

Description

The invention relates to a corner fitting for freight containers.

EP-A-54881, which is part of the prior art according to article 54(3)EPC, describes a corner fitting for freight containers comprising three walls defining the corner of a cube, a corner opening being provided at one edge so as to be common to the two adjoining walls. Among other things it is described therein in what way a corner fitting may be made by edge-forming operations from a circular or square blank formed with a central circular or square opening, in which corner fitting two quadrants of the blank overlap each other thereby forming a surface of the corner fitting. In one embodiment thereof, the opening is formed merely by a cut in the corner portion facing away from the container so that an outwardly extending bent beak-like projection results on this corner, and beneath said projection a hole is formed in the same edge, through which the tip of a crane hook, which is inserted behind the projection, may exit. For the rest, the walls of the corner fitting according to the earlier patent application are formed with holes which - as in the conventional corner fitting according to ISO Standard No. 1161 - are used for inserting special means used for the lateral coupling of adjacent containers.

In order to enable manipulation of containers by means of fork trucks it is usual to provide channels for insertion of the truck arms at the container bottom between the corner fittings. On the one hand, such channels reduce the useful volume available inside of the space defined by the corner fittings; on the other hand, they require additional structural elements which increase the manufacturing costs and the weight of the container.

It is an object of the invention to provide a corner fitting for freight containers, which while being of even simpler structure may be universally used for all eight corners of a container and also allows a still simpler coupling
5 between adjacent containers both laterally and vertically with an accompanying improvement in rigidity and safety, and which further permits handling of the container by fork-lift trucks without any additional structural elements. The benefits provided by the
10 earlier container corner, especially the possibility of inserting crane attachments in the three typical diagonal directions, as well as the reliable retaining of a crane hook inserted into the corner fitting against inadvertent detachment due to cable slackness, are to
15 be retained.

The solution to this object, as provided by the invention, is set forth in claim 1. Accordingly, the edge holes which are provided in all three edges of the corner fitting, in conjunction with the corner opening common to all three walls of
20 the cube corner and the symmetrical design relative to the body diagonal of the corner fitting, permit the use of the same corner fitting for all eight corners of the container so as to readily couple both stacked and side-by-side containers by the insertion
25 of pairs of pins into the facing corner openings of the corner fittings, which are disposed either in side-by-side or vertically stacked relationship, which pairs of pins are then connected to each other in the region of the corner openings and also in the region of the then also
30 adjacent edge holes. Due to the fact that the edge portions of the corner fittings have high dimensional

stability, a particularly safe coupling is obtained. The same advantage of high stability is utilized upon insertion of a crane hook which - in contrast to earlier solutions - applies its load to an edge portion instead
5 of an area portion of the corner fitting.

The development of the invention according to claim 2 is advantageous in that the corner fitting leaves the ends of the container frame elements free, so that these may be used directly for engagement by fork-lift arms penetrating
10 through the corner fitting. Otherwise, a freight container having such a corner fitting is the subject matter of the divisional application EP-A-215217.

The development of the invention according to claims 3 to 5 results in the advantage that the corner edge elements
15 may be inserted without play into the corner fitting and welded thereto even if they have sharp edges. This leads to the further advantage that additional welding may be performed from the outer edge, which is particularly favourable with respect to a reliable joining of the
20 corner fitting in case of round cross-section container edge elements.

The developments of the invention according to claims 6 and 7 are particularly preferable in case of relatively small dimensions of the corner fitting to ensure sufficient strength of the remaining hole edges.
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Preferred embodiments of the invention will be described in detail with reference to the accompanying drawings, in which

Figure 1 shows a blank for forming a corner fitting for
30 freight containers;

Figure 2 shows the corner fitting formed from the blank shown in Figure 1;

Figure 3 shows a modification of a finished corner fitting;

Figure 4 is a perspective view of the section elements forming a container corner and welded to a corner fitting;

Figure 5 is a side view of the arrangement shown in Figure 4;

Figures 6 and 7 are modifications of the arrangements shown in Figure 5.

The blank shown in Figure 1 for a corner fitting is formed by three equal-sided right-angled triangles 11, 12 and 13 which are joined in such a way that their hypotenuses define three sides of a square. This blank is provided with a circular opening 14 having its centre in the point of intersection of the diagonals. Furthermore, a circular hole 15 is provided between the circular opening 14 and each corner of the square, the centre of said hole being located on the respective diagonal. As the blank has the overall configuration of a square with one quarter-surface missing, the central opening 14 also corresponds only to a three-quarter circle, and two of the holes 15 are correspondingly only semicircular.

When the blank shown in Figure 1 is bent at right angles about the diagonal lines 16 and 17, the corner fitting having the shape of Figure 2 will result, wherein the two legs of the omitted triangle of the blank join one another and are welded to each other.

Instead of forming the corner fitting in this way from a bent flat blank it is also possible to make the corner fitting shown in Figure 2 by steel-casting, deep-drawing or a similar process, wherein the corner opening 14 and the three edge holes 15 shown in Figure 2 will then be provided subsequently.

Instead of being formed as a triangular pyramid as shown in Figure 2, the corner fitting may also be formed of three 90 degrees circular ring segments 11', 12', 13' as shown in Figure 3. This configuration may also be made of
5 a flat blank by edge-forming and welding or by steel-casting or by another process.

The corner fitting shown in Figure 3 has on each edge a slot 19 extending from the outermost corner of the corner fitting along each edge to the hole 15.
10 When the container edge elements, which are not shown in the drawing, are inserted into the corner fitting, the slots 19 ensure that both faces of said edge elements are in even engagement on the inner faces of the corner fitting without any play therebetween
15 and may be welded thereto even if the outer edges of said edge elements are relatively sharp. If the slots 19 were not provided, engagement on either face would not be possible because of the rounded-in corners or fillets always present in fittings which are made by edge-
20 forming, casting or in any other way. Furthermore, it is possible on account of the slot 19 to secure the edge element inserted into the corner fitting from its outer edge with an additional weld to the corner fitting, which will be especially advantageous when the container edge
25 elements have round or externally radiused cross-section.

The slots 19 may also be provided in the corner fitting according to Figure 2. Also, as shown for example at 19' for the lower vertical edge, the slots may be so wide that their confining lines are tangential to
30 the corresponding edge hole 15. As further explained below in connection with Figure 6, the corner fitting may in this case be manufactured at a minimum of material and weight.

The shape of the corner opening 14' shown in Figure 3 has been modified over that of Figures 1 and 2. The description of Figure 4 will explain the reason for this shape, which is formed by substantially square cut-outs lying in each wall member, each cut-out having a radius opposite to the outer corner of the fitting.

When the corner fitting as shown in Figure 2 or Figure 3 is made by edge-forming and welding, the slot 19 or 19' in the edge where the blank is welded may be produced simply by effecting the welding operation only up to the edge hole 15. In that case the other two slots are punched out just as the edge holes 15 while the blank is in its flat state.

On the finished container, the corner opening 14 is used, for instance, for inserting a crane hook whose tip exits through one of the edge holes 15. In the case of normal crane attachments such crane hooks will hook into all four upper corner fittings of a container, wherein the tips of the crane hooks exit through the edge holes 15 formed in the vertically downwardly extending edges. From the crane hooks the cables extend to a common location approximately centrally above the container. When the container is set down, the cables will slacken, whereupon the crane hooks have the tendency to turn further into the corner opening 14; thereby the hooks will be prevented from detaching themselves.

Due to this way of manipulation the edge portion between the corner opening 14 and the edge hole 15 is subjected to particular loads, and it should therefore suitably be reinforced. This reinforcement may be provided by the punching which was punched out of the edge hole 15. Instead of being completely punched out, the punching may also remain joined to the side facing the corner opening 14 and may be folded inwardly and welded to that location, which is indicated at 20 in Figure 2.

The 3/4 circular configuration shown in the drawing for the corner opening 14 offers the advantage of presenting a somewhat flatter working angle for the crane hook, thus centring the same in the diagonal.

- 5 While the purely tetrahedral configuration of the corner fitting according to Figure 2 offers the advantage of allowing maximum edge lengths with a minimum of weight and material, the embodiment according to Figure 3, where
10 the corner fitting is composed of three 90 degree circular ring segments, is advantageous in a certain way because the support faces for the edge elements of the container have been somewhat enlarged.

When containers are stacked or set side by side, the
15 respective adjacent corner fittings may be readily coupled by means of pairs of pins inserted through the corner openings 14, said pairs of pins being then connected to one another through the adjacent edge holes 15. Since these edge holes 15 define backsettings relative to
20 the remaining profile of the containers or corner fittings, respectively, they offer good engagement upon quick-lashing either with or without the corner opening 14. By securing a shackle through the corner opening 14, which shackle protrudes behind the respective edge hole 15, it is easy to obtain a lashing secured by gravity.

- 25 Figures 4 and 5 show the structural members forming a left-hand bottom corner area of a cargo container, said members including a corner fitting 30, three section elements 31, 32, 33 which constitute three parts of a container frame and extend perpendicularly to each

- other, and an attachment fitting 34 (shown only in Figure 5) reinforcing the corner fitting. As explained above, the corner fitting comprises three wall members 21, 22, 23 which extend perpendicularly to each other and together define a corner opening 24. The corner fitting 30 may be made according to Figure 1, from a flat blank by edge-forming and welding or by pressing, drawing or any other forming process. The attachment fitting 34 is that piece of material which is obtained on cutting the corner opening 24 from the corner fitting 30. Each of the three edges of the corner fitting 30 further is provided with an edge hole 25 cut out of two adjacent wall elements.
- 15 The three section elements 31, 32, 33 are inserted into the edge portions of the corner fitting 30 to such an extent as to terminate shortly before the corner opening 24. Each of said section elements is in turn provided with an edge hole 26 substantially in alignment with the
- 20 corresponding edge hole 25 of the corner fitting 30. In this position the section elements 31, 32, 33 are welded to the corner fitting 30 at the locations indicated in Figure 5. The attachment fitting 34 is disposed such that its two vertical side faces partially engage the vertical
- 25 inner faces of the section elements 31 and 33 and are also welded thereto. If required, the joint between the attachment fitting 34 and the vertical section element 32 may be effected through an additional member (not shown in the drawing). If the relatively adjacent vertically
- 30 extending edges of the attachment fitting 34 and of the vertical section element 32 are not excessively radiused, both members may also be directly welded at these edges.

The section elements 31, 32, 33 are designed as hollow section elements having substantially square cross-section. The corner opening 24 of the corner fitting 30 is formed by three substantially square cutouts disposed in the individual wall members 21, 22, 23, wherein the corner of each cutout facing away from the common corner is radiused. These square faces are somewhat larger than the clear cross-section of the section elements 31, 32, 33, so that the section elements may be used as fork-truck channels and their full cross-section is accessible through the corner opening 24. The outer shape of the three wall members 21, 22, 23 forming the corner fitting 30 respectively corresponds to the quadrant of a circle, the centres of the circles coinciding in the (imaginary) corner of the corner fitting 30.

When all eight corners of a container are set up in accordance with the illustration shown in Figures 4 and 5, the container may be lifted by means of a fork truck in any desired position and from any side, because the truck arms may be inserted in any of the three directions through any corner fitting into the truck channel formed by the respective section element 31, 32, 33. On account of the square cross-sections of the truck channels, which are provided for reasons of symmetry, it is advantageous when the truck arms or fork tines, respectively, also have square cross-section. As compared to the normally flat tine cross-sections this is beneficial because of the increased flexural strength.

To manipulate the container by means of a fork-lift truck, the truck arms may be inserted into the two lower or the two upper corner fittings and the section elements provided behind the same to a correspondingly great distance. Instead thereof it is also possible to insert two substantially shorter fork arms or ram attachments into the two upper corner fittings and section elements to a relatively short length and to secure them by retention pins which are inserted through the edge holes 25, 26 into corresponding recesses in the truck arms or which are fixedly secured at an appropriate spacing from the arms at the truck-side end of the arms. Further, it is also possible to insert comparatively short ram attachments into all four corner fittings facing the fork truck and into the section elements disposed behind the same, wherein also in this case side spreaders are employed. In that case the friction of the four ram attachments within the four section elements will provide for an even more reliable retaining of the container on the fork-lift truck.

Finally, parallel coupling rods may be fed through the lower corner fittings and mutually aligned hollow-section elements of a plurality of containers disposed in a row behind each other. Such a coupled unit could be placed on axle units without requiring a platform or chassis. The saving in weight achieved by this concept is apparent.

Instead of the section elements shown in Figures 4 and 5, which have substantially square hollow section, it is also possible to employ those having circular hollow section. In this case also the arms or tines of the fork truck or side spreader, respectively, should have circular cross-section, as is known for manipulating paper rolls or the like.

Furthermore it is also possible to use L-section elements as elements 31, 32, 33, which are disposed in the usual manner so that their edges form the outer edges of the container frame. In that case only those section elements may be used as truck channels which in the respective container position are the upper section elements.

To lift the container by means of crane hooks, the hook is inserted through the corner opening 24 in such a way that its tip will exit through that edge hole 25, 26 which is positioned in the direction of tension of the crane cable. The radiused shape shown in Figures 4 and 5 of the corner opening 24, which for the rest is formed by square faces, causes that portion of the crane hook which is adjacent the point of contact of the cable to press close into the rounded portion, whereby it is centred in a position in which it is secured against dropping when the cable is slack.

Upon coupling of containers which are either in side-by-side relationship or stacked upon each other it is possible to insert coupling elements through the corner openings 24 or through the edge holes 25, 26 of the respective directly adjacent corner fittings 30 of the two containers, wherein these coupling elements may be additionally secured through the respective other holes or openings.

The embodiment according to Figure 6 differs from that according to Figures 4 and 5 in that the corner opening 24' is defined by three quarter circles whose radius is substantially equal to the diagonal of the interior cross-section of the section elements 31, 32, 33. The wall members, of which Figure 6 shows particularly the wall member 23, are reduced to a relatively narrow ring which extends only to a portion of the edge holes 26 formed in the section elements 31, 32. In these edge regions the corner fitting according to Figure 6 is provided with edge cutouts 25'.

Whereas in the corner fitting 30 according to Figures 4 and 5 the edge holes 25, 26 are each defined as a semi-circle in the two contiguous wall members (wherein the edge hole 25 formed in the corner fitting is somewhat larger than the edge hole 26 in the section elements in order to accommodate tolerances in the mutual alignment), it is also possible to define the edge hole 26' in the section elements by a right-angled or inclined cutout as indicated in dashed lines in Figure 6. With a view to modes of fabrication, a straight cutout extending across the edge of the section element is particularly advantageous.

Figure 6 does not show an attachment fitting. Furthermore, the section elements are inserted into the corner fitting 30' only to a short distance. This configuration of the container corner therefore requires little material and is of lightweight construction, which may be useful and beneficial in the case of small containers.

In the further modification shown in Figure 7, the wall members of the corner fitting 30" have an even more reduced width of material. In this case the corner fitting terminates outside of the edge holes 26" provided in the section elements 31, 32, 33. To increase the rigidity or strength, an attachment fitting 34 is again provided, which in this case is inserted in such a way that its vertical surface, which faces the viewer, engages the wall member 23" and is welded thereto, whereas the other two surfaces of the attachment fitting 34 are welded to the top surface of the section element 31 and the inner right-hand surface of the section element 32, respectively. In that case a joint between attachment fitting 34 and the third section element 33 may again be provided by means of an additional structural member (not shown).

The design characteristics described above for the three embodiments shown in the drawing may be varied in accordance with requirements. Thus, an attachment fitting may also be used in the embodiment shown in Figure 6. In each case the attachment fitting may be designed in accordance with Figures 5 and 7. Furthermore, in all cases the corner fitting may be formed of triangular or even square wall elements instead of the quadrants of a circle as shown. Similarly, the corner opening 24 of the corner fitting may in each case be formed of square cutouts with a radiused corner according to Figures 4 or 5, or of quarter-circle shaped cutouts according to Figures 6 and 7, or even of triangular cutouts.

Claims

1. Corner fitting for freight containers comprising three walls (11, 12, 13; 21, 22, 23) defining the corner of a cube, a corner opening (14; 24) common to all three walls (11, 12, 13; 21, 22, 23) being provided in the corner region of the cube corner remote from the freight container, an edge hole (15; 25) common to the respective two adjoining walls being provided at each of the three edges, the corner opening (14; 24) and the three edge holes (15; 25) being disposed substantially symmetrically with respect to the space diagonal of the cube corner extending through the corner opening (14; 24).
2. The corner fitting of claim 1, wherein the corner opening (14; 24) is formed and dimensioned such that it leaves free the clear aperture of profile elements, which form a container frame and are inserted into the edges of the corner fitting, in the projections of these elements.
3. The corner fitting of claim 1 or 2, wherein the three edges of the cube corner are slotted (19) from the corners remote from the corner opening (14).
4. The corner fitting of claim 3, wherein the slots (19) extend to the edge holes (15).

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5. The corner fitting of claim 3, wherein each slot (19') is confined by tangent lines of the associated edge hole (15) extending parallel to the respective edge of the corner fitting.
6. The corner fitting of any of claims 1 to 5, wherein the edge regions existing between the corner opening (14) and the edge holes (15) are reinforced.
7. The corner fitting of claim 6, wherein the reinforcements are formed by roundels (20) cut at least partly from the edge holes (15) and eventually folded inwardly.