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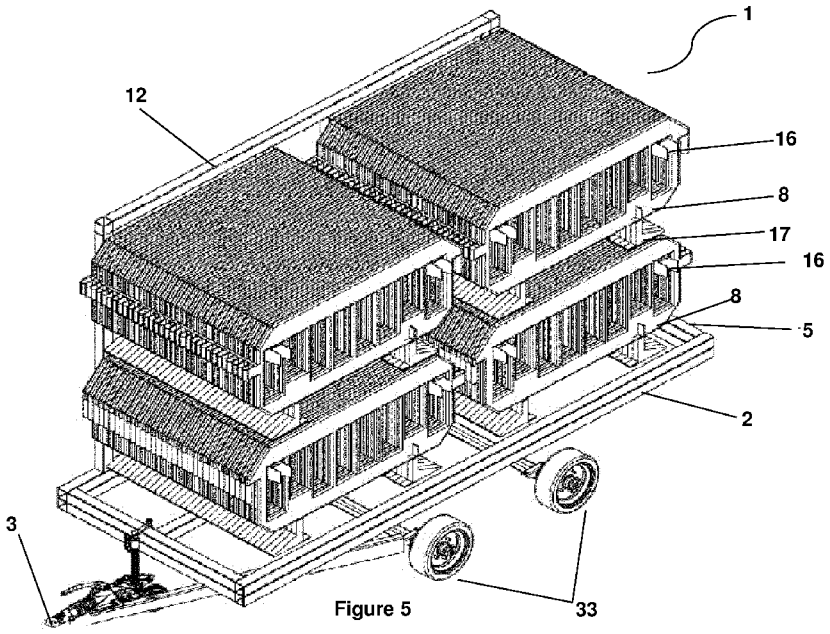

Figure 5

(57) Abstract: An assembly for handling barriers comprising a chassis, the chassis having a leading end and a trailing end and two opposing lateral portions extending between the leading end and the trailing end. The assembly has an arrangement for supporting barriers being mountable on the chassis. The arrangement for supporting barriers is adapted for receiving and dispensing barriers along one lateral portion of the chassis only.

AN ASSEMBLY FOR HANDLING BARRIERS

The present invention relates to an assembly for handling barriers and in particular to an assembly for the stowage of temporary barriers, such as roadwork barriers etc.

Temporary barriers of this kind have a wide range of functions. Barriers are utilised as a safety device for road workers to protect them from traffic by securing a portion of the road or motorway etc. These barriers secure a portion of the road while operators undertake installation, maintenance or upgrade work or the like services on the side of the road. As the workers move along, the area requiring cordoning off moves and so the barriers have to be moved along the road as the workers progress. Police utilise barriers to delimit and secure particular routes or locations such as directing traffic and other road users in times of emergency. Event organisers use these barriers for crowd control, preventing a large number of individuals entering a small confined space at once such as festivals, concert halls etc. Barriers are also used in a variety of circumstances to prevent individuals gaining access to otherwise restricted areas. However, the placement of these barriers prior to the event and collection subsequent to the event can be a logistically challenging task for all operators involved.

Trailers for transport of barriers and for assisting operators with installation and recovery of barriers from worksites are well known. Conventional trailers require an operator to load the trailer from two sides. The support mechanism for barrier handling trailers is conventionally located along or proximal to the center of the trailer. This requires that an operator upon collection and installation of the barriers must place or remove barriers from both sides of the trailer to get all the barriers off and to allow equal balance of the weight of the barriers on the trailer otherwise the trailer can become unstable. The removal from both sides of the trailer for getting the job done and for counter balancing purposes is a time consuming task as barriers are typically placed along a roadside for example in a linear arrangement. This requires an operator to remove half of the barriers from a side facing away from the desired barrier placement location and maneuver it around the trailer for placement. This is particularly cumbersome in the case of road workers or the police while partitioning off a section of road proximal to moving traffic as it increases the health and safety risk of workers exposed to traffic offloading barriers from one side of the assembly.

It is an object of the present invention to provide an improved assembly for handling barriers, whereby barriers or the like can be distributed and collected in a safe, time efficient manner beyond that which is possible using the prior art.

Accordingly, the present invention provides an assembly for handling barriers comprising:

a chassis;

the chassis having a leading end and a trailing end and two opposing lateral portions extending between the leading end and the trailing end;

means for supporting barriers being mountable on the chassis;

wherein the means for supporting barriers is adapted for receiving and dispensing barriers along one lateral portion of the chassis only.

Advantageously, this means that all barriers are dispensed from the assembly and loaded back onto the assembly at the exact location where they are required meaning there is no double handling of barriers. Instead each barrier is off loaded in sequence and placed alongside the previous barrier on the inside of the assembly keeping workers safe from any traffic.

Preferably, the chassis having a carriage means.

Ideally, the assembly comprises a trailer.

In an alternative arrangement, the assembly is mounted on or built into a vehicle with an open ended rear or open ended leading end or open ended lateral portion for transporting equipment such as barriers. Vehicles such as pick-up trucks or flatbed lorries are suitable for mounting the assembly on or alternatively designing a bespoke vehicle such as a pickup truck or flatbed lorry with an integrated assembly for handling barriers.

Ideally, in this alternative arrangement, the chassis of the vehicle and the chassis of the assembly for handling barriers can be a common chassis.

Ideally, the means for supporting barriers comprises upright support means extending upwards from the chassis.

Preferably, the means for supporting barriers is movably mounted on the chassis.

Ideally, the means for supporting the barriers comprises means for carrying the barriers.

Ideally, the means for carrying the barriers is directly contactable with the barriers supporting the barriers during transport and handling.

Preferably, the means for carrying the barriers protrude from the upright support means towards a lateral portion of the chassis.

Ideally, the upright support means is movably mounted on the chassis.

Preferably, the upright support means extends upwards from the chassis proximal to a lateral portion of the chassis.

Ideally, the upright support means is located proximal to and extends along a lateral portion of the chassis in one position.

Advantageously, the assembly adopts this position when the barrier support means is fully loaded with barriers or empty.

Ideally, the upright support means comprises at least one upright stanchion for supporting the weight of the barrier carrying means and the barriers.

Preferably, the upright support means comprises a plurality of upright stanchions spaced apart along all or a part of the length of the assembly between the leading and trailing end of the chassis.

Ideally, the plurality of upright stanchions are in alignment.

Preferably, the stanchions are connected by rails to form an upright support frame for improving the rigidity of the upright support means.

Preferably, motive means are operably couplable between the barrier supporting means and the chassis.

Advantageously, the motive means allows the barrier supporting means to move relative to the chassis. This allows the weight of the barriers to be evenly distributed across the chassis of the assembly to avoid excess weigh being applied on either side of the assembly.

Ideally, the motive means are powered motive means.

Preferably, the motive means have a power source on the assembly.

Ideally, the motive means is operably coupleable between the stanchion and the chassis.

Preferably, the motive means is mechanical, electromechanical or hydraulic.

Ideally, the at least one stanchion has movable coupling means on the base of the stanchion for movably coupling the stanchion to the chassis.

Preferably, the chassis has at least one corresponding chassis coupling means for engaging the stanchion coupling means, the chassis coupling means extending at least partly between the two opposed lateral portions of the chassis.

Ideally, each stanchion has movable coupling means on the base of each stanchion for movably coupling the stanchion to the corresponding chassis coupling means.

Preferably, the chassis has a plurality of corresponding chassis coupling means for engaging the stanchion coupling means, the plurality of chassis coupling means extending at least partly between the two opposed lateral portions of the chassis.

Ideally, the barrier carrying means comprises at least one barrier retention arm protruding from the upright support means.

Preferably, the barrier carrying means comprises at least one barrier retention arm protruding from the stanchion.

Preferably, the barrier carrying means protrudes from the upright support means at a vertical distance sufficient so that the base of the barriers are supported a distance above the chassis or any floor of the assembly.

Advantageously, this gap between the chassis or floor of the assembly and the base of the barrier allows an operator to easily slide the barrier along the barrier carrying means on and off the assembly.

Preferably, the barrier carrying means protrudes from the upright support means at two different vertical levels.

Advantageously, this allows barriers to be stacked on top of each other in a double decker fashion.

Preferably, the first level of barrier carrying means comprises a plurality of barrier retention arms protruding from the upright support means at approximately the same height as one another above the floor of the chassis.

Ideally, the second level of barrier carrying means comprises a plurality of barrier retention arms protruding from the upright support means at approximately the same height as one another above the floor of the chassis and above the first level of barrier carrying means.

Ideally, the second level of barrier carrying means are located vertically above the first level of barrier carrying means a distance greater than the overall vertical height of the barrier.

Advantageously, this ensures the second level of barriers do not engage the first level of barriers during transport, storage, loading or offloading

Ideally, the barrier retention arm is a cantilever beam.

Preferably, the barrier retention arm is length adjustable.

Ideally, fastening means are provided to fasten the barriers to the assembly.

Preferably, fastening means are provided to fasten the barriers to the upright support means or the barrier supporting means or the barrier carrying means.

Ideally, the fastening means to fasten the barriers to the assembly or upright support or the barrier supporting means or the barrier carrying means is provided by elongate flexible members, straps, belts, belts and buckles or flexible bracing members or any combination of these fastening arrangements.

Preferably, the trailer comprises a tow hitch which is detachable from the chassis.

Ideally, the trailer provides a storage means offsite or in a storage area.

Advantageously, there is no requirement to offload the barriers during storage and so there is less risk of barriers getting damaged whilst leaning against walls or resting on top of each other or lying loose in the yard/storage area while in storage.

Ideally, the barrier retention arm protrudes from the upright support means substantially parallel to the chassis.

Preferably, the barrier retention arm is moveable relative to the chassis.

Ideally, retention arm driving means provides the relative movement of the barrier retention arm and the chassis.

Ideally, the retention arm driving means are operably couplable between the upright support means and the barrier retention arm to provide movement of the barrier retention arm.

Preferably, the retention arm drive means are powered drive means.

Ideally, the retention arm drive means has a power source on the assembly.

Preferably, the retention arm drive means uses the same power source as the motive means on the assembly.

Preferably, the assembly comprises a pivotal coupling arrangement pivotally coupling the barrier retention arm to the upright support means.

Ideally, the pivotal coupling arrangement enables rotation of the barrier retention arm around the upright support means.

Advantageously, this allows the barrier retention arm to be rotated around the upright support means to allow the barrier support means to dispense barriers on both sides of the assembly.

Preferably, the pivotal coupling arrangement enables the barrier retention arm to rotate at least 180 degrees.

Preferably, the barrier retention arm comprises at least first and second shaft members.

Ideally, the first shaft member and the second shaft member are axially adjustable relative to one another for allowing the retention arm to extend from a retracted configuration to an extended configuration.

Preferably, the axially adjustable first and second shaft members comprise of telescopic components.

Ideally, relative movement of the first and second shaft members is assisted via a guiding mechanism.

Preferably, either or both of the first shaft member and/or the second shaft member has a mechanism for guiding the relative movement of the other shaft member.

Ideally, either or both of the first shaft member and/or the second shaft member has a mechanism for moving the other shaft member via the guiding mechanism towards the opposing lateral portion of the chassis. It will be appreciated the movable shaft member could also move beyond this opposing lateral portion of the chassis.

Preferably, the moving mechanism is an actuator.

Ideally, the actuator is a hydraulic ram.

Preferably, the actuator is mounted internally of the retention arm.

Preferably, either or both of the first shaft member or second shaft member has a stop means for halting the movement of the movable shaft member.

Advantageously, the stop means halts the movement of the movable shaft member at a predetermined distance. This predetermined distance corresponds to the amount of load upon the barrier retention arm.

Preferably, the moving mechanism for moving the other shaft member via the guiding mechanism positively engages at least part of the other shaft member.

Ideally, the assembly has an adjustable locking means for preventing the barriers sliding off the retention arms, when required, at or about the free ends of the barrier carrying means.

Ideally, the assembly has an adjustable locking means for preventing the barriers sliding off the retention arms, when required, at or about the free ends of the retention arms.

Ideally, a barrier pushing means is operably coupled with the assembly for pushing barriers towards one lateral portion of the assembly.

Ideally, the barrier pushing means is operably coupled to the barrier supporting means or the barrier carrying means.

Preferably, the barrier pushing means comprises a barrier pushing member such as a plate.

Ideally, an actuator is operably coupled between the barrier pushing means and the barrier supporting means or the barrier carrying means for pushing barriers along the barrier carrying means towards one lateral portion of the assembly.

In a third embodiment, the assembly is movably mounted on the carriage arrangement so that the entire assembly is tiltable towards one or both lateral portion so that the barrier support mechanism is inclined downwards towards that lateral portion making unloading or loading of barriers easier for the operator.

Ideally, the angle of incline of the entire assembly relative to the horizontal plane or main plane of the carriage means can be 1 to 10 degrees, more preferably 2 to 5 degrees and most preferably 3 degrees. However, the angle can be adapted to suit the specific circumstances. It will also be appreciated that the assembly can sit level relative to the carriage arrangement for transport and storage.

Preferably, the chassis of the assembly has a primary base frame which is mechanically coupled to an intermediate frame of the same or similar length and width by fastening means.

Ideally, the carriage comprises at least one axle and two wheels and a carriage chassis built around the axle.

Preferably, the chassis of the assembly comprising the base frame and the intermediate frame are movably coupled to the chassis of the carriage to allow the entire assembly to be tiltable towards one or both lateral portions so that the barrier support

mechanism is inclined downwards towards that lateral portion making unloading or loading of the barriers easier for the operator.

Ideally, one or more actuators are operably coupled between the carriage chassis and the chassis of the assembly to allow the entire assembly to be tilted relative to the carriage.

Preferably, the assembly is movable relative to the carriage between a first orientation for loading and unloading the barriers at one lateral portion of the carriage and a second opposite orientation for loading and unloading barriers at the other lateral portion of the carriage.

Ideally, a turntable arrangement is operably coupled between the assembly and the carriage to allow an operator to rotate the assembly about the carriage between the first orientation and the second orientation to readily allow the operator to load and unload barriers from opposite lateral sides of the carriage.

Preferably, the base of the cantilever beams which are mounted to the upright stanchions have a greater depth of material between their upper surface and their underside surface than the free ends of the barrier retention arms. Advantageously, this compensates for the maximum moment and shear stress load acting at the point of mechanical coupling between the barrier retention arms and the upright stanchions as a result of the weight of the barriers when the assembly is partly or fully loaded.

Ideally, the barrier retention arms taper from a broad base of the barrier retention arm which is coupled to the upright stanchion to a narrow tip of the barrier retention arm where the barriers are loaded and unloaded. In an alternative arrangement, the barrier retention arms may be braced, reinforced or otherwise strengthened at the point of mechanical coupling with the upright stanchions to compensate for the maximum moment and shear stress load acting at the point of mechanical coupling between the barrier retention arms and the upright stanchions as a result of the weight of the barriers when the assembly is partly or fully loaded.

The skilled man will appreciate that all preferred or optional features of the invention described with reference to only some aspects or embodiments of the invention may be applied to all aspects of the invention.

It will be appreciated that optional features applicable to one aspect of the invention can be used in any combination, and in any number. Moreover, they can also be used with any of the other aspects of the invention in any combination and in any number.

The invention will now be described with reference to the accompanying drawing which shows by way of example only one embodiment of an apparatus in accordance with the invention.

Figure 1 is a side view of a first embodiment of assembly of the present invention;

Figure 2 is a rear view of the first embodiment of the assembly;

Figure 3 is a further side view of a second embodiment of the assembly of the present invention;

Figure 4 is a schematic view of one drive arrangement of the present invention;

Figure 5 is a perspective view of a third embodiment of assembly fully loaded with barriers;

Figure 6 is a perspective view of the third embodiment of assembly with the barriers unloaded;

Figure 7 is a second perspective view of the third embodiment of assembly with the barriers unloaded;

Figure 8 is a perspective exploded view of the third embodiment of assembly fully loaded with barriers;

Figure 9 is a second perspective exploded view of the third embodiment of assembly fully loaded with barriers;

Figure 10 is a front elevation view of the third embodiment of assembly in a barrier loading configuration;

Figure 11 is a second front elevation view of the third embodiment of assembly in a barrier transport and storage configuration; and

Figure 12 is a third front elevation view of the third embodiment of assembly in a barrier unloading configuration.

In the drawings, there is shown an assembly being a trailer indicated generally by the reference numeral 1 adapted for handling barriers 8 comprising a chassis 2 which has a carriage component 33. Although the drawings illustrate the present invention embodied as a trailer it will of course be appreciated that the invention is not limited to trailers. The chassis 2 comprises a leading end 4 and a trailing end 5 and two opposing lateral portions 6. The two opposing lateral portions 6 extend between the chassis leading and 4 and the trailing end 5. The trailer 1 or other assembly/vehicle further comprising a mechanism 7 for supporting barriers 8 which is mounted on the chassis 2 of the trailer 1 or other assembly/vehicle 1 and the mechanism 7 is adapted for receiving and dispensing barriers 8 along one lateral portion 6 of the chassis 2 only. This means that all barriers 8 are dispensed from the trailer 1 or other assembly/vehicle and loaded back onto the trailer 1 or other assembly/vehicle at the exact location where they are required meaning there is no double handling of barriers 8. Instead each barrier 8 is off loaded in sequence and placed alongside the previous barrier 8 on the inside of the trailer 1 or other assembly/vehicle keeping workers safe from any traffic.

The mechanism 7 for supporting barriers 8 comprises an upright support 9 extending upwards from the chassis 2 and comprises an arrangement 10 for carrying the barriers 8. This arrangement 10 protrudes from the upright support 9 towards a lateral portion 6 of the chassis 2. In the embodiments shown in Figures 1 to 4, the upright support 9 is movably mounted on the chassis 2 via actuator 19 see Figure 4. The mechanism 7 for supporting barriers 8 has arrangement 10 for carrying the barriers 8. This arrangement 10 is directly contactable with the barriers 8, supporting them during transport and handling. The upright support 9 extends upwards from the chassis 2 proximal to a lateral portion 6 of the chassis 2.

The upright support 9 is located proximal to and extends along a lateral portion 6 of the chassis 2 when the barrier support mechanism 7 is fully loaded or empty. In the embodiment shown in Figures 5 to 12, the upright support 9 is always located proximal to and extends along a lateral portion 6 of the chassis 2 other than when the orientation of the assembly 1 is being changed relative to the carriage 33.

The upright support 9 comprises a plurality of aligned upright stanchions 11 spaced apart along all or part of the length of the trailer 1 or other assembly/vehicle between the leading and trailing end of the chassis (4 and 5) for supporting the weight of the barrier carrying arrangement 10 and the barriers 8. The stanchions 11 are connected by rails 12 to form an upright support frame 13 for improving the rigidity of the upright support 9.

In the embodiments shown in Figures 1 to 4, the mechanism 7 for supporting barriers 8 is operably coupled to the chassis 2 via movable coupling members. The movable coupling members allow the mechanism 7 for supporting barriers 8 to move relative to the chassis 2 via actuator 19, see Figure 4. This allows the weight of the barriers 8 to be evenly distributed across the chassis 2 of the trailer 1 or other assembly/vehicle. The actuator 19 can be either powered by mechanics, electronics or hydraulics.

Again, in the embodiments shown in Figures 1 to 4, the stanchions 11 have movable coupling members on the base of the stanchion 11 for movably coupling the stanchion 11 to the chassis 2. The chassis 2 has corresponding chassis coupling mechanisms for engaging the stanchion coupling members. The chassis coupling members extend at least partly between the two opposed lateral portions of the chassis 6.

In all embodiments, the barrier carrying arrangement 10 comprises barrier retention arms 16 protruding from the stanchions 11 at a distance so that the base 17 of the barriers 8 are supported a distance above the chassis 2 or any floor of the trailer 1 or other assembly/vehicle. This gap 18 between the chassis or floor of the trailer 1 and the base 17 of the barrier 8 allows an operator to easily slide the barrier 8 on and off the trailer 1.

The barrier carrying arrangement 10 protrudes from the upright support 9 at two different vertical levels. This allows barriers 8 to be stacked on top of each other in a double decker fashion. The first level of barrier carrying arrangement 20 comprises a plurality of

barrier retention arms 16 protruding from the upright support 9 at approximately the same height as one another above the floor of the chassis 2. The second level of barrier carrying arrangement 21 comprises a plurality of barrier retention arms 16 protruding from the upright support 9 at approximately the same height as one another above the floor of the chassis 2 and above the first level of barrier carrying arrangement 20. This ensures the second level of barriers 21 do not engage the first level of barriers 20 during transport, storage, loading or offloading

The barrier retention arm 16 is a cantilever beam. Fastening elements are provided to fasten the barriers 8 to the trailer 1 or other assembly/vehicle. The fastening elements to fasten the barriers 8 to the trailer 1 or other assembly/vehicle 9 is provided by elongate flexible members, straps, belts, belts and buckles or flexible bracing members or any combination of these fastening arrangements.

Referring to Figures 1 to 4, the barrier retention arms 16 protrude from the upright support 9 substantially parallel to the chassis and are movable relative to the chassis via a drive mechanism. The retention arm driving mechanism is operably couplable between the upright support 9 and the barrier retention arm 16 to provide movement of the barrier retention arm 16. The retention arm drive mechanism uses the same power source as the actuators 19 on the trailer 1. The trailer 1 comprises a pivotal coupling arrangement pivotally coupling the barrier retention arm 16 to the upright support 9. This allows the barrier retention arm 16 to be rotated around the upright support 9 to allow the barrier support mechanism 7 to dispense barriers 8 on both sides of the trailer 1. The pivotal coupling arrangement enables relative rotation of at least 180 degrees between the barrier retention arm 16 and the upright support 9.

Referring more specifically to Figure 4, the barrier retention arm 16 comprises a first shaft member 25 and a second shaft member 26. The first shaft member 25 and the second shaft member 26 are axially adjustable relative to one another for allowing the retention arm 16 to extend from a retracted configuration to an extended configuration (Figure 2 and 4 shows the retention arms 16 in the extended configuration of the invention). Either or both of the first shaft member 25 or the second shaft member 26 has a mechanism for guiding the relative movement of the other shaft member towards the opposing lateral portion 6 of the chassis 2. It will be appreciated the movable shaft member could also move beyond this opposing lateral portion of the chassis. The first shaft member 25 and the second shaft member 26 has an actuator 31 (such as a hydraulic ram) operably coupled there between for positively engaging at least part of the other shaft member for moving the other shaft member via the guiding mechanism. The actuator 31 is mounted internally of the retention arm 16.

Either or both of the first shaft member 25 or second shaft member 26 has a stopping member for halting the movement of the movable shaft member. The stopping member halts the movement of the movable shaft member at a predetermined distance. This predetermined distance corresponds to the amount of load upon the barrier retention arm 16. At or about the free ends of the barrier retention arms 16, an adjustable locking mechanism 30 is provided for preventing the barriers 8 sliding off the retention arms 16, when required namely during transport and storage. This adjustable locking mechanism 30 is moved into an open position during loading and unloading of the barriers.

Referring to the drawings generally, the trailer 1 comprises a tow hitch 3. In some embodiments, the tow hitch 3 is detachable from the chassis 2. The trailer 1 provides storage offsite or in a storage area. There is no requirement to offload the barriers 8 during storage and so there is less risk of barriers 8 getting damaged whilst leaning against walls or resting on top of each other or lying loose in the yard/storage area while in storage.

In the embodiment shown in Figures 5 to 12, the assembly 1 is movably mounted on the carriage arrangement 33 so that the entire assembly 1 can be tilted towards one lateral portion so that the barrier support mechanism 7 is inclined downwards towards that lateral portion 6 making unloading of the barriers 8 easier for the operator, see Figure 12. It will of course be appreciated that the entire assembly 1 can be tilted towards the opposite lateral portion 6 so that the barrier support mechanism 7 is inclined downwards towards the opposite lateral portion 6 making loading of the barriers 8 easier for the operator. The angle of incline of the entire assembly 1 relative to the horizontal plane can be 3 degrees. However, the angle can be adapted to suit the specific circumstances and could be in a range of 1 to 10 degrees. It will also be appreciated that the assembly 1 can sit level relative to the carriage arrangement 33 for transport and storage, see Figure 11.

In the embodiment shown in Figures 5 to 12, the chassis 2 of the assembly has a primary base frame 35 which is mechanically coupled to an intermediate frame 35 of the same or similar length and width by mechanical fasteners 36, see Figure 11. The carriage 33, of which only two axles 37 and four wheels are shown as has a carriage chassis built around the axles. The chassis 2 of the assembly 1 comprising the base frame 35 and the intermediate frame 34 are movably coupled to the chassis of the carriage 33 to allow the entire assembly 1 to be tiltable towards one or both lateral portions 6 so that the barrier support mechanism 7 is inclined downwards towards that lateral portion 6 making unloading or loading of the barriers 8 easier for the operator. One or more actuators are operably coupled between the carriage chassis, not shown and the chassis 2 of the assembly 1 to allow the entire assembly 1 to be tilted relative to the carriage.

Referring to the drawings and now to Figures 6 to 9, there is shown the assembly 1 facing in a first direction for loading and unloading the barriers 8 at one lateral portion 6 of the

assembly 1, see Figures 6 and 8 and the assembly 1 facing in a second opposite direction for loading and unloading barriers 8 at the other lateral portion 6 of the assembly 1, see Figures 7 and 9. In one embodiment, the assembly 1 is lifted off the chassis of the carriage 33 by a separate powered vehicle such as a fork lift or other similar vehicle and transported to the opposite side of the carriage chassis and set back onto the carriage chassis so as to face in the second opposite direction as the first original direction. In an alternative arrangement, a turntable arrangement, not shown is operably coupled between the assembly 1 and the carriage 33 to allow an operator to simply rotate the assembly 1 about the carriage 33 between the first direction and the second direction to readily allow the operator to load and unload barriers from opposite lateral sides of the assembly 1. In the embodiment shown in Figures 5 to 12, the barrier carrying mechanisms 7 are barrier retention arms 16 in the form of cantilever beams. The base of the cantilever beams 16 which are mounted to the upright stanchions 11, either via welding or mechanical fastening arrangements, have a greater depth of material between their upper surface and their underside surface than the free ends of the barrier retention arms 16. Advantageously, this compensates for the maximum moment and shear stress load acting at the point of mechanical coupling between the barrier retention arms 16 and the upright stanchions 11 as a result of the weight of the barriers 8 when the assembly 1 is partly or fully loaded. In the embodiment shown in the drawings, the barrier retention arms 16 taper from a broad base of the barrier retention arm 16 which is coupled to the upright stanchion 11 to a narrow tip of the barrier retention arm 16 where the barriers 8 are loaded and unloaded. In an alternative arrangement, the barrier retention arms may be braced, reinforced or otherwise strengthened at the point of mechanical coupling with the upright stanchions to compensate for the maximum moment and shear stress load acting at the point of mechanical coupling between the barrier retention arms 16 and the upright stanchions 11 as a result of the weight of the barriers 8 when the assembly 1 is partly or fully loaded.

In relation to the detailed description of the different embodiments of the invention, it will be understood that one or more technical features of one embodiment can be used in combination with one or more technical features of any other embodiment where the transferred use of the one or more technical features would be immediately apparent to a person of ordinary skill in the art to carry out a similar function in a similar way on the other embodiment.

In the preceding discussion of the invention, unless stated to the contrary, the disclosure of alternative values for the upper or lower limit of the permitted range of a parameter, coupled with an indication that one of the said values is more highly preferred than the other, is to be construed as an implied statement that each intermediate value of said parameter, lying between the more preferred and the less preferred of said alternatives,

is itself preferred to said less preferred value and also to each value lying between said less preferred value and said intermediate value.

The features disclosed in the foregoing description or the following drawings, expressed in their specific forms or in terms of a means for performing a disclosed function, or a method or a process of attaining the disclosed result, as appropriate, may separately, or in any combination of such features be utilised for realising the invention in diverse forms thereof as defined in the appended claims.

CLAIMS

1. An assembly for handling barriers comprising:

a chassis;

the chassis having a leading end and a trailing end and two opposing lateral portions extending between the leading end and the trailing end;

means for supporting barriers being mountable on the chassis;

wherein the means for supporting barriers is adapted for receiving and dispensing barriers along one lateral portion of the chassis only.

2. An assembly as claimed in claim 1, wherein the chassis having a carriage means.
3. An assembly as claimed in claim 1 or claim 2, wherein the assembly comprises a trailer.
4. An assembly as claimed in claim 1 or claim 2, wherein the assembly is mounted on or built into a vehicle with an open ended portion for transporting barriers.
5. An assembly as claimed in any preceding claim, wherein the means for supporting barriers comprises upright support means extending upwards from the chassis.
6. An assembly as claimed in any preceding claim, wherein the means for supporting barriers is movably mounted on the chassis.
7. An assembly as claimed in any preceding claim, wherein the means for supporting the barriers comprises means for carrying the barriers.
8. An assembly as claimed in claim 7, wherein the means for carrying the barriers is directly contactable with the barriers supporting the barriers during transport and handling.
9. An assembly as claimed in claim 7 when dependent on claim 5, wherein the means for carrying the barriers protrude from the upright support means towards a lateral portion of the chassis.
10. An assembly as claimed in claim 5 or any of claims 6 to 9 when dependent on claim 5, wherein the upright support means is movably mounted on the chassis.
11. An assembly as claimed in claim 5 or any of claims 6 to 10 when dependent on claim 5, wherein the upright support means extends upwards from the chassis proximal to a lateral portion of the chassis.
12. An assembly as claimed in claim 5 or any of claims 6 to 11 when dependent on claim 5, wherein the upright support means is located proximal to and extends along a lateral portion of the chassis in one position.

13. An assembly as claimed claim 7 when dependent on claim 5, wherein the upright support means comprises at least one upright stanchion for supporting the weight of the barrier carrying means and the barriers.
14. An assembly as claimed in claim 7 when dependent on claim 5, wherein the upright support means comprises a plurality of upright stanchions spaced apart along all or a part of the length of the assembly between the leading and trailing end of the chassis.
15. An assembly as claimed in claim 13 or 14, wherein the plurality of upright stanchions are in alignment.
16. An assembly as claimed in any one of claims 13 to 15, wherein the stanchions are connected by rails to form an upright support frame for improving the rigidity of the upright support means.
17. An assembly as claimed claim 7 when dependent on claim 5, wherein the barrier carrying means comprises at least one barrier retention arm protruding from the upright support means.
18. An assembly as claimed claim 7 when dependent on claim 5, wherein the barrier carrying means protrudes from the upright support means at a vertical distance sufficient so that a base of the barriers are supported a distance above the chassis or any floor of the assembly.
19. An assembly as claimed claim 7 when dependent on claim 5, wherein the barrier carrying means protrudes from the upright support means at two different vertical levels.
20. An assembly as claimed in claim 19 when dependent on claim 17, wherein the first level of barrier carrying means comprises a plurality of barrier retention arms protruding from the upright support means at approximately the same height as one another above the floor of the chassis.
21. An assembly as claimed in claim 20, wherein the second level of barrier carrying means comprises a plurality of barrier retention arms protruding from the upright support means at approximately the same height as one another above the floor of the chassis and above the first level of barrier carrying means.
22. An assembly as claimed in claim 21, wherein the second level of barrier carrying means are located vertically above the first level of barrier carrying means a distance greater than the overall vertical height of the barrier.
23. An assembly as claimed in claim 17, wherein the barrier retention arm is a cantilever beam.
24. An assembly as claimed in claim 17 or 23, wherein the barrier retention arm is length adjustable.

25. An assembly as claimed in claim 17, 23 or 24, wherein the barrier retention arm protrudes from the upright support means substantially parallel to the chassis.
26. An assembly as claimed in any one of claims 2 to 25, wherein the assembly is movably mounted on the carriage means so that the entire assembly is tiltable towards one or both lateral portions so that the barrier supporting means is inclined downwards towards that lateral portion making unloading or loading of barriers easier for the operator.
27. An assembly as claimed in claim 26, wherein the angle of incline of the entire assembly relative to the horizontal plane or main plane of the carriage means can be 1 to 10 degrees, more preferably 2 to 5 degrees and most preferably 3 degrees.
28. An assembly as claimed in any one of claims 2 to 27, wherein, the assembly is movable relative to the carriage means between a first orientation for loading and unloading the barriers at one lateral portion of the carriage means and a second opposite orientation for loading and unloading barriers at the other lateral portion of the carriage means.
29. An assembly as claimed in claim 28, wherein a turntable arrangement is operably coupled between the assembly and the carriage means to allow an operator to rotate the assembly about the carriage means between the first orientation and the second orientation to readily allow the operator to load and unload barriers from opposite lateral sides of the carriage means.
30. An assembly as claimed in claim 17, wherein the base of the barrier retention arms which are mounted to the upright support means have a greater depth of material between their upper surface and their underside surface than the free ends of the barrier retention arms.
31. An assembly as claimed in claim 17, wherein the barrier retention arms taper from a broad base of the barrier retention arm which is coupled to the upright support means to a narrow tip of the barrier retention arm where the barriers are loaded and unloaded.
32. An assembly as claimed in any one of the preceding claims, wherein fastening means are provided to fasten the barriers to the assembly.
33. An assembly as claimed in any one of the preceding claims, wherein the assembly comprises a tow hitch.
34. An assembly as claimed in any one of the preceding claims, wherein the assembly provides a storage means offsite or in a storage area.
35. An assembly substantially as hereinbefore described with reference to and/or as shown in the drawings.

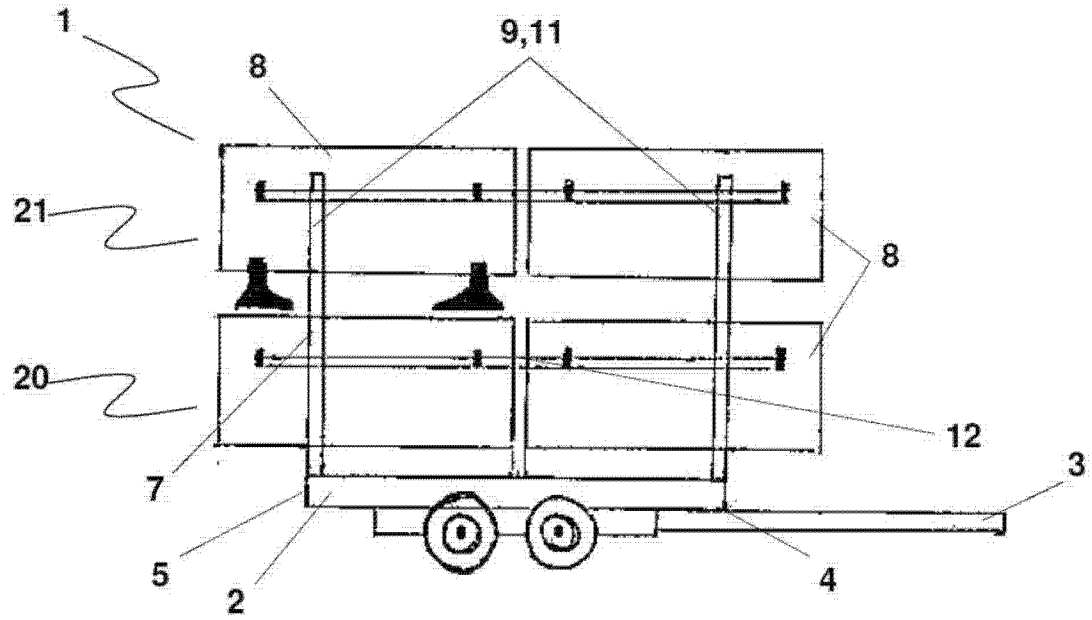

Figure 1

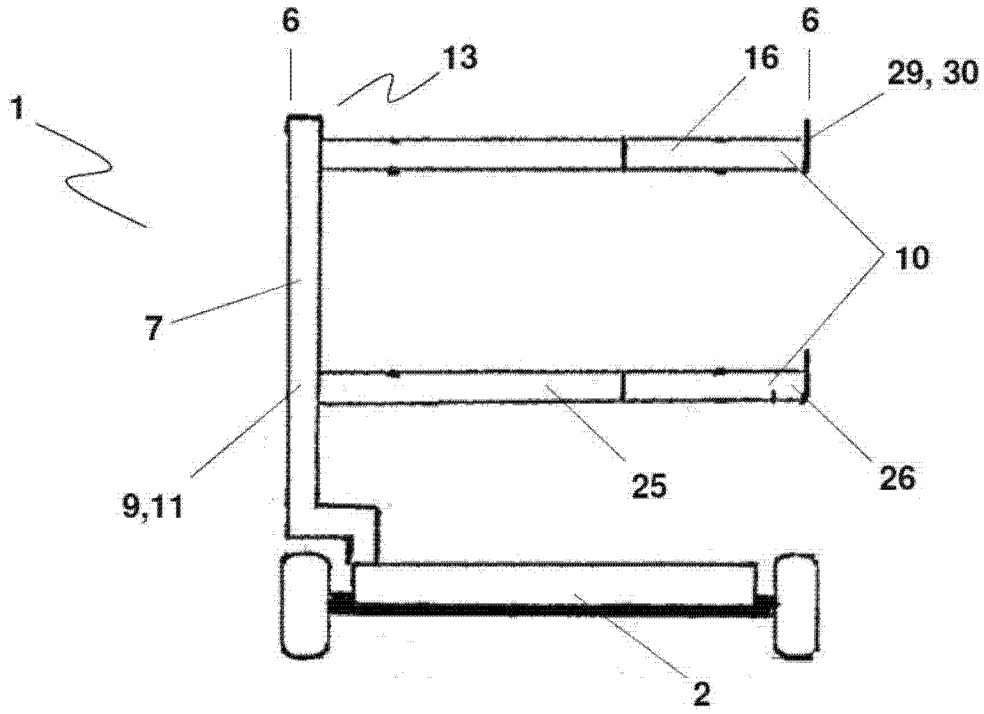

Figure 2

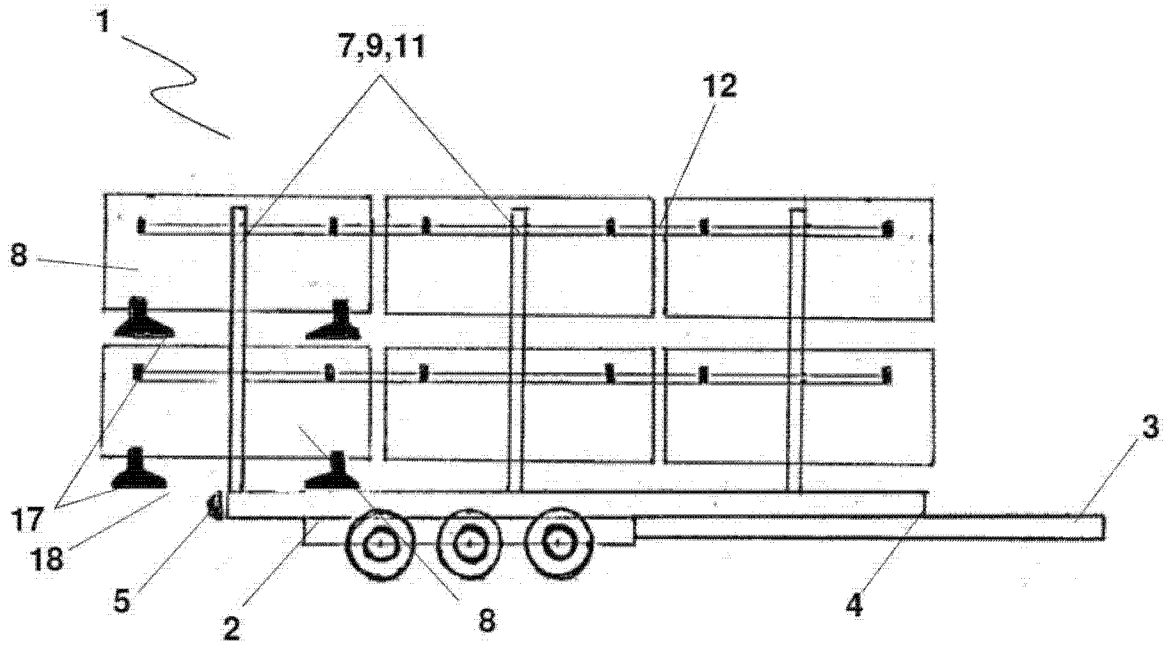

Figure 3

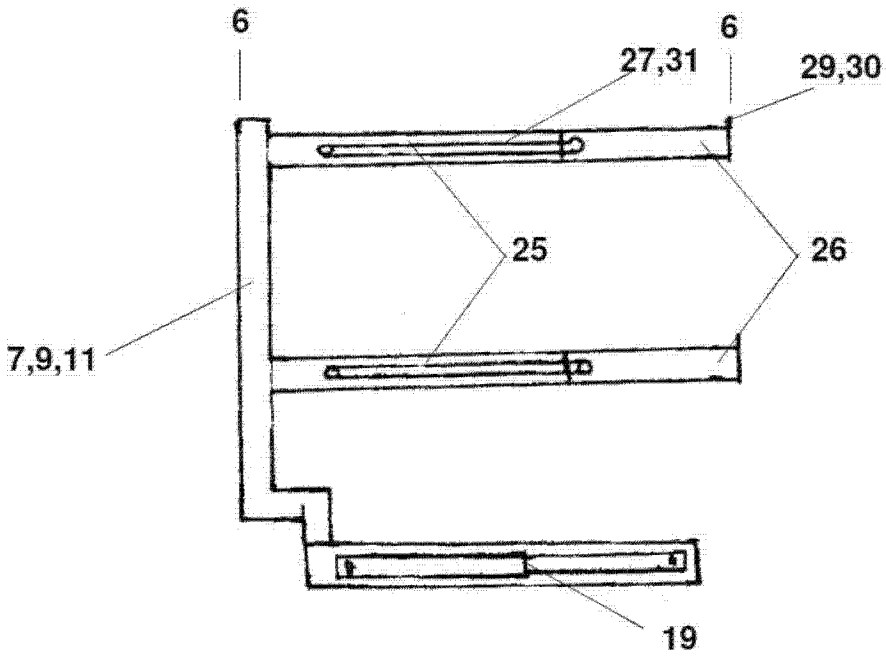

Figure 4

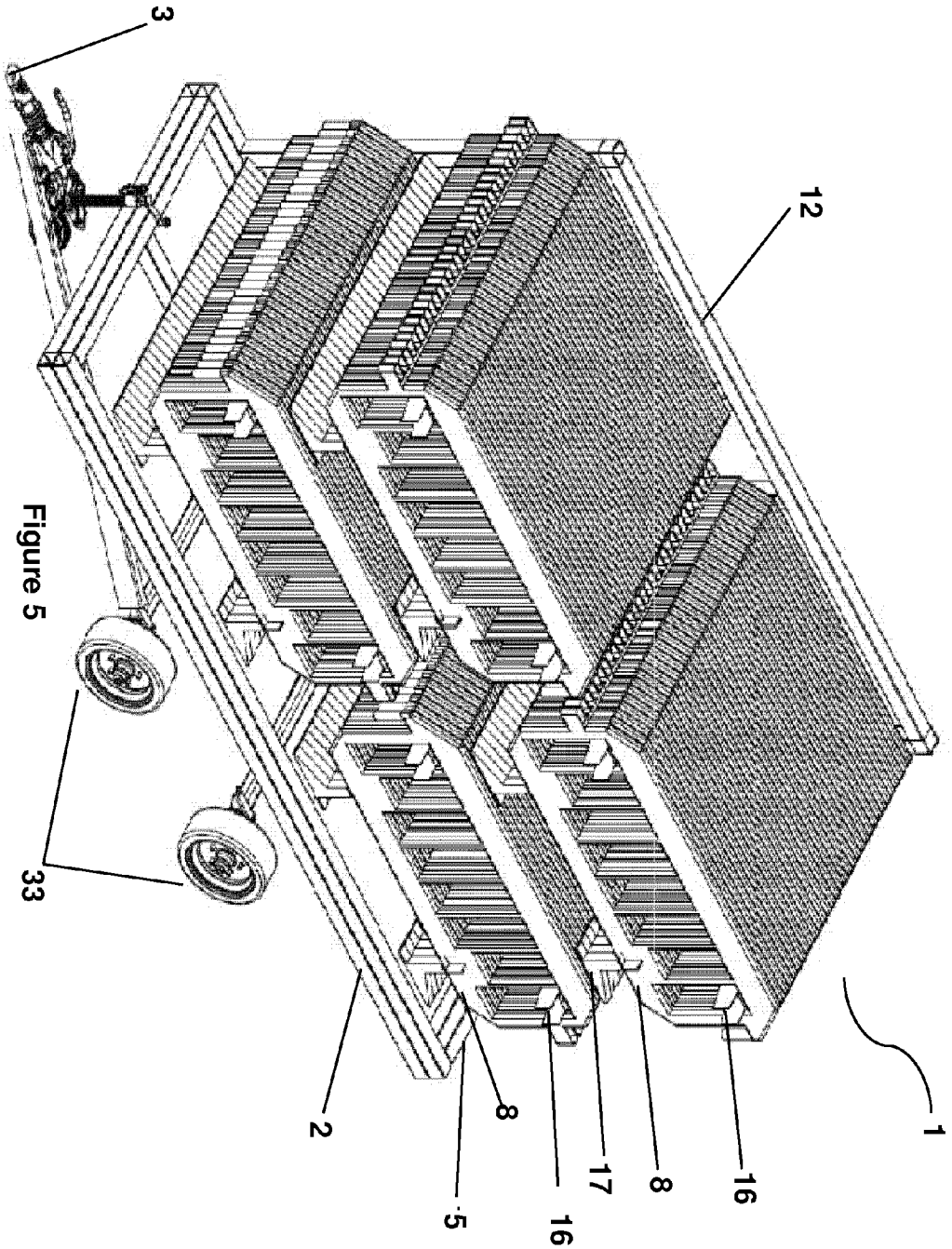

Figure 5

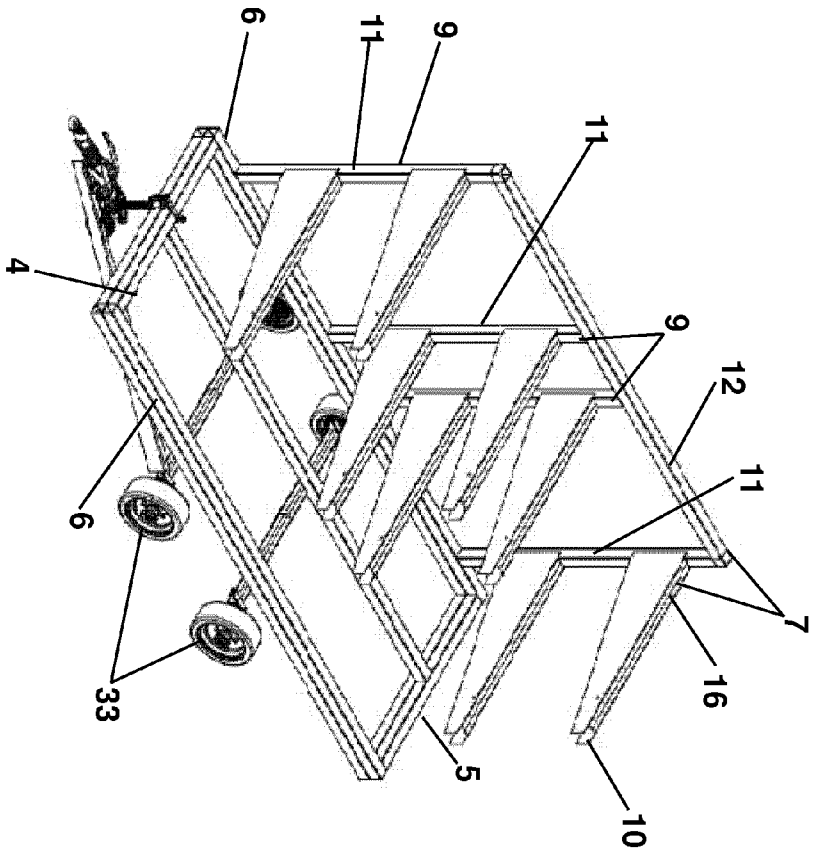

Figure 6

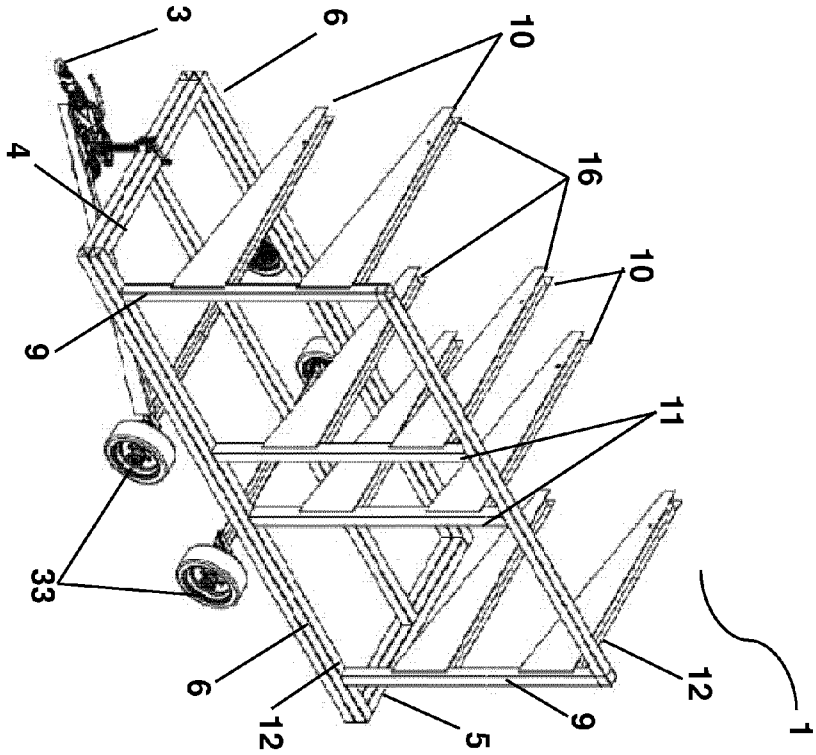

Figure 7

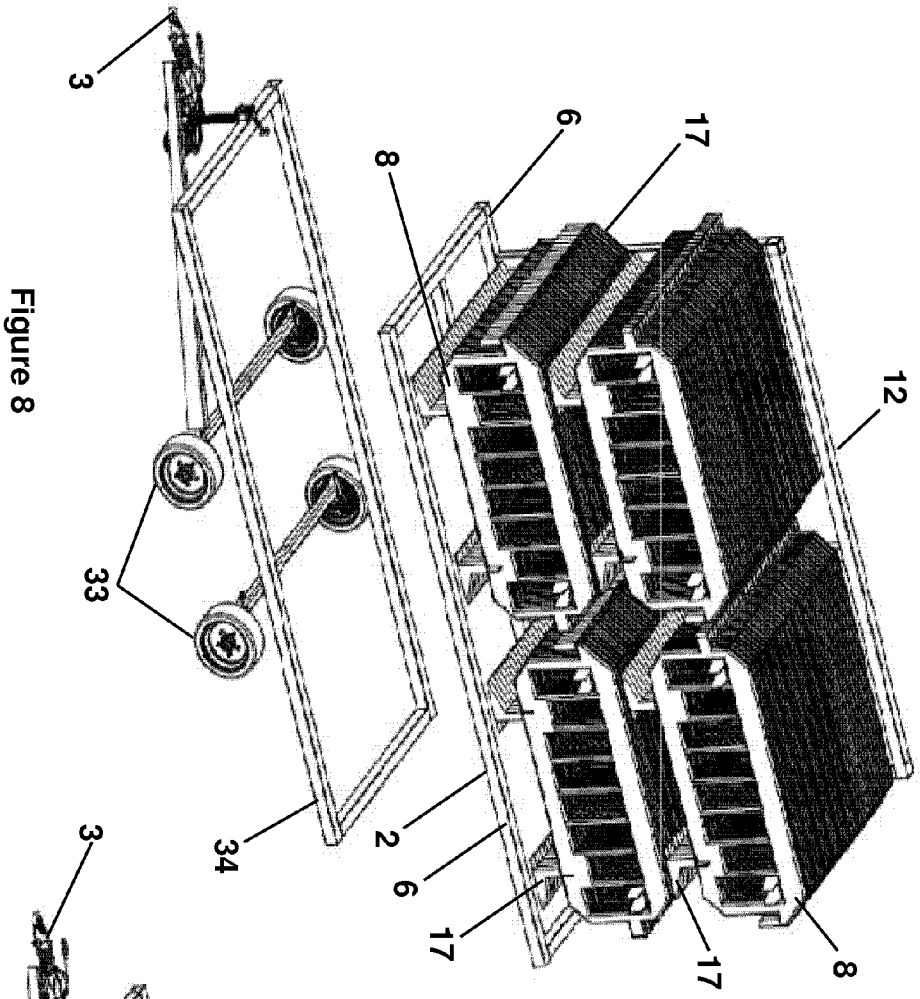

Figure 8

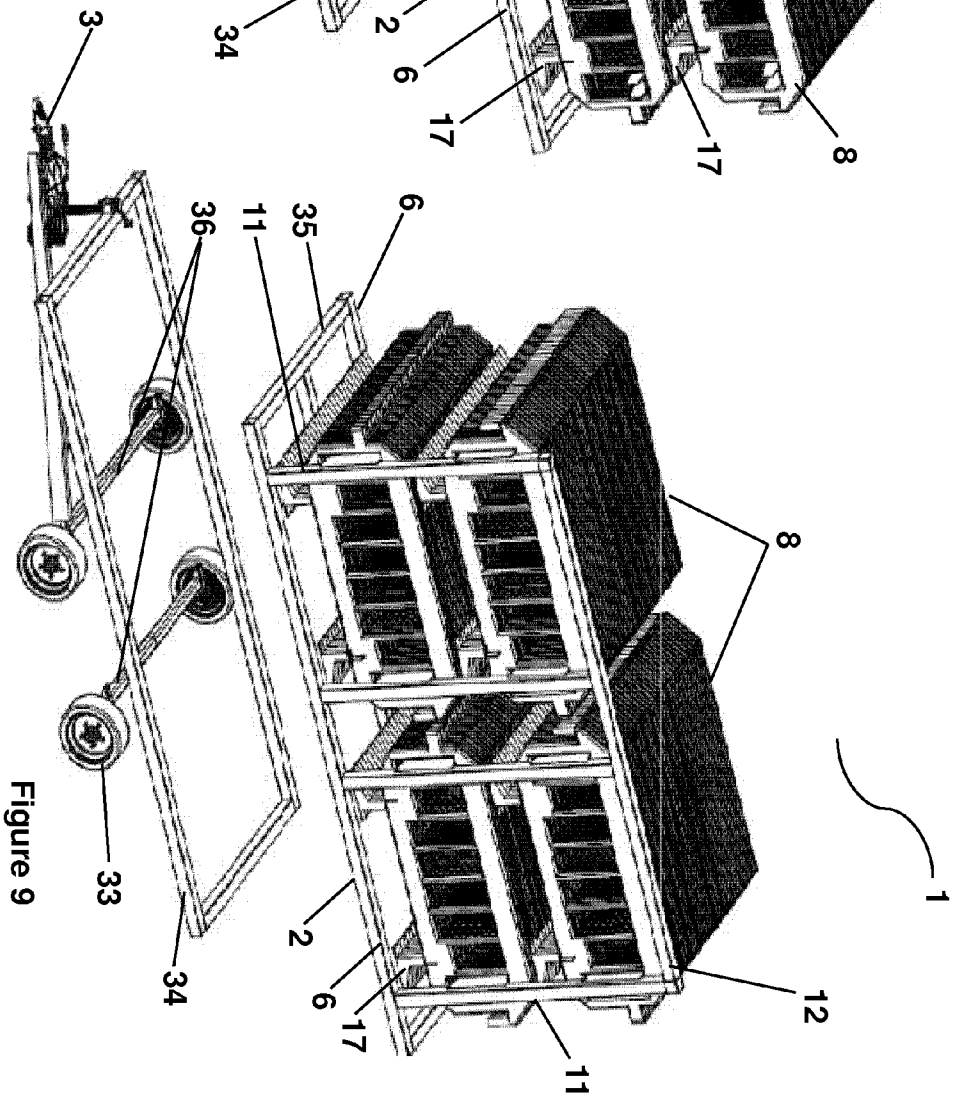

Figure 9

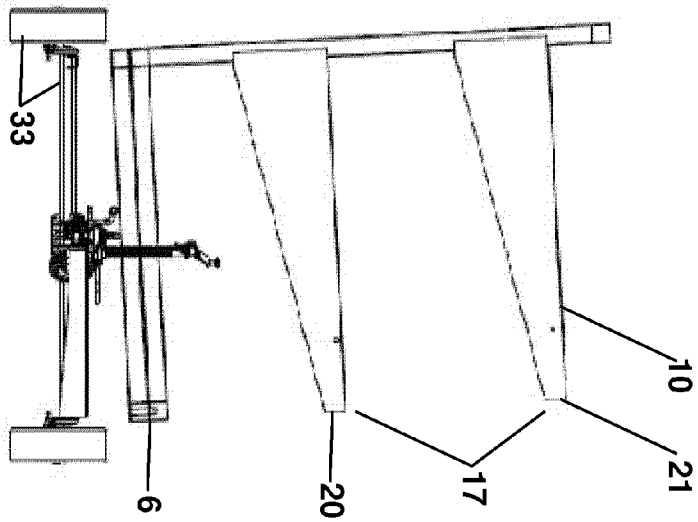

Figure 10

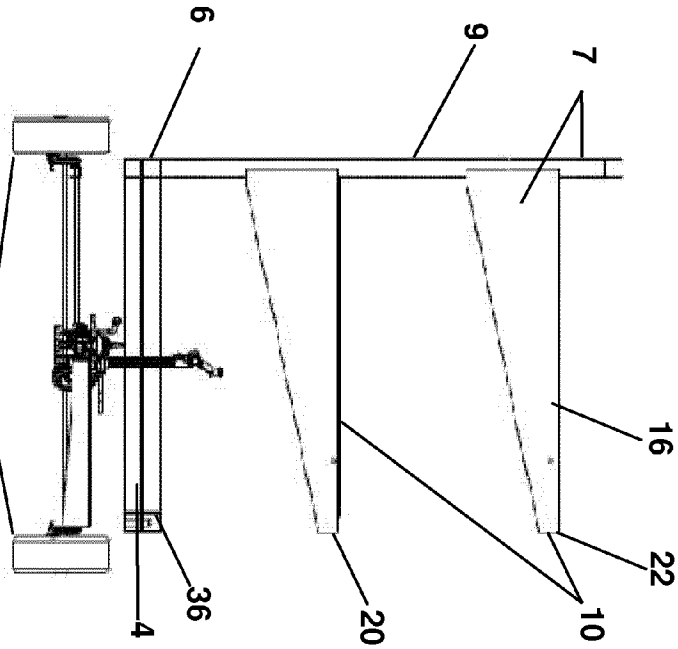

Figure 11

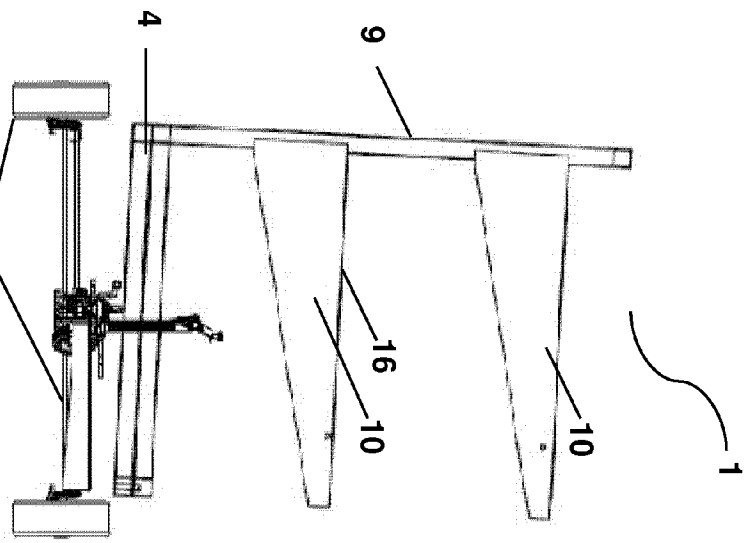

Figure 12

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/054828

A. CLASSIFICATION OF SUBJECT MATTER
INV. E01F9/70
ADD.

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)
E01F E04H B60P B65D

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	FR 2 719 296 A1 (DOUSSAINT LOUIS [FR]) 3 November 1995 (1995-11-03)	1-10
A	the whole document	11-34

X	FR 2 834 960 A3 (MUGNIER FRANCIS [FR]) 25 July 2003 (2003-07-25)	1-3,5-10
A	the whole document	11-34

A	FR 2 624 072 A1 (VALLETTE PAVON [FR]) 9 June 1989 (1989-06-09) abstract; figures 1-5	1,29

A	FR 2 730 199 A1 (MOST [FR]) 9 August 1996 (1996-08-09) abstract; figures 1,2	1

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[X] Further documents are listed in the continuation of Box C.

[X] 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	Date of mailing of the international search report
6 June 2017	19/06/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Flores Hokkanen, P

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/054828

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 20 2010 010099 U1 (B & F BAUMASCHINEN UND FACTORI [CH]) 14 October 2010 (2010-10-14) paragraph [0050]; figures 1,2 -----	1

1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2017/054828

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.: 35
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:

see FURTHER INFORMATION sheet PCT/ISA/210

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:

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.:

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.

Continuation of Box II.2

Claims Nos.: 35

Claim 35 relies, in respect of its technical features of the invention, on references to the description or drawings for which no definite construction can be given

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2017/054828

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2719296 A1	03-11-1995	NONE	
FR 2834960 A3	25-07-2003	NONE	
FR 2624072 A1	09-06-1989	NONE	
FR 2730199 A1	09-08-1996	NONE	
DE 202010010099 U1	14-10-2010	DE 202010010099 U1	14-10-2010
		EP 2590867 A1	15-05-2013
		WO 2012028128 A1	08-03-2012