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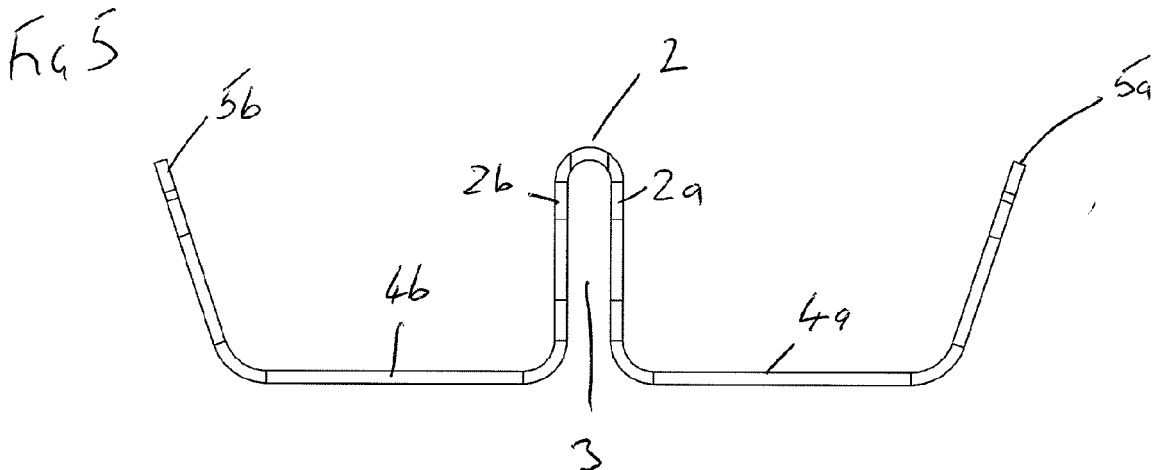
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(54) **Fall arrest systems and anchor**

(57) An anchor for a fall arrest or fall safety system, has a plate for securing to a structure which is formed to have an upwardly extending spine, the upwardly extending spine being provided with a pair of spaced securing formations such as apertures or holes. The invention pro-

vides a low profile anchor for use with containers, transportable units or other structures providing shear loading in the event of a fall arrest and also energy absorbing functionality by virtue of the plastically deformable nature of the spine of the anchor plate.



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Description

[0001] The present invention relates to fall arrest system and an anchor for such a fall arrest systems incorporating such anchors.

[0002] The present invention is particularly suited for use in relation to situations in which a low profile anchor or fall arrest system is required. Such situations arise in relation to systems for use on shipping containers or portable units, which may be positioned in end to end arrangements and/or one on top of another.

[0003] An improved anchor and fall arrest system has now been devised.

[0004] According to the present invention, there is provided an anchor for a fall arrest or fall safety system, the anchor comprising a plate for securing to a structure, the plate being formed to have an upwardly extending spine, the upwardly extending spine being provided with a pair of spaced securing formations.

[0005] It is preferred that the spaced securing formations comprise apertures extending through the spine.

[0006] In a preferred embodiment the spine comprises a fold in the plate. Beneficially, the spine comprises first and second spine plate portions positioned facing one another, preferably separated by a small intervening gap.

[0007] It is preferred that the securing formations are positioned proximate adjacent opposed ends of the spine.

[0008] Beneficially, the spine extends substantially from one end of the plate to another.

[0009] The anchor preferably includes plateau portions extending outwardly of the spine on a common plane with one another.

[0010] In a preferred realisation, the anchor includes peripheral marginal wings upwardly extending (from the general plane or plateau of the plate) in the same direction as the spine. The marginal wings may be inclined in an upward direction.

[0011] It is preferred that the upward projection extent of the wings is similar to or less than the upward projection extent of the spine.

[0012] Beneficially, the anchor is provided with fixing means for securing to a structure.

[0013] It may be preferred that the fixing means comprises apertures for mechanical fixings such as bolts.

[0014] In one embodiment the anchor includes peripheral marginal upstanding wings upwardly extending (from the general plane or plateau of the plate) in the same direction as the spine, and the fixing means are provided in the upstanding wings.

[0015] The fixing means preferably comprises apertures for mechanical fixings such as bolts, and the apertures are provided in separate ranks or line groups for each wing. Each wing is preferably provided with two separate ranks or line groups of apertures each rank being at an opposed side of the plate.

[0016] According to a second aspect, the invention provides a fall arrest or fall safety system comprising a plu-

rality of anchors and a safety line connected between securing formations in separate anchors.

[0017] According to this aspect, it is preferred that the system includes a tensioner for the safety line.

[0018] According to a further aspect, the invention provides a container or portable transportation unit fitted with an anchor or fall safety system as defined herein.

[0019] According to a further aspect, the invention provides a method of setting up a safety system in which adjacent containers or transportable units are fitted with anchors and a safety line connected between securing formations in separate anchors on separate adjacent containers

[0020] The invention will now be further described, by way of example only and with reference to the accompanying drawings in which:

Figure 1 is a schematic plan view of an anchor in accordance with the invention;

Figure 2 is a schematic side view of the anchor of Figure 1;

Figure 3 is perspective view of the anchor plate from above;

Figure 4 is a perspective view of the anchor plate from below;

Figure 5 is a schematic end view of the end plate of Figures 1 to 4; and

Figure 6 is a schematic view of a fall arrest system employing the anchor plate of Figures 1 to 5 in use;

[0021] Referring to the drawings there is shown an anchor plate 1 for use in fall arrest applications. Referring to Figures 1 to 5 the anchor plate 1 is in this exemplary embodiment fabricated from mild steel plate and comprises a central upwardly extending spine 2 folded over from the material of the plate to form a double thickness of spine plate portions 2a 2b spaced by an intervening gap 3. Extending outwardly from the spine are plateau portions 4a 4b which extend outwardly from the spine 2 to peripheral upturned wings or flanges 5a 5b. The plate is symmetrical about the fold line of the spine 2. The upwardly inclined wings or flanges 5a 5b are provided with separate groups of securing apertures 6a 6b 6c 6d positioned at spaced opposed ends of the anchor plate. In use the securing apertures are used to secure to a structure by means of securing bolts.

[0022] At each opposed end of the central spine 2 are provided respective pairs 8a 8b 9a 9b of aligned apertures in each of the spine plate portions 2a 2b which provide an aperture passage extending transversely through complete spine. The apertures correspond 8a 8b 9a 9b positionally to one another in each portion of the adjacent spine. A small notch 7a 7b is provided in

the spine at either opposed end the notch 7a 7b is provided to aid in folding of the plate to form the spine 2 avoiding crinkling or buckling during the folding process.

[0023] In use the spacing between the peripheral wings or flanges 5a 5b and the relative dimensions are tailored to enable the anchor plate 1 to rest in the profiled trough that is found on the structure to which the system is to be secured. For example, where the system is to be used with a portable container or transportable unit, the dimensions of the peripheral wings or flanges 5a 5b and the spacing between them are dimensioned to enable the anchor plate 1 to nest within the profiled trough formation that is typically present on the roof of such a storage container or transportable unit. The anchor plate 2 can then be secured to the container by means of bolts passing into the profiled skin of the container.

[0024] The anchor plate is fabricated of steel mild or stainless steel and formed with the central spine 2 such that when a load is applied to the central spine the spine can deform inwardly and upwardly with respect to the plateau portions 4a 4b and the peripheral wings 5a 5b. This enables energy to be absorbed. The anchor plate, including the spine 2 is low profile and designed such that during a fall arrest event shear load is applied to the bolt fastenings through the multiple groups of securing apertures 6a 6b 6c 6d in the wings or flanged 5b. Securing on the wings or flanges 5a 5b is preferred to securing via the plateau portions 4a 4b for technical reasons including providing more scope for plastic deformation (to absorb energy) of the anchor plate by permitting the spine to lift upwardly plate to deform during a fall arrest event.

[0025] Being low profile, the anchors 1 can be secured in position on the roof of a container or transportable unit and left in place even if containers or transportable units are to be stacked one on top of another.

[0026] The anchor plate 1 can be used as an anchor by securing through either one or both of the apertures 6 in the opposed ends of the spine 2. In a first realisation of the invention the anchor plate 1 can be used in a fall arrest system as shown in Figure 6 where adjacent containers 10 (or transportable units) are positioned end to end and each adjacent container 10 is provided with a separate respective anchor 1 positioned at opposed ends of the respective container 10. A tensioned safety line 11 is connected between opposed anchor plates 1 on each container 10 and also between adjacent anchor plates 1 on adjacent containers 10. This enables an individual 12 to be secured to the safety line 11 by means of a karabiner and lanyard 13 as shown in Figure 6. When in between the containers the person can unclip from a first length of the safety line 11 and clip to the section of the safety line 11 extending between adjacent containers. Typically, in such a system the safety line 11 can be secured by bolts and a tensioning device 14 will be provided to enable tension to be imparted to the safety line.

[0027] In an alternative use, the safety lines 11 can be dispensed with and a karabiner for a safety lanyard can be secured directly through one of the apertures 6 in the

spine.

[0028] The invention provides a low profile anchor for use with containers, transportable units or other structures providing shear loading in the event of a fall arrest and also energy absorbing functionality by virtue of the plastically deformable nature of the arrangement or flange, plateau and spine of the anchor plate. Provision of the securing apertures at either end of the spine enable connection either directly to a securing lanyard or connection to one or two safety lines in a 'daisy chain' arrangement where containers are positioned end to end and a safety line is required to extend across the divide between adjacent containers.

Claims

1. An anchor for a fall arrest or fall safety system, the anchor comprising a plate for securing to a structure, the plate being formed to have an upwardly extending spine, the upwardly extending spine being provided with a pair of spaced securing formations.
2. An anchor according to claim 1, wherein the spaced securing formations comprise apertures extending through the spine.
3. An anchor according to claim 1, wherein the spine comprises a fold in the plate.
4. An anchor according to any preceding claim, wherein:
 - i) the spine comprises first and second rib portions positioned facing one another; and/or,
 - ii) the securing formations are positioned proximate adjacent opposed ends of the spine; and/or
 - iii) the spine extends substantially from one end of the plate to another.
5. An anchor according to any preceding claim, wherein the anchor includes plateau portions extending outwardly of the spine on a common plane with one another.
6. An anchor according to any preceding claim, wherein the anchor includes peripheral marginal wings upwardly extending (from the general plane or plateau of the plate) in the same direction as the spine.
7. An anchor according to claim 8, wherein the marginal wings are inclined in an upward direction.
8. An anchor according to claim 6 or claim 7, wherein the upward projection of the wings is similar to or less than the upward projection extent of the spine.

9. An anchor according to any preceding claim including fixing means for securing to a structure.
10. An anchor according to claim 9, wherein the fixing means comprises apertures for mechanical fixings such as bolts. 5
11. An anchor according to claim 9 or claim 10, wherein the anchor includes peripheral marginal upstanding wings upwardly extending (from the general plane or plateau of the plate) in the same direction as the spine, and the fixing means are provided in the upstanding wings. 10
12. An anchor according to claim 11, wherein the fixing means comprises apertures for mechanical fixings such as bolts, and the apertures are provided in separate ranks or line groups for each wing; preferably wherein each wing is provided with two separate ranks or line groups of apertures each rank being at an opposed side of the plate. 15 20
13. A fall arrest or fall safety system comprising a plurality of anchors according to any preceding claim and a safety line connected between securing formations in separate anchors, preferably wherein the system includes a tensioner for the safety line. 25
14. A container or portable transportation unit fitted with an anchor or fall safety system according to any preceding claim. 30
15. A method of setting up a safety system in which adjacent containers or transportable units are fitted with anchors according to any preceding claim and a safety line connected between securing formations in separate anchors on separate adjacent containers. 35

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