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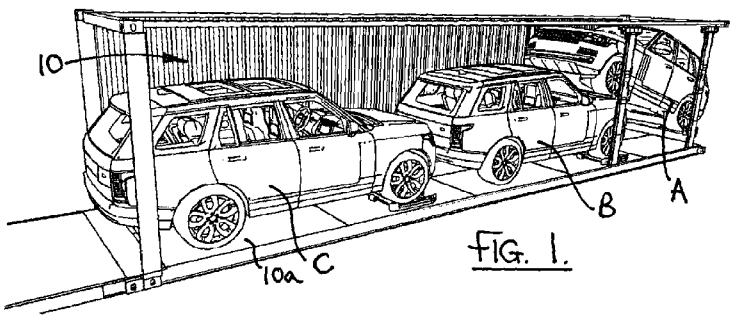

FIG. 1.

(57) Abstract: A vehicle transportation system for loading and unloading a wheeled vehicle or vehicle body without wheels into and out of a walled shipping container. The system has a supporting frame designed to extend transversely across the container and including vehicle wheel or vehicle body receiving members located on the supporting frame. The supporting frame has transportation wheels or rollers on which a vehicle or vehicle body supported on the wheel or body receiving means can be pushed into and pulled out of the container, and guidance means carried on the supporting frame which cooperate with formations associated with the container walls to guide the supporting frame transversely of the container into a required position within the container with the wheeled vehicle or vehicle body clear of the container walls. The guidance means may be cam surfaces associated with the transverse supporting frame which cooperate with the formations associated with the container walls.

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VEHICLE TRANSPORTATION SYSTEMS, SUB-FRAMES THEREFOR AND METHODS OF LOADING VEHICLES INTO A SHIPPING CONTAINER

This invention relates to transportation systems for transporting vehicles within shipping containers.

It is well known to transport vehicles in this manner often with some of the vehicles in the container raised off the floor of the container and tipped to allow partial vertical overlapping of these raised vehicles with vehicles positioned below the tipped vehicles to increase the number of vehicles which can be loaded into the container.

Problems are beginning to arise with such systems as vehicles, particularly more expensive vehicles, are becoming larger and wider making it difficult, if not impossible, to open the doors of such vehicles sufficiently to allow exit or entrance to the vehicles once they are within currently available shipping containers. Also, as such vehicles become more sophisticated, they are often arranged to be totally immobilised if the ignition key is removed or not in the "on" position thus applying the handbrake function and locking the steering making the manoeuvring of such vehicles into and out of such containers impractical.

It is an object of the present invention to provide an improved form of vehicle transportation system which addresses the above problems.

Thus according to the present invention there is provided a vehicle transportation system for loading and unloading a wheeled vehicle or vehicle body without wheels into and out of a walled shipping container, the system comprising a supporting frame designed to extend transversely across the container and including vehicle wheel or vehicle body receiving means located on the supporting frame, the supporting frame having transportation wheels or rollers on which a vehicle or vehicle body supported on the wheel or body receiving means can be pushed into and pulled out of the container, and guidance means carried on the supporting frame which cooperate with formations associated with the container to guide the supporting frame transversely of the container into a required position within the container with the wheeled vehicle or vehicle body clear of the container walls.

The guidance means may comprise cam surfaces associated with the transverse supporting frame which cooperate with the formations associated with the container. In one form of the invention vertical posts are secured to the container walls, the ends of the transversely extending supporting frame being connectable with hoist means provided on the posts to allow the vehicle or vehicle body supported from the supporting frame to be raised from a floor of the container to tip the vehicle or vehicle body and allow partial vertical overlapping of the vehicle or vehicle body with a vehicle or vehicle body position below in the container to increase the number of vehicles or vehicle bodies which can be loaded into the container.

Conveniently each end of the transverse supporting frame has end plates which slide up and down inwardly facing surfaces on the vertical posts. These end plates may have the additional features as set cut in claims 5 and 6.

In a system for the transportation of wheeled vehicles the transversely extending supporting frame is in two or more parts, an upper frame on which the wheels of the vehicle are supported and one or more lower sub-frames which carry the transportation wheels or rollers and which are demountable from the upper frame when the upper frame is raised to its transportation position on the posts to give more clearance below the upper frame for vehicles positioned below the supporting frame in the container.

The upper frame and lower sub-frame or frames have the additional features set out in claims 8 to 14.

In a system for the transportation of wheeled vehicles on the floor of a container the supporting frame may comprise a single piece component which carries the transportation wheels or rollers and the guidance means and is used as the sole support for a pair of vehicle wheels of a vehicle to be supported on the floor of the container as the vehicle is pushed into the container.

Such a single piece supporting frame may be provided by a lower sub-frame of the system of claim 8.

The guidance means mounted on the container may cooperate with the guidance means on the supporting frame to guide the supporting frame into the desired position transversely relative to the walls of the container and also act as chocks preventing the supporting frame moving forward in the container beyond a predetermined transport position.
The guidance means mounted on the container which act as chocks may conveniently comprise angled blocks facing inwardly into the container which cooperate with angled cam surfaces on the supporting frame.

Additional features of the supporting frame or single lower sub-frame are set out in claims 19 to 23 and 28 to 30.

A fastening member may be provided to hold the transversely extending wheel supporting frame stationary during loading of vehicles onto the frame, one end of the fastening member engaging the wheel support frame and the other end being secured to the container during loading of the vehicle onto the supporting frame. Other features of this fastening member are set out in claims 25 to 27.

The invention also provides a system for the transportation of a vehicle body without wheels, the system comprising a pair of support frames extendable transversely between pairs of vertically extending posts secured at longitudinally spaced locations to the walls of a shipping container, and longitudinally extending members extending between these support frames to form a vehicle body support structure, wheels being provided on the support structure to allow the structure to be wheeled into the container carrying a vehicle body, and guidance means on the support structure to guide the structure into the desired position transversely relative to the walls of the container as the structure is wheeled into the container, the structure being raiseable on the vertical posts above the floor of the container if required.

In accordance with a further aspect of the present invention there is provided a method of loading a twin axle wheeled vehicle onto the floor of a shipping container comprising the steps of:-
driving the wheels of one axle of the vehicle onto a wheel supporting frame which extends transversely across the container and includes wheel receiving members located at opposite ends of the supporting frame and transportation wheels or rollers

on which the vehicle whose wheels are supported on the wheel receiving means can be pushed into the container or pulled out of the container;
securing the wheels to the wheel supporting frame;
raising the other pair wheels of the vehicle of the floor;
pushing the vehicle into the desired position in the container with its other pair of wheel raised;
lowering the other pair of raised wheels on to the floor of the container, and
securing the vehicle to the container. The vehicle may, for example, be secured to the container via its wheels or via a towing eye provided on the vehicle.

Additional features of this method are set out in claims 33 and 34.

The invention also provides a method of loading a twin axle wheeled vehicle into a position raised above the floor of a shipping container comprising the steps of:-
providing two pairs of vertical posts secured to the inside of the walls of the container and two wheel supporting frames for extending between respective pairs of the posts and winch means on at least one pair of posts for raising the associated wheel supporting frame clear of the floor of the shipping container;
providing a lower sub-frame with transportation wheels or rollers for supporting one of the wheel supporting frames clear of the floor as the vehicle is pushed into the container;
locating the wheels of one axle the vehicle on one of the wheel supporting frames mounted on the sub-frame;
locating the wheels of the other axle on the other wheel support frame;
securing each pair of wheels to their respective wheel support frame;
raising the wheel support frame not supported on the lower sub-frame from the floor and pushing the vehicle into the required longitudinal position in the container on the wheels or rollers of the lower sub-frame;
connecting the ends of the wheel support frame supported on the lower sub-frame with the post winches;
winching the wheel support frame to the required vertical position;
raising the other wheel support frame to its required vertical position, and
securing the wheel support frames to their respective posts for transportation.

Additional features of this method are set out in claims 36 to 42.

A method is also provided of loading several twin axle vehicles into a shipping container with one or more vehicles are loaded into raised positions in the container using any one of the methods of claims 35 to 41 and one or more vehicles are loaded on to the floor of the container using the method of any one of claims 34 to 42.

The invention also provides a method of loading a vehicle body without wheels into a walled shipping container comprising the steps of:-
providing a wheeled vehicle body support structure comprising a pair of support frames extendable transversely between pairs of vertically extending posts secured at longitudinally spaced locations to the walls of a shipping container, and longitudinally extending members extending between these support frames;
loading and securing the vehicle body onto the body support structure;
wheeling the body into the container on the body support structure with guidance means on the support structure guiding the support structure transversely relative to the walls of the container to ensure that the body does not contact the container walls, and
either securing the support structure in its transport position on the floor of the container or raising the body and the support structure above the floor on the vertical posts to a raised transport position.

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

Figures 1 shows an arrangement for loading three large vehicles into a standard 40 foot shipping container with one vehicle raised clear of the floor of the container and two vehicles supported on the floor of the container;

Figure 2 shows an arrangement for loading three large vehicles into a standard 40 foot shipping container with two vehicles raised clear of the floor of the container and one vehicle supported on the floor of the container;

Figures 3 and 4 show the two pairs of vertical posts and transversely extending wheel support frames used to support each raised vehicle clear of the container floor;

Figures 5 and 6 show the ramps and wheel support frames arranged outside the container prior to loading of a vehicle which is to be raised clear of the container floor;

Figure 7 shows a fastening member which can be used for securing the rear wheel support frame during loading of a vehicle onto the frame;

Figures 8 and 9 show plan and perspective views of a two-piece wheel support frame arrangement having an upper frame resting on a lower sub-frame which is used for loading the rear wheels of a vehicle to be raised clear of the container floor;

Figures 9A and 9B show the lower sub-frame of Figures 8 and 9 and associated chocks which is used for loading the front wheels of a vehicle to be supported on the container floor;

Figure 10 shows a vehicle reversed onto the wheel support frames of Figure 6;

Figures 11 and 12 show the front and rear wheels lashed to the wheel support frames of Figure 6;

Figure 13 shows the front wheel support frame being lifted clear of the floor for pushing into the container using a fork lift truck;

Figure 14 shows the vehicle of Figure 13 pushed to its required longitudinal position in the container ready to be lifted clear of the container floor;

Figure 15 shows the vehicle of Figure 14 raised clear of the container floor to the transport position shown in Figure 1;

Figure 16 shows a single piece sub-frame used as a wheel support frame for the front wheels of a vehicle to be supported on the floor of the container arranged outside the container prior to loading of a vehicle which is to be supported on the floor of the container;

Figure 17 shows a vehicle driven onto the wheel support frame of Figure 16;

Figure 18 shows the front wheels of the vehicle of Figure 17 lashed to the wheel support frame;

Figure 19 shows an operator with a fork lift truck raising the rear wheels of the vehicle of Figure 18;

Figure 20 shows the vehicle of Figure 19 having been pushed into its required longitudinal position in the container;

Figure 21 shows the vehicle with its rear wheels lowered into contact with the floor of the container;

Figure 22 shows the rear wheels of the vehicle of Figure 21 lashed to securing points provided on the inside of the container and the front wheels secured on the wheel support frame by guidance chocks;

Figure 23 shows more details of the ramps shown in Figure 16;

Figure 24 shows how end plates of an upper wheel supporting frame are located in recesses in a single lower sub-frame to locate the upper supporting frame relative to a lower sub-frame;

Figure 25 shows Figure 9 of WO2012/022941 to better illustrate certain features used in the present invention;

Figure 26 shows a perspective view of a vehicle body support structure which allows vehicle bodies without wheels to be wheeled into and out off a shipping container;

Figure 27 shows a container loaded with vehicle bodies using the support member of Figure 26, and

Figure 28 shows a modified form of the support structure of Figure 26 used to load general cargo into a raised position in a shipping container.

Referring to the drawings, Figures 1 and 2 shows two arrangements for loading three large vehicles A, B and C into a standard 40 foot shipping container 10. In Figure 1 vehicle A is raised clear of the floor 10a of the container and vehicles B and C are supported on the floor of the container with vehicle A partially vertically overlapping vehicle B. In Figure 2 vehicles A and B are raised clear of the floor 11of the container 10 and partially vertically overlapping each other and vehicle C is supported on the floor of the container and partially vertically overlapped by vehicle B.

Figures 3 and 4 show the two pairs of vertical posts 11 and 12 and transversely extending wheel support frames 13 and 14 used to support the front and rear wheels of each vehicle which is to be raised clear of the container floor 10a. This post and wheel support frame arrangement is disclosed and claimed in WO2012/022941 and is shown in more detail in Figure 25 which corresponds to Figure 9 of WO2012/022941. These pairs of vertical posts are attached to the corrugated walls 15 of the container 10 by, for example, straps 16 or other fasteners which engage standard fastening rings 17 provided on the container and pull the upper ends of the posts in the fore and aft direction via ratchets 16a (see Figure 25) as disclosed and claimed in WO2012/022941. The lower ends of the posts 11 and 12 can also be secured to the container by similar straps 16 or can be nailed or screwed to the container floor through fastening plates 18 as also disclosed in WO2012/022941.

The ends of wheel supporting frames 13 and 14 have end plates 19 which slide up and down flanges 20 on the posts 11 and 12 when the wheel support frames are raised relative to the posts by lift chains 21 which engage lifting rings 22 on end plates 19 and are raised by winches 23 provided at the top of each post as shown in Figure 25. The winches 23 are detachably mounted on their associated posts via hooks 23a and brackets 23b so that they can be removed when not required. End plates 19 have arrays of holes 24 and flanges 20 have vertical lines of holes 25. Bolts 24a or other fasteners can be which inserted through aligned holes in the end plates and flanges to secure the wheel support frames in their required transport positions against vertical, horizontal or rotary movement relative to their associated posts as is also described and claimed in WO2012/022941.

In accordance with the present invention in order to load a vehicle into the position occupied by vehicle A in Figure 1 posts 11 and 12 are secured inside the container using the straps 16 and fastening plates 18 as described above.

Front wheel ramps 27 and rear wheel ramps 28 are then positioned on the floor as shown in Figure 5 with rear wheel ramps 28 supported on a lower sub-frame 29. A front wheel supporting frame 13 is placed on front wheel ramps 27 and upper rear wheel supporting frame 14 is placed on top of lower sub-frame 29 as shown in Figure 6. The upper rear wheel supporting frame 14 and lower sub-frame 29 thus together form a two-piece wheel supporting frame for the rear wheels of the vehicle.

This two-piece wheel supporting frame 14, 29 is shown in more detail in Figures 8, 9 and 9A. The upper frame 14 has two vehicle wheel receiving zones 30 on which the end plates 19 with their arrays of holes 24 are carried. The lower sub-frame 29 has cross members 31 and end pieces 32 which carry guidance means in the form of cam surfaces 33. These cam surfaces cooperate with the bases of the posts 11 and 12 to guide the wheel supporting frames and thus the vehicle loaded thereon into its desired transverse position clear of the container walls as the vehicle is pushed into the container. The cross members 31 may be provided with additional support in the form of wheels or rollers (similar to wheels or rollers 34, 34a below) in their central region if heavier vehicles are to be carried. Alternatively, additional bracing members may be arranged to extend between the cross members.

The sub-frame also carries two pairs of transportation wheels or rollers 34, 34a spaced longitudinally of the vehicle to be carried. The wheels or rollers 34, 34a are positioned away from the outer ends of the sub-frame to avoid problems associated with missing the container loading ramps when loading the container.

The wheels or rollers 34a which enter the container first may be displaceable transversely relative to the remainder of the lower sub-frame on their support axles 35 to facilitate transverse displacement of the wheel supporting frame transversely relative to the container walls as the vehicle is pushed into or out of the container. The transversely displaceable wheels or rollers 34a may be displaceable on their axles 35 against centralising spring loading (not shown). The other rear wheels or

rollers 34 may be located transversely nearer to the central part of the sub-frame than wheels or rollers 34a to provide more even support of the sub-frame transversely relative to the container. It will be understood that in different versions of the lower sub-frame 29 the relative transverse positioning of the wheel or rollers 34, 34a can be varied according to the load to be supported by the sub-frame.

Figures 5 and 6 show the sub-frame 29 is fastened to the container 10 by an optional rake-like fastening member 50 (see Figure 7). The fastening member includes pivots 60 and 61 to accommodate the shape of the angled entry ramp 62 of the container and one end 51 of fastening member engages the sub-frame 29 and the other end 52 is secured to the container. In the example shown, the end 51 of the fastening member 50 has a channel portion 53 which slides over a bar member 29' of the sub-frame 29 and the end 52 is provided with a fastening plate 54 through which the member 50 is screwed or otherwise secured to the wooden floor 10a of the container 2 during loading of the vehicle onto the supporting frame 14, 29. The use of fastening member 50 prevents movement of the support frame 14, 29 when the vehicle is being driven onto the supporting frame.

The lower sub-frame 29 has wheel securing winches 36 mounted thereon for tightening wheel lashings for securing the vehicle wheels to the sub-frame 29. These winches may be adjustably mounted transversely relative to the lower sub-frame 29 to allow use with vehicles with different wheel tracks. The single piece lower sub-frame also has lashing securing formations 37 for securing one end of each wheel lashing, the other end of each lashing being connected with the associated wheel securing winch 36. These lashing securing formations can conveniently comprise securing bars 37 which extend part way across the single piece lower sub-frame 29 to allow attachment of the wheel lashings of vehicles of different wheel tracks.

The single piece lower sub-frame 29 also has abutment means in the form of a plate 38 against which an associated upper wheel supporting frame 14 is pushed when the vehicle is being pushed into the container. Plate 38 also helps to locate the channel portion 53 of fastening member 50 by engaging cut out 53a. The end plates 19 of the upper wheel supporting frame 14 are located in recesses 41 (see Figure

24) in the single lower sub-frame 29 during loading of the vehicle into the container to locate the upper supporting frame transversely relative to the lower sub-frame.

With the ramps and wheel supporting frames in the position shown in Figure 6 the vehicle A is reversed onto the wheel supporting frames as shown in Figure 10.

The wheels are then lashed to the wheel supporting frames 13 and 14 by lashings 39 and 40 as shown in Figures 11 and 12.

The front wheel support frame 13 is then lifted clear of the floor by a fork lift truck X or similar machinery (see Figure 13) and the vehicle is pushed into the container on the wheels or rollers 34, 34a of sub-frame 29 using the fork lift truck X to the Figure 14 position ready to be lifted clear of the container floor. The cam surfaces 33 on sub-frame 29 cooperate with the bottom of the vertical posts 11 and 12 to guide the vehicle transversely relative to the container to avoid any contact with the container walls as the vehicle is pushed into the container to the Figure 14 position. Safety stops may be used on the lifting tines of any fork lift truck used to raise the wheel support frame 13, the stops being clamped to the tines to prevent the support frame sliding along the tines during loading.

The end plates of the upper wheel supporting frame 14 are then connected to the lift chains 21 of the posts 12 and the rear wheels of the vehicle are raised to the required height using winches 23 on the top of posts 12. On raising the upper wheel supporting frame 14 to the required height the sub-frame 29 is left standing on the floor of the container from where it is subsequently removed (not shown in the drawings). The fork lift is then used to raise the front wheel supporting frame 13 to the required height and both wheel supporting frames 13 and 14 are then secured to their respective vertical posts using bolts or other fasteners extending through the aligned holes 24 in end plates 19 and holes 25 in post flanges 20. The fork lift is then lowered and reversed out of the container leaving the vehicle A in the Figure 15 position.

To load a vehicle into the position occupied by vehicle B in Figure 1 a single piece sub-frame 29 is positioned as shown in Figure 16 ready to receive the front wheels of vehicle B. Ramps 28 which hook over the securing bars 37 (see Figure 23) are

also used to facilitate loading the vehicle on to frame 29. The ramps 28 help to hold the sub-frame 29 stationary together with the optional fastening member 50 when the vehicle is being driven on to the frame 29. Side tabs (not Shown) attached to the ramps 28 can be screwed to the floor to hold the ramps and thus the frame still during loading. The vehicle B is then driven to position its front wheels on sub-Frame 29 as shown in Figure 17 and the front wheels are lashed to the sub-frame by lashings 42 as shown in Figure 18.

Ramps 28 are then removed to release the sub-frame 29 and fork lift truck Y (or similar device) is then used (via a specially design lifting frame attachment) to raise the rear wheels of vehicle B of the floor and to push the vehicle into the container using the transportation wheels or rollers 34 on sub-frame 29 (see Figure 19). The cam surfaces 33 on sub-frame 29 cooperate with the bottom of the vertical posts 11 and 12 to guide the vehicle transversely relative to the container to avoid any contact with the container walls as the vehicle is pushed into the container to the position shown in Figure 20.

The loading is then continued by lowering the rear wheels onto the floor using the fork lift to leave vehicle B in the position shown in Figure 21. The rear wheels of vehicle B are then lashed to the standard securing rings 45 provided along the edge of the floor of the container using lashings 44 as shown in Figure 22 to secure the vehicle for transportation. To avoid lashing the front wheels to lashing rings 45 the sub-frame 29 may be provided with flanges with screw holes via which the sub-frame can be screwed or otherwise secured to the container floor during transportation. As an alternative to lashing the vehicle to the container via its wheels, towing eyes provided on the vehicle can be used.

To further improve the guidance of the sub-frame 29 into the container chocks 61 (see Figures 9A and 9B) may also be provided with inwardly facing cam surfaces 60. The cooperation between cam surfaces 60 on chocks 61 and the cam surfaces 33 on sub-frame 29 guides the sub-frame into the desired position transversely relative to the container walls and also prevents further forward movement of the sub-frame beyond predetermined transport position. The chocks 61 also have a portion 61a which overhangs the side rails 32 of the sub-frame 29 (see Figure 9A) to prevent

vertical movement of the sub-frame when in the chocks. The chocks 61 are secured relative to the floor of the container using, for example, nails or other securing members which extend through holes 62 in chock flanges 63a and 63b. By using the chocks 61 it is no longer necessary for an operator who is loading the vehicle into a container to try to pass between the loaded vehicle and the walls of the container to place chocks on the front wheels or to lash the front wheels to the container once the vehicle is in its transport position. The securing of the vehicle is completed by chocking and lashing the rear of the vehicle using lashings 44 as described above.

The loading configuration shown in Figure 1 is completed by loading vehicle C into the container using the method described above in relation to Vehicle B. As will be appreciated the vehicle loading configuration shown in Figure 2 is achieved by loading the vehicles A and B of Figure 2 in the same way as described above for vehicle A of Figure 1and Vehicle C of Figure 2 is loaded in the same way as described above for vehicle B of Figure 1.

The vehicles A, B and C are unloaded from the container by reversing the above described sequences and the cam surfaces 33 on the sub-frame 29 again guide the vehicle out of the container without contact with the container walls.

The invention also provides a system which can be used to transport, for example, vehicle bodies without wheels.

Figure 26 shows a supporting frame 100 which includes two transversely extending frames 101 and 102 which have end plates 103 designed to side up and down the inside of vertical posts 104 secured to the inside of a shipping container by flexible ties 104a which pull in the fore and aft direction and fixing plates 104b at the bottom of the posts so that the post can be secured at any desired position longitudinally along the container (see Figure 27). Frames 101 and 102 are joined by longitudinally extending members 105 to form a vehicle body support structure which can support vehicle bodies 106 via body support means 108. The body support means 108 has conical projections 108' which enter apertures in the underside of the vehicle body. The positioning of the support means 108 on the frame 100is adjustable to cater for the transportation of different vehicle bodies and the support means 108 can be folded or removed to allow easy stacking of frames 100 when required.

Ss shown in Figure 27 the vehicle bodies can be carried both on the floor of the container and in raised positions.

The supporting frames 100 each have wheels /castors 107 on which the vehicle bodies can be wheeled into the container. The raised bodies 106' are then winched into their raised positions by winches (not shown) carried at the top of the vertical posts 104 as described above in relation to wheeled vehicles. The end plates 103 have angled guide portion 103a which co-operate with the bases of the vertical posts 104 to guide the frames 100 into the correct position transversely of the container as the frames are pushed into the container.

The supporting frame 100, minus the vehicle body support means 108, can be used to carry general cargo. For example, Figure 28 shows frames 100 whose longitudinally extending members 105 support upper loaded pallets 109' which have been raised, using winches (not shown) mounted on the top of vertical posts 104, to allow the loading of lower loaded pallets 109 onto the container floor.

The various wheel supporting frames and sub-frames disclosed in this application can be made telescopic in a transverse sense relative to the container so that they can be used in different width shipping containers.

The present invention thus provides a system, method and equipment for loading vehicles and vehicle bodies into a shipping container which avoids the need for access to the vehicle during or after loading. This is particularly advantageous as vehicle are becoming larger and wider making it difficult, if not impossible, to open the doors of such vehicles sufficiently to allow exit or entrance to the vehicles once they are within currently available shipping containers. Also, as indicated above, such vehicles become more sophisticated, they are often arranged to be totally immobilised if the ignition key is removed or not in the "on" position thus applying the handbrake function and locking the steering making the manoeuvring of such vehicles into and out of such containers impractical.

It has also been found that, using the systems and methods of the present invention, it is possible to load vehicles and vehicle bodies into a standard refrigerated shipping

container which is conventionally a standard shipping container lined with insulating materials and therefore has a narrower width available for loading vehicles or vehicle bodies. This allows, for example, a refrigerated container to carry vehicles, vehicle bodies of other general cargo, using the systems and methods described above, on a return journey when no refrigerated cargo is available.

CLAIMS

P2836

1 A vehicle transportation system for loading and unloading a wheeled vehicle or vehicle body without wheels into and out of a walled shipping container, the system comprising a supporting frame designed to extend transversely across the container and including vehicle wheel or vehicle body receiving means located on the supporting frame, the supporting frame having transportation wheels or rollers on which a vehicle or vehicle body supported on the wheel or body receiving means can be pushed into and pulled out of the container, and guidance means carried on the supporting frame which cooperate with formations associated with the container to guide the supporting frame transversely of the container into a required position within the container with the wheeled vehicle or vehicle body clear of the container walls.

2 A system according to claim 1 in which the guidance means comprises cam surfaces associated with the transverse supporting frame which cooperate with the formations associated with the container.

3 A system according to claim 2 in which vertical posts are secured to the container walls, the ends of the transversely extending supporting frame being connectable with hoist means provided on the posts to allow the vehicle or vehicle body supported from the supporting frame to be raised from a floor of the container to tip the vehicle or vehicle body and allow partial vertical overlapping of the vehicle or vehicle body with a vehicle or vehicle body position below in the container to increase the number of vehicles or vehicle bodies which can be loaded into the container.

4 A system according to claim 3 in which each end of the transverse supporting frame has end plates which slide up and down inwardly facing surfaces on the vertical posts.

5 A system according to claims 3 and 4 in which the end plates are connected with the hoist means and can be fastened to the posts to prevent vertical, horizontal

or rotary movement of the supporting frame relative to the posts when the supporting frame has been raised to its transportation position.

6 A system according to claim 5 in which the end plates have an array of holes which can be aligned with holes in the cooperating inwardly facing surfaces of the vertical posts so that pins or bolts inserted in these aligned holes fasten the supporting frame against vertical, horizontal or rotary movement relative to the posts.

7 A system according to any one of claims 3 to 6 for the transportation of wheeled vehicles in which the transversely extending supporting frame is in two or more parts, an upper frame on which the wheels of the vehicle are supported and one or more lower sub-frames which carry the transportation wheels or rollers and which are demountable from the upper frame when the upper frame is raised to its transportation position on the posts to give more clearance below the upper frame for vehicles positioned below the supporting frame in the container.

8 A system according to claim 7 in which a single lower sub-frame is located below the upper frame with the upper frame sitting on the lower sub-frame during loading of the vehicle into the container.

9 A system according to claim 7 in which separate lower sub-frames are located at each end of the wheel supporting frame, each lower sub-frame being detachably secured beneath the upper frame during loading of the vehicle into the container.

10 A system according to claim 8 or 9 in which the or each lower sub-frame carries the guidance means in the form of cam surfaces which cooperate with formations associated with the adjacent container walls to guide the wheel supporting frame into its required position transversely relative to the container as the vehicle is moved into and out of the container.

11 A system according to any one of claims 8 to 10 in which the or each lower sub-frame has front and rear wheels or rollers spaced longitudinally of the vehicle.

12 A system according to claim 11 in which the wheels or rollers which enter the container first are displaceable transversely relative to the remainder of the lower sub-frame on their support axles to facilitate transverse displacement of the wheel supporting frame transversely relative to the container walls as the vehicle is pushed into or out of the container.

13 A system according to claim 12 in which the transversely displaceable wheels or rollers are displaceable on their axles against centralising spring loading.

14 A system according to any one of claims 4 to 6 and claim 8 in which the end plates of the upper wheel supporting frame are located in recesses in the single lower sub-frame during loading of the vehicle into the container to locate the upper supporting frame transversely relative to the lower sub-frame.

15 A system according to claims 1 and 2 for the transportation of wheeled vehicles in which the supporting frame is a single piece component which carries the transportation wheels or rollers and the guidance means and is used as the sole support for a pair of vehicle wheels of a vehicle to be supported on the floor of the container as the vehicle is pushed into the container.

16 A system according to claim 15 in which the single piece supporting frame is provided by a lower sub-frame of the system of claim 8.

17 A system according to claim 15 or 16 in which guidance means mounted on the container cooperate with the guidance means on the supporting frame to guide the supporting frame into the desired position transversely relative to the walls of the container and also act as chocks preventing the supporting frame moving forward in the container beyond a predetermined transport position.

18 A system according to claim 17 in which the guidance means comprise angled blocks facing inwardly into the container which cooperate with angled cam surfaces on the supporting frame.

19 A system in which the single piece wheel supporting frame of claim 15 or the single sub-frame of claim 8 has wheel securing winches mounted thereon for tightening wheel lashings for securing the wheel to the sub-frame.

20 A system according to claim 19 in which the winches are adjustably mounted transversely relative to the supporting frame or single sub-frame to allow use with vehicles with different wheel tracks.

21 A system according to claims 19 or 20 in which the supporting frame or single lower sub-frame has lashing securing formations for securing one end of each wheel lashing, the other end of each lashing being connected with the associated wheel securing winch.

22 A system according to claim 21 in which the lashing securing means comprises securing bars which extend part way across the supporting frame or single lower sub-frame to allow attachment of the wheel lashings of vehicles of different wheel tracks.

23 A system according to claim 8 in which the single lower sub-frame has abutment means against which an associated upper wheel supporting frame is pushed when the vehicle is pushed into the container.

24 A system according to any one of claims 7 to 23 in which a fastening member is provided to hold the transversely extending wheel supporting frame stationary during loading of vehicles onto the frame, one end of the fastening member engaging the wheel support frame and the other end being secured to the container during loading of the vehicle onto the supporting frame.

25 A system according to claim 24 in which the fastening member is used to hold stationary the lower sub-frame of a two-part wheel supporting frame for supporting the rear wheels of a vehicle which are intended to be raised clear of the floor of a container when loaded.

26 A system according to claim 24 in which the fastening member is used to hold stationary a single piece wheel support frame consisting of a lower sub-frame of the two-part frame for supporting the rear wheels of a vehicle which is to be supported on the floor of the container when loaded.

27 A system according to any one of claims 24 to 26 in which the fastening member has a channel portion at one end which engages the wheel support frame

and a fastening plate at the other end through which the member is screwed or otherwise secured to the floor of the container.

28 A system according to any one of claims 7 to 27 in which the wheels or rollers on the wheel support frame are positioned away from the outer ends of the frame to avoid problems associated with missing container loading ramps when loading the container.

29 A single piece lower sub-frame for use in the transportation system according to claim 8 which has front and rear wheels or rollers spaced longitudinally of the vehicle and guidance means for guiding the supporting frame transversely of the container into a required position within the container with the vehicle clear of the container walls.

30 A pair of lower sub-frames for use in the transportation system according to claim 9, each lower sub-frame having front and rear wheels or rollers spaced longitudinally of the vehicle and guidance means for guiding the supporting frame transversely of the container into a required position within the container with the vehicle clear of the container walls.

31 A system according to claims 1 to 6 for the transportation of a vehicle body without wheels, the system comprising a pair of support frames extendable transversely between pairs of vertically extending posts secured at longitudinally spaced locations to the walls of a shipping container, and longitudinally extending members extending between these support frames to form a vehicle body support structure, wheels being provided on the support structure to allow the structure to be wheeled into the container carrying a vehicle body, and guidance means on the support structure to guide the structure into the desired position transversely relative to the walls of the container as the structure is wheeled into the container, the structure being raiseable on the vertical posts above the floor of the container if required.

32 A method of loading a twin axle wheeled vehicle onto the floor of a shipping container comprising the steps of :-

driving the wheels of one axle of the vehicle onto a wheel supporting frame which extends transversely across the container and includes wheel receiving members located at opposite ends of the supporting frame and transportation wheels or rollers on which the vehicle whose wheels are supported on the wheel receiving means can be pushed into the container or pulled out of the container;

securing the wheels to the wheel supporting frame;

raising the other pair of wheels of the vehicle of the floor;

pushing the vehicle into the desired position in the container with its other pair of wheels raised;

lowering the other pair of raised wheels on to the floor of the container, and

securing the vehicle to the container.

33 A method according to claim 32 in which guidance means carried on the wheel supporting frame cooperate with formations associated with the container to gu de the supporting frame transversely of the container into a required position within the container with the vehicle clear of the container walls.

34 A method according to claim 33 in which in which guidance means mounted in the container also act as chocks preventing the wheel supporting frame moving forward in the container beyond a predetermined transport position.

35 A method according to any one of claims 32 to 34 in which the vehicle is secured to the container via its wheels or a towing eye provided on the vehicle.

36 A method of loading a twin axle wheeled vehicle into a position raised above the floor of a shipping container comprising the steps of:-

providing two pairs of vertical posts secured to the inside of the walls of the container and two wheel supporting frames for extending between respective pairs of the posts and winch means on at least one pair of posts for raising the associated wheel supporting frame clear of the floor of the shipping container;

providing a lower sub-frame with transportation wheels or rollers for supporting one of the wheel supporting frames clear of the floor as the vehicle is pushed into the container;

locating the wheels of one axle the vehicle on one of the wheel supporting frames mounted on the sub-frame;

locating the wheels of the other axle on the other wheel support frame;
securing each pair of wheels to their respective wheel support frame;
raising the wheel support frame not supported on the lower sub-frame from the floor and pushing the vehicle into the required longitudinal position in the container on the wheels or rollers of the lower sub-frame;
connecting the ends of the wheel support frame supported on the lower sub-frame with the post winches;
winching the wheel support frame to the required vertical position;
raising the other wheel support frame to its required vertical position, and
securing the wheel support frames to their respective posts for transportation.

37 A method according to claim 36 in which guidance means carried on the wheel supporting frame carried on the lower sub-frame cooperate with formations associated with the container to guide the supporting frame transversely of the container into a required position within the container with the vehicle clear of the container walls.

38 A method according to claim 36 or 37 in which the other wheel support frame is raised to its required vertical position using a fork lift truck or similar device.

39 A method according to claim 38 in which safety stops are used on tines of any fork lift truck used to raise the wheel support frame, the stops being clamped to the tines to prevent the support frame sliding along the tines during loading.

40 A method according to claim 36 or 37 in which the other wheel support frame is raised to its required vertical position using a second pair of winches carried by the other pair of vertical posts.

41 A method according to claim 33 or 36 in which a fastening member is engaged at one end with the wheel supporting frame and is secured at the other end to the container to hold the wheel supporting frame stationary during loading of the vehicle onto the supporting frame.

42 A method according to claim 41 in which the fastening member is used to hold stationary the lower sub-frame of a two-part wheel supporting frame for

supporting the rear wheels of a vehicle which are intended to be raised clear of the floor of a container when loaded.

43 A method according to claim 41 in which the fastening member is used to hold stationary a single piece wheel support frame for supporting the rear wheels of a vehicle which is to be supported on the floor of the container when loaded.

44 A method of loading several twin axle vehicles into a shipping container with one or more vehicles are loaded into raised positions in the container using any one of the methods of claims 36 to 42 and one or more vehicles are loaded on to the floor of the container using the method of any one of claims 34 to 43.

45 A method of loading a vehicle body without wheels into a walled shipping container comprising the steps of:-

providing a wheeled vehicle body support structure comprising a pair of support frames extendable transversely between pairs of vertically extending posts secured at longitudinally spaced locations to the walls of a shipping container, and longitudinally extending members extending between these support frames;

loading and securing the vehicle body onto the body support structure;

wheeling the body into the container on the body support structure with guidance means on the support structure guiding the support structure transversely relative to the walls of the container to ensure that the body does not contact the container walls, and either securing the support structure in its transport position on the floor of the container or raising the body and the support structure above the floor on the vertical posts to a raised transport position.

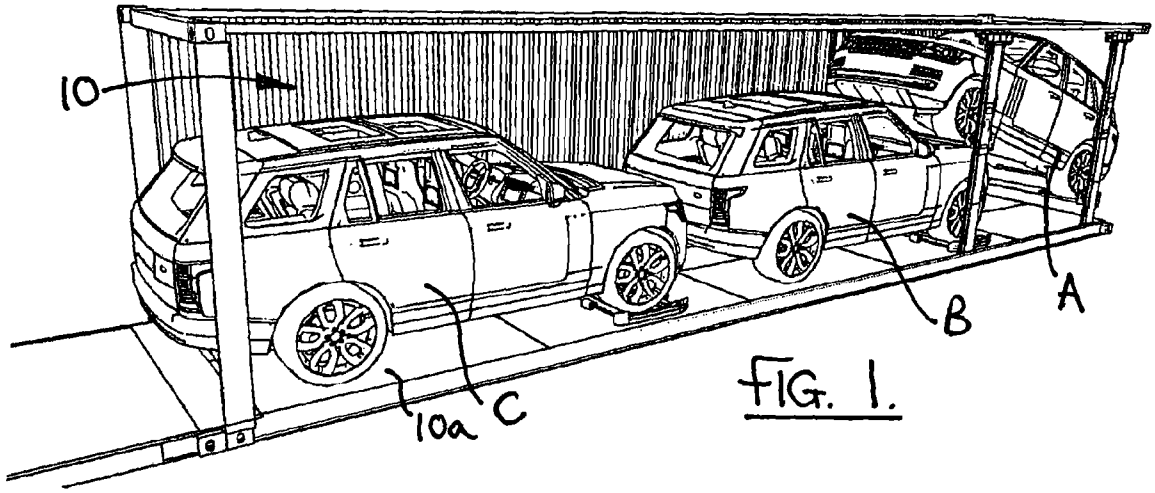


FIG. 1.

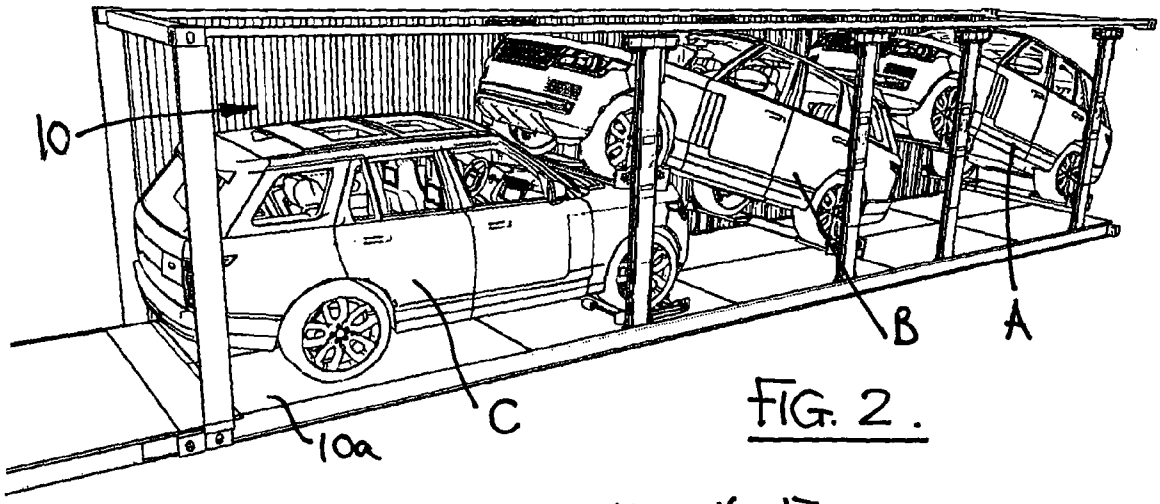


FIG. 2.

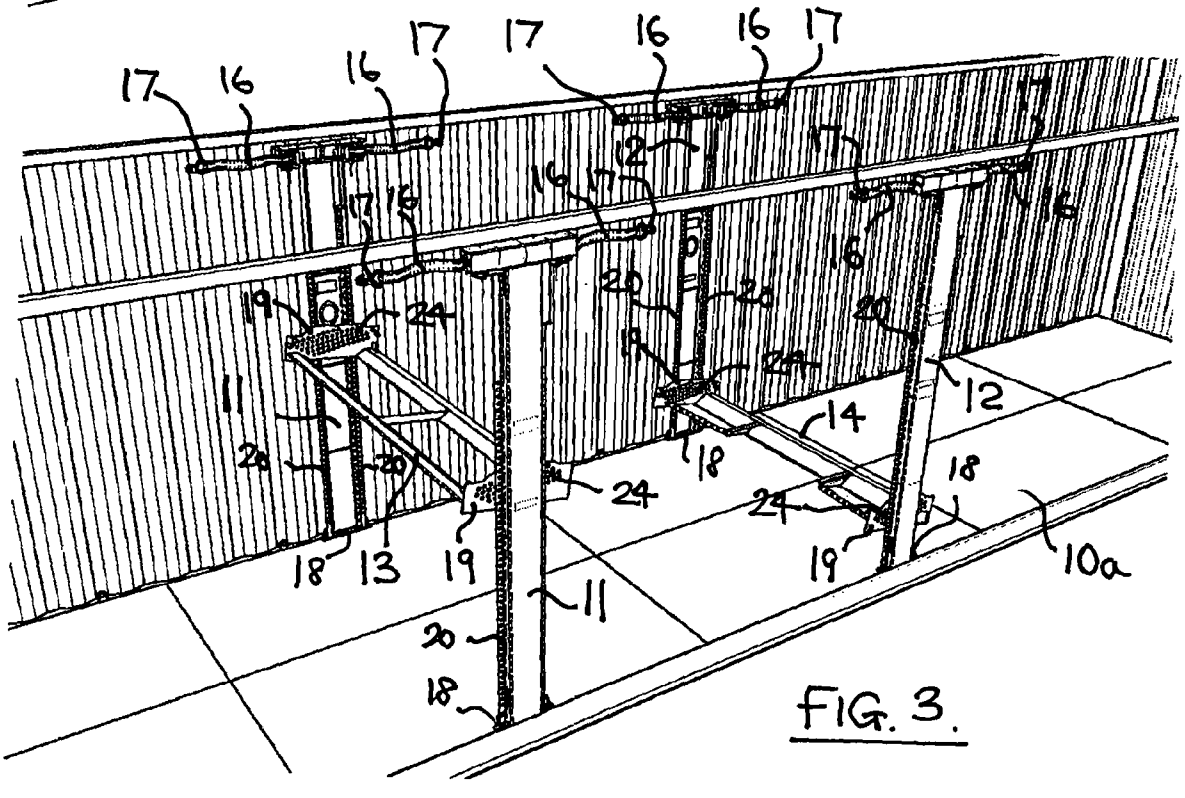


FIG. 3.

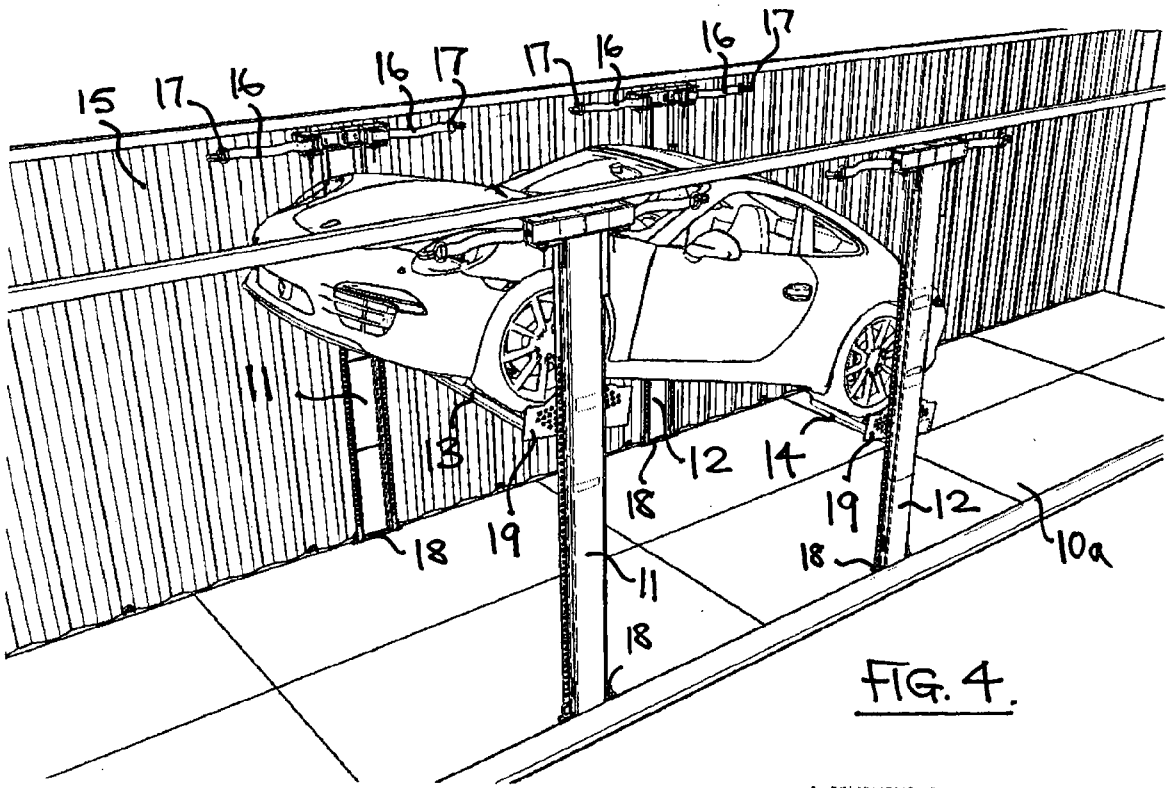
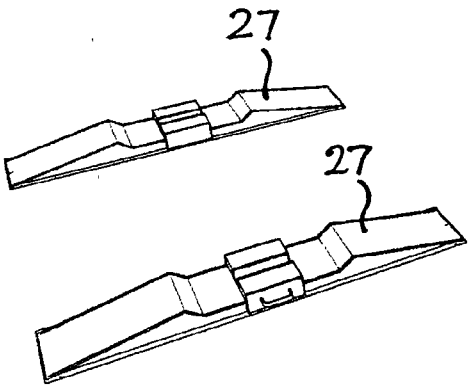


FIG. 4.



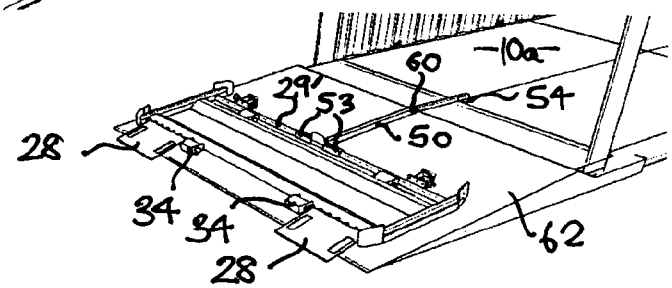
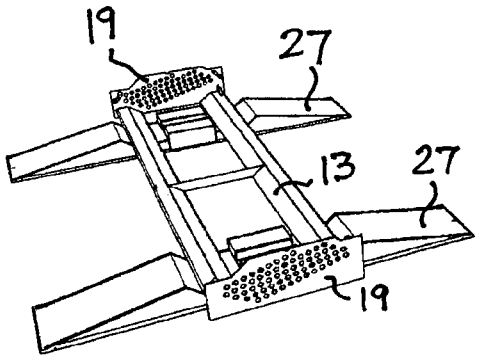
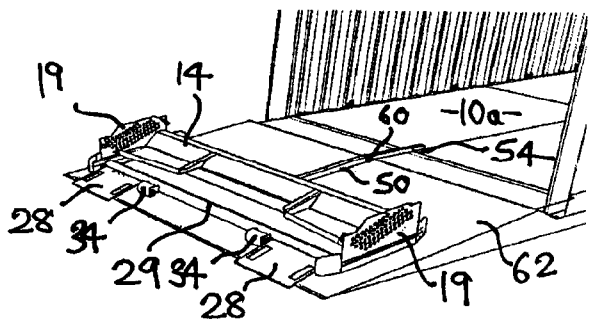


FIG. 5.





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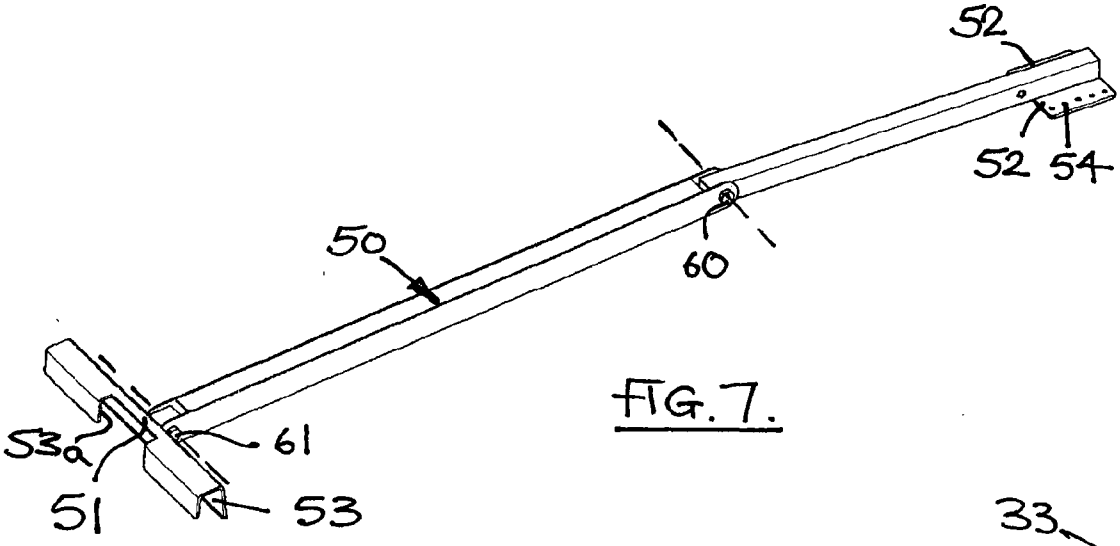


FIG. 7.

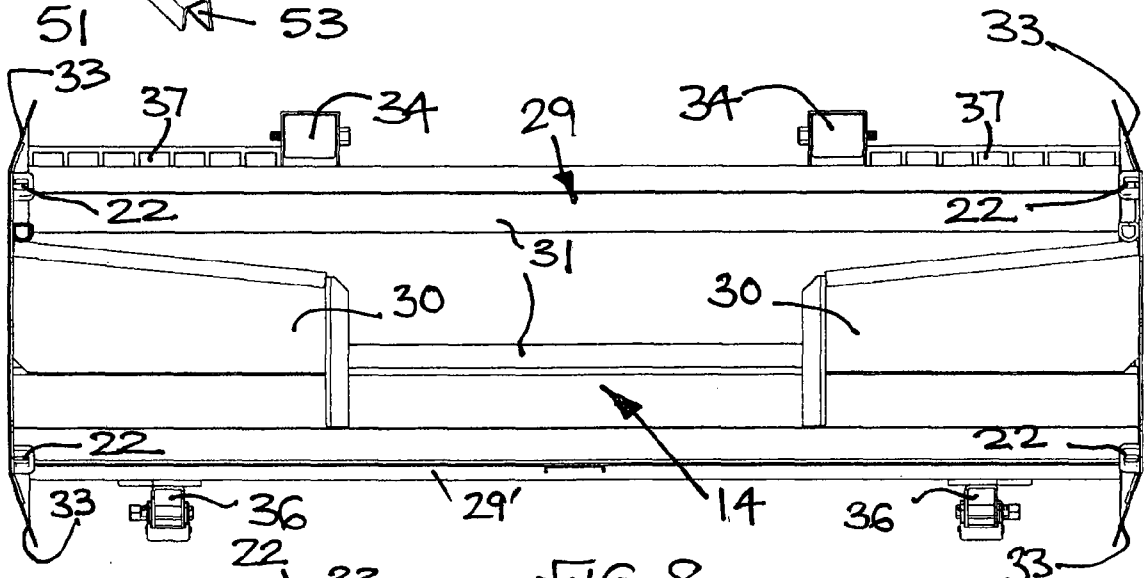
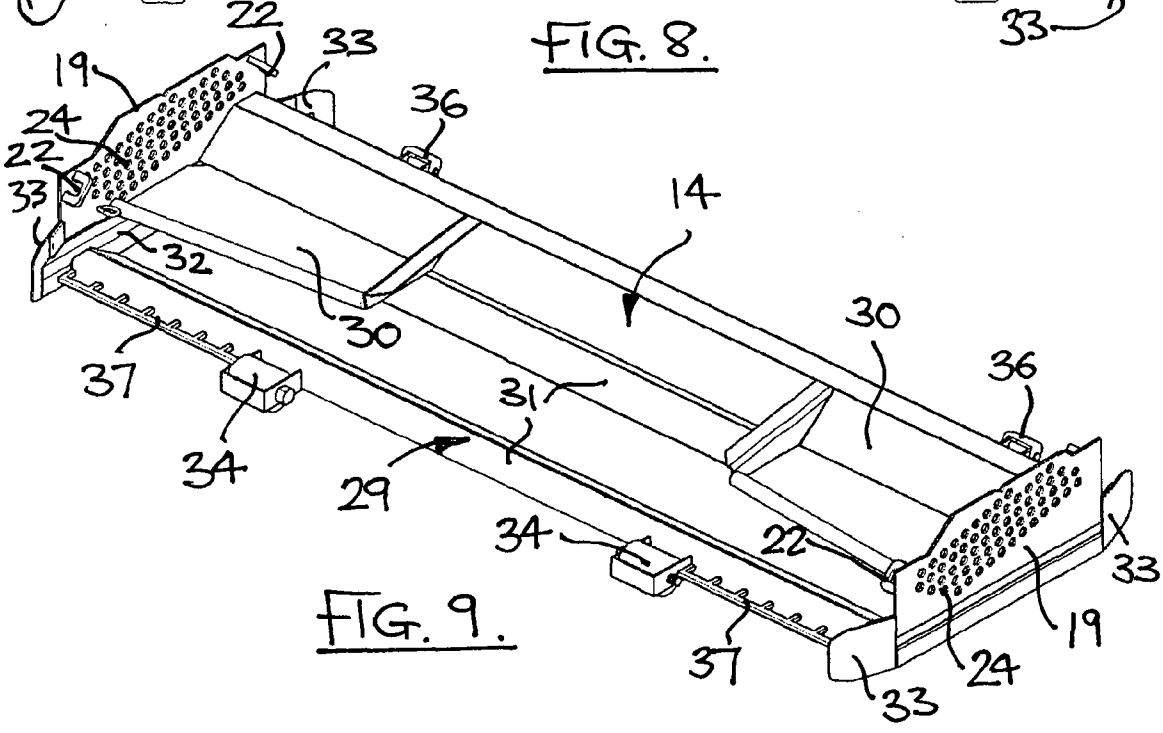


FIG. 8.



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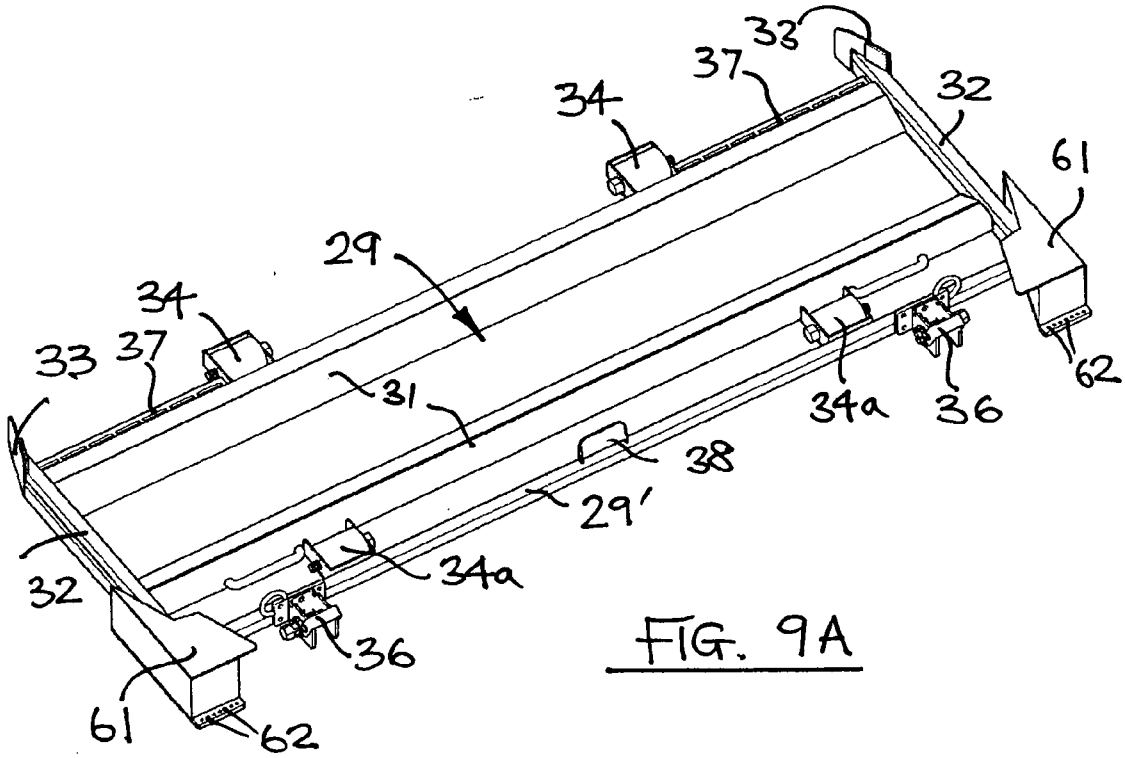
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FIG. 9A

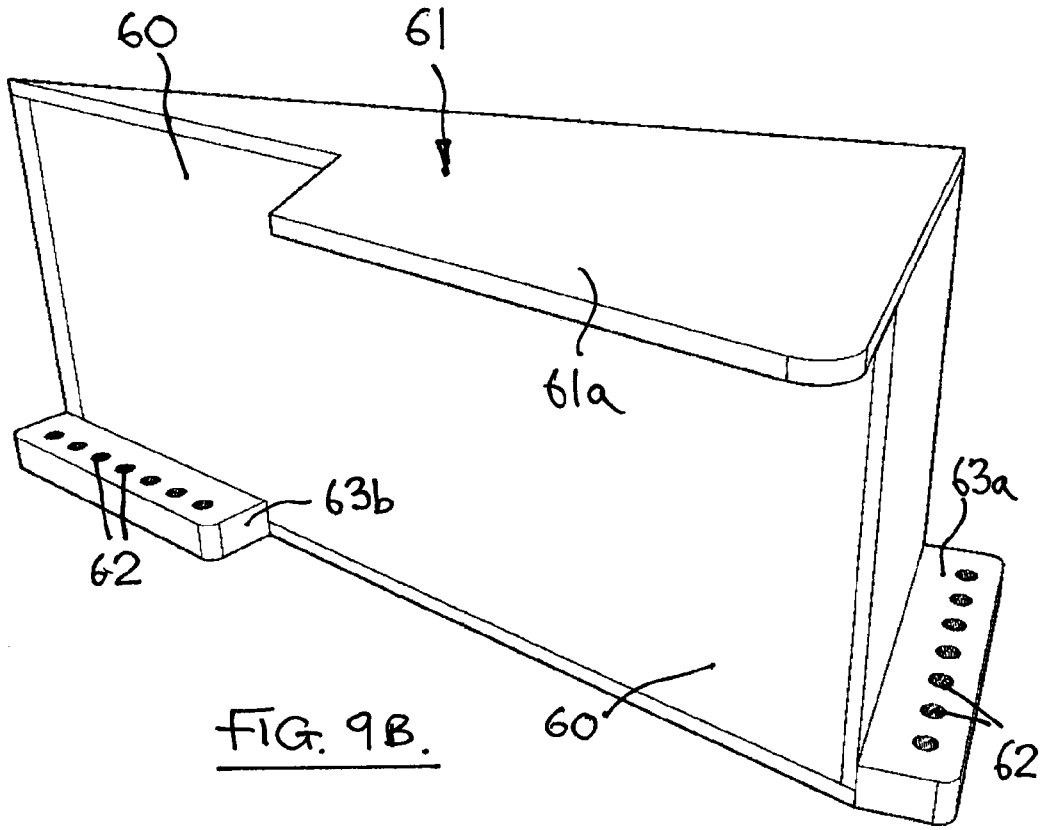
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FIG. 9B.

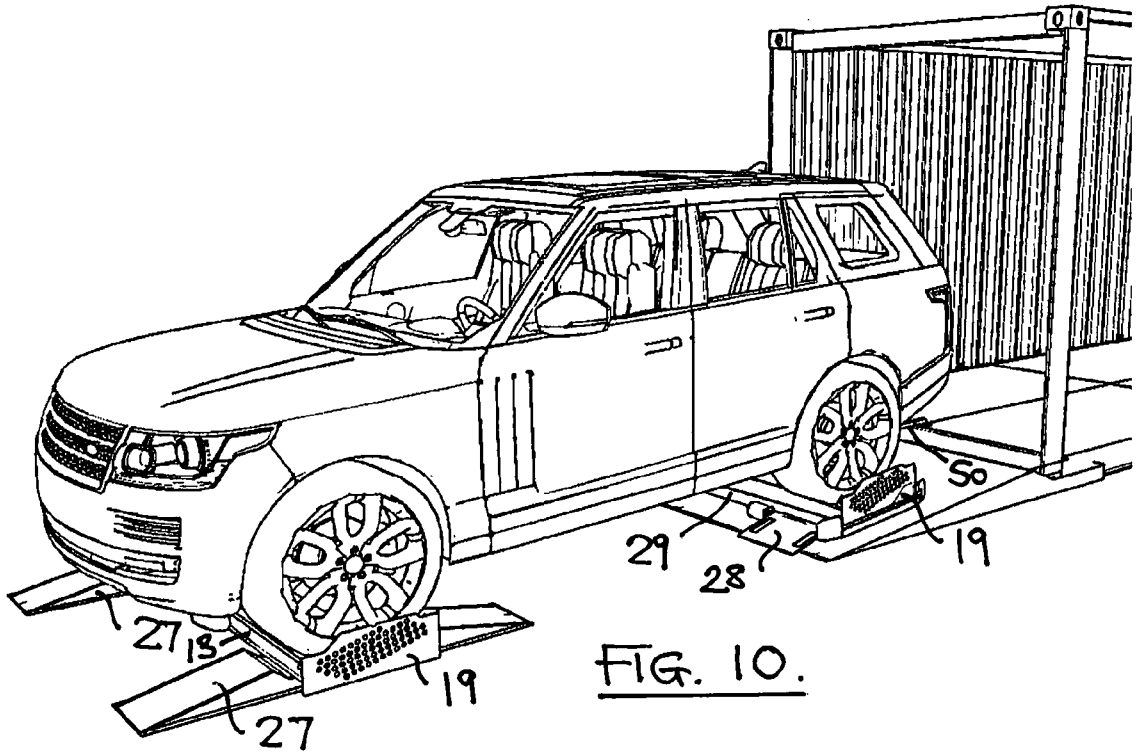


FIG. 10.

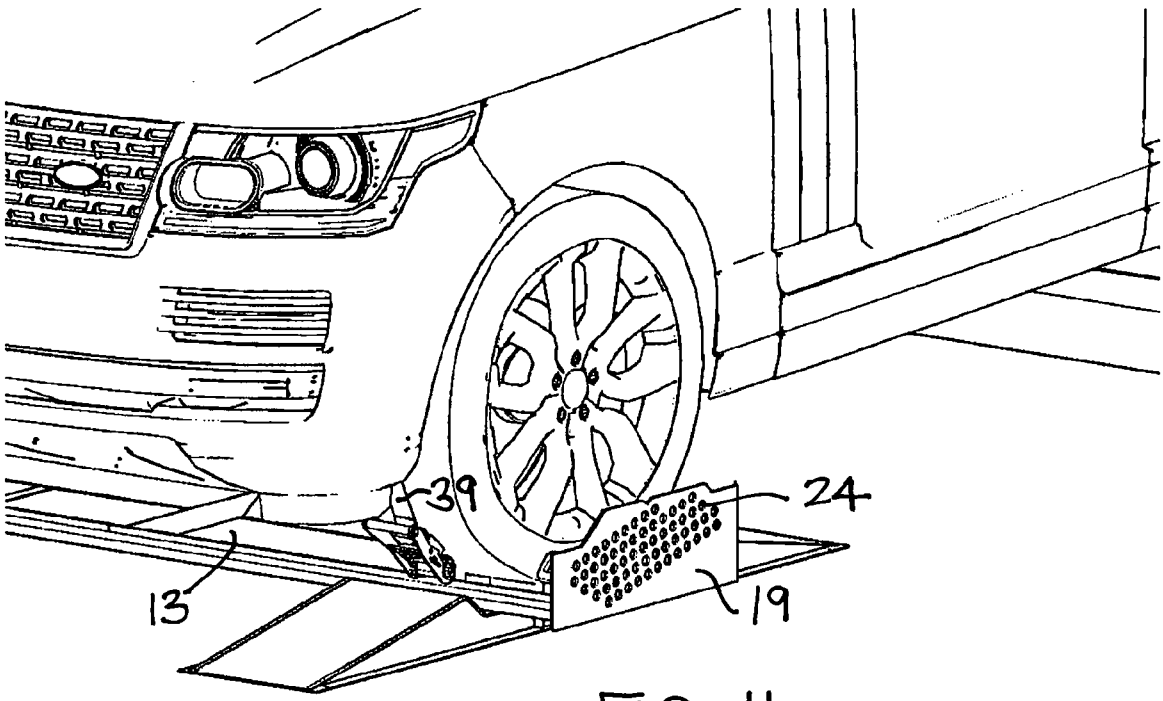


FIG. 11.

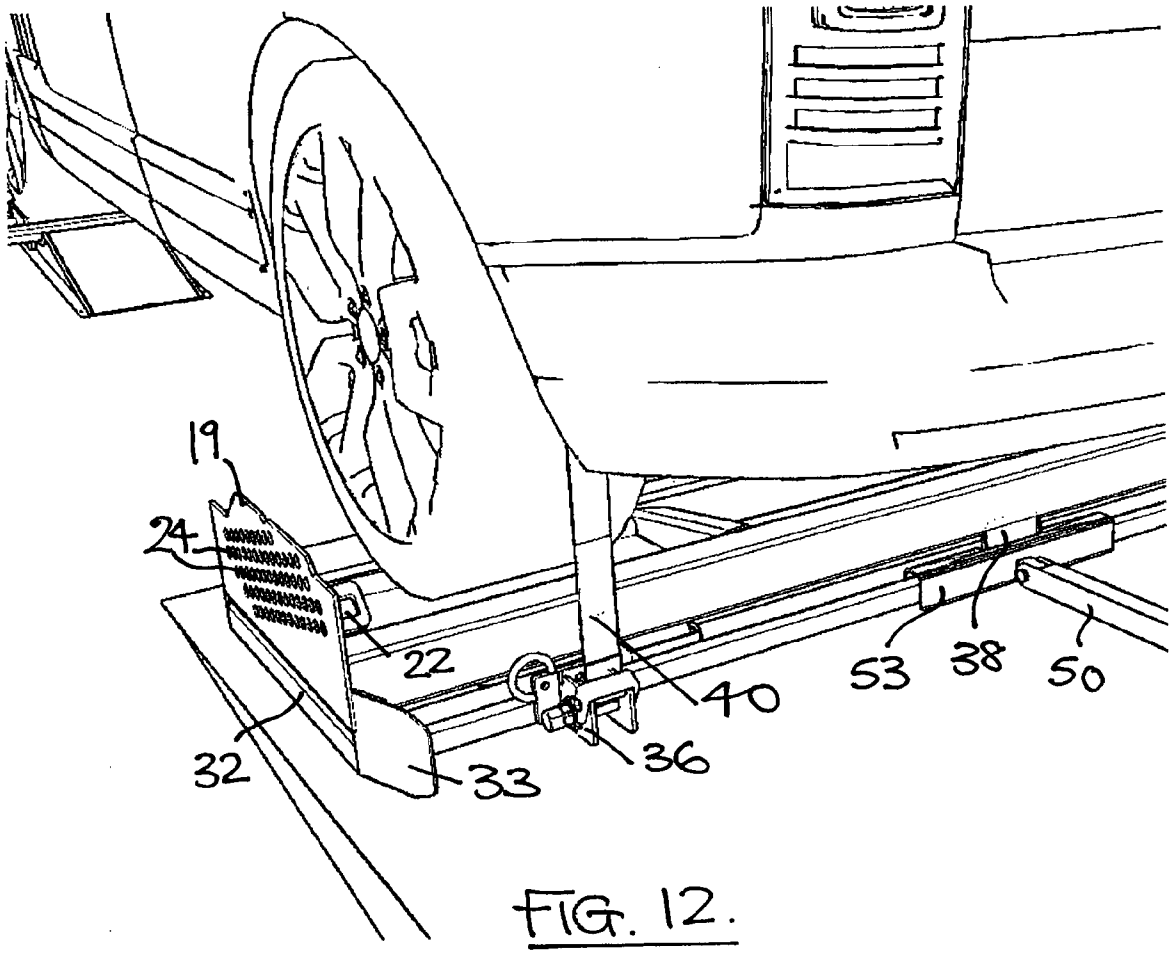


FIG. 12.

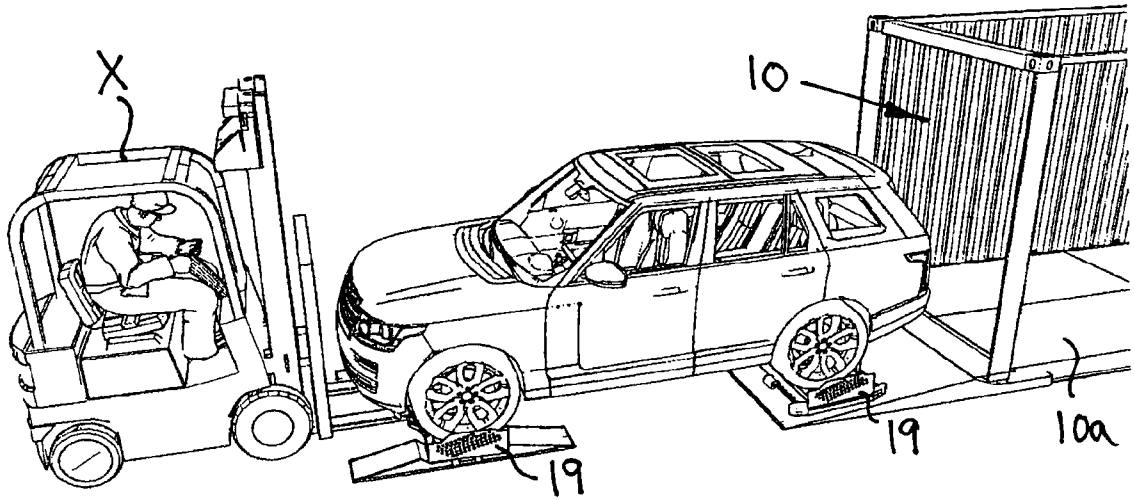


FIG. 13.

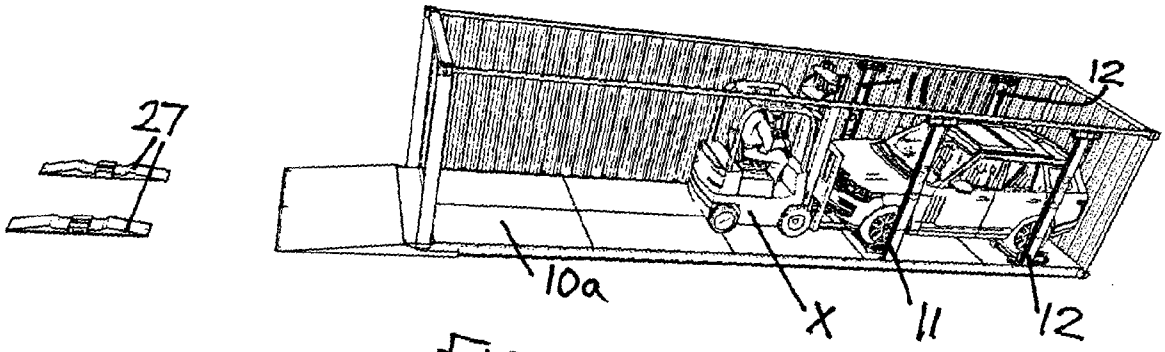


FIG. 14.

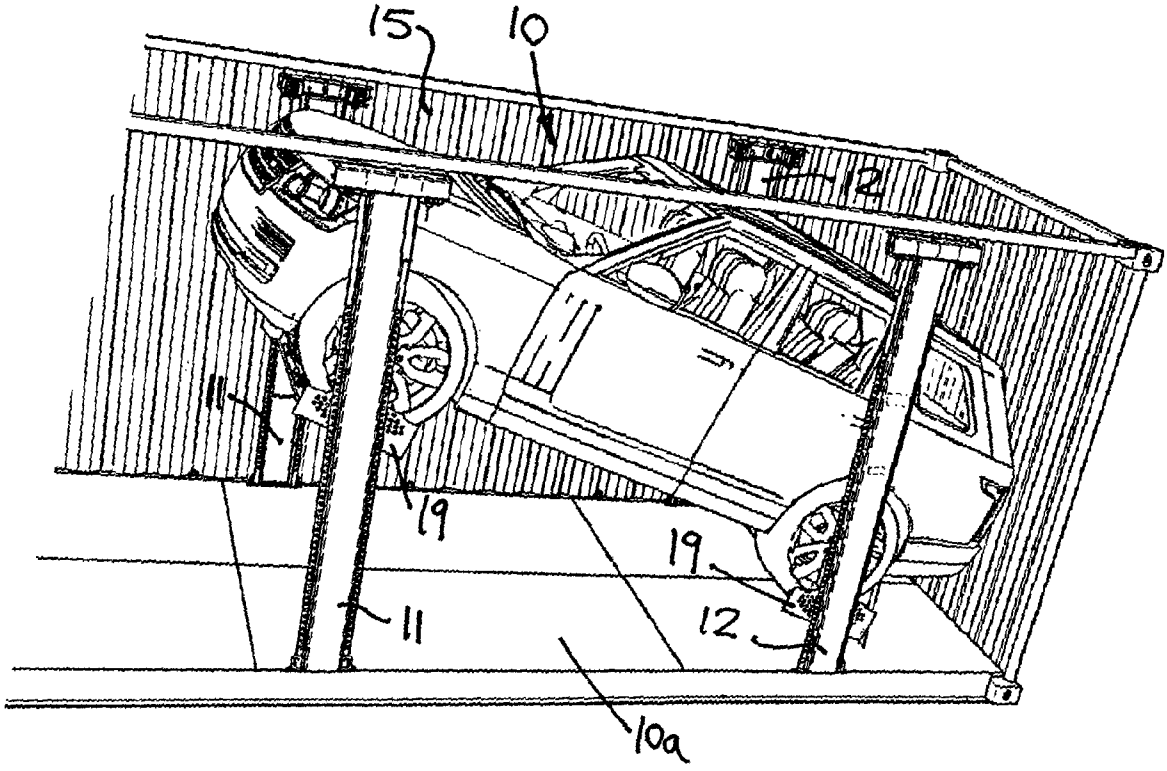


FIG. 15.

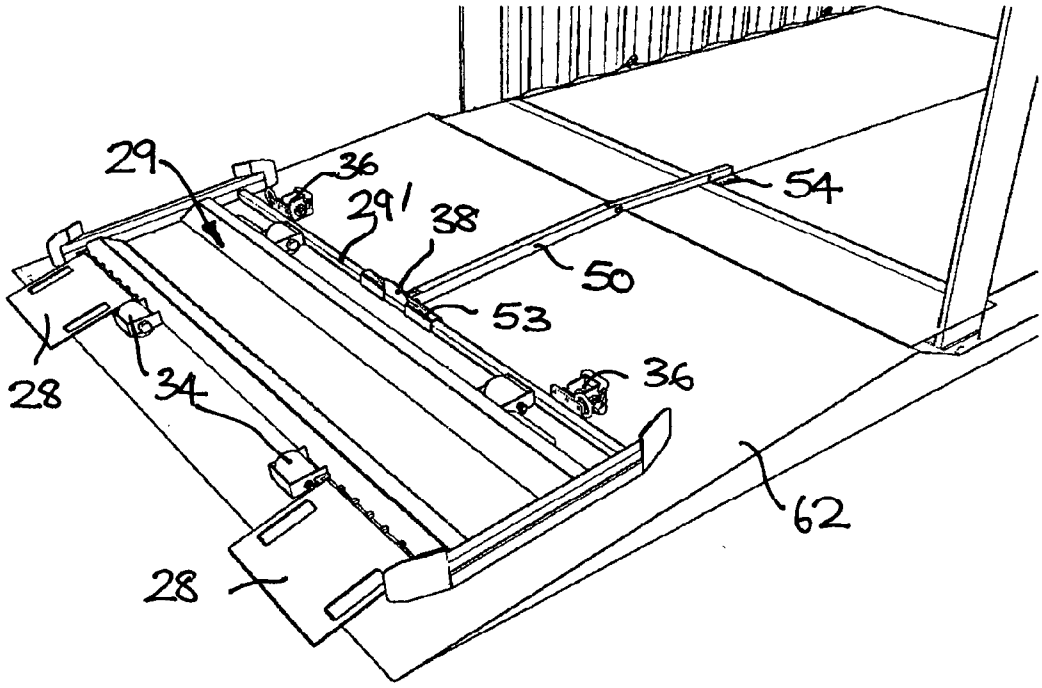


FIG. 16.

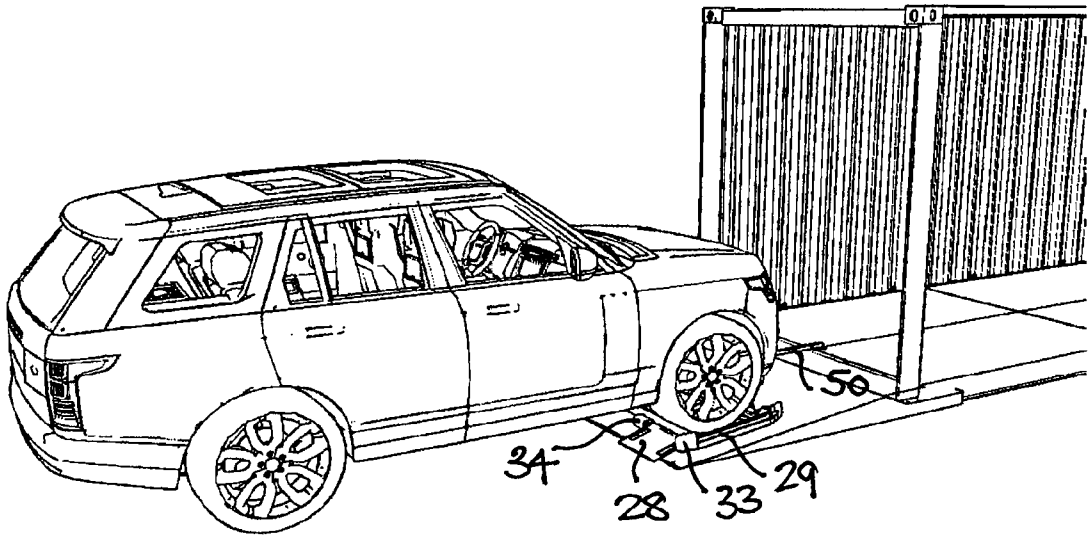


FIG. 17.

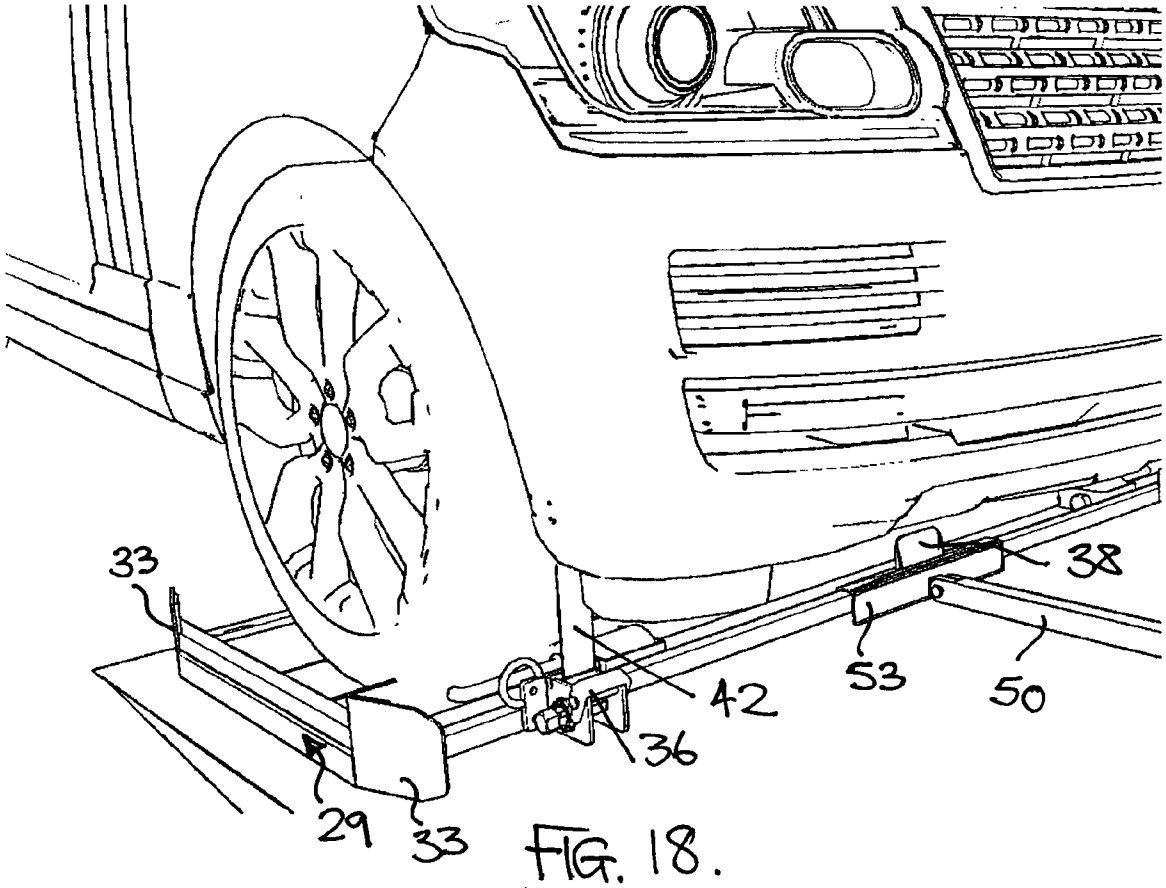


FIG. 18.

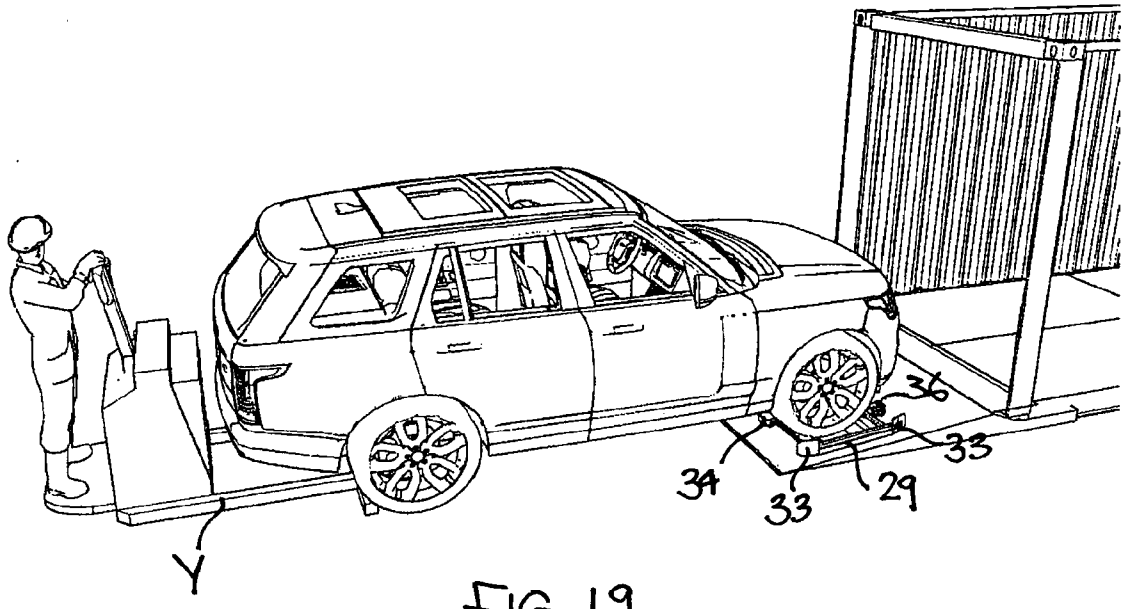


FIG. 19.

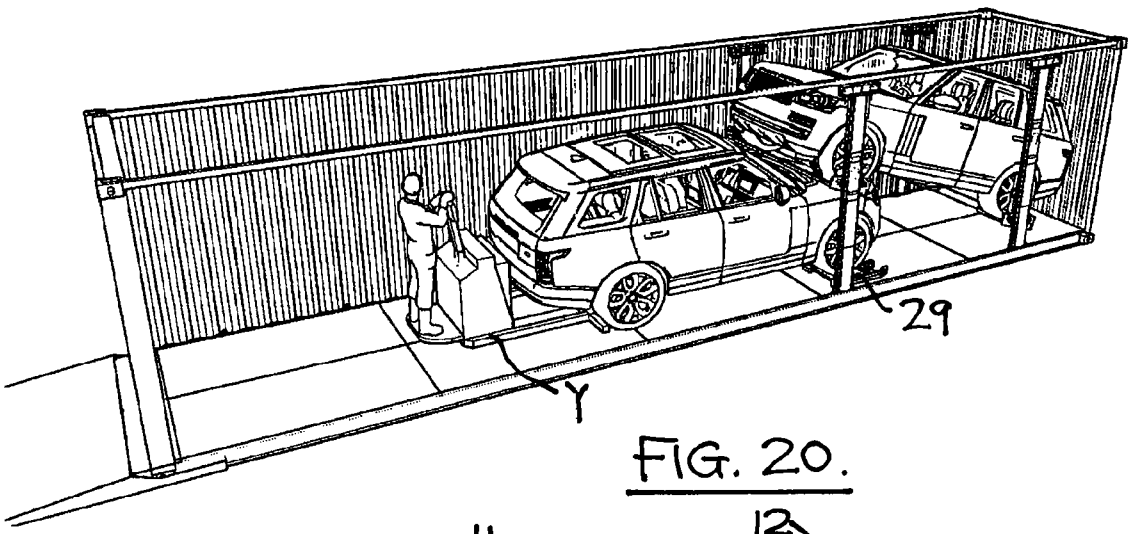


FIG. 20.

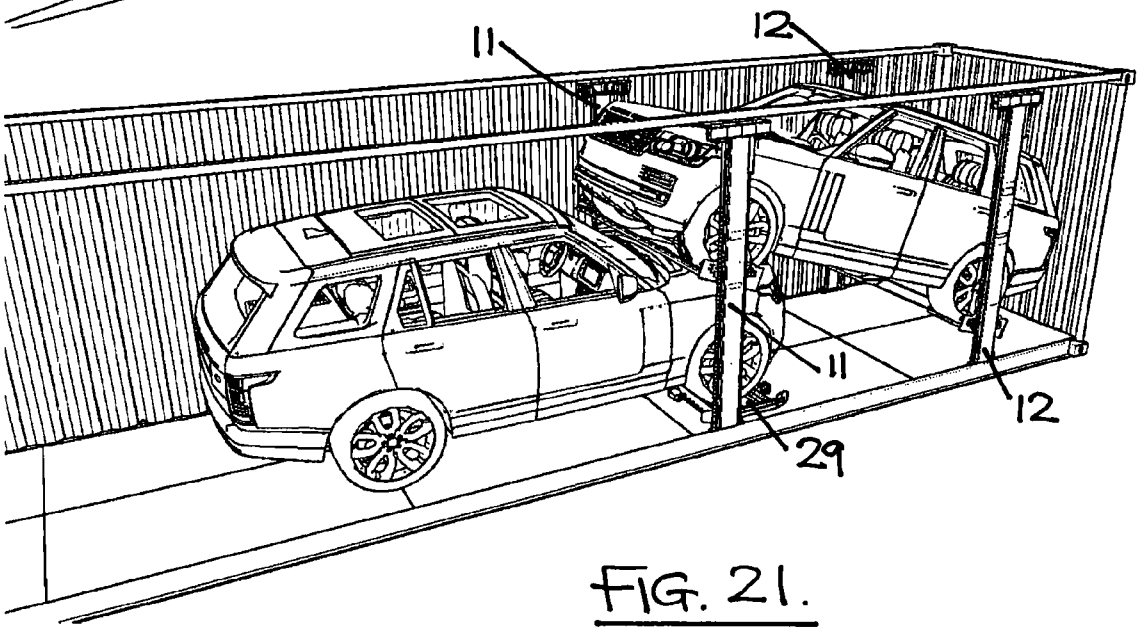


FIG. 21.

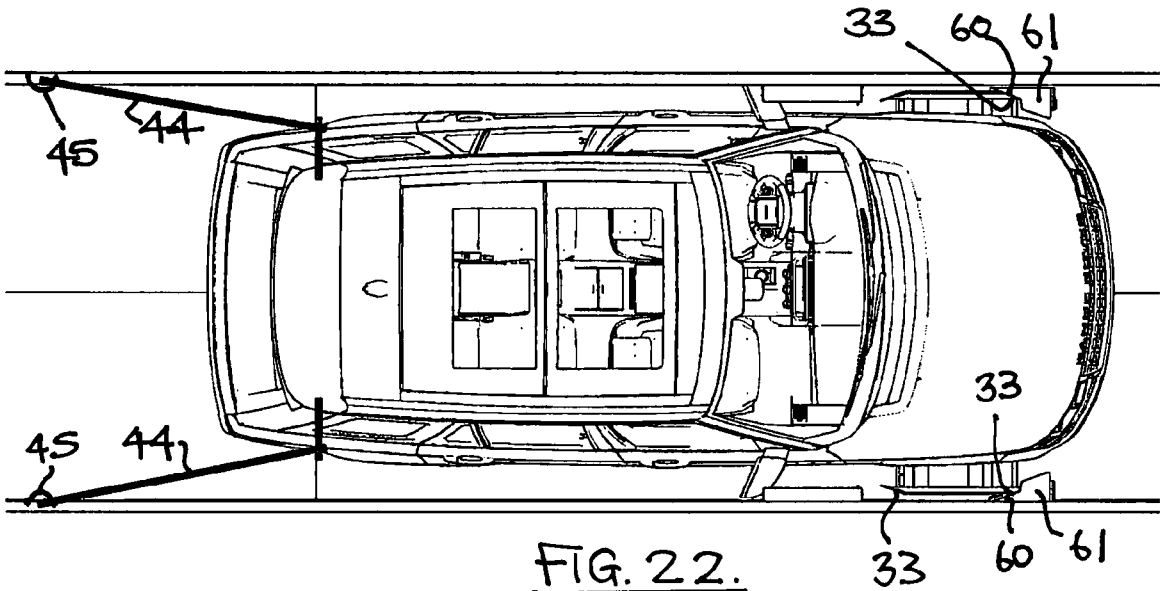


FIG. 22.

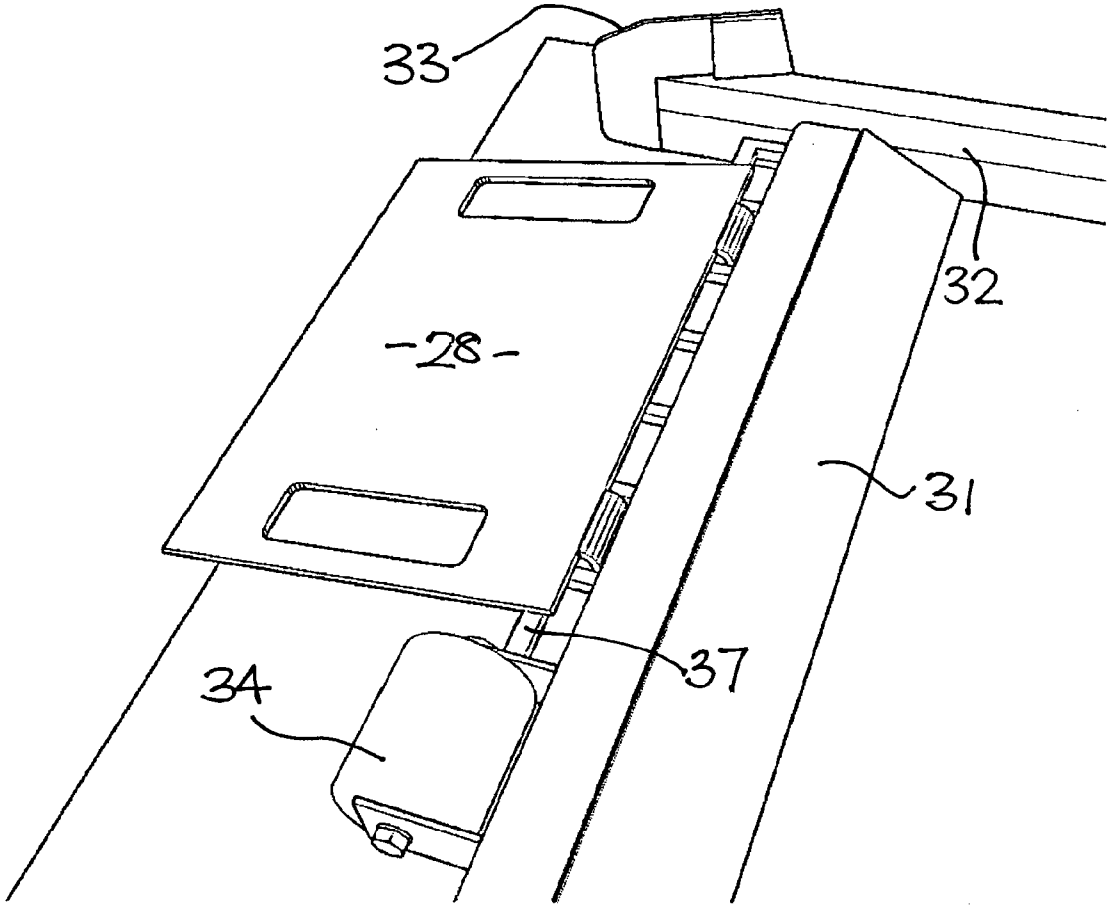
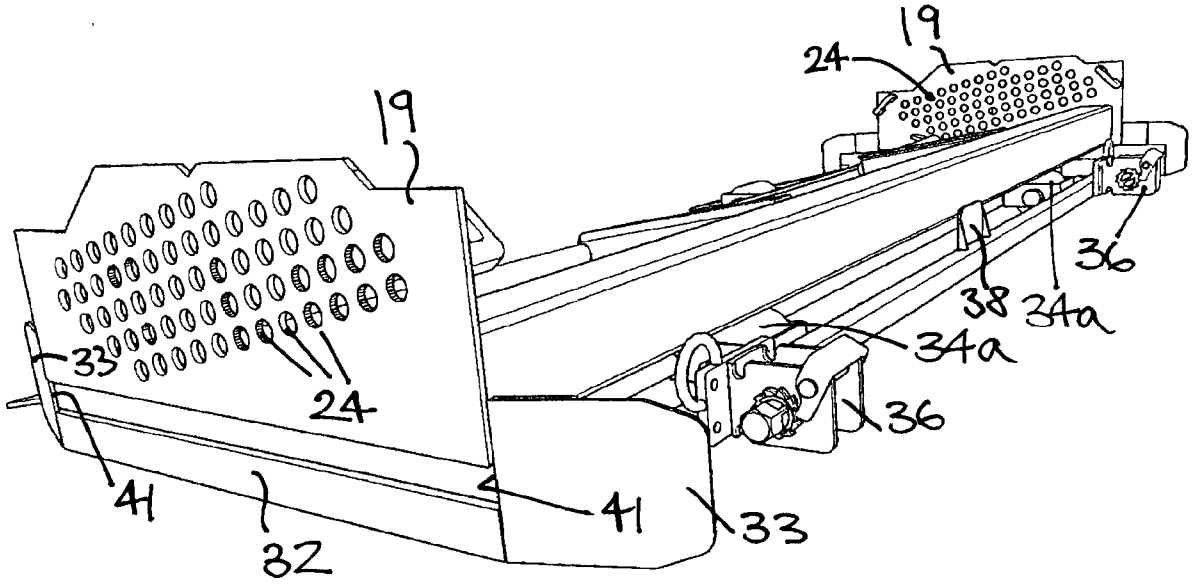


FIG. 23.



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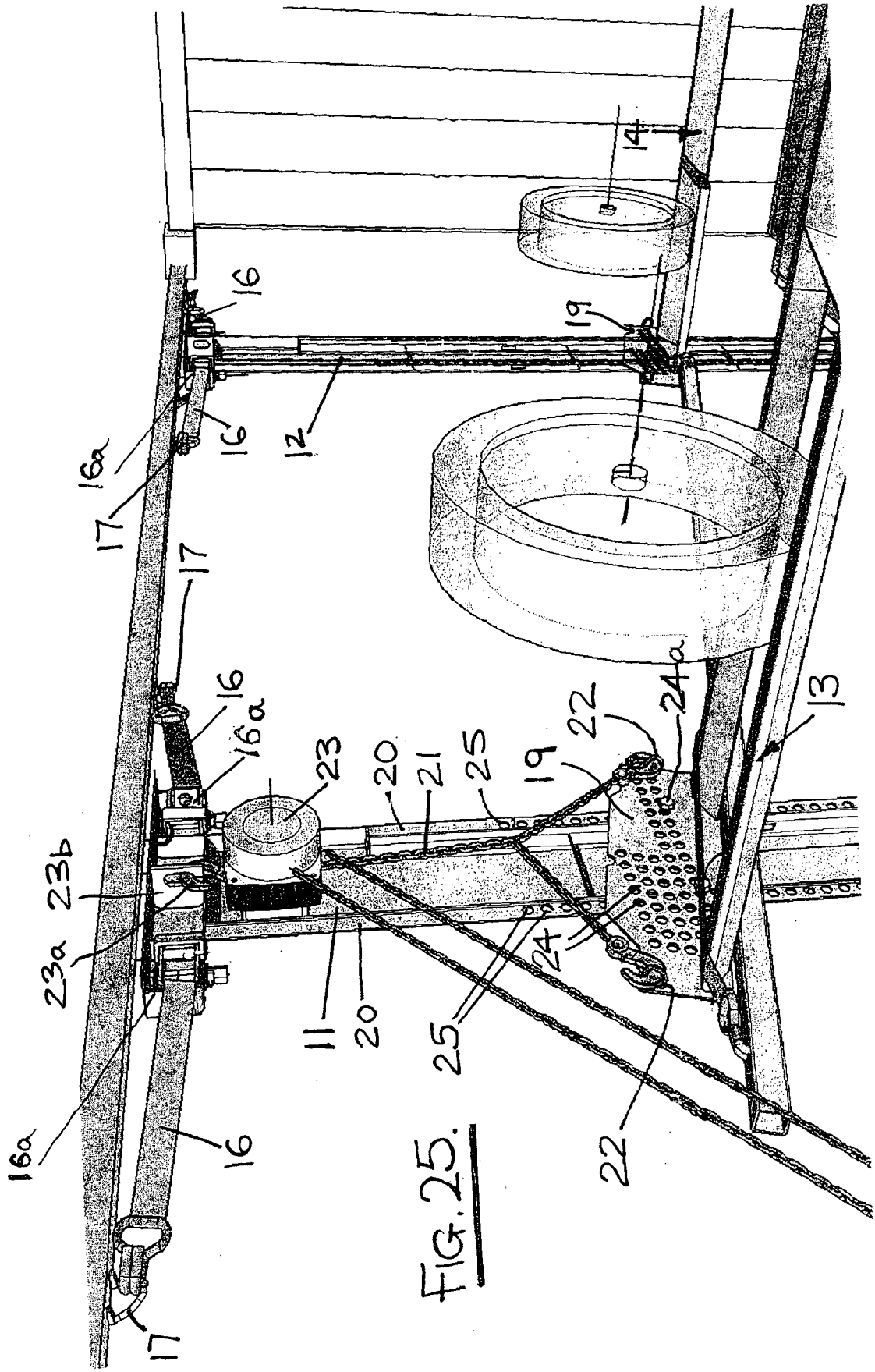
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FIG. 25.

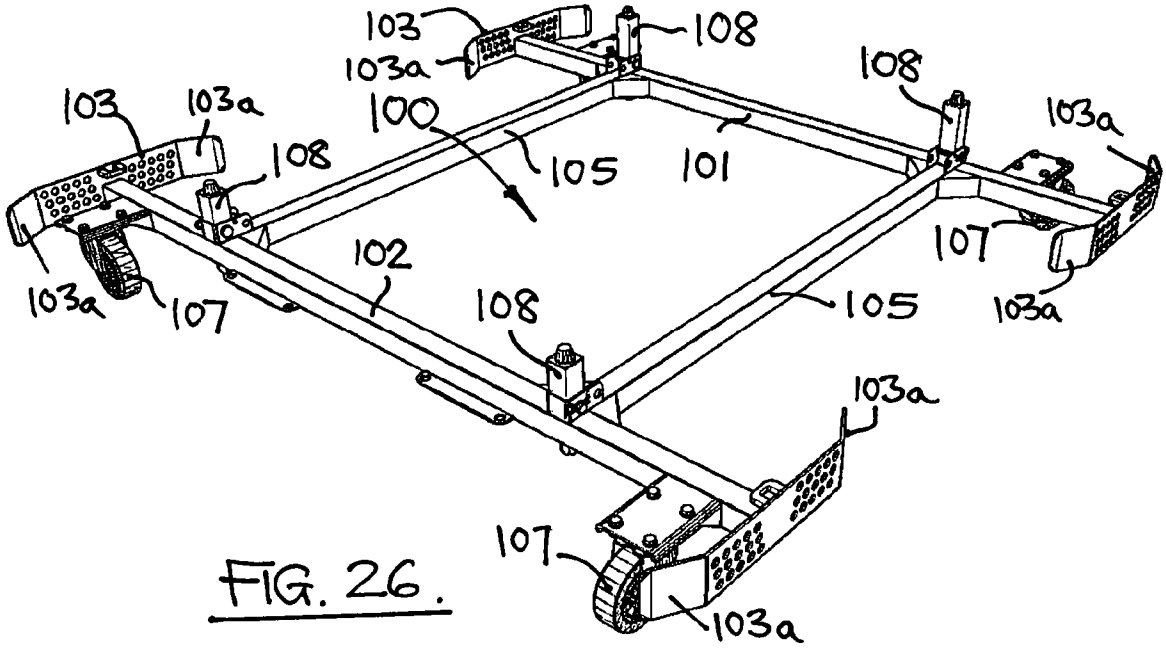

FIG. 26.

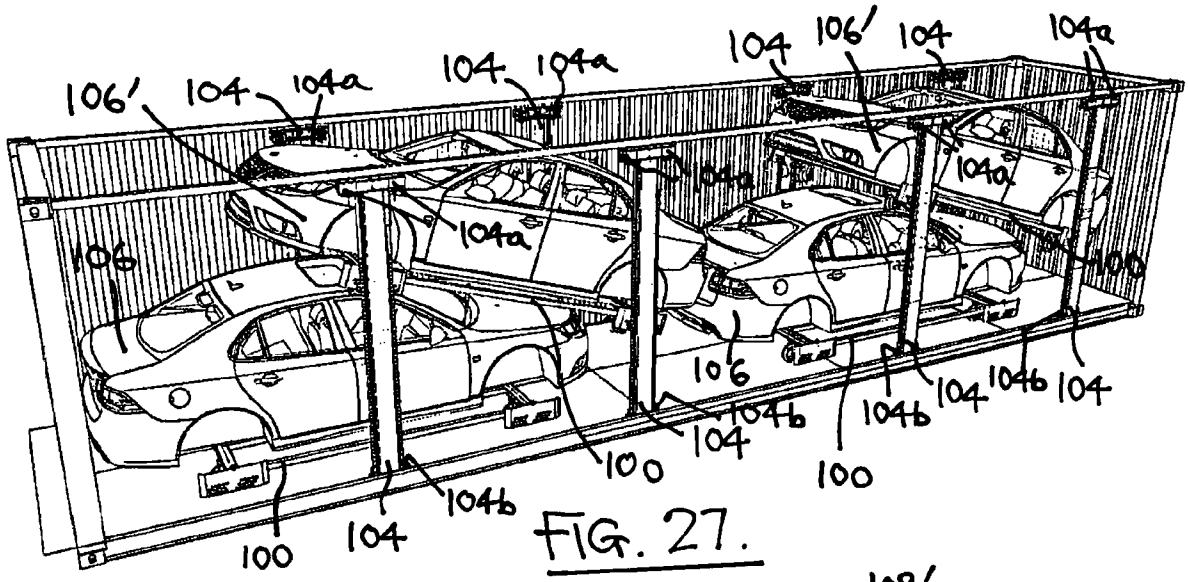

FIG. 27.

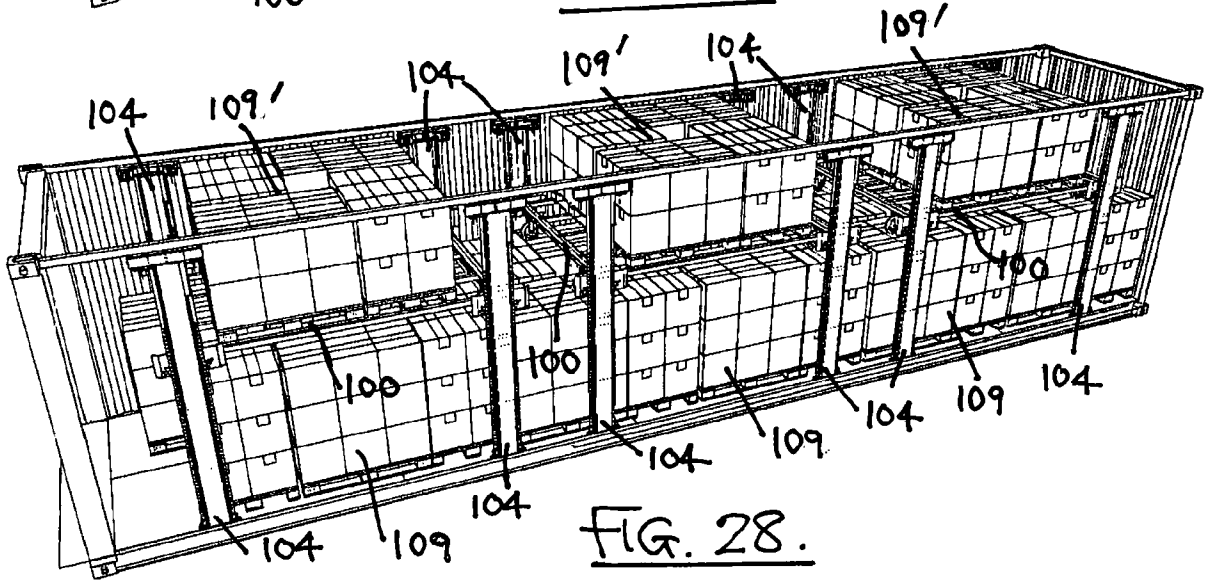

FIG. 28.

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2017/000002

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65D85/68
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)
B65D B60P B65G

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2004/078632 A2 (CLIVE-SMITH MARTIN [GB]) 16 September 2004 (2004-09-16)	1-6,15, 19-22, 28-30, 32,33, 35-40,44
A	page 7, lines 23-25 page 15, lines 7-8, 31-34 figures 7B, 10	7-14,16, 23-27, 41-43

X	JP H04 6075 A (FURUKAWA SHIGENOBU) 10 January 1992 (1992-01-10)	1,2,15, 17-22, 28-30, 32-35
A	abstract; figures 1-11	16, 24-27, 41-43

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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
23 February 2017	24/04/2017

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	Piolat, Olivier

2

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2017/000002

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.:

1-30, 32-44

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: 1-30, 32-44

   Vehicle transportation system

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2. claims: 31, 45

   Vehicle body transportation system

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2017/000002

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	abstract; figures 1-5	16, 24-27, 41-43

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