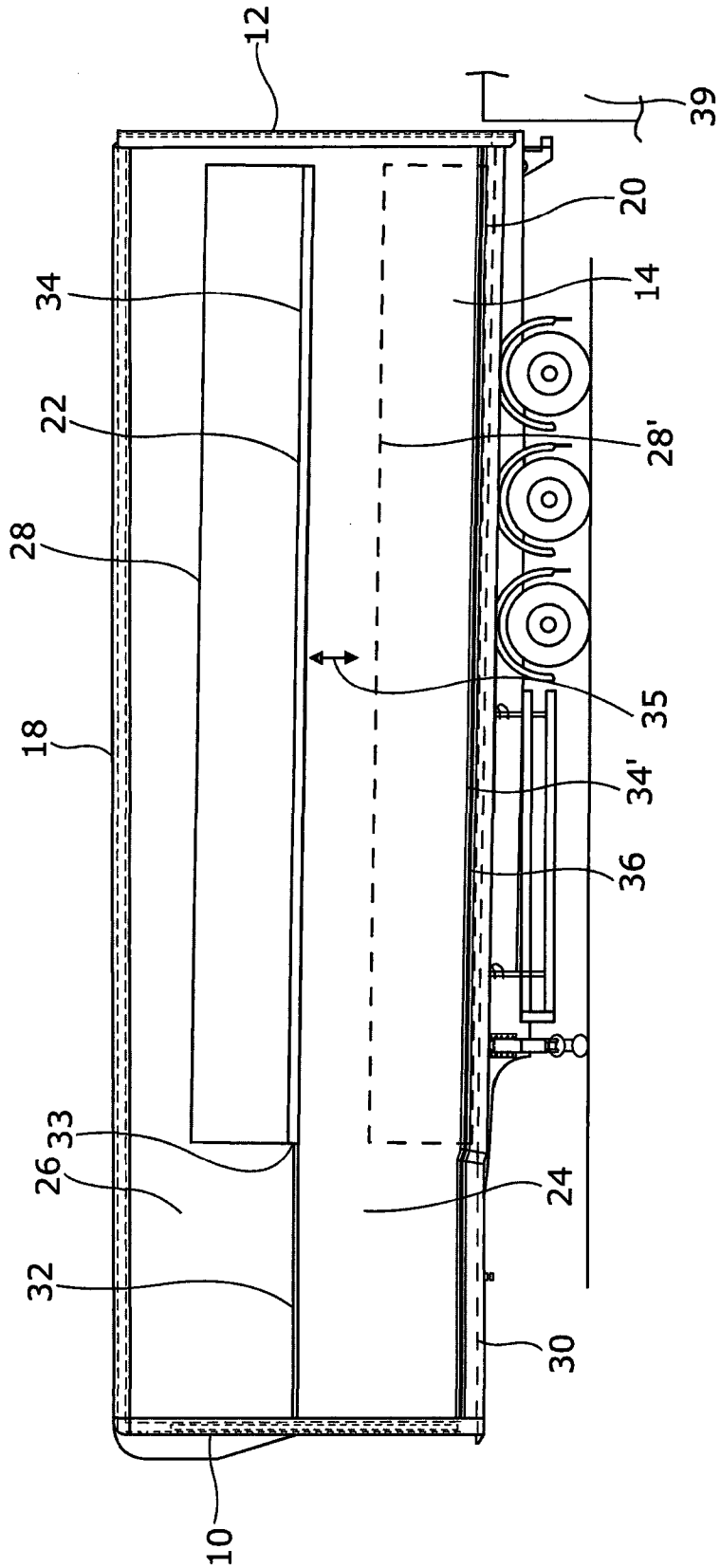


Figure 6

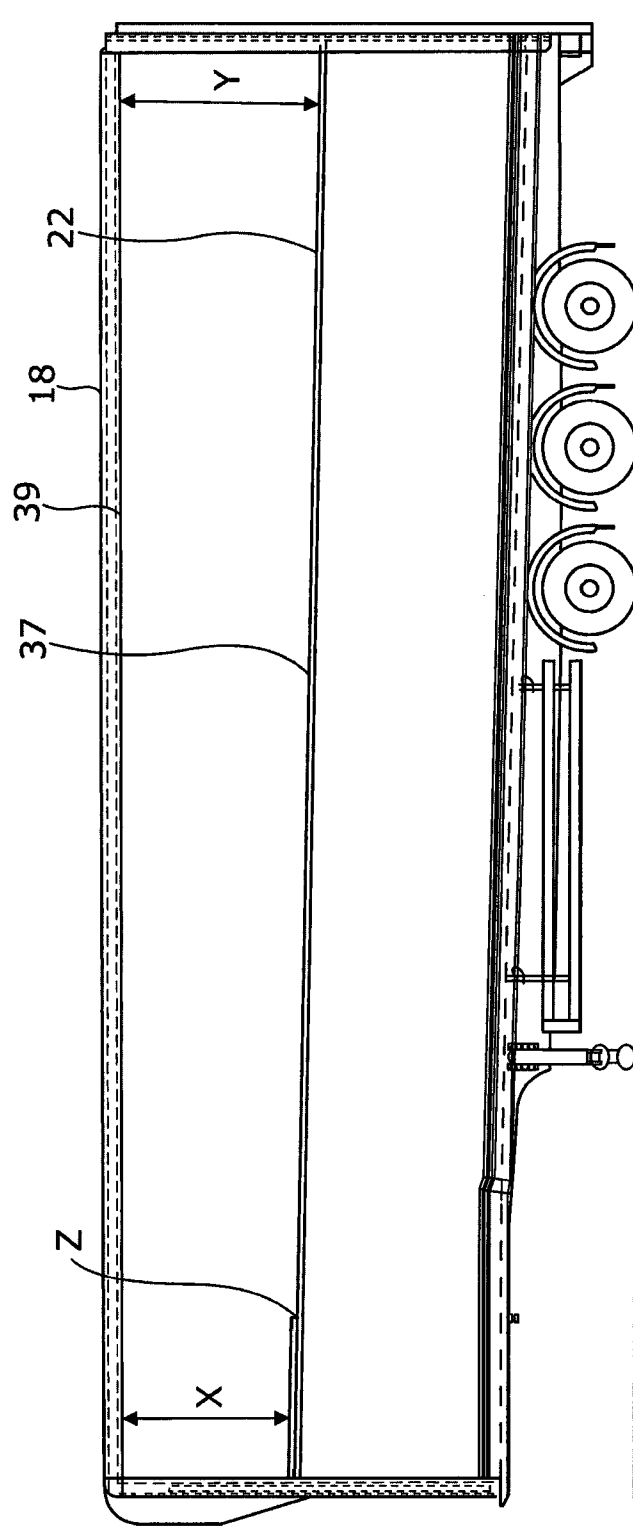


Figure 7

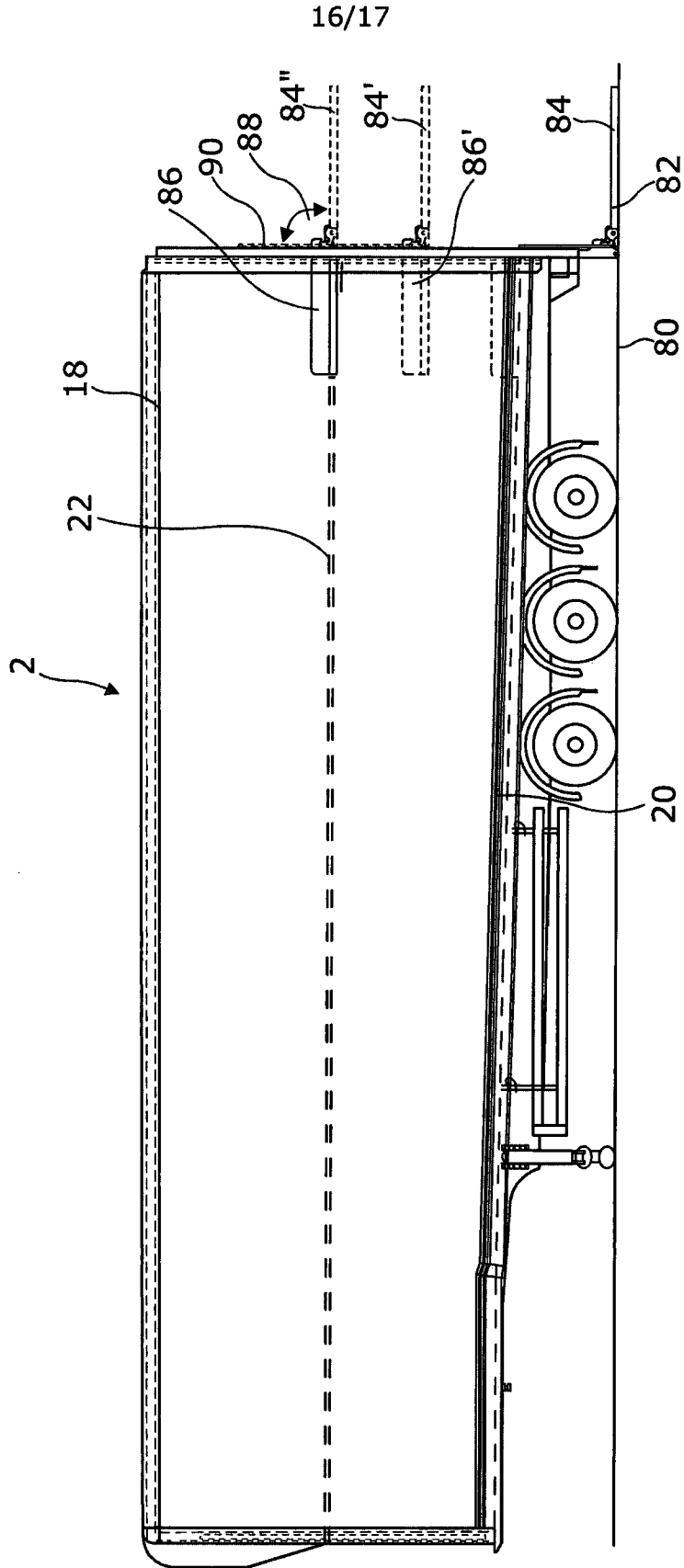


Figure 8

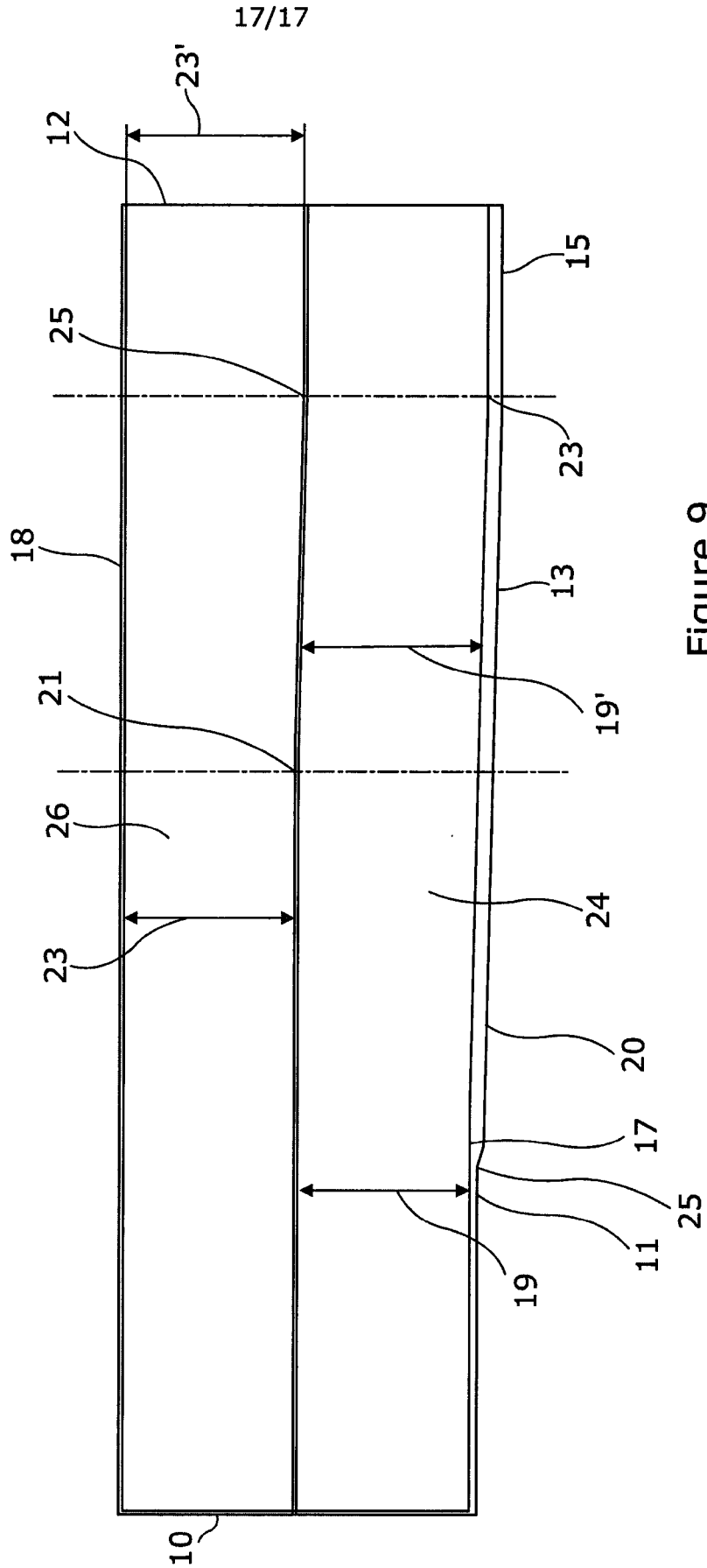


Figure 9

INTERNATIONAL SEARCH REPORT

International application No PCT/GB2018/051038

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B60P1/02 B60P1/44 B60P1/64
 ADD. B60P1/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 B60P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 966 510 A (JOHNSON JR JAMES N [US]) 30 October 1990 (1990-10-30)	1-10, 19-32, 44-49
Y	abstract column 5, line 34 - column 5, line 55 column 7, line 44 - column 8, line 12 column 9, lines 17-34 column 13, line 56 - column 14, line 4 figures 1, 2, 7	11,12
X	----- GB 2 532 839 A (WILLIAM MARK ADAMS [GB]) 1 June 2016 (2016-06-01) cited in the application abstract page 6, line 1 - page 7, line 28 claims 1, 4 figures 1-4 -----	1-10,21, 24-28, 34,37, 38,44-49
	-/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

24 July 2018

Date of mailing of the international search report

25/09/2018

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
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 Fax: (+31-70) 340-3016

Authorized officer

Larangeira, F

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2018/051038

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 4 738 575 A (BLODGETT WILLIAM W [US] ET AL) 19 April 1988 (1988-04-19)</p> <p>abstract column 3, lines 5-13 column 4, line 5 - column 5, line 14 column 7, lines 15-19 figures 1, 2, 5, 6</p>	<p>1-5, 8-10, 19-31, 34-38, 44-49</p>
Y	<p>-----</p> <p>DE 20 2013 105403 U1 (KUVVETLI SAMI [DE]) 16 December 2014 (2014-12-16) abstract figure 5a</p>	<p>11,12</p>
Y	<p>-----</p> <p>EP 0 849 136 A2 (INTEGRAL VERKEHRSTECH AG [AT]) 24 June 1998 (1998-06-24) abstract figure 2</p> <p>-----</p>	<p>11,12</p>

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2018/051038

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-12, 19-32, 34-38, 44-49

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-12, 19-32, 34-38, 44-49

Goods movement comprising two vertically spaced loading floors, characterised in that said floors include a change in angle and/or are movable with respect to the roof.

2. claims: 13-18, 33

Goods movement trailer comprising two vertically spaced loading floors, characterised in that it comprises a door including a first and a second portion, wherein one of said portions includes an expandable portion.

3. claims: 39-43

Goods movement trailer comprising two vertically spaced loading floors, characterised in that it comprises a tail lift operable in a first mode in which said tail lift comprises a platform located externally of the trailer and in a second mode in which said tail lift comprises a platform located externally and internally of the trailer.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/GB2018/051038

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4966510	A	30-10-1990	NONE
GB 2532839	A	01-06-2016	FR 3028480 A1 20-05-2016
			GB 2532839 A 01-06-2016
US 4738575	A	19-04-1988	NONE
DE 202013105403	U1	16-12-2014	NONE
EP 0849136	A2	24-06-1998	AT 1331 U2 25-03-1997
			EP 0849136 A2 24-06-1998