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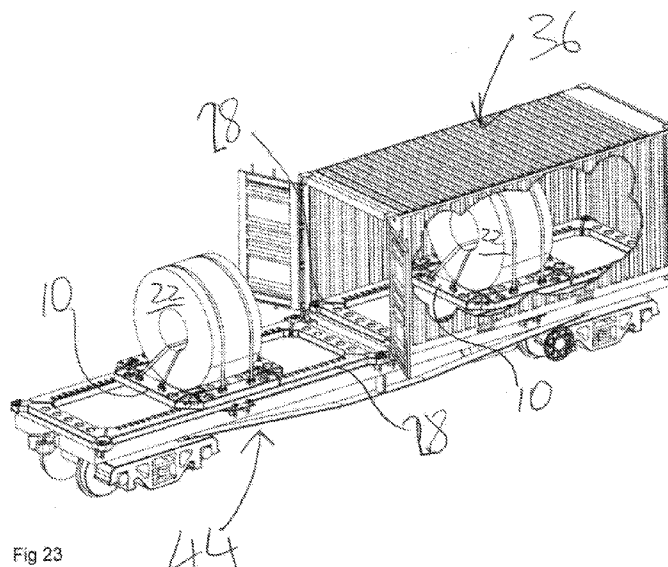


Fig 23

(57) Abstract: The invention provides a coil transport cradle apparatus, said apparatus including a cradle upon which said coil is placed and which supports said coil in use; and a support beam base upon which said cradle is placed and which supports and is releasably connected to said cradle in use, the base being adapted to be loaded directly into an ISO container, on a train wagon or on a road going vehicle, while supporting the cradle and said coil, so that in use, the base is displaceable within said container to a transport position fully inside said container in which the cradle is positioned, either in an eye to the front or eye to the side orientation on the support beam base, whereat the base distributes the load of said coil and the cradle to permit conventional transport of said coil by road or by rail with or without a container.



COIL TRANSPORT CRADLE AND PROCESS

The entire contents of South African Provisional Patent Application No 2016/00771 from which this application claims priority is incorporated herein by reference as if specifically reproduced herein.

Field of the Invention

The invention is in the field of coil transportation cradles and the process of transporting a metal coil.

Background to the Invention

There is a requirement to transport steel coils with a mass of up to 24t. Currently the coils are transported by tying or bracing them inside ISO containers, using wooden beams and braces to support the coils in position. A typical 24t packed coil is shown in <http://www.containerhandbuch.de>. In the prior art the coils are lashed longitudinally and transversely and shored longitudinally and transversely using a wooden frame structure. For examples see Figs 20, 35, 36 in <http://www.containerhandbuch.de>.

The wooden beams and lashings are added to secure the coils in position as well as to reduce the bending moments working in on the floor of the container, due to the point load generated by the single 24t coil. Figure 2 in <http://www.containerhandbuch.de> shows typical damage to a container floor due to an overload condition.

There are a number of existing systems for transporting coils, for example:

1. The Coil-Tainer System which can be seen at <http://www.coil-tainer.com> and which is the subject of several patents viz. US 6,231,284 B1 and US 7,383,951 B2.

5 The Coil-Tainer system makes use of singular cradles which fit inside the ISO container. The Coil is secured to the cradle, and the cradle and coil combination is then positioned inside the shipping container by utilising a fork lift or a Joloda Guide rail system.

10 The system however only allows for the coils to be transported inside a container, and with an eye to the side orientation. Where a single heavy coil is transported, additional empty cradles are added into the container to restrain the centre coil, effectively reducing the payload of the container.

2. Cradle and Saddle Assembly which is the subject of several patents viz. US D 674,165S and EP 2 447 188 A1. The system, as patented, makes use of a saddle and base, on which the saddle is supported and tied down. The Saddle is used to support the coil, in an eye to the front arrangement, while the base assembly secures the saddle in position and transfers the forces to the ISO container structure as required. As per the Coil-Tainer system, this system can only be used to transport a coil inside an ISO shipping container on which the saddle is supported and tied down. The Saddle is used to support the coil, in an eye to the front arrangement, while the base assembly secures the saddle in position and transfers the forces to the ISO container structure as required. As per the Coil-Tainer system, this system can only be used to transport a coil inside an ISO shipping container.

- 25 To load the assembly into a container, the coil is positioned onto the saddle and tied down by means of a fork lift. The saddle is in turn tied to the beam and the complete assembly is then slid into the container, as described in the patent description.

3. Other transport methods for coils are in use and these include various other methods used to transport steel coils in containers and on vehicles. However, in most applications dedicated rail or road transport wagons are required, or dedicated containers are used.

5

The inventor has identified a need for a coil transport system and process which reduces the disadvantages of the above known coil transport apparatus and transport methods and has its own advantages.

10 Summary of the Invention

According to a first aspect of the invention, there is provided a coil transport cradle apparatus, said apparatus including a cradle upon which said coil is placed and which supports said coil in use; and a support beam base upon which said cradle is placed and which supports and is releasably connected to said cradle in use, the base being adapted to be loaded directly into an ISO container, on a train wagon or on a road going vehicle, while supporting the cradle and said coil, so that in use, the base is displaceable within said container to a transport position fully inside said container in which the cradle is positioned, either in an eye to the front or eye to the side orientation on the support beam base, whereat the base distributes the load of said coil and the cradle to permit conventional transport of said coil by road or by rail with or without a container.

The cradle may be in a square layout which allows the cradle assembly to be handled from two sides.

The cradle assembly may include corner locks, lifting pods, as well as forklift fork openings.

The lifting pods may be extendible and retractable to lift the cradle when loading into the support beam. The lifting pods may be extendible hydraulically. The lifting pods may include wheels or other similar rolling means.

5

The cradle assembly may include tie down lugs which are welded to it.

10 The cradle assembly may include support pads which in use ensure that the cradle can be positioned on a level surface, without the coil coming in contact with the surface.

The position of the fork lift openings may be accessible from all four sides of the cradle so that the forklift can therefore position the cradle with the required coil eye orientation.

15

The support beam base may be sized and dimensioned to be positioned inside a normal ISO container, or on top of a rail wagon or a flat bed trailer of a road going vehicle for transport.

20 A main frame of the support beam base may be extendable to allow the support beam to fit inside a container, as well as mounted onto the four corner twist lock positions of rail wagon or road trailer.

25 The support beam base has complementary attachment points to that of the cradle so that the cradle may be secured thereto for transport in either eye orientation position.

The support beam may include extendable and retractable corner posts which in use extend to provide a securing position for the support beam base on a rail wagon or transport vehicle, and which are retracted for the support beams base to fit into an ISO container.

5

The corner posts may be retracted by means of a screw mechanism to allow the cradle to be positioned inside the container. The posts are then extended to secure the cradle against the load support areas inside the container.

10 The extendable posts therefore allow for use both inside a normal ISO container, as well as on top of a rail wagon or road trailer, fitted with corner twist locks to transport ISO containers. The cradle and coils are however in both instances locked to the support beam by means of the corner locks.

15 Lock pins may be provided at locations spaced from the cradle corners thereby to create a clear path for forklift tynes to be inserted into the forklift openings in the cradle for displacement of the cradle by forklift while permitting at least some of said lock pins to be locked in place. The lock pins may be twist lock pins.

20 According to a second aspect of the invention there is provided a process for loading steel coils and other similar loads on a cradle substantially as described above into an ISO container, said process including the following steps:

Step 1: positioning a support beam inside the container with the corner posts retracted, said positioning being by means of a forklift attachment, and
25 the step further including securing the cradle onto the beam, at the cradle lock positions;

Step 2: extending the corner posts until the posts are secured against the sides and front of the container;

- Step 3: positioning the cradle with the coil on the front of the support beam inside the container by means of the forklift;
- Step 4: inserting four hydraulic operated lifting pods into corner pockets provided for their fitment;
- 5 Step 5: activating the hydraulic pack, whether manually or electrically, and extending the lifting pods to lift the cradle onto four support wheels;
- Step 6: pushing the cradle to its pre-determined position on the support beam and inserting the corner locks into their holes, and lowering the cradle into position by releasing the hydraulic pressure in the lifting pods;
- 10 Step 7: locking the corner locks to lock the cradle in position and removing the lifting pods; and
- Step 8: inserting a front lock beam to lock the cradle at the container door side and once the container is fully loaded then closing the container for transport.

15

According to a third aspect of the invention there is provided a process for loading steel coils and other similar loads on a cradle substantially as described above onto a rail wagon or a road trailer, said process including the following steps:

- 20 Step 1: positioning the support beam on top of the rail wagon or road trailer, with the corner posts extended to engage the corner twist locks;
- Step 2: positioning the cradle with coil secured thereto by means of a forklift on top of the support beam at a required position;
- Step 3: inserting the corner locks to lock the cradle to the support beam; and
- 25 Step 4: Optionally, should it be required, repositioning the cradle by means of the hydraulic pods.

The forklift may position the cradle on the support beam from the side due to the cradle configuration.

5 The invention extends to a container lashing twist lock which can be positioned on the top of the corner posts, to lock down a standard ISO container, without removing the support beams assembly.

10 Should it be required to have empty cradles in place, a spacer bracket may be fitted between the support beams and the container, to allow for a loaded container to be transported.

The invention also permits support beams and cradles of the invention to be stacked inside a standard ISO container for bulk transport.

15 **Description of Embodiments of the Invention**

The invention will now be described, by way of non-limiting examples only, with reference to the diagrammatic drawings at the end hereof.

20 Figure 1 shows the cradle layout, which has the main function of supporting the coils when handled and transported;

Figure 2 shows a 24t coil positioned on the cradle and tied down;

Figure 3 shows how the position of the forklift openings is accessible from both sides of the cradle;

25 Figure 4 shows the cradles in two orientations on the support beam assembly;

Figure 5 shows the corner lock in position;

Figure 6 shows the corner lock in position with side support being provided by the support pads pushing against the support beam sides;

Figure 7 shows the support beam positioned inside a standard ISO container;

Figure 8 shows the support beam corner posts extended so that the support beam
5 can be positioned on top of a rail wagon (similar dimensions to a road going trailer);

Figure 9 shows the support beam positioned inside the container with the corner posts retracted;

Figure 10 shows the cradle with the coil being positioned on the front of the support beam inside the container by the forklift;

10 Figure 11, together with Figure 10, shows the cradle in position, four hydraulic operated lifting pods are inserted into the corner pockets allowed for their fitment;

Figures 12 and 13 show the hydraulic pack being activated (manually or electrically) and the lifting pods extended to full stroke to lift the cradle onto the four support wheels;

15 Figure 14 shows how the cradle is pushed to its pre-determined position and the corner locks are inserted into their holes;

Figures 15 and 16 show the support beam being positioned on top of the rail wagon, with the corner posts extended to engage the corner twist locks;

Figure 17 shows how a forklift positions the cradle and coil on top of the support
20 beam at a required position;

Figure 18 shows corner locks inserted to lock cradle to support beam;

Figure 19 shows a container lashing twist lock positioned on the top of the corner posts, to lock down a standard ISO container, without removing the support beams assembly;

25 Figure 20 shows a spacer bracket fitted between the support beams and the container, to allow for a loaded container to be transported;

Figures 21 and 22 show the support beams and cradles stacked inside a standard ISO container for bulk transport;

Figure 23 shows the invention in use with coils lashed to cradles loaded and secured to support beams within a container and a cradle secured directly to a support beam
5 on a wagon without an ISO container; and

Figure 24 shows the invention in use with an alternative loading configuration to that of Figure 23, including showing a blown up view of the extended corner posts.

In the example which follows, the inventor has developed a coil transport cradle and
10 process to simplify the handling, securing, positioning and transport of steel coils in general, while furthermore allowing for transport inside ISO containers or without ISO containers, without the requirement for modified or special trailers or wagons.

Although the system also makes use of a cradle and support beam assembly, it has
15 specific features that make it different from any other available system currently operational. The specific features of this embodiment of the invention will be discussed in detail below.

1. Cradle Assembly

Figure 1 shows the cradle layout 10, which has the main function of supporting the
20 coils when handled and transported. The cradle is based on a square layout, which allows the cradle assembly to be handled from two sides. Allowance is made in the cradle design for corner locks 12, lifting pods (position 14) as well as forklift forks by means of pockets 16 into forklift tines may be received. Tie down lugs 18 are also
25 welded to the cradle structure and support pads 20 are also provided on the lower surface of the cradle.

Figure 2 shows a 24t coil 22 positioned on the cradle 10 and tied down 24. The support pads 20 of Figure 1 ensure the cradle 10 can be positioned on a level surface, without the coil 22 coming in contact with the surface.

Furthermore, the position of the forklift openings 16 is accessible from both sides of the cradle, as shown in Figure 3. The forklift 26 can therefore position the cradle with the required coil orientation.

5 **2. Support Beam Assembly**

Figure 4 shows the cradles 10 in three orientations on the support beam assembly 28. Figure 5 shows the corner lock 30 in position with Figure 6 showing the corner lock in position with side support being provided by the support pads pushing against the support beam sides. The relative positions of two cradles inside a container or on top of a wagon/trailer can be adjusted due to the additional locking positions, to allow the positioning of the combined centre of gravity as closely as possible to the centre of the container or wagon/trailer. This is especially required where the coils being transported are of different weight.

15 The support beams were designed to be positioned inside a normal ISO container, or on top of a rail wagon/road wagon for transport. To allow the support beam to fit inside a container, as well as mounted onto the four corner twist lock positions of a rail wagon or road trailer, the main frame should be extendable.

20 Figure 7 shows the support beam 28 positioned inside a standard ISO container. The corner posts 32 are retracted by means of a screw mechanism 34 to allow the cradle 10 to be positioned inside the container. The posts are then extended to secure the cradle 10 against the load support areas inside the container.

25 Figure 8 shows the support beam 28 corner posts 32 extended so that the support beam 28 can be positioned on top of a rail wagon (similar dimensions to a road going trailer). The corner posts are extended by means of the corner screws 34 to line up the twist lock pocket with the wagon's twist locks.

The extendable posts therefore allow for use both inside a normal ISO container, as well as on top of a rail wagon or road trailer, fitted with corner twist locks to transport ISO containers.

- 5 The cradle and coils are however in both instances locked to the beam assembly by means of the corner locks, as shown in Figure 5.

3. Coil and Cradle Loading

10 The system as illustrated was developed and designed to allow for versatility and ease of operation. This means that the coils should be able to be transported both inside an ISO container and directly on top of a rail wagon or road going trailer. The cradle and coil taking into account its weight, should be able to be loaded easily, quickly and safely, either inside an ISO container or on top of a wagon or trailer of a road going vehicle.

- 15 For this reason, allowance was made for both a positioning system, to position the cradles inside a container, and for direct forklift loading, when positioning the cradles on top of a wagon or truck.

3.1. Coil and Cradle Loading Inside Container

20 Figures 9 to 14 show the typical process to load a cradle into a standard ISO container.

The loading process is as follows:

Step 1: The support beam 28 is positioned inside the container 36 with the corner posts 32 retracted. The beam 28 will be positioned with a forklift attachment, securing onto the beam, at the cradle lock positions. (Figure 9)

- 25 Step 2: The corner posts are extended by turning the power screw assembly, until the posts are secure against the sides and front of the container.

Step 3: The cradle 10 with the coil 22 is then positioned on the front of the support beam 28 inside the container 36 by the forklift 26. (Figure 10)

Step 4: With the cradle in position, four hydraulic 38 operated lifting pods 40 are inserted into the corner pockets 14 allowed for their fitment. (Figure 10 and 11)

Step 5: The hydraulic pack 38 is activated (manually or electrically) and the lifting pods are extended to full stroke to lift the cradle onto the four support wheels 42. (Figure 12 to 13)

Step 6: The cradle is pushed to its pre-determined position and the corner locks 30 are inserted into their holes. The pod pressure is released and the cradle 10 is lowered into position. (Figure 14)

Step 7: The corner locks 30 are turned 90 degrees to lock the cradle in position and the liftings pods 40 are removed.

Step 8: The front lock beam (not shown in the figures) is inserted to lock the cradle at the door side, and the container is closed and ready for transport.

3.2. Coil and Cradle Loading on Rail Wagon/Road Trailer

Figures 15 to 18 show the typical process to load a cradle onto a rail wagon or road trailer.

The loading process is as follows:

Step 1: The support beam is positioned on top of the rail wagon 44, with the corner posts 32 extended to engage the corner twist locks 46. (Figure 15 and 16)

Step 2: Forklift 26 positions the cradle 10 and coil (not shown) on top of the support beam 28 at a required position (Figure 17)

Step 3: Corner locks are inserted to lock cradle to support beam (Figure 18)

Should it be required, the hydraulic pods can be used to re-position the cradle.

The advantage of the dual access cradle layout is that the forklift can position the cradle on the support beam from the side.

In order to optimise turnaround times, a container lashing twist lock 50 can be positioned on the top of the corner posts 48, to lock down a standard ISO container, without removing the support beams assembly, as shown in Figure 19. Should it be required to have empty cradles in place, a spacer bracket 52 can be fitted between the support beams and the container, to allow for a loaded container to be transported as shown in Figure 20.

The design also allows for the support beams 28 and/or cradles 10 to be stacked inside a standard ISO container 36 for bulk transport, as shown in Figures 21 and 22.

The invention as illustrated in the Figures and especially in Figures 23 and 24 and as described, has at least the following advantages:

- The coils can be loaded onto the cradles for storage or transport.
- The cradles have access from all sides, allowing the coils to be positioned eye to the side or eye to the front inside the containers.
- The support beams can be fitted inside a standard ISO container, or on top of a rail wagon/road trailer.
- The cradles can be loaded onto a rail wagon by means of a forklift, in any eye orientation
- The cradle can be positioned inside the front of the container on top of the support beams, and then relocated to the required position by means of the lifting pods as described.

- The corner locks lock the cradles to the support beams, with no additional locking required.
- By using lashing twist locks, loaded containers can be loaded on top of the support beams for relocation, without the requirement of removing the support beams from the vehicle.
- By replacing the lashing twist locks with higher corner brackets, a full container can be loaded on top of the support beams, without removing the empty cradles.

Claims

1. A coil transport cradle apparatus, said apparatus including a cradle upon which said coil is placed and which supports said coil in use; and a support beam base upon which said cradle is placed and which supports and is releasably connected to said cradle in use, the base being adapted to be loaded directly into an ISO container, on a train wagon or on a road going vehicle, while supporting the cradle and said coil, so that in use, the base is displaceable within said container to a transport position fully inside said container in which the cradle is positioned, either in an eye to the front or eye to the side orientation on the support beam base, whereas the base distributes the load of said coil and the cradle to permit conventional transport of said coil by road or by rail with or without a container.
2. A coil transport cradle apparatus as claimed in claim 1, which is in a square layout which allows the cradle assembly to be handled from two sides.
3. A coil transport cradle apparatus as claimed in claim 1 or claim 2, which includes corner locks, lifting pods, as well as forklift fork openings.
4. A coil transport cradle apparatus as claimed in claim 3, wherein the lifting pods are extendible and retractable to lift the cradle when loading into the support beam.
5. A coil transport cradle apparatus as claimed in claim 4, wherein the lifting pods include wheels or other similar rolling means.

6. A coil transport cradle apparatus as claimed in claim in any one of claims 3 to 5, wherein the position of the fork lift openings is accessible from all four sides of the cradle so that the forklift can therefore position the cradle with the required coil eye orientation.

5

7. A coil transport cradle apparatus as claimed in claim any one of the preceding claims, wherein the support beam base is sized and dimensioned to be positioned inside a normal ISO container, or on top of a rail wagon or a flat bed trailer of a road going vehicle for transport.

10

8. A coil transport cradle apparatus as claimed in claim in any one of the preceding claims, wherein the main frame of the support beam base is extendable to allow the support beam to fit inside a container, as well as mounted onto the four corner twist lock positions of rail wagon or road trailer.

15

9. A coil transport cradle apparatus as claimed in anyone of claims 3 to 8, wherein the support beam base has complementary attachment points to that of the cradle so that the cradle may be secured thereto for transport in either eye orientation position.

20

10. A coil transport cradle apparatus as claimed in claim 8 or claim 9, wherein the support beam includes extendable and retractable corner posts which in use extend to provide a securing position for the support beam base on a rail wagon or transport vehicle, and which are retracted for the support beams base to fit into an ISO container.

25

11. A coil transport cradle apparatus as claimed in any one of claims 3 to 10, which includes lock pins at locations spaced from the cradle corners thereby to create a clear path for forklift tines to be inserted into the forklift openings in

the cradle for displacement of the cradle by forklift while permitting at least some of said lock pins to be locked in place.

12.A process for loading steel coils and other similar loads on a coil transport cradle apparatus as claimed in any one of claims 1 to 11 into an ISO container, said process including the following steps:

Step 1: positioning a support beam inside the container with the corner posts retracted, said positioning being by means of a forklift attachment, and the step further including securing the cradle onto the beam, at the cradle lock positions;

Step 2: extending the corner posts until the posts are secured against the sides and front of the container;

Step 3: positioning the cradle with the coil on the front of the support beam inside the container by means of the forklift;

Step 4: inserting four hydraulic operated lifting pods into corner pockets provided for their fitment;

Step 5: activating the hydraulic pack, whether manually or electrically, and extending the lifting pods to lift the cradle onto four support wheels;

Step 6: pushing the cradle to its pre-determined position on the support beam and inserting the corner locks into their holes, and lowering the cradle into position by releasing the hydraulic pressure in the lifting pods;

Step 7: locking the corner locks to lock the cradle in position and removing the lifting pods; and

Step 8: inserting a front lock beam to lock the cradle at the container door side and once the container is fully loaded then closing the container for transport.

13. A process for loading steel coils and other similar loads on a coil transport cradle apparatus as claimed in any one of claims 1 to 11 onto a rail wagon or a road trailer, said process including the following steps:

- Step 1: positioning the support beam on top of the rail wagon or road trailer,
5 with the corner posts extended to engage the corner twist locks;
- Step 2: positioning the cradle with coil secured thereto by means of a forklift on top of the support beam at a required position;
- Step 3: inserting the corner locks to lock the cradle to the support beam; and
- Step 4: Optionally, should it be required, repositioning the cradle by means of
10 the hydraulic pods.

14. A process as claimed in claim 13, wherein the forklift positions the cradle on the support beam from the side due to the cradle configuration.

15. A container lashing twist lock for a coil transport cradle apparatus as claimed in any one of claims 1 to 11, which twist lock can be positioned on the top of the corner posts, to lock down a standard ISO container, without removing the support beams assembly.

20 16. A coil transport cradle apparatus as claimed in any one of claims 1 to 11 or claim 15, wherein in order to have empty cradles in place, a spacer bracket is fitted between the support beams and the container, to allow for a loaded container to be transported.

25 17. A coil transport cradle apparatus as claimed in any one of claims 1 to 11 wherein support beams and/or cradles are stacked inside a standard ISO container for bulk transport.

18. A coil transport cradle apparatus as claimed in claim 1, substantially as herein described and illustrated.

5 19. A process for loading steel coils and other similar loads on a coil transport cradle apparatus as claimed in claim 12 or claim 13, substantially as herein described and illustrated.

10 20. A new coil transport cradle apparatus or a new process for loading steel coils and other similar loads on a coil transport cradle apparatus substantially as herein described.

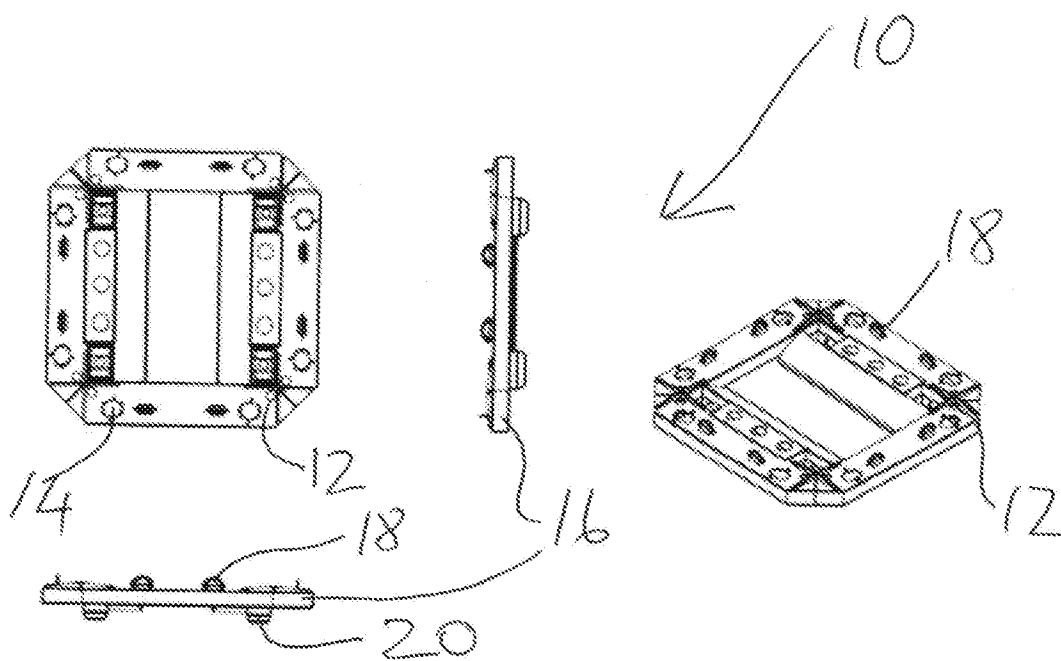


Fig 1

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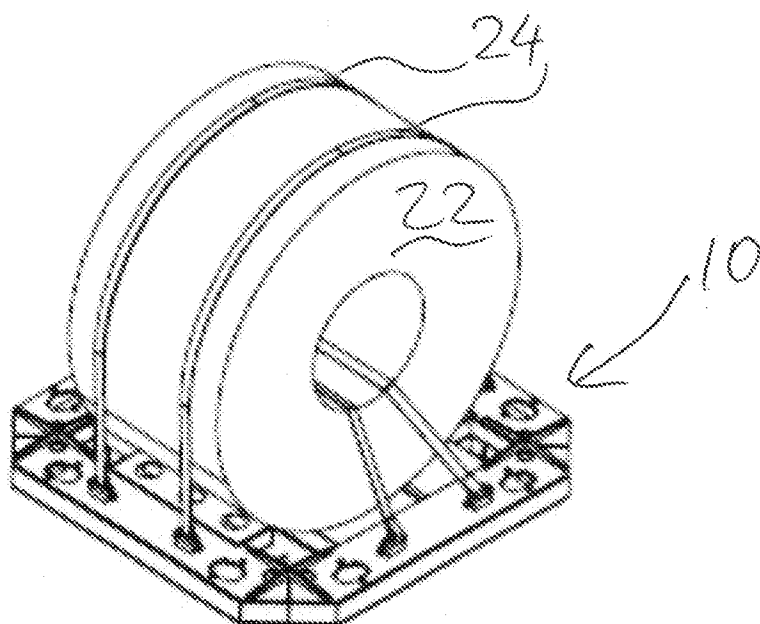


Fig 2

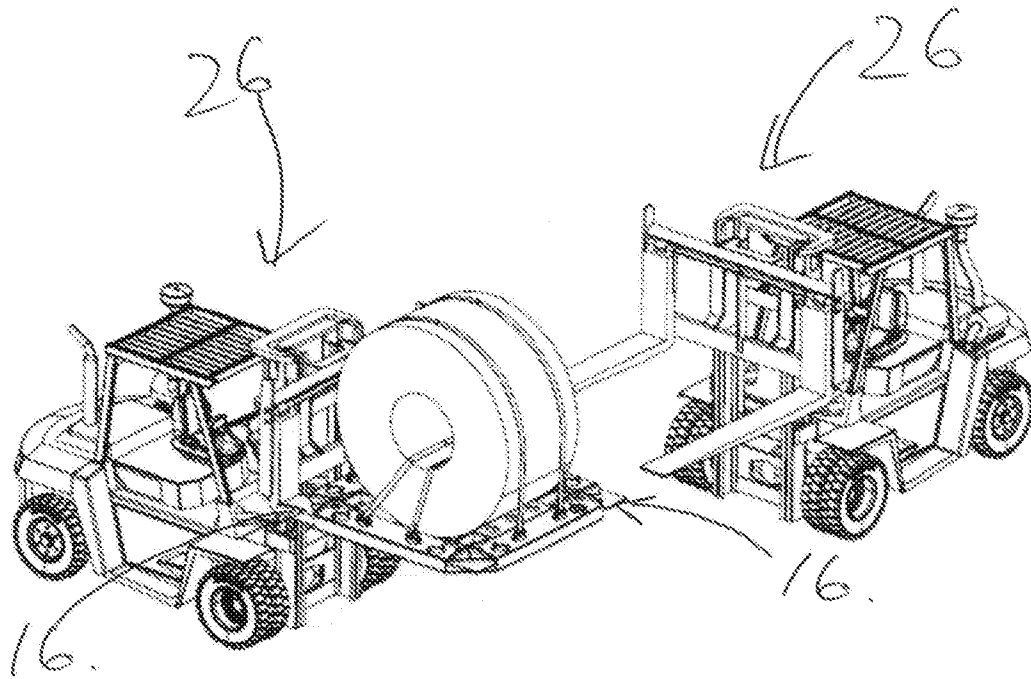


Fig 3

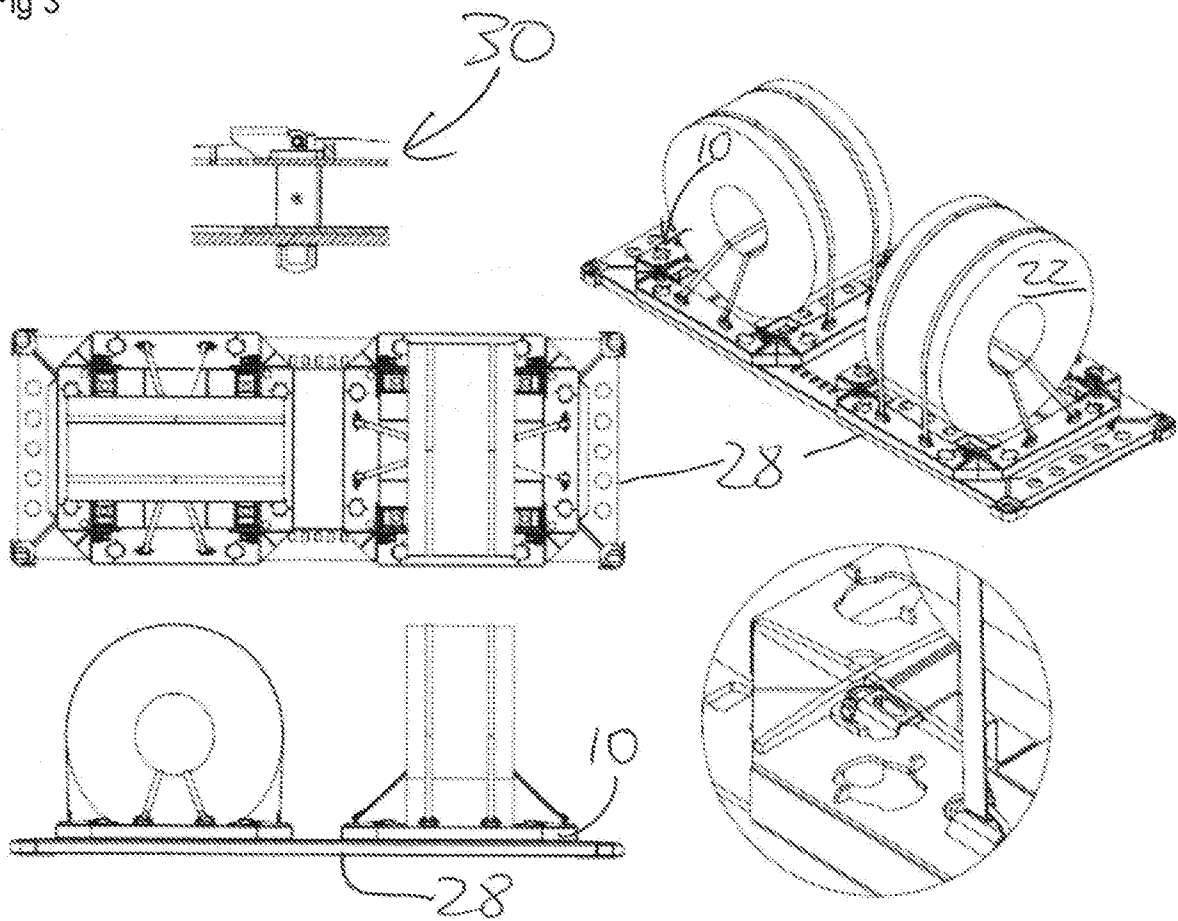


Fig 4.

Fig 4

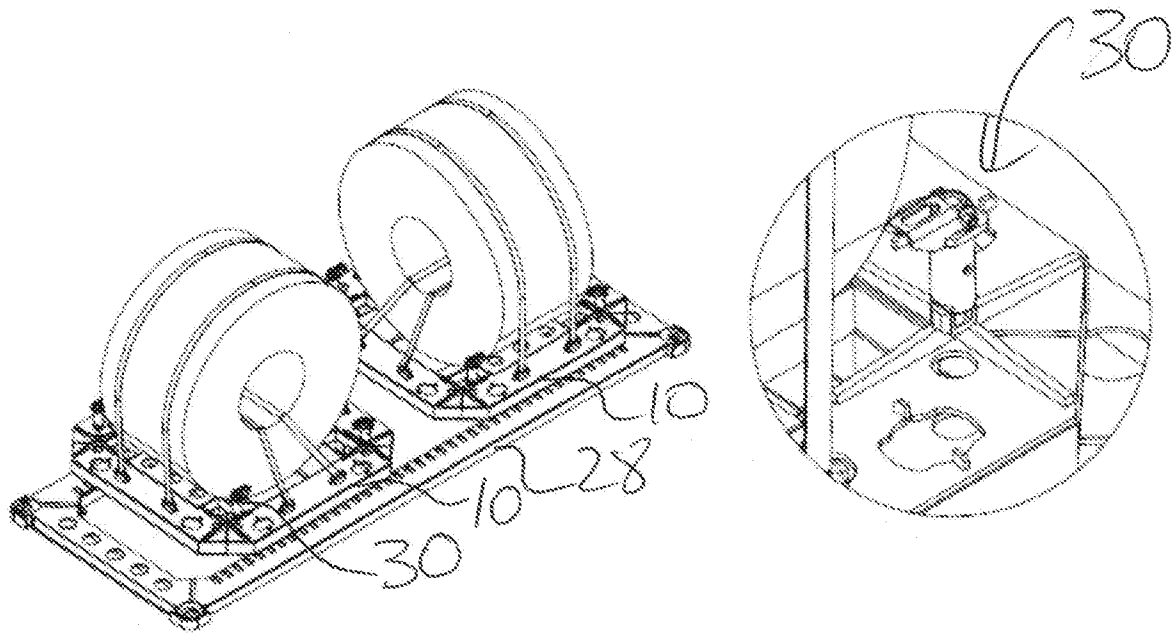
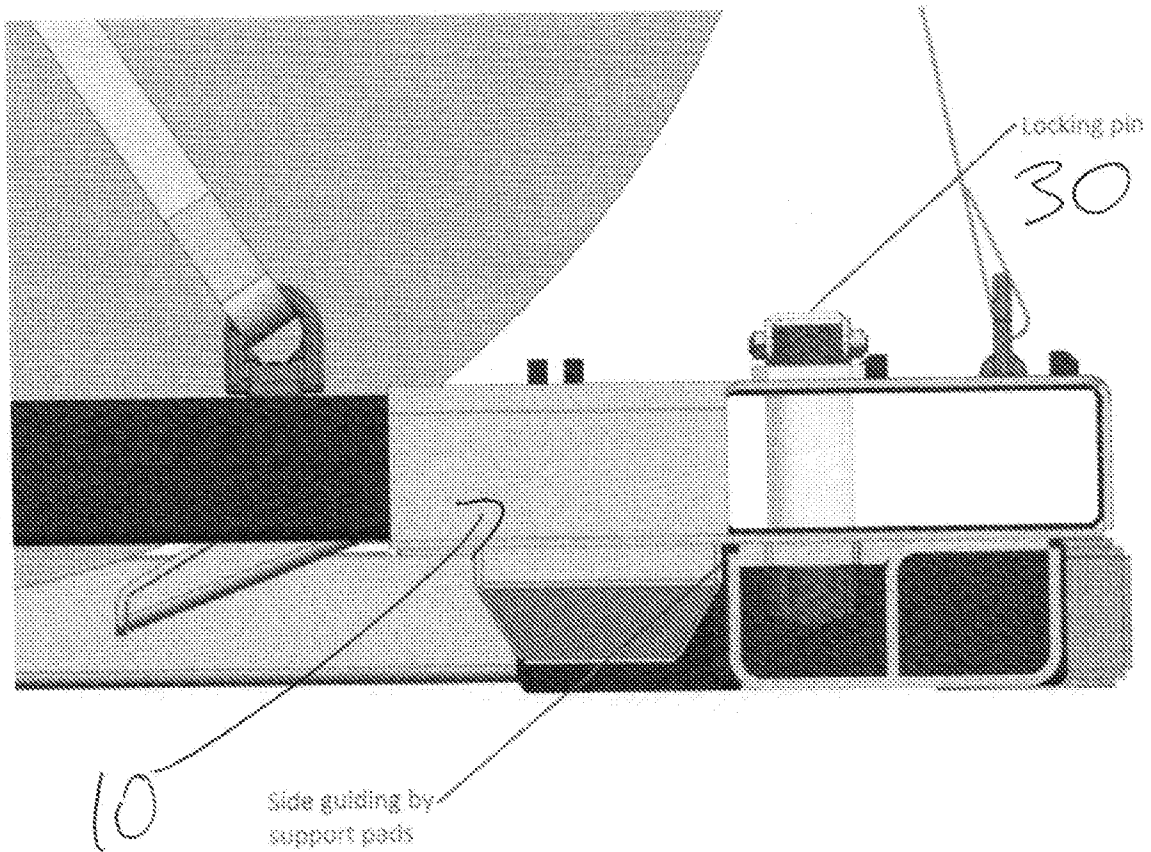


Fig 5



5 Fig 6

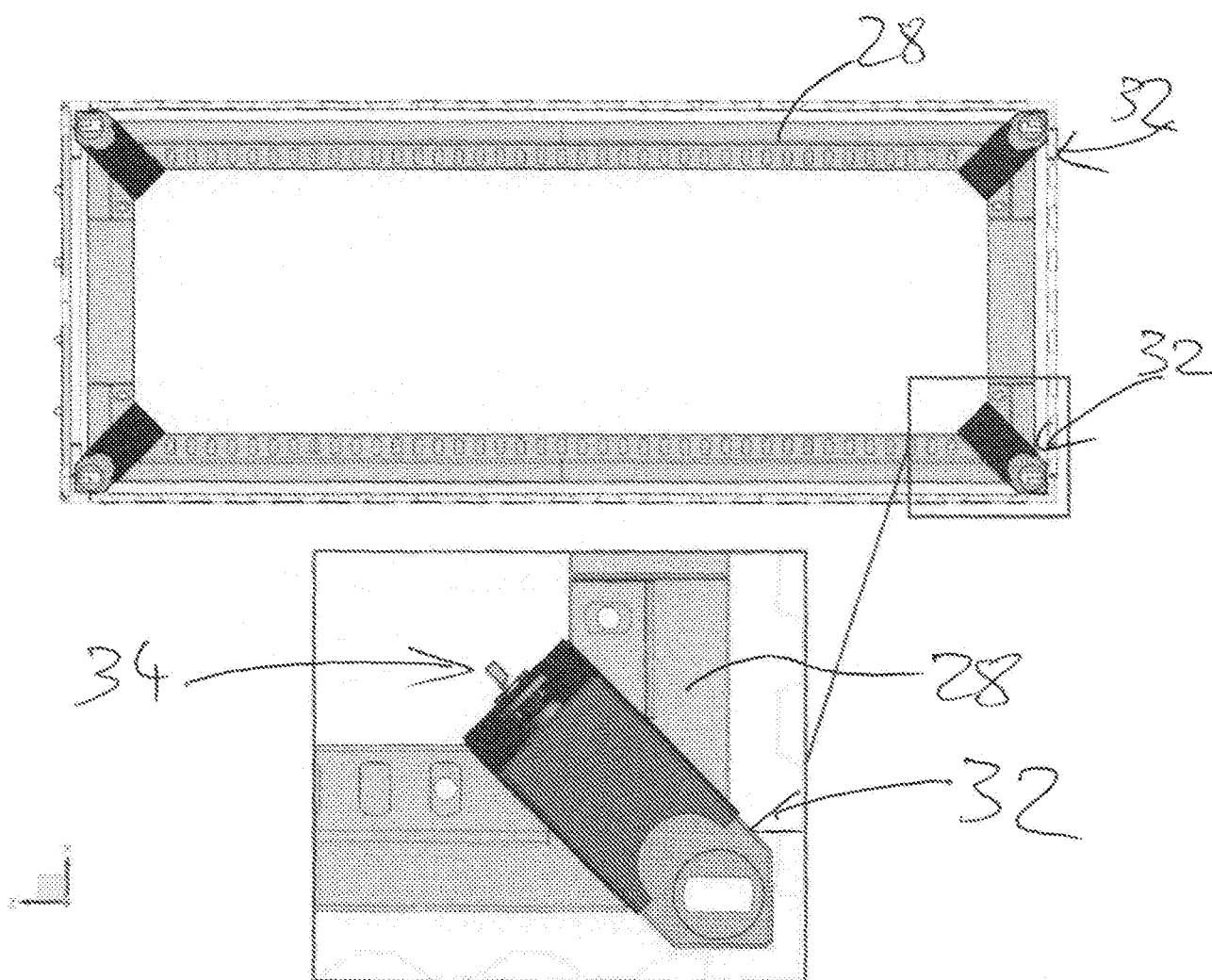
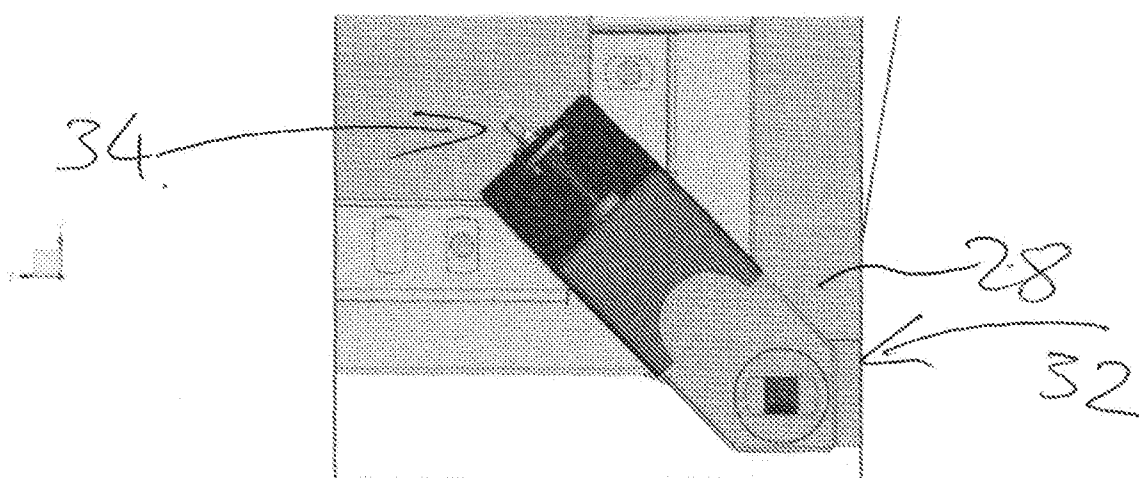


Fig 7



5 Fig 8

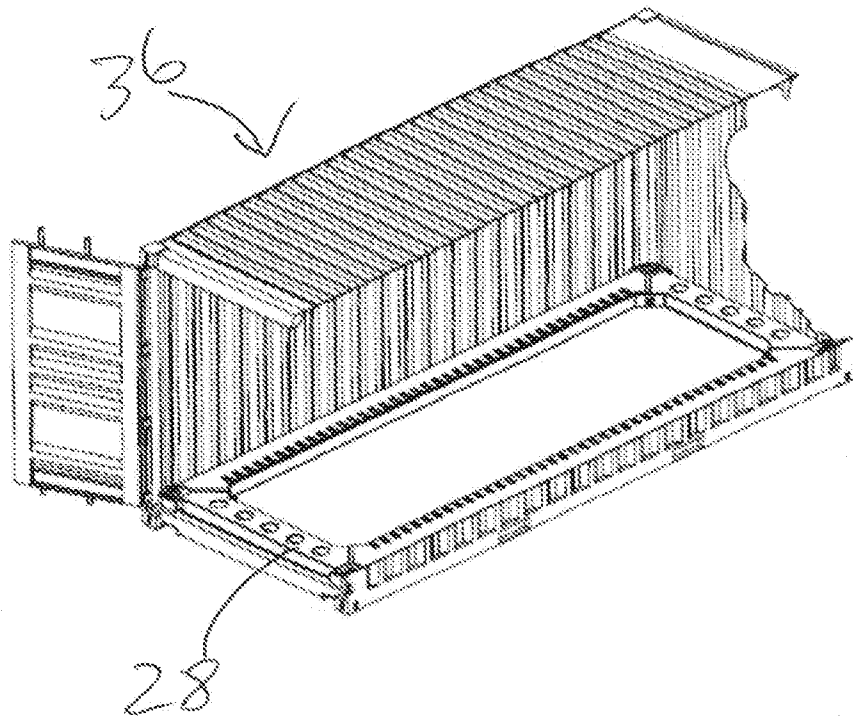
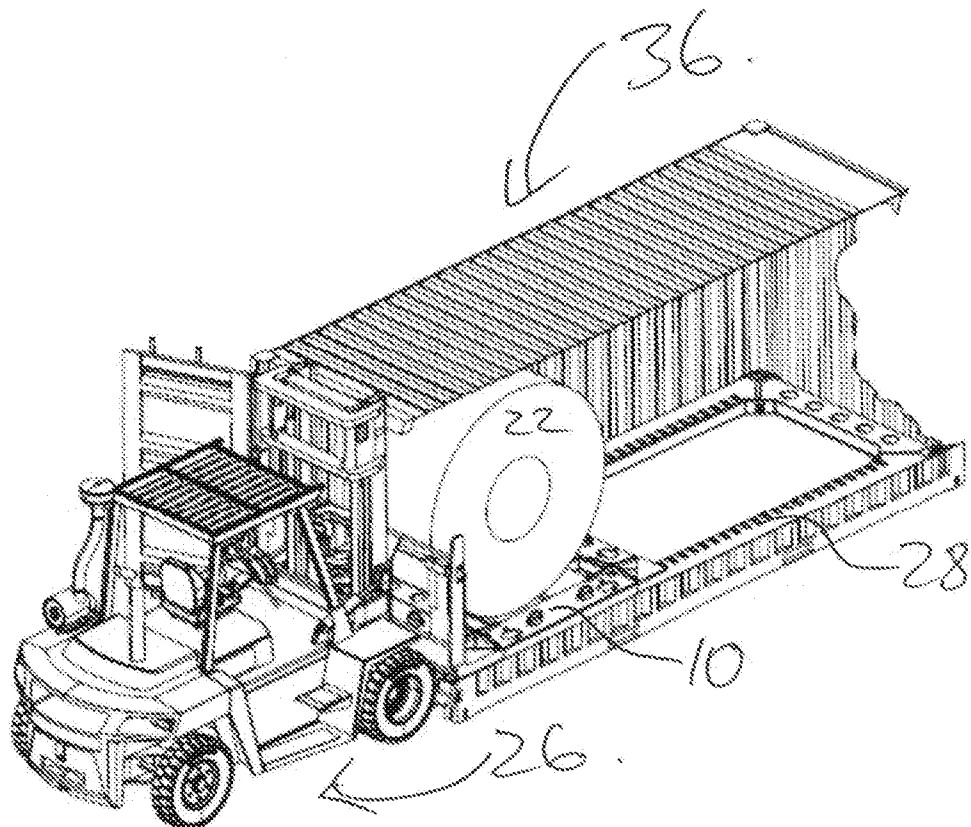


Fig 9



5 Fig 10

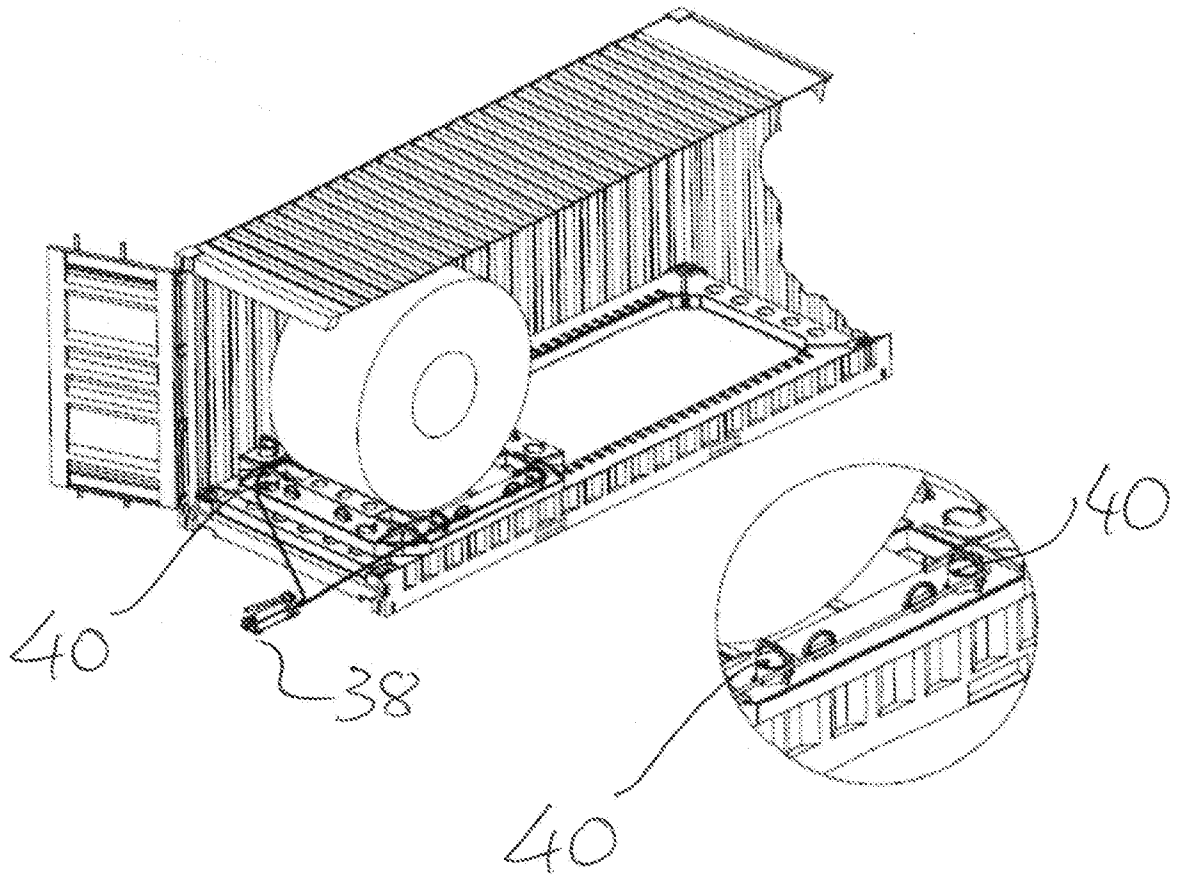


Fig 11

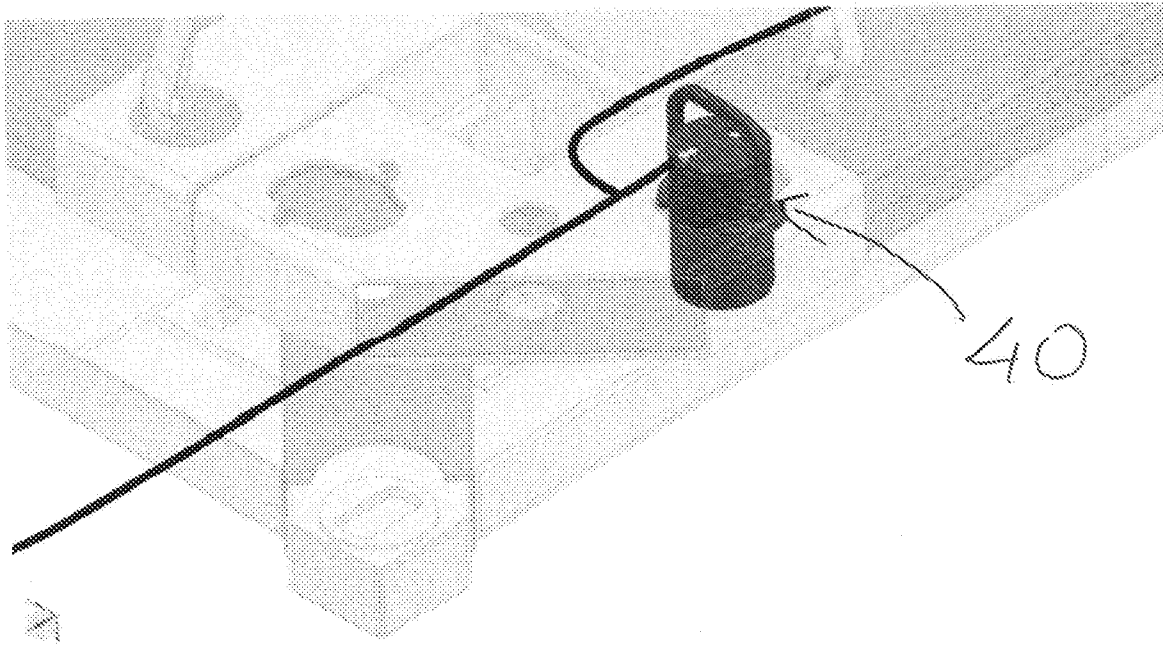


Fig 12

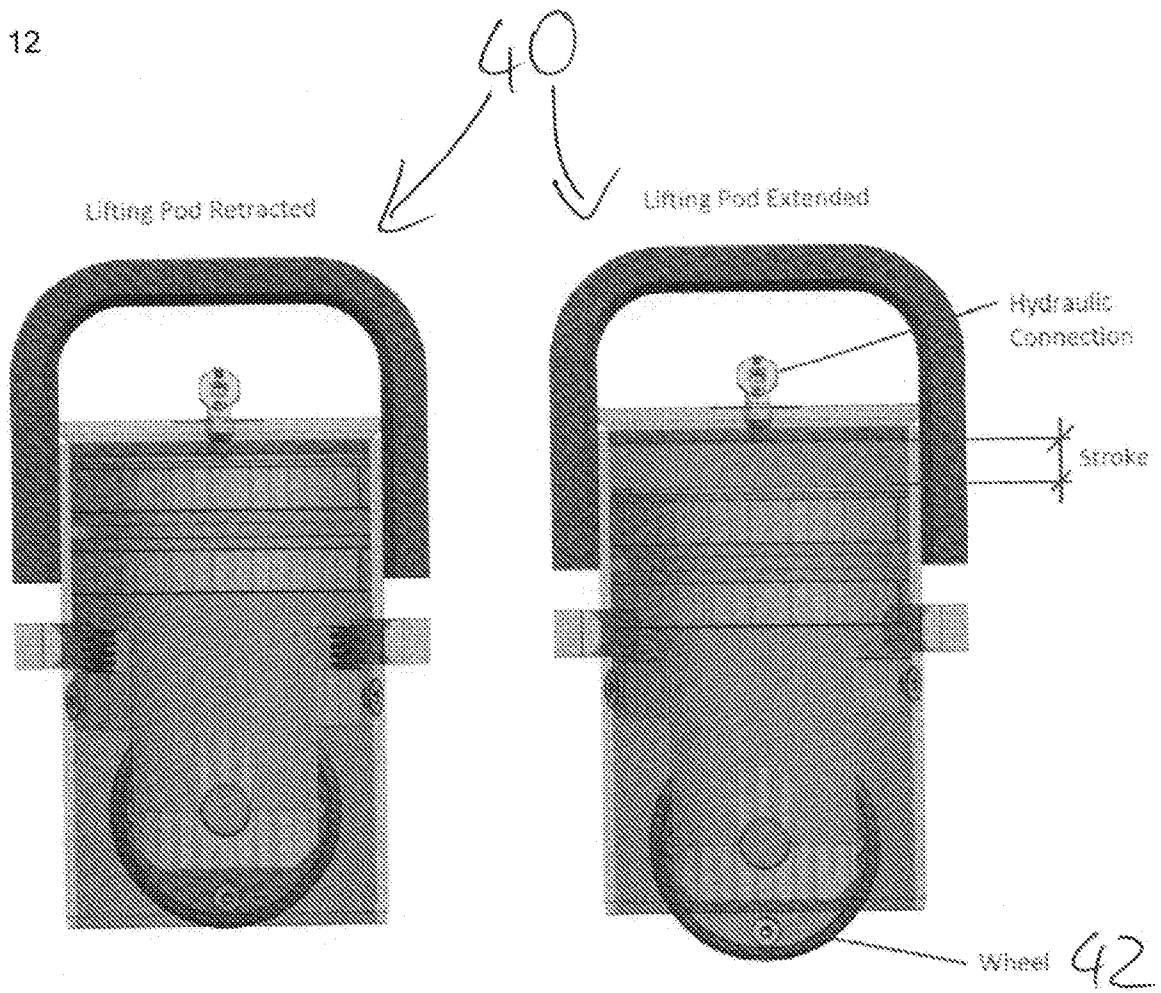
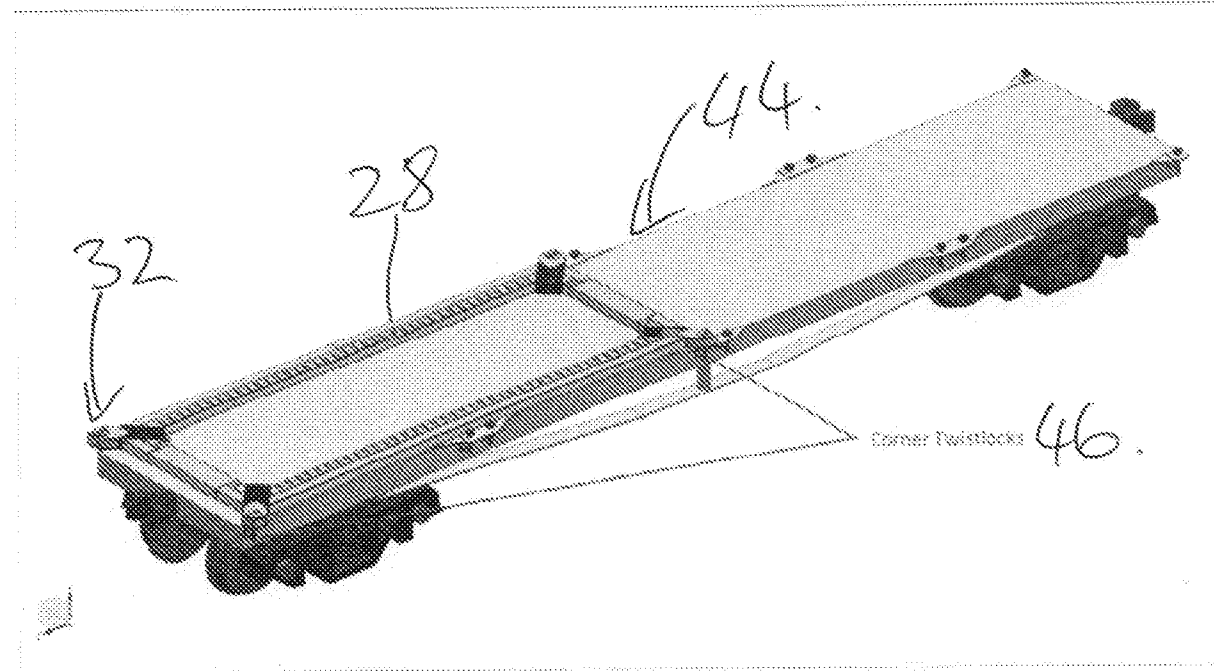
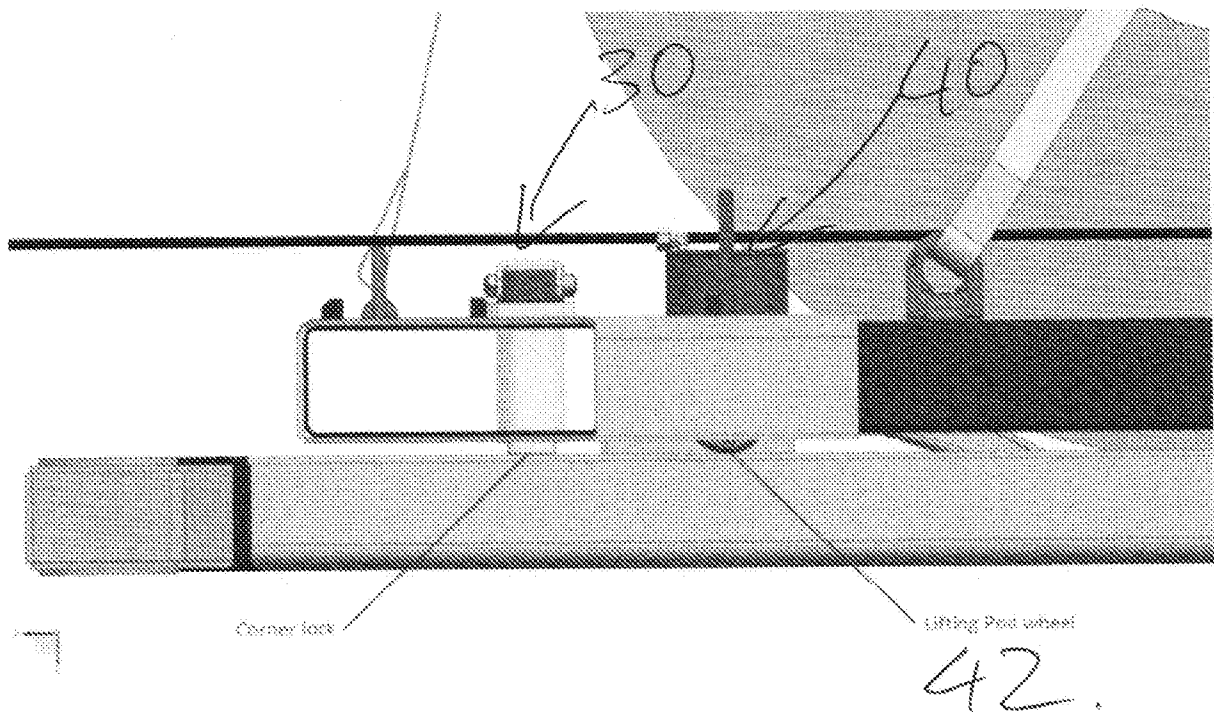


Fig 13



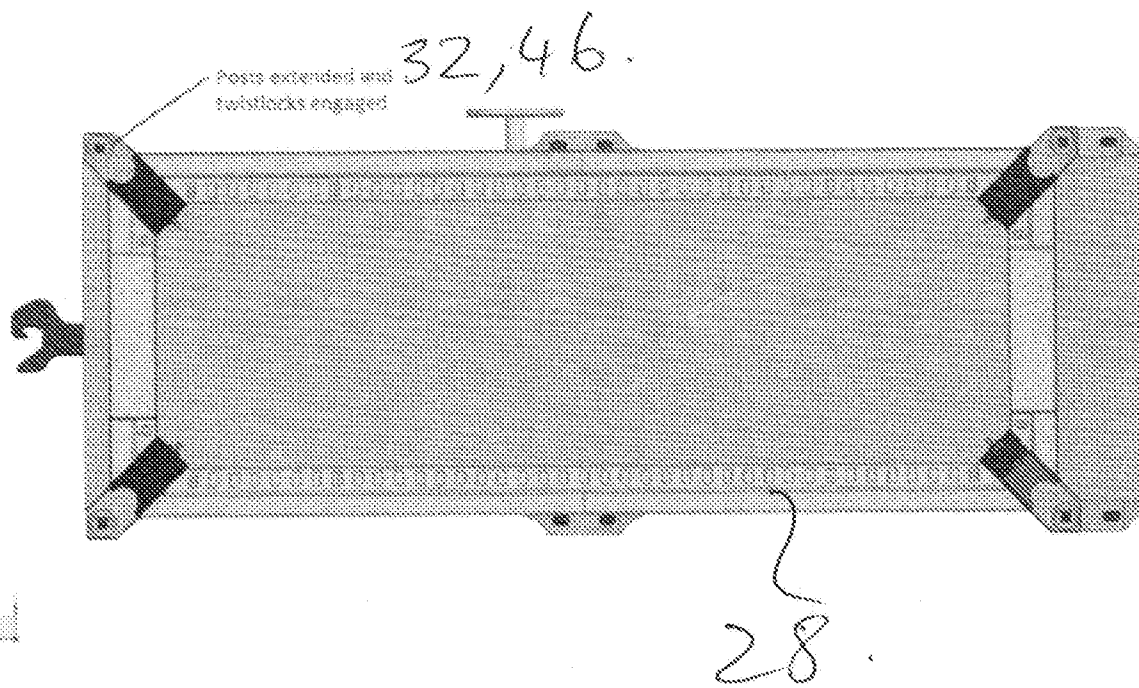
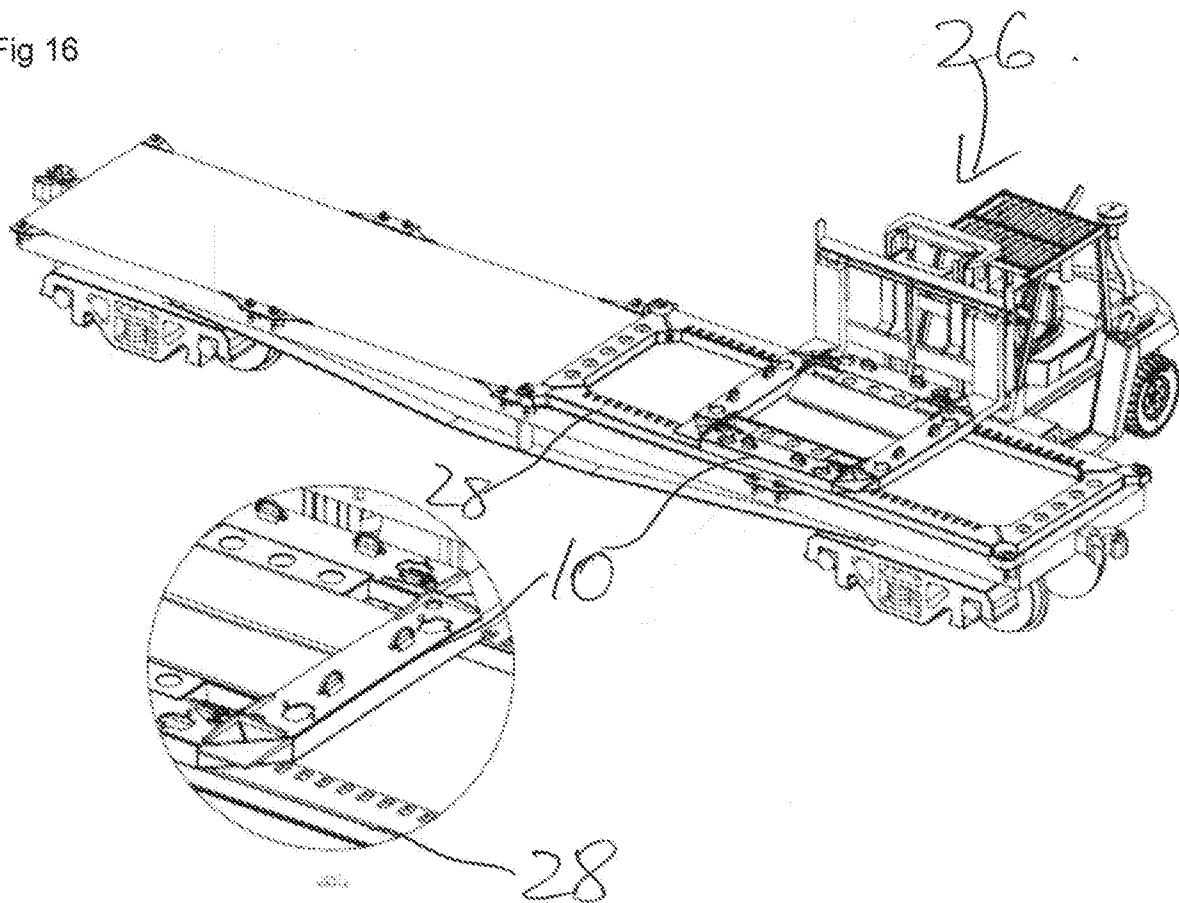


Fig 16



5 Fig 17

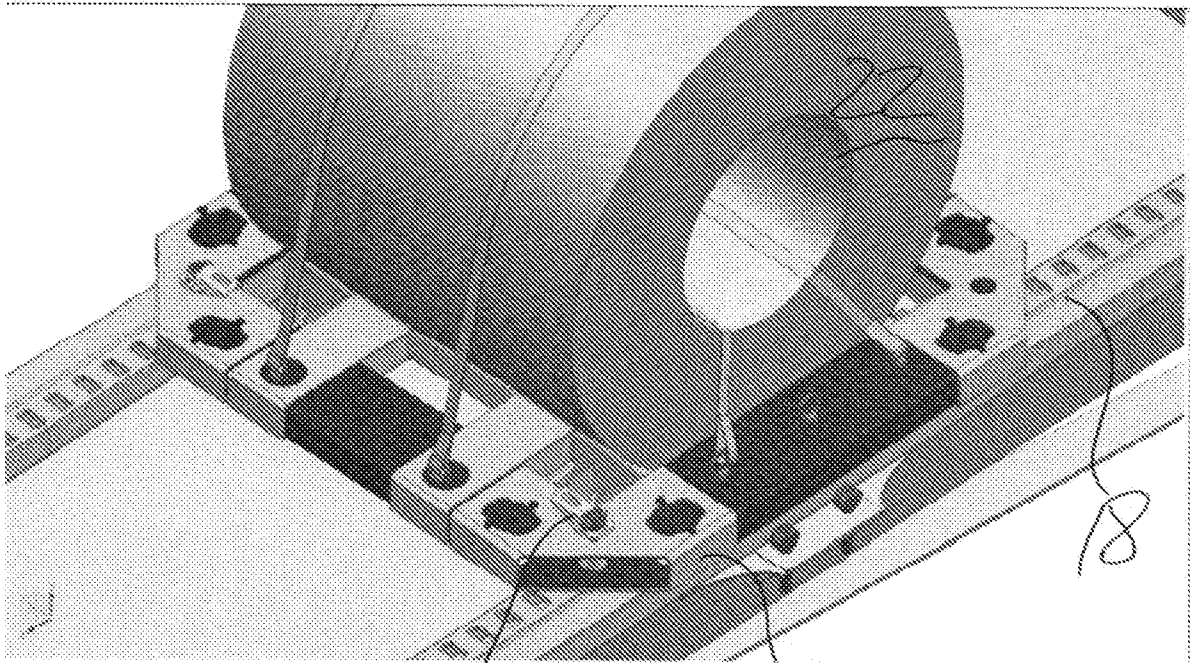


Fig 18

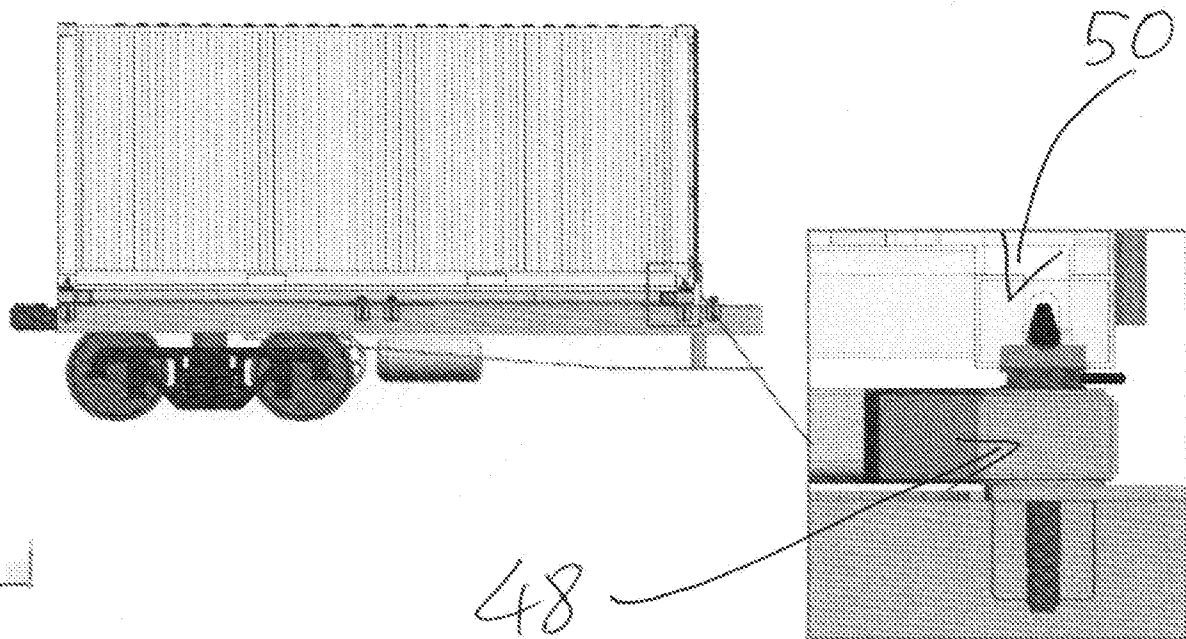


Fig 19

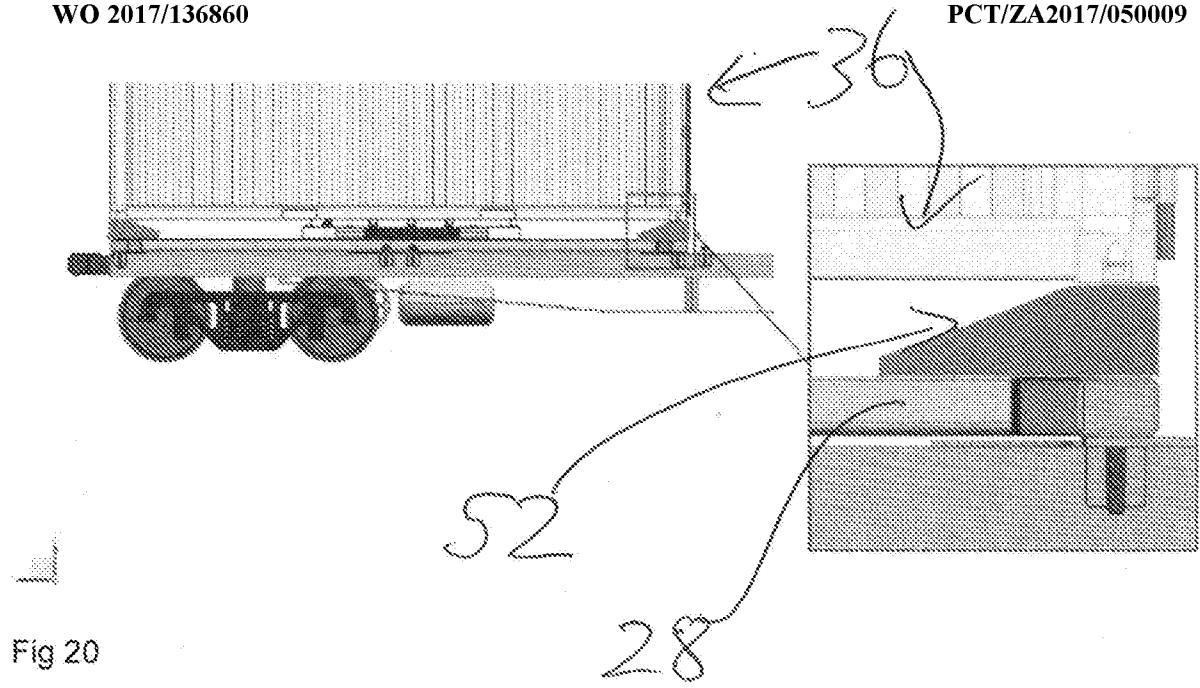


Fig 20

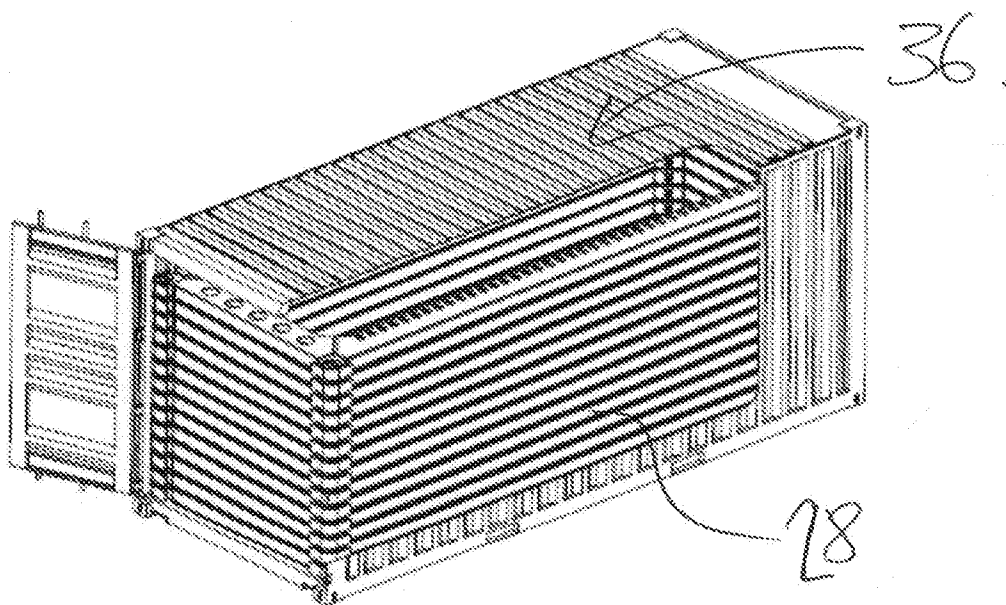


Fig 21

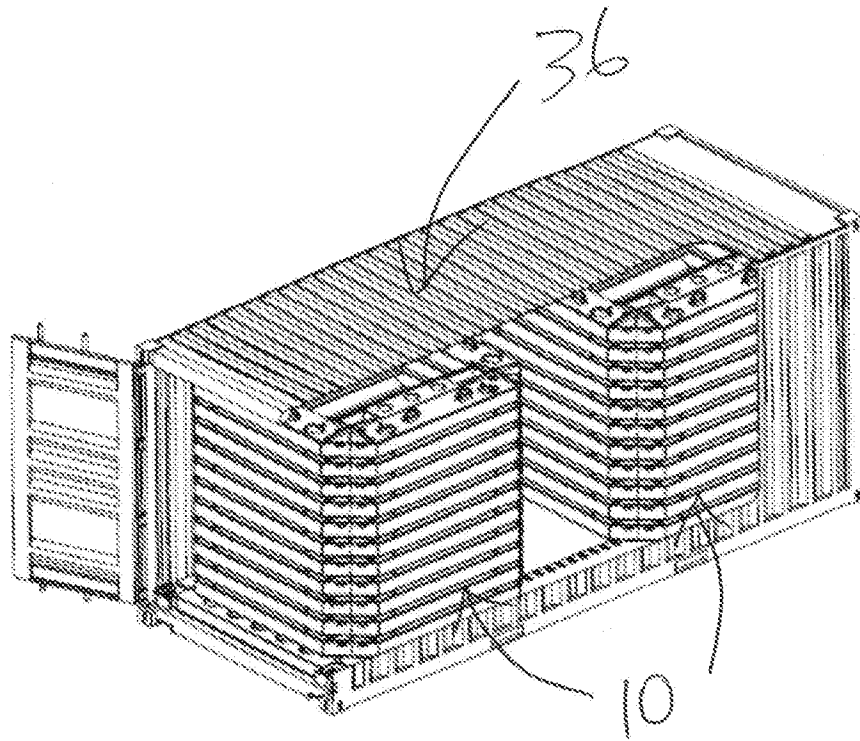


Fig 22

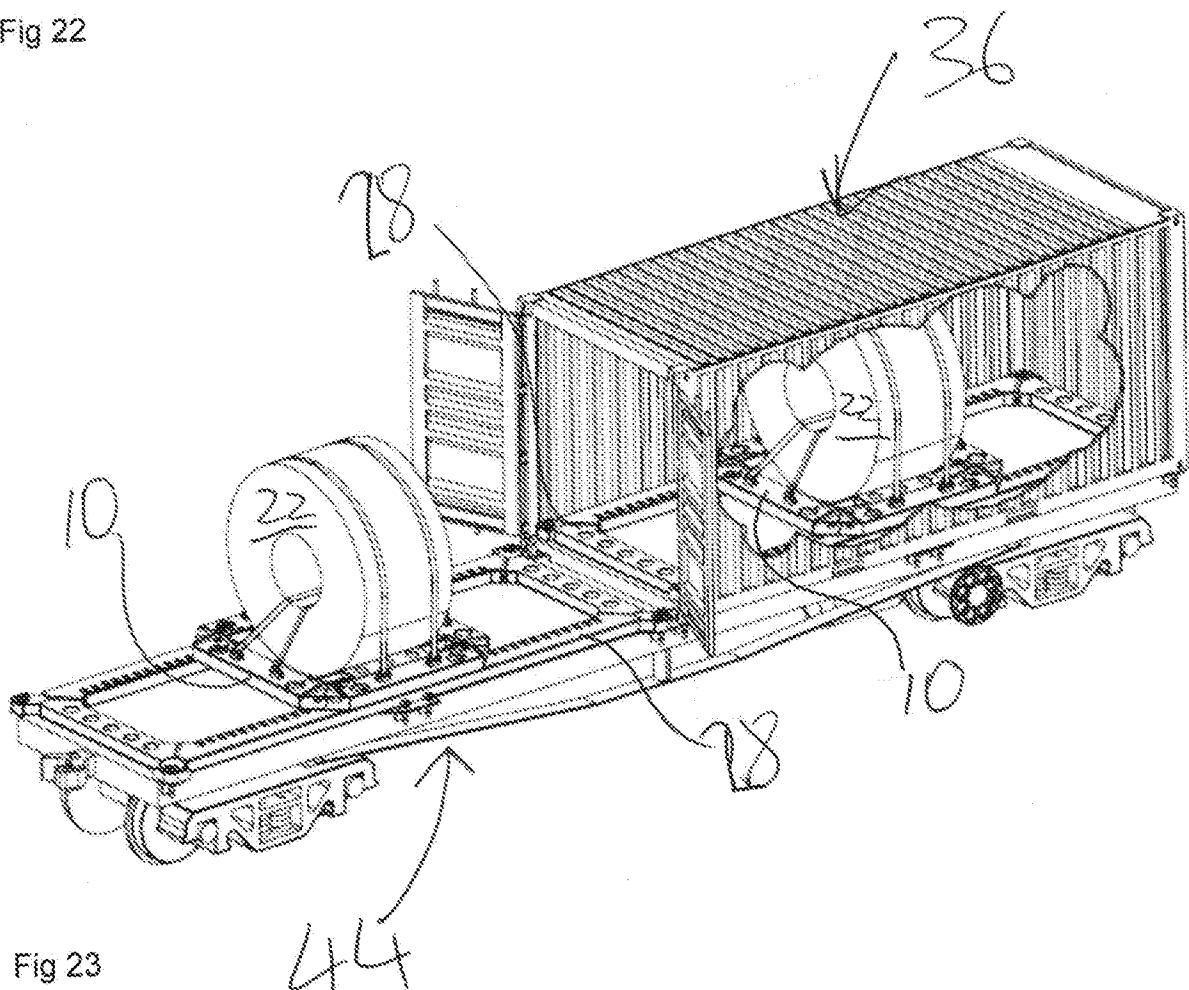


Fig 23

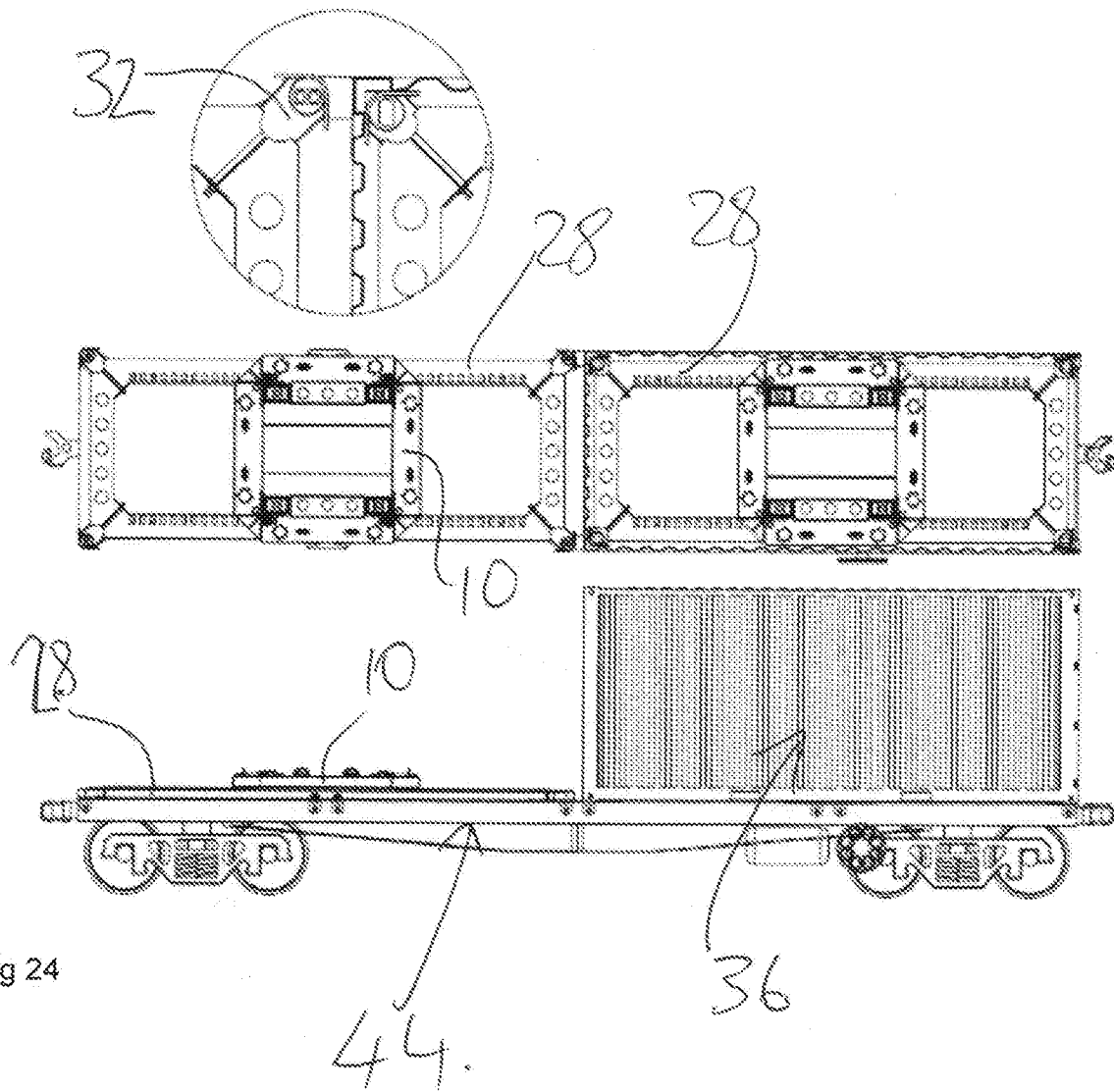


Fig 24