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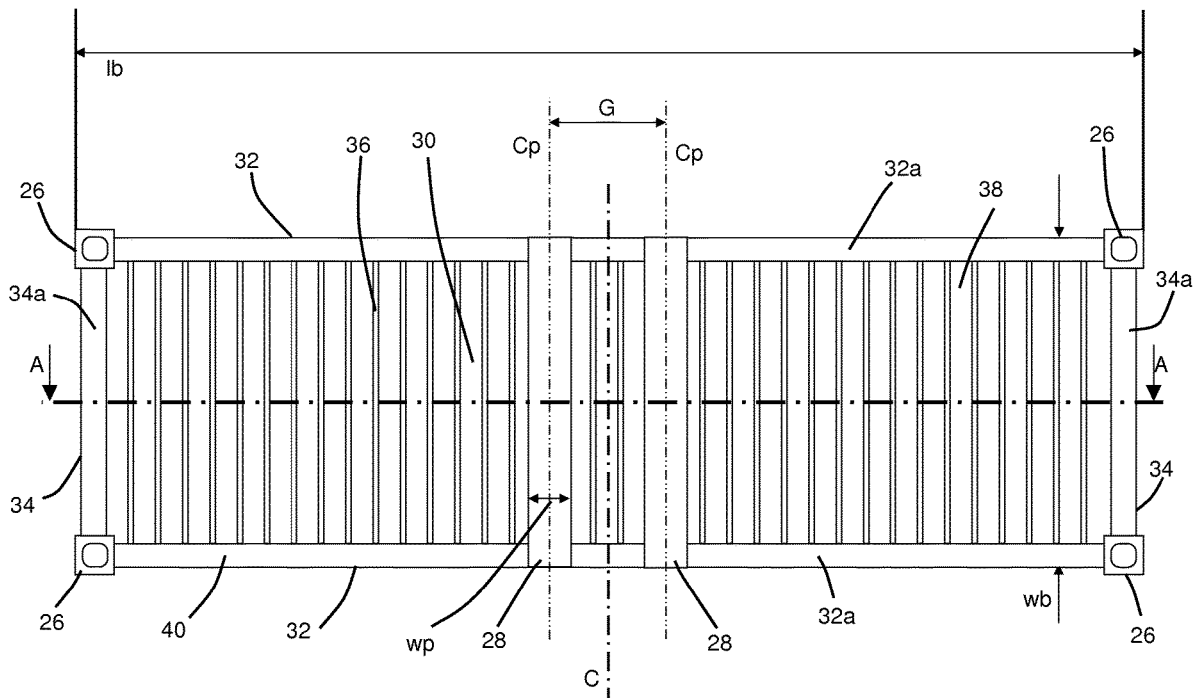
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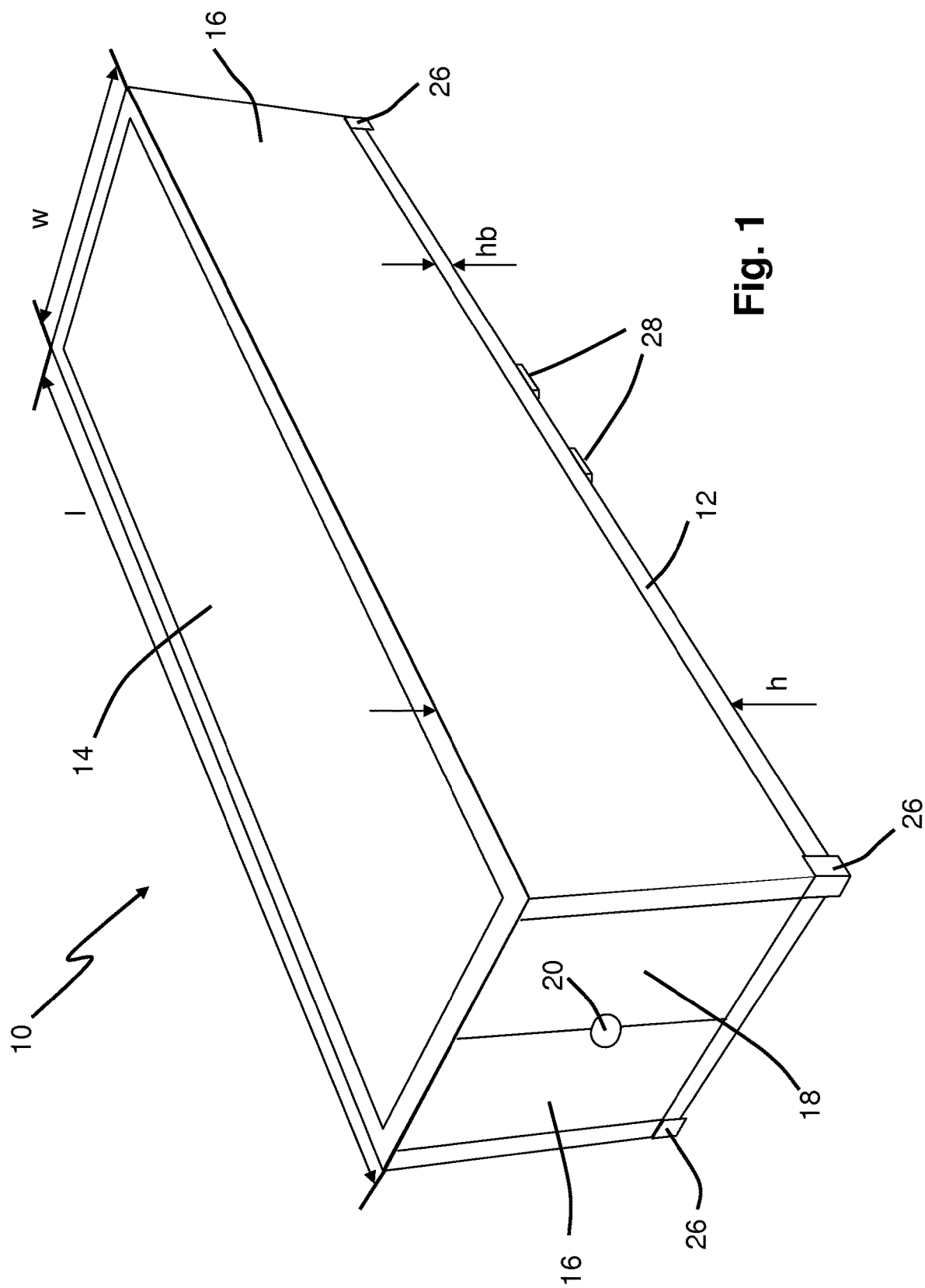
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ABSTRACT

Intermodal container The present disclosure provides an intermodal container comprising a container base comprising a structural base and a floor provided on a first inner side of the structural base. The container base comprises a ladderframe comprising first and second side rails and a plurality of cross members extending between the first and second side rails. The side rails each comprise an upper rail surface and a lower rail surface and the plurality of cross members support the floor. The container comprises a protective shield provided on a second outer side of the structural base for protecting the container base. The shield is arranged to protect one or more of the plurality of cross members and/or the floor. The shield is fixed to the lower rail surfaces of the side rails or the shield is located in a recess provided in each of the lower rail surfaces of the side rails.





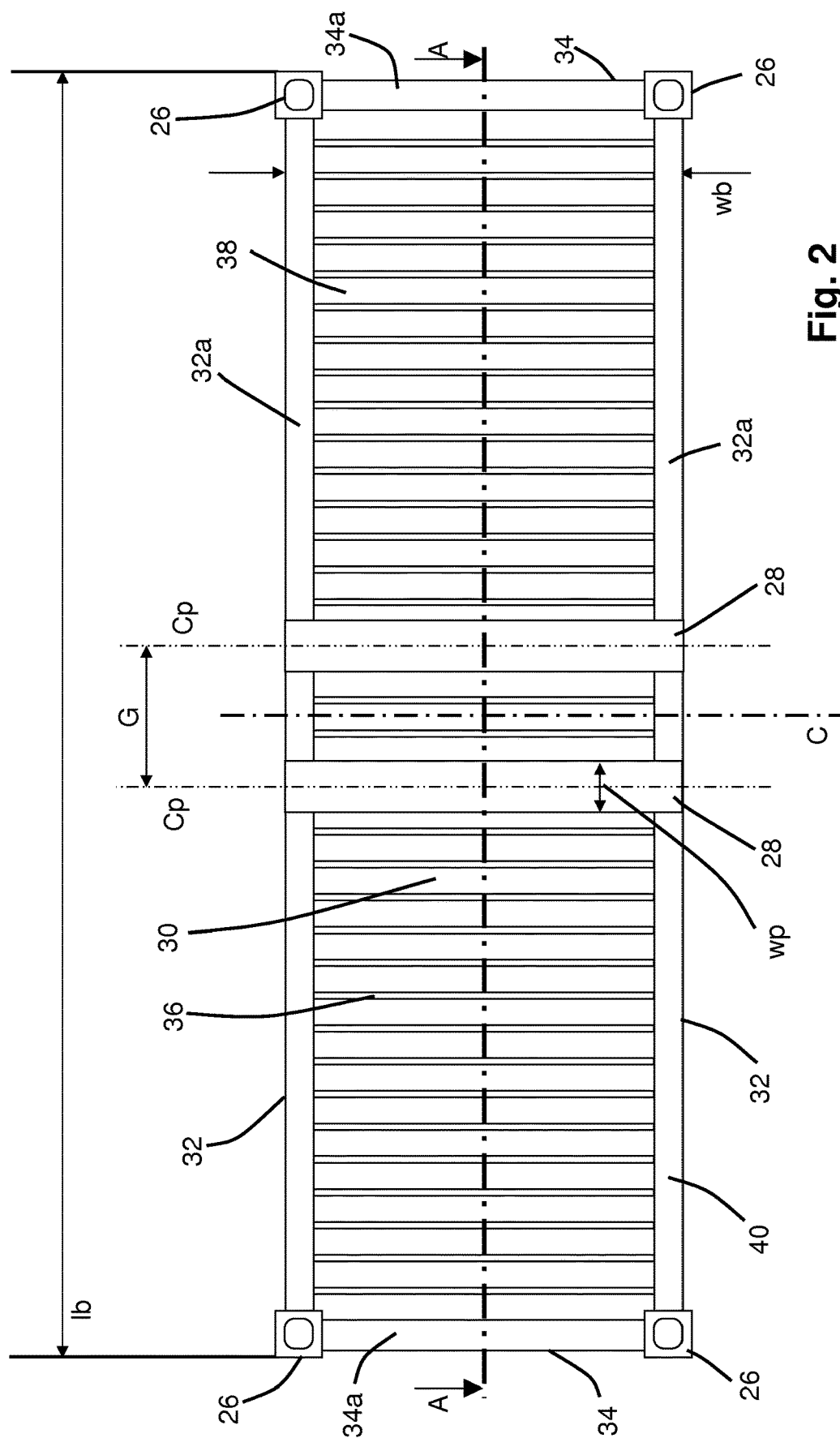


Fig. 2

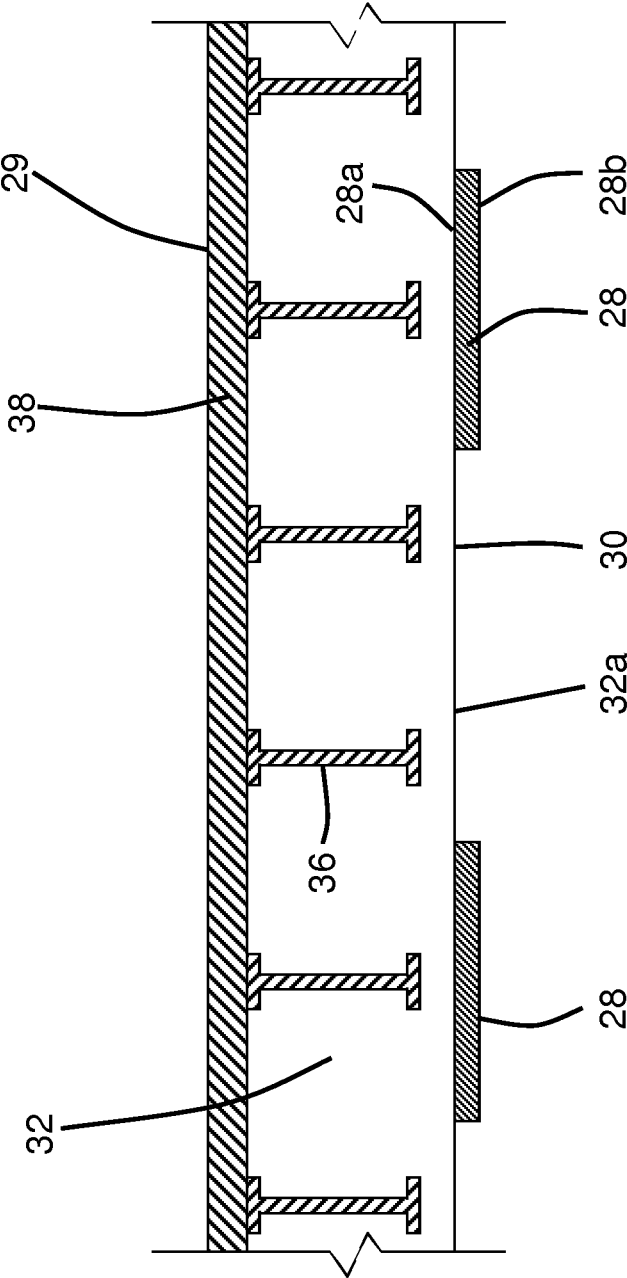


Fig. 3

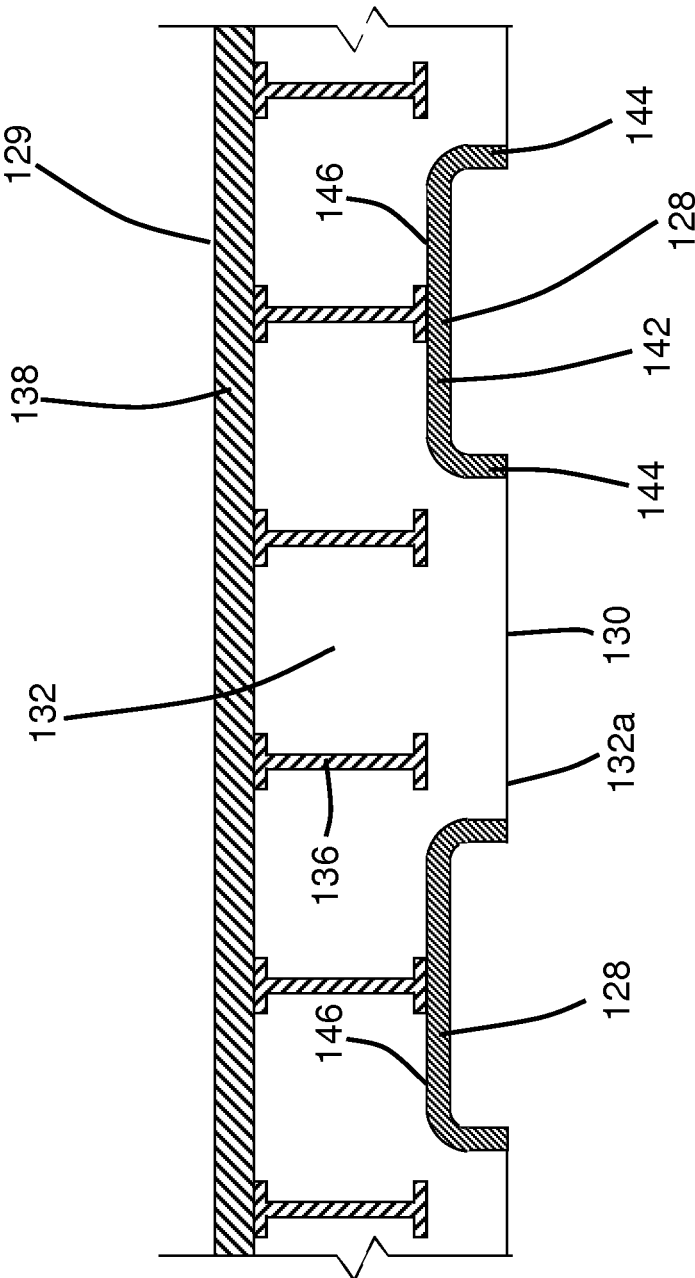


Fig. 4

INTERMODAL CONTAINER AND PROTECTIVE SHIELD THEREFOR

[0001] The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 711257.

[0002] This disclosure relates to intermodal containers, and in particular to the protection of intermodal containers.

[0003] Intermodal containers are widely used for containing goods to be transported by various modes of transport, such as ship, rail, and road. The containers are typically designed to be re-usable and are available in different standard sizes to ensure compatibility with equipment around the world and to minimize wasted space. In particular, most intermodal containers have a standard width and height, but are available in various lengths. The most commonly used intermodal containers are 20 ft or 40 ft in length and have the same width.

[0004] Intermodal containers are typically moved using crane equipment when they are filled with goods due to their weight. However, when an intermodal container is empty, it may be possible to move it using a forklift. To this end, some containers are provided with forklift pockets for receiving the forks of a forklift.

[0005] However, as it can be hazardous to move larger containers with a forklift even when they are empty, the provision of forklift pockets may be banned by law for containers over a certain size. Despite the lack of provision of pockets, some users may nevertheless attempt to lift these larger containers with forklifts, which is dangerous and can cause damage to the container.

[0006] In view of the above considerations, it will be understood that improvements in the field of intermodal containers are desirable.

[0007] The present disclosure provides a container, such as a freight container, a shipping container, a transport container, or an intermodal container, or any combination thereof. The container comprises a container base comprising a structural base and a floor provided on a first inner side of the structural base. A protective shield is provided on a second outer side of the structural base for protecting the container base.

[0008] In a first aspect, there is provided an intermodal container comprising a container base comprising a structural base and a floor provided on a first inner side of the structural base. The container base comprises a ladderframe comprising first and second side rails and a plurality of cross members extending between the first and second side rails. The side rails each comprise an upper rail surface and a lower rail surface and the plurality of cross members support the floor. The intermodal container also comprises a protective shield provided on a second outer side of the structural base for protecting the container base. The protective shield is arranged to protect one or more of the plurality of cross members and/or the floor. The protective shield is fixed to the lower rail surfaces of the side rails or the protective shield is located in a recess provided in each of the lower rail surfaces of the side rails.

[0009] The structural base may comprise a ladderframe. The ladderframe may comprise first and second side rails and a plurality of cross members extending between the first and second side rails. The cross members may be structural cross members for forming the structure of the base and receiving loading forces from an internal floor of the con-

tainer. The protective shield may protect one or more of the plurality of structural cross members or a floor of the container which is supported by the plurality of structural cross members, or both the cross members and the floor.

[0010] The floor may be supported by the structural cross members. The floor may comprise one or more floor plates or sheets which may form an internal floor of the container.

[0011] The container may comprise a plurality of walls and a roof. The container may define an internal volume. The inner base side may be a surface or side of the base which faces the internal volume of the container the inner base side may also be an upper base side. The floor of the base may form the inner base side. An inward or upper surface of the side rails and end rails may form the inner base side. The outer base side may be a surface or side of the base opposite the inner side of the base which faces external to the container and the internal volume. The inner and outer base sides may not be a solid and continuous surfaces and may be a plane defined by one or more components of the base. The outer base side may lie in a plane defined by the side rails and end rails of the base, in particular by the outward or lower surfaces of the side rails, the end rails, or both pairs of rails.

[0012] The container may be a collapsible container. By collapsible container, it should be understood that the container comprises elements which permit a total volume of the container to be reduced when the container is empty. The elements may be collapsible or foldable walls which enable a roof of the container to be moved in closer proximity to the base of the container, thereby reducing the total height of the container when in its collapsed state.

[0013] The protective shield may extend between the first and second side rails. The shield may extend between the first and second side rails in a direction substantially perpendicular to the first and second rails. The base may further comprise end rails spanning between the side rails at first and second ends of the base. The side rails may have a length substantially similar to a length of the container. The end rails may have a length substantially similar to a width of the container. The side rails may be substantially parallel to each other and spaced apart by a distance substantially equal to a length of the structural cross members or the end rails. The length of the container may be a longest dimension of the container in plan view. Distances along the length of the container may be described as longitudinal. A width of the container may be a shortest dimension of the container in plan view.

[0014] One or more of the plurality of cross members may be arranged between the inner base side and the protective shield. Each cross member may comprise a C-beam, an I-beam, or an H-beam. Each of the plurality of cross members may be substantially identical. The plurality of cross members may be substantially evenly spaced along a length of the structural base.

[0015] The side and end rails may each comprise an upper rail surface and a lower rail surface. The upper rail surfaces may form part of the inner base side. The upper rail surfaces may support the floor plates or floor of the container, in particular in combination with the structural cross members.

[0016] The protective shield may be fixed to the lower surfaces of the side rails. The protective shield may be fixed below the outer base side or below the side rails. The shield may prevent contact with the lower surface or underside of the rail in the region of the shield. The shield may be

arranged on the lower surfaces of the rails so as to provide a barrier on the underside of the rails.

[0017] The protective shield may be located in a recess provided in each of the lower surfaces of the first and second side rails. The protective shield may comprise a channel. The channel may comprise a central plate portion and side wall portions. The side walls may extend extending substantially perpendicular to the central plate or in an outward direction oblique to a plane of the base. The side walls may be parallel to the end rails of the base. The side rails may comprise a discontinuous lower surface, the recess and protective shield may be arranged in a discontinuity of the lower surface. The recess may be an open recess or channel formed in the lower surface of the side rail. In other words, the recess may be unbounded by the side rail on a lowermost side thereof, such that a forklift fork can be introduced to the recess from below.

[0018] The protective shield may be in contact with or connected to one or more of the plurality of cross members. There may be no gap between the lower surface of one or more of the structural cross members and the protective shield in a direction perpendicular to the plane of the base.

[0019] The protective shield may be spaced apart from one or more of the plurality of cross members. A gap may be present between one or more of the plurality of structural cross members which are proximate the protective shield in a direction perpendicular to the plane of the structural base.

[0020] The protective shield may be arranged in a plane substantially parallel to a plane defined by the outer base side.

[0021] The protective shield may be a continuous sheet of material, for example a continuous sheet of metal. The protective shield may be formed of a reinforced material or a stainless material. The material may be steel. In other examples, the shield could be formed of a plurality of closely arranged parallel bars or rails, or a mesh, extending across the width of the base.

[0022] The protective shield may be a forklift protective shield.

[0023] The container may further comprise a plurality of container support members arranged to protrude from the outer base side such that, when the container is located on a flat surface, the protective shield is spaced apart from the flat surface. The container support members may be corner castings. The container support members may be arranged at four corners of the base, in particular at the corners of the ladderframe. Four container support members may be provided on the base. The container support members may be arranged fixed to first and second ends the side and end rails of the base so as to form a rectangular frame having opposing sides formed by a pair of side rails and a pair of end rails, and having a corner casing at each corner thereof.

[0024] The container may be a container over 20 feet (6.1 metres) in length. In particular, a length of the container may be approximately 25 feet (7.58 m), 30 feet (9.12 m) or 40 feet (12.2 m), 45 feet (13.7 m), 48 feet (14.6 m), or 53ft (16.2 m) in length.

[0025] A width of the protective shield may be 0.36 m. A height of the side walls of the protective shield may be less than 0.1 m, and may in particular be 0.031 m. A width of the container may be between 2 m and 3 m, and in particular, may be around 8 feet (2.44 m). The width and length of the container may be external dimensions of the container.

[0026] The container may comprise a second protective shield arranged on the outer base side for protecting the base. The second protective shield may be substantially identical to the first protective shield hereinbefore described.

[0027] A centre of mass of the container may lie along a centreline of the container or at a longitudinal mid-point of the container. In other examples, the centre of mass of the container may not lie at a longitudinal mid-point or centreline of the container, for example if one end of the container (e.g. a door end) is heavier than the other end. The centreline of the container span the width of the container at 50% along the container's length. The first and second protective shields may be spaced apart from a centre of mass of the container by an equal distance or from the centre line of the container by an equal distance. A gap or distance between the respective centrelines of the first and second protective shields in a longitudinal direction of the container may be between 3 m and 0.5 m. In particular, a longitudinal distance between the respective centrelines of each of the first and second protective shields may be 2.05 m.

[0028] In a second aspect, there is provided a protective shield for use in a container hereinbefore described.

[0029] To avoid unnecessary duplication of effort and repetition of text in the specification, certain features of the present disclosure are described in relation to only one or several aspects or arrangements of the disclosure. However, it is to be understood that, where it is technically possible, features described in relation to any aspect or arrangement of the disclosure may also be used with any other aspect or arrangement of the disclosure.

[0030] For a better understanding of the present disclosure, and to show more clearly how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

[0031] FIG. 1 depicts a perspective view of a container;

[0032] FIG. 2 depicts a bottom view of a container according to FIG. 1;

[0033] FIG. 3 depicts a cross sectional view of a base of the container of FIGS. 1 and 2; and

[0034] FIG. 4 depicts a cross sectional view of a base of an alternative container.

[0035] FIG. 1 shows a container 10 in perspective view. In the illustrated example, the container is an intermodal freight container 10, but it may also simply be referred to as a container 10 in this disclosure for brevity.

[0036] The base 12 of the container 10 forms a lowermost part of the container. The container 10 also comprises a roof 14, which is supported by four walls 16 which extend perpendicularly from the base 12. The walls 16 of the container 10 space apart the roof 14 and base 12 to form a substantially hollow cuboid structure, which is the container 10. An internal volume (not visible in FIG. 1) is defined by the container 10, and each of the roof 14, walls 16, and base 12 have an inner side or face which is exposed to the internal volume, and an outer side or face which is exposed to the exterior of the container 10. The container may comprise one or more doors 18 or other access means for providing access to the interior of the container. The doors 18 may be lockable with a lock 20 to prevent unwanted access to the container 10.

[0037] The container 10 has a length l, a width w, and height h. The length l of the container is its longer dimension in plan view, and the width w of the container is its shorter

dimension in plan view. The height h of the container is the total height of the walls 16, the roof 14, and the base 12.

[0038] As the container 10 is substantially cuboidal, it has six outer sides, consisting of the base 12, the roof 14, and the four walls 16. The walls 16 are provided in two opposing pairs: sides 22 and ends 24. The sides 22 are formed parallel to the longer axis or length l of the container and the ends 24 are parallel to the shorter axis or width w of the container 10. As the walls 16 each have the same height, the sides 22 are the walls 16 having a longer second dimension, and the ends 24 are the walls 16 having a shorter second dimension. In some examples, the container 10 may be a collapsible container. In this case, the walls 16 may comprise means for reducing the total height of the container or for collapsing the container.

[0039] The base 12 is substantially rectangular in plan view, having a length l_b substantially equal to length l of the container 10 and a width w_b substantially similar to the width w of the container 10. The base has a height h_b which is measured in the same direction as the height h of the container 10.

[0040] At each corner of the base 12, there is provided a container support member 26 in the form of a corner casting. The corner castings 26 are substantially cube-shaped elements have a greater height than the base 12, and protrude from the base 12 such that the outer or lower side of the base 12 is spaced apart from a surface on which the container is placed. The corner castings 26 also comprise means (not shown) for connecting a lifting device, such as a crane, to the container for lifting and moving the container 10. Corner castings may also be provided at the corners of the roof 14.

[0041] The base 12 of the container comprises a pair of protective shields 28, in particular protective plates 28, arranged on the outer side of the base 12 and spanning the width w of the container 10 for protecting the base from being damaged by the forks of a forklift (not shown) if a user attempts to lift the container 10 with a forklift.

[0042] FIG. 2 shows a bottom view of the container 10. The view of FIG. 1 is taken from directly underneath the container 10, showing an outer side 30 or underneath of the base 12 of the container 10. In the view of FIG. 2, the construction of the base 12 can be seen more clearly.

[0043] The base 12 comprises a pair of side rails 32 and a pair of end rails 34, and a plurality of cross members 36. The rails 32, 34, and the cross members 36 in combination form a ladderframe 40, which is so named because it has the appearance of a ladder. The ladderframe 40 forms the base 12 of the container.

[0044] Each of the rails 32, 34 and the cross members 36 is an elongate beam of substantially constant cross-section. The pair of side rails 32 are formed at opposing sides of the base 12 forming the sides of the base 12. The end rails 34 span between the side rails 32 at their ends. The end rails 34 are arranged perpendicular to the side rails 32 in plain view and form the ends of the base 12. The corner casings 26 form a joint between the side rails 32 and the end rails 34, such that the side rails 32 and end rails 34 in combination form a rectangular shape in bottom view. The side rails 32 and end rails 34 may be formed from lengths of hollow section, such as a square section, or may be solid along their length. The rails may be formed from C-beam, I-beam, H-beam, or W-beam. The rails 32, 34, and the corner castings 26 may be connected by welding, for example.

[0045] The cross members 36 also span between the side rails 32 at substantially equal spacing along the length of the side rails 32. The cross members 36 are I-beam shaped of smaller dimension than the rails 32, 34. The cross members 36 are also arranged substantially perpendicular to the side rails 32. The cross members 36 are attached to the side rails 32 at each end, for example by welding. A floor 38 is provided on the inner or upper base side, which is supported by the cross members 36. The floor 38 may be a continuous sheet of material, for example wood, or may be formed of a number of sheets of material.

[0046] As the ladderframe 40, and thus the base 12, have a length and a width greatly exceeding their height, they can be broadly approximated as planar, having two opposing sides. These sides can be identified as an inner base side 29 (see FIG. 3) and an outer base side 30. The inner base side may also be referred to as an upper base side and the outer base side 30 may also be referred to as a lower base side. The base 12 generally defines a plane, and the inner and outer base sides are parallel to the plane of the base and form opposing sides of the base 12.

[0047] Halfway along the length of the base 12 and perpendicular to the side rails 32, a centreline C of the base 12 is defined. Provided that the weight of the container is evenly distributed, the centre of mass of the container will lie on the centreline C . Thus, the container should balance across the centreline C .

[0048] Each of the rails 32, 34 comprise an inward-facing rail surface (not visible in FIG. 2), which may also be referred to as an upper rail surface, and an outward-facing rail surface 32a, 34a, which may also be referred to as a lower rail surface. The lower rail surfaces 32a, 34a lie within and form part of the outer base side 30.

[0049] Spanning between the side rails 32 and fixed to the outward rail surfaces 32a are the two protective plates 28. The plates 28 are substantially rectangular, having a width w_p and a length l_p in bottom view. The length l_p is substantially equal to the width of the base w_b , such that the plates 28 span the entire width of the container 10. As with the end rails 34 and the cross members 36, the plates 28 span perpendicular to the side rails 32.

[0050] The plates 28 are evenly spaced from and perpendicular to the centreline C of the base 12. The total distance or gap G between the plates 36 is defined by the distance between the centreline C_p of each plate across its width. The distance or gap G is bisected by the centreline C of the base 12. In this way, if the container 10 is supported beneath both plates 28, it will be evenly balanced along its length.

[0051] The distance G is substantially the same as the distance between the forks of a forklift truck which, in this example, is around 2.05 m. It should be understood that distance G could be another distance depending on the forklift against which the plates are designed to protect. The width of each plate 28 is also designed to be greater than the width of each of the forks of a forklift. In this example, the width of each plate is 0.31 m (around 1 foot).

[0052] In an alternative example, only a single protective plate 28 may be provided instead of two plates with a gap therebetween. In this example, the plate may have an increased width and be arranged with its centreline C_p aligned with the centreline C of the base.

[0053] The plates 28 and the part of the base 12 in the vicinity of the plates is shown in FIG. 3 in cross section along the line A-A of FIG. 2.

[0054] As shown, the floor 38 of the base is formed on the upper base side 29, and the side rails form part of the outer base side 30. The plates 28 each have an inner plate surface 28a and an outer plate surface 28b. The inner plate surface 28a of each of the plates 28 fixed to the lower rail surface 32a of the side rails 32 such that the plates 28 are arranged on the outer side 30 of the base 12.

[0055] The plates 28 are arranged below one or more of the cross members 36 to limit access to the cross members 36. The protective plates 28 provide suitable flat surfaces against which the forks of a forklift can be inserted without making contact with the cross members 36, the floor 30, or the side rails 32. Accordingly, in the event a user does try to lift the container 10 with a forklift, the components forming the base 12 are protected from damage by forks being inserted under the base 12.

[0056] The plates 28 are steel plates which have been fixed, by welding or otherwise, to the rails 32. The thickness of the plates can be tailored to the material of the plates 28. For example, if a stronger material is used, the thickness of the plates may be reduced.

[0057] As any attempt to lift the container 10 by forklift requires the container to be balanced across the forks of the forklift, the forks will be inserted under the base in the locations of the plates 28 by necessity as they are spaced apart either side of the centre of mass of the container. Thus, protection afforded by the plates is focussed only in the areas that it is required, rather than providing a protective plate extending across the entire base, which would greatly increase the weight of the container and make manufacture and servicing more difficult.

[0058] Owing to the increased height of the corner castings 26 compared to the base 12, the outer side 30 of the base 12 may be spaced apart from the support surface on which the container 10 is resting (not shown). Therefore, a gap provided between the support surface and the outward surface 28b of the plates 28 such that the forks of a forklift can be inserted underneath the base against the plates 28.

[0059] An alternative base 112 is shown in FIG. 4 in the same cross section as FIG. 3. Like features between the two examples are referenced by reference numbers spaced apart by 100.

[0060] The plates 128 of the base 112 are in the form of channels having a central plate portion 142 and two side wall portions 144. The side wall portions 144 extend perpendicular to the central plate portion 142 and parallel to the cross members 136. The plates 128 have been formed from a flat plate by bending the side wall portions 144 to project perpendicular to the central plate portion 142. However, in another example, the side walls 144 could be formed separately and fixed to the central plate portion 142. Furthermore, it is possible that the side wall portions 144 could project outwardly at an acute angle from the central plate portion 142, for example at an angle of around 45 degrees.

[0061] Each of the side rails 132 has two recesses 146 formed in their respective outward rail surfaces 132. The recesses 146 cause the lowermost part of the rails 132 and the outward rail surfaces 132 to be discontinuous. The recesses substantially correspond to the cross-sectional shape of the plates 128 such that the plates 128 can be fully or partially recessed into the rails 132. The arrangement of base 112 provides a greater gap between the plates 128 and the support surface to enable forks to be inserted in contact with the plates smoothly and without damaging other com-

ponents of the base. The recesses 146 differ from conventional forklift pockets, which may be formed in a 'hole' in the side of the side rail, such that the lower part of the side rail is intact and the side rail completely encircles the hole. The recesses 146 are therefore 'open' recesses, which enable a forklift fork to enter the recess 146 conveniently from below, which is not achievable with a 'hole' type forklift pocket. The recesses 146 and plates 128 therefore also permit greater leeway in the height of the forks of the forklift during lateral insertion for lifting.

[0062] Also in the base 112, the plates 128 are each in contact with the cross members 136 directly above the plates 128. In some examples, the plates 128 and the cross members 136 above them may be fixed together, for example by welding. These examples can provide increased reinforcement for the plates or the cross members. It should be understood that the plates 28 and the cross members 36 of the example shown in FIGS. 2 and 3 may also be in contact in this manner if the height of the rails 32 is reduced, or the height of the cross members 36 is increased. Furthermore, it should also be understood that the plates 128 and the cross members 136 of the base 112 in FIG. 4 may also be spaced apart in the manner of base 12 of FIG. 3.

[0063] It will be appreciated by those skilled in the art that although the disclosure has been described by way of example with reference to one or more arrangements, it is not limited to the disclosed arrangements and that alternative arrangements could be constructed without departing from the scope of the disclosure as defined by the appended claims.

1. An intermodal container comprising:

a container base comprising a structural base and a floor provided on a first inner side of the structural base, the container base comprising a ladderframe comprising first and second side rails and a plurality of cross members extending between the first and second side rails, the side rails each comprising an upper rail surface and a lower rail surface and the plurality of cross members supporting the floor; and

a protective shield provided on a second outer side of the structural base for protecting the container base, the protective shield arranged to protect one or more of the plurality of cross members and/or the floor, wherein:

a) the protective shield is fixed to the lower rail surfaces of the side rails; or
b) the protective shield is located in a recess provided in each of the lower rail surfaces of the side rails.

2. An intermodal container as claimed in claim 1, wherein the protective shield extends between the first and second side rails

3. An intermodal container as claimed in claim 1, wherein one or more of the plurality of cross members are arranged between the inner base side and the protective shield.

4. An intermodal container as claimed in claim 1, wherein an inward face of the protective shield is in contact with or connected to one or more of the plurality of cross members.

5. An intermodal container as claimed in claim 1, wherein the protective shield is spaced apart from one or more of the plurality of cross members.

6. An intermodal container as claimed in claim 1, wherein the protective shield is arranged in a plane substantially parallel to a plane defined by the outer base side.

7. An intermodal container as claimed in claim 1, wherein the protective shield is a continuous sheet of material.

8. An intermodal container as claimed in claim 1, wherein the intermodal container further comprises a plurality of container support members arranged to protrude from the outer base side such that, when the intermodal container is located on a flat surface, the protective shield is spaced apart from the flat surface.

9. An intermodal container as claimed in claim 1, wherein the intermodal container is an intermodal container over 20 feet (6.1 metres) in length.

10. An intermodal container as claimed in claim 1, wherein the protective shield is a forklift protective shield.

11. An intermodal container as claimed in claim 1, wherein the protective shield is a plate.

12. An intermodal container as claimed in claim 1, wherein the protective shield is a continuous member covering a portion of the outer side of the structural base.

13. An intermodal container as claimed in claim 1, further comprising a second protective shield arranged on the outer base side for protecting the structural base.

14. An intermodal container as claimed in claim 13, wherein the first and second protective shields are spaced apart from a longitudinal mid-point of the intermodal container or the centre of mass of the intermodal container by an equal distance.

15. A protective shield for use in the intermodal container of claim 1.

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