

Description

The invention relates to a corner fitting for freight containers of the kind set forth in the classifying portion of claim 1.

The corner fitting of the above-indicated kind, as set down in international standard ISO 1161 is intended for large containers in which the outside dimensions are between 10 and 40 feet (around 3 to 12 metres) in length, 8 feet (around 2.40 metres) in width and up to 8½ feet (around 2.60 meters) in height. In accordance with those container dimensions and the loads occurring in regard to such containers, the known standardised corner fittings are in the form of square box-like components measuring about 170 x 160 x 120 mm and are correspondingly heavy.

German laid-open application (DE-OS) No 19 52 581 discloses a corner fitting wherein one of the outside surfaces is set back with respect to the container profile. That set-back configuration is provided for dimensional adaptation so that wider containers which extend in regard to their dimensions beyond the ISO recommendations can be fixed in position, stacked and transloaded even with such apparatuses as comply with those recommendations. The known corner fitting is also provided at its outward tip with a small inclined triangular surface which is formed from a rounded-off portion which is provided to reduce the risk of accident.

The known standardised corner fittings are excessively large and excessively heavy for small or medium containers which are also of a lighter construction because of the smaller loads to be transported. It is not possible to scale down the corner fittings because in that case the openings arranged in the upper and lower walls and in the side walls thereof, for accommodating the usual carrying elements such as for example crane hooks as well as conventional coupling elements then become too small.

A disadvantage of the known corner fittings is also that, by virtue of the arrangement of the above-mentioned openings and because of the difference in configuration of the upper and lower corner

fittings for the total of eight corners of a container, four different corner fittings are required.

The invention is based on the problem of providing a corner fitting for small and medium containers, which is of such a configuration that it can be used in the respective same form at least for the four upper corners of a container and in the respective same form for the four lower corners of a container, which has a high degree of stiffness while being low in weight and of small dimensions, and which additionally permits simple and direct lateral coupling between the mutually facing corners of adjacent containers so that a group of smaller containers can be joined together to form a unit which can be handled as one item.

The solution to that problem according to the invention is set forth in the characterising portion of claim 1. The corner fitting which is provided in accordance therewith is bevelled or chamfered at its outer edge (with respect to the container) in such a way that the resulting face extends perpendicularly to the three-dimensional diagonal of the corner fitting, thereby providing that the same corner fitting can in principle be used for all eight corners of a container. The triangular face which joins the three outer walls of the corner fitting contributes in that arrangement to easier handling and to strength and stability in respect of shape. The opening provided therein means that the opening in at least one of the three outer walls is accessible from the inside of the corner fitting, thus permitting lateral coupling of adjacent containers without intermediate elements, for example by simple screw means.

The dimensioning rules set forth in claim 2 are of advantage insofar as on the one hand the cut walls are still sufficiently large to accommodate the openings which may be required, while at the same time the triangular face is of adequate size to permit easy access into the interior of the corner fitting. The last-mentioned fact is a matter of particular importance when four containers which are brought together with their corners are to be connected together in

both directions, which is possible in accordance with the further development set forth in claim 7.

The opening provided in the triangular face may be of the shape which is characterised in one of claims 3 and 4. In both cases the corner regions of the triangular face are left, thereby guaranteeing the stiffening action of that inclined face. That also applies in regard to the development of the invention as set forth in claim 5 wherein, instead of a single opening, there are three openings associated with the respective cut walls of the corner fitting.

The further development of the invention as set forth in claim 6 provides that the comparatively large opening which is required for the introduction of a conventional coupling or carrying element, for example a crane hook, in spite of the smaller overall dimensions of the corner fitting, can be disposed in the cut upper and lower wall face, wherein a hook can be introduced either through the slot in the upper wall face or through the opening in the inclined face, and can emerge with its tip through the respective other opening. In such a situation of use, the reinforcement provided in accordance with claim 8, in respect of the edge between the two openings, is particularly advantageous.

If the reinforcement in accordance with claim 9 is in an inclinedly upwardly extending fin, that fin at the same time performs the function of a guide means when a plurality of containers are stacked one upon the other.

On the other hand, in accordance with claim 10, it is also possible to provide a bracket into which a hook can engage, at the said edge. In that arrangement, in a corner fitting intended for an upper container corner, as set forth in claim 11, it is advantageous for the bracket to be disposed perpendicularly while in accordance with claim 12 it preferably extends horizontally on a corner fitting which is intended for a lower container corner. In that way the stackability

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of the containers is not adversely affected.

Claim 13 provides a further universal suspension means which at the same time provides for good reinforcement of the corner fitting in the region of the inclined face.

5 The corner fitting may be in the form of a cast member in conventional manner and it may also be formed from a sheet metal blank in accordance with claim 14. In the latter case, the three triangular portions of the blank which correspond to the cut-off apex, in accordance with claim 15, can be used to reinforce the inclined face or, in accordance with
10 claim 16, they can be used to reinforce the three cut outer wall faces. In the latter case, in accordance with claim 17, it is particularly advantageous if the lateral bores are formed in the reinforced part of the respective wall. On the other hand, with such a method of
15 which serves for reinforcement and guiding purposes, in accordance with claim 18, to be formed from one of the three triangular portions of the blank.

According to claim 19, the corner fitting may be formed from a blank of simple closed form substantially by a cut and bending operations
20 in order to form substantially two straight lines. The two quarter faces of the blank which in that case come to bear one against the other and which are connected to each other advantageously provide the upper face of a corner fitting which is to be disposed at an upper corner of a container or the lower face of the lower corner fitting.
25 In the first case, the fact that the upper wall of the corner fitting is of double thickness is a fact of significance for the reason that that face serves to accommodate any containers to be stacked thereon, as well as serving as an engagement face for crane hooks, and coupling or lashing elements. In the second case the double thickness of the
30 lower wall is important in regard to the strength thereof as a support face of the container. If an adequate thickness of material is used, the other three faces of the corner fitting, which are towards the

container, as are to be found for example in the corner fittings for large containers as set down in international standard ISO 1161, may be omitted.

In the development as set forth in claims 20 and 21, there is the additional advantage that, with unreduced strength in the stressed regions, in particular at the edge regions of the corner fitting, it is possible to save in regard to material and weight, while in addition in mass production from large pieces of sheet metal, the individual blanks can be arranged in displaced relationship relative to each other in such a way as to give rise to less waste.

The development of the invention as set forth in claim 22 gives the advantage that the opening which is to be provided in the corner region of the corner fitting can be produced by a simple stamping or other perforating operation and in the finished condition gives a triangular-like shape with rounded edges, which reduces the notch effect and which is advantageous in regard to the distribution of forces in centering, lifting and lashing operations. For a similar reason, in regard to the triangular opening with straight edges as set forth in claim 24, the rounded configuration which is used in accordance with claim 25 in the corner regions of the blank is advantageous.

It is particularly advantageous that that region which can be used for the engagement of crane hooks is particularly strong and stable due to the double wall thickness.

Other advantageous strengthening and reinforcing measures are recited in claims 26 to 31.

In the advantageous development as set forth in claim 32, the three walls which extend perpendicularly to each other and which form the outer faces of the corner fitting are connected by way of a substantially triangular junction piece which extends in the three-dimensional diagonal face which is substantially parallel to the outer

truncated pyramid face, wherein the three corners of the junction piece respectively fit to the corners of the walls, which are in diagonally opposite relationship to the outer corner of the corner fitting. The junction piece thus forms the sole rear wall of the corner fitting, 5 which faces towards the container but which leaves free the regions of the three outer edges of the corner fitting. That design configuration gives the following substantial advantages:

10 a) The junction piece which extends in the three-dimensional diagonal plane of the corner fitting provides, in all three co-ordinate directions, a higher degree of stability in respect of shape than the three inner wall faces which are to be found in the ISO corner fittings, which extend perpendicularly relative to each other and which make up the square configuration.

15 b) At the same time less material is required for the sole rear wall formed by the junction piece so that, in spite of having a higher degree of stiffness, the corner fitting is made lighter.

20 c) The frame members of the container may be introduced into the corner fitting over a greater or smaller distance, into the edge regions of the corner fitting which are left free by the triangular junction piece, and can be welded in overlapping relationship to the corner fitting. That means that the precise length of the frame members of the container is not critical and the desired outside dimensions of the container may be maintained with a high degree of accuracy when the corner fittings are welded up in overlapping relationship.

25 d) The inside face of the junction piece is available for mounting fixing or engagement elements which are accessible through the opening provided at the outer cut-off apex of the fitting.

e) A smaller support spacing is provided for those elements which are fixed to the junction piece, for craning and lashing purposes.

30 In accordance with the development of the invention as set forth in claim 33, the connection between the junction piece and the outer

walls of the corner fitting may be made by the apices of the junction piece being bent in the direction of the outer corner of the container or in the opposite direction and welded in overlapping relationship to the walls. Alternatively the corners of the three walls of the corner fitting, which are in diagonally opposite relationship to the outer corner of the fitting, may be bent inwardly and welded in overlapping relationship to the junction piece which is cut off at its apices.

In accordance with claims 41 and 42, the entire corner fitting may be produced from a blank wherein either the three walls of the corner fitting are individually formed on the junction piece in the region of the apices thereof or the three walls are connected together by way of two of the outer edges of the corner fitting and the junction piece is formed on one of the walls, with an apex thereof. In the first case, for the purposes of manufacturing the finished corner fitting, welded seams are required in all three outer edges, which can possibly be produced together with the overlapping welding of the inserted container frame members. In the second case, only one welded seam is required at an outer edge of the corner fitting, while two further connections may occur in overlapping welds between the two free apices of the junction piece and the associated corners of the walls of the corner fitting.

In the embodiment of the invention as set forth in claims 35 and 36, an engagement element is provided for the engagement of hoisting, lashing and/or coupling elements, on the inner face of the junction piece, which comprises a shackle which is welded with its one end to said face and which is formed with its other end on an apex of the junction piece. In that construction the junction piece and the shackle may be produced from a one-piece blank by suitable bending and turning operations. The arm of the shackle which is formed on the one apex of the junction piece may be welded over a part of its length to the inside of the corresponding wall of the corner fitting and may thus contribute to further stiffening same. In the embodiment set forth in

claim 37 the same shackle may also serve as a centering element when a plurality of containers are stacked one above the other if the configuration provided in that respect is used at the four upper corner fittings of a container. In accordance with claim 38, it is additionally
5 provided that a ring which serves for example for the engagement of a crane hook therein can be drawn out of the corner fitting and permits the crane hook to be easily engaged therein, while on the other hand in the condition in which it is not used, it is accommodated in the interior of the corner fitting where it causes no problems. The
10 development of the invention as set forth in claim 39 results in an additional increase in stiffness both of the shackle and also of the entire corner fitting.

In the alternative embodiment as set forth in claim 40, the engagement element which is fixed to the junction piece may comprise
15 a hook with an open helical eye into which a cable sling or a ring may be engaged, in which case the hook with the eye does not project out of the corner fitting.

When the corner fitting is used in a freight container as set forth in claims 44 and 45 the junction piece may be of such dimensions
20 relative to the edge elements of the container frame that said elements can be welded not only in the corner regions of the fitting but additionally at the edge of the junction piece. In that arrangement, the container edge elements may possibly also be suitably cut off at their inner edges. An additional welding configuration of that nature
25 results in the corner fitting being further stiffened.

Preferred embodiments of the invention are described in greater detail hereinafter with reference to the drawings in which:

Figure 1 is a perspective view of a corner fitting for small containers in a first embodiment,

30 Figures 2 and 3 are side views of further alternative forms of corner fittings,

Figure 4 shows a blank for a corner fitting for freight containers,

Figure 5 shows the corner fitting produced from the blank shown in Figure 4,

5 Figure 6 shows an alternative embodiment of the corner fitting of Figure 5 which has been produced from a blank modified somewhat in comparison with that shown in Figure 4,

Figure 7 shows a further blank for a corner fitting,

Figure 8 shows the corner fitting produced from the blank shown in
10 Figure 7,

Figure 9 shows a further corner fitting with an inner reinforcing wall,

Figure 10 is a perspective diagrammatic view for illustrating the geometry of a further corner fitting,

15 Figures 11 and 12 are views of blanks from which such a corner fitting may be produced,

Figure 13 is a perspective view of the corner fitting in conjunction with container edge elements, and

Figures 14 and 15 are a perspective view and a side view
20 respectively of a preferred embodiment of the corner fitting.

In the view shown in Figure 1, the broken lines 10 denote an upper edge region of a container which is not illustrated in further detail and into which a corner fitting is inserted. Of the corner fitting, Figure 1 shows an inner face 11 which is
25 towards the container, the upper wall 12, a side wall 13 and an inclined face 14. A part of the second side wall 16 is also visible through the opening 15 provided in the inclined face 14.

The inclined face 14 is in the form of an equilateral triangle, which means that it is perpendicular to that three-dimensional diagonal
30 which joins the corner 17, which is towards the interior of the container, of the cubic corner fitting, to the oppositely disposed

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corner 18 which forms the apex of the cut-off prism. The cut edges of the inclined face 14 with the side walls 13 and 16 and the upper wall 12 therefore extend at an angle of 45° with respect to the edges of the cube. As shown in Figure 1, those cut edges are so disposed
5 that approximately one third of the overall length remains of the cut edges of the cube.

The opening 15 provided in the inclined face 14 is in the configuration of a circle inscribed in the triangle of the inclined face, in Figure 1. In Figures 2 and 3, the opening 15' and 15" respectively
10 is in the form of a hexagon, that shown in Figure 2 being a regular hexagon in which each second side coincides with the triangle of the inclined face 14 so that only the corner regions of the triangular face remain. In Figure 3 the hexagonal opening 15" occupies almost the entire triangular face.

15 The bores 19 in the side walls 13 serve for coupling adjacent containers together in side-by-side relationship. As the bores 19 are accessible through the opening 15 in the inclined face 14 from the inside, direct coupling is possible, for example by nuts and bolts. The inclined faces further make it possible to couple together four
20 containers which meet in a plane in order in that way to produce larger units which can be handled jointly, which is particularly important in regard to small containers. For static reasons, the bores 19 in the side walls 13 are arranged adjacent the inner face 11 of the container fitting, which faces towards the container. They are therefore
25 in the position shown in solid lines in Figure 1 or the position shown in broken lines. A bore 19, 19' may also be provided at each of the two positions.

The upper wall 12 of the container fitting has a slot 20 whose longest axis extends diagonally and perpendicularly to the inclined
30 edge of the upper wall 12, which is delimited by the inclined face 14. The slot 20 is of such a size that conventional coupling or hoisting elements such as crane hooks can be inserted thereinto. In

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that situation, such a hook is introduced for example through the slot 20 in such a way that the tip thereof emerges through the opening 15 in the inclined face 14. Such a manner of fixing the hook is advantageous when the pull comes from a point above the middle of the container. When the pulling force is relieved, the hook then cannot come out of the fixing position thereof, on its own. If on the other hand the direction of pull is perpendicular, inclinedly upwardly and outwardly or in a horizontal direction, it is advantageous for the hook to be inserted through the opening 15 and for the tip thereof to issue through the slot 20 thereby also ensuring in that case that, when the pulling force is relieved, the hook turns further into its anchorage position, due to its own weight. That turning movement is promoted by the inclined face 14. The slot 20 may also serve for coupling containers which are stacked one upon the other, by way of locking elements.

In Figure 1, the inclined edge formed by the inclined face 14 and the upper wall 12 of the container fitting is reinforced by an inclinedly upwardly and outwardly extending fin 21 which is approximately in the form of a segment of a circle. At the same time the fin 21 performs the function of an aligning and abutment element when containers are stacked one upon the other, wherein the corresponding inclined edge at the lower corner fitting of the container which is to be positioned thereon is guided by the fin 21 into the correct position. The inclinedly upwardly extending fin 21 is only provided in fittings which are intended for upper corners of containers while it is omitted from lower corner fittings. In that configuration therefore upper corner fittings differ from lower corner fittings; however, by virtue of the cube shape, any corner fitting may be used for all four upper corners of a container or all four lower container corners respectively.

Instead of projecting outwardly as shown in Figure 1 a reinforcing fin may also be disposed at the edge in such a way as to project into the interior of the fitting. In that case the fitting may be used for all eight corners of a container.

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In the embodiment shown in Figure 2 an arcuate bracket 22 is provided in place of the fin 21 in the Figure 1 embodiment. The bracket 22 is welded to the triangular portions of the inclined face 14, which are left by the opening 15'. The bracket 22 can be used for
5 engaging hooks or other pulling elements so that in this case the slot 20 shown in Figure 1 in the upper wall is not required. For locking in a vertical direction between containers which are stacked one upon the other, unless operating with special clamping locks, a circular bore would then be sufficient, as is also provided in the
10 side walls. The bracket 22 may extend inclinedly upwardly and outwardly, similarly to the fin 21 in Figure 1, while once again it has the function of centering containers which are stacked one upon the other while at the same time providing for a certain stiffening of the inclined edge.

15 However, as shown in Figure 2, it may also project perpendicularly upwardly, in which case, when two containers are stacked one upon the other, it then projects into the opening 15' in the corner fitting of the upper container. If on the other hand the bracket 22 is provided on a lower corner fitting, it then extends horizontally
20 and can thus serve for arresting and lashing down the container to a support. When stacking containers, the upright bracket on the upper corner fitting of the lower container then engages through the lying bracket on the upper container.

In the embodiment shown in Figure 3, there is a three-armed
25 bracket 23 whose three ends are welded to the corner regions of the inclined face, which are left by the opening 15'. Once again the bracket 23 serves both for stiffening of the inclined edges and also for the engagement of pulling elements. As it does not project out of the configuration of the cube in any direction, the
30 corner fitting shown in Figure 3 is suitable for all eight corners of a container.

The corner fitting may be formed in conventional manner as a cast member, in which respect the fin 21 shown in Figure 1 may be formed or welded thereon. In that case the edges of the openings 15, 19 and 20 are simultaneously strengthened in regard to their cross-section. It is also possible however for the corner fitting to be bent from a sheet metal blank and for the mutually abutting edges to be welded together. In that case the fin 21 in Figure 1 may be formed from that triangular region of the upper wall 12 which remains as a result of the cut-off pyramid. The other two triangular pieces can be welded one upon the other in order to form reinforcement of the opening 15 in the inclined face 14, or they may be folded back inwardly and then reinforce the other two inclined edges in the side walls 13. The latter situation is shown in broken lines in Figure 2. In such a case it is advantageous for the bore 19 to be provided in the region of the side wall 13, which is reinforced by the folded-back sheet metal portion.

As can be seen from Figure 1, the inner faces of the container fitting 11, which face towards the container, are in the form of closed walls. They may be joined to the container in any fashion, in particular by welding. It is also possible however for the walls 11 to be more or less completely omitted and for the fitting to be joined to the shaped angular members forming the edges of the container, in such a way that the fitting is pushed into the angular members or is pushed on to the edges of the container. In the first case the outer walls of the container fitting are set back with respect to the walls of the container whereby space for intermediate members of clamping locks is provided between the container fittings of containers which are disposed in juxtaposed or superposed relationship. The above-mentioned space may also be used for wedging fast containers which are loaded flush relative to each other.

For the purposes of coupling between adjacent containers, instead of the above-mentioned screw bolts and clamping locks, it is also possible to use wire cables, packing straps, chains or similar connecting



elements which are pulled through the holes in the respective corner fittings and tensioned.

The blank 30 shown in Figure 4 is made up of four quarter faces 31, 32, 33 and 34 of which the faces 31 and 32 are in the form of
5 quarters of a circle and the faces 33 and 34 are in the form of squares with edge lengths which are equal to the radius of the circle. The four quarter faces 31 to 34 meet at substantially straight lines 35 and 36 which intersect each other in perpendicular relationship.

An opening 37 in the form of a quadrilateral kite-like
10 configuration is stamped out in the middle of the blank 30. The axes of the opening 37 coincide with the lines 35 and 36 and the opening is arranged symmetrically with respect to the line 36. The boundary edges of the opening 37 which lie in the faces 33 and 34 extend at 45° to the lines 35 and 36. Likewise the other two edges of the opening
15 37 may extend at 45° relative to the lines 35 and 36, in which case the opening is square. The corners of the opening 37, as shown at 38, are rounded out in order to eliminate stress peaks. Instead the corners may also be rounded off inwardly. A respective bore
19 is provided in each of the faces 31 and 32 while a respective
20 slot 20 is provided in each of the faces 33 and 34, the longitudinal axis of the slots 20 extending at 45° through the point of intersection of the two lines 35 and 36.

To manufacture the corner fitting shown in Figure 5, the blank in Figure 4 is cut through in the part of the line 36 which is at
25 the top in Figure 4, as shown by the solid line, whereas in the lower part of the line 36 and along the line 35 the blank is bent in the same direction through 90° . When that is done, the two faces 33 and 34 come to lie one upon the other and are adequately welded to each other. As indicated in Figure 4, the bend line 35 is displaced
30 in the region of its point of intersection with the line 36 by the thickness of the material of the blank 30 in order to ensure a clean

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and tidy cube shape in the finished corner fitting.

In the corner fitting shown in Figure 5, the double wall 33 and 34 forms the upper face of a corner fitting on an upper container corner or the lower wall at a lower container corner. The slot 20 serves for the introduction of a crane hook, the tip of which can emerge through the opening 37, or vice-versa. The double wall thickness ensures an adequate level of strength when hoisting by means of a crane hook which is inserted in that way. Having regard to the square initial configuration of the wall 33 and 34 the slot 20 may be readily disposed therein. The bores 19 provided in the side walls 31 and 32 of the corner fitting are provided for laterally coupling containers which are disposed in side-by-side relationship, and the bores 19 may also be disposed in the initial face of the blank, which is in the form of a quarter of a circle, and that is also advantageous in regard to the saving of material and weight, especially as the corner region of the wall which lies outside the circular arc (in the case of a notional square initial shape) is of minor importance in regard to the strength of the corner.

The corner fitting shown in Figure 5 is mounted to the respective container by the edge members thereof being introduced into the edge regions of the corner fitting or also by being fitted thereonto and welded thereto.

The corner fitting shown in Figure 6 is produced from a blank which differs from the blank 30 shown in Figure 4 only in that, instead of the diamond-shaped opening 37, it has a circular opening which is concentric with respect to the point of intersection of the two lines 35 and 36. That results in a substantially triangular opening 37' with curved sides, on the finished corner fitting as shown in Figure 6.

As also illustrated in Figure 6, the edge region of the opening 37' is reinforced by ring elements 41 which are welded into position therein. Similar (straight) reinforcing elements with or without

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engagement points for high-speed lashing may be provided if required in relation to the triangular opening 37 of the corner fitting shown in Figure 5.

The corner fitting shown in Figure 8 is produced from a round blank as shown in Figure 7, wherein the projection 43' and the opening 45' are formed by a semicircular cut 46 which is disposed in the blank as shown in Figure 7. In addition, the web portion 51 between the cut 46 and the hole 42 is cut through by a cut 47 which extends along the line 36', and the two parts which are formed in that way are welded together in partly overlapping relationship, as shown in Figure 8. That provides a somewhat inwardly inclined projection which is of double wall thickness in that part in which it is most severely exposed to loading and wear due to the crane hook. In that arrangement the round edge 44' of the projection 43' serves for guiding, centering and arresting purposes when containers are stacked one upon the other.

Figure 9 shows a corner fitting which is produced from a blank which differs from that shown in Figure 4 in that the two lower quarter faces 31 and 32 are also square. Fitted into the corner fitting of Figure 9 is a triangular reinforcing wall 48 whose lower edge forms the surface diagonal of the lower wall (not present) of the corner fitting, and which sticks out with its upper corner region 49 through the opening 37. The reinforcing wall 48 is welded with its edges extending within the corner fitting to the side walls 31 and 32 of the corner fitting and with its face which is at the rear in Figure 9, to the upper edge of the opening 37, as shown in broken lines. The upper tongue portion 49 may also be bent over with respect to the major part of the reinforcing wall 48, which lies within the corner fitting, in such a way that the tongue portion extends outwardly inclinedly to a somewhat greater degree. The tongue portion 49 serves for guiding and centering purposes when stacking containers one upon the other.

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Provided in the reinforcing wall 48 is an opening 50 which in conjunction with the slot 20 provided in the upper face of the corner fitting, serves for engaging a crane hook into the corner fitting.

5 Instead of the reinforcing wall 48 shown in Figure 9, the corner fitting may also be reinforced by an inner lattice-like rod or ring system which, in relation to the reinforcing wall 48, while giving the same or even an enhanced degree of stiffness, can provide for a saving in weight.

10 The features described by reference to the foregoing embodiments may also be combined in other ways. For example, instead of a circular blank, the corner fitting shown in Figure 8 may also be produced from a square blank or a blank of the general shape shown in Figure 9. The reinforcing wall 48 may also be provided in a corner
15 fitting which is made from a blank as shown in Figure 4, wherein the limbs of the reinforcing wall are suitably shortened in the lower part thereof, corresponding to the rounded-off side walls of the corner fitting. Instead of the illustrated circular or elongate holes, it is also possible to use other hole shapes which are adapted to the
20 crane, lashing, coupling and centering forces which occur.

As shown in Figure 10, the corner fitting comprises two side walls 13 and 16, an upper wall 12 and a junction piece 53 forming a rear wall. The walls 12, 13 and 16 together define a cube and form the three outer walls of the corner fitting. As above, the outer corner
25 of the cube is cut off thus producing the triangular opening 37 which is inclined with respect to all three walls. The three apices of the junction piece 53 are joined to those corners of the three walls 12, 13 and 16 which are each disposed in diagonally opposite relationship to the cut-off corner of the cube. As the corner fitting
30 is of an overall cube configuration and the opening 37 in the illustrated embodiment forms an equilateral triangle, the junction

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piece 53 lies in a three-dimensional diagonal of the cube, which extends parallel to the plane of the opening 37.

The walls 12 and 13 and the junction piece 53 leave free a triangular opening which is directed rearwardly in Figure 10 and which is towards the container. Corresponding triangular openings are formed by the junction piece 53 with the two walls 13 and 16 and the two walls 12 and 16. As shown in Figure 13, the frame elements of the container may be inserted through those openings, the frame elements being represented in Figure 13 by angular bars 55. The overlap of the ends of the angular bars 55 with the edge regions of the corner fitting make it possible to compensate for inaccuracies in the lengths of the angular bars, without adversely affecting the overall outside dimensions of the container. The angular bars may also be welded in overlapping relationship with the corner fitting.

As shown in Figure 11, the corner fitting may be produced from a continuous blank, wherein the three walls 12, 13 and 16 are connected together at two of the edges of the cube which are left by the triangular opening 37. In addition, the triangular junction piece 53 is formed in the region of its one apex on the outer corner of the part of the blank forming the upper wall 12.

To produce the corner fitting, the blank shown in Figure 11 is bent at the broken lines, the two free short edges 62 and 62' of the walls 13 and 16 being welded together and forming the front perpendicular edge shown in Figure 10. The two free apices of the junction piece 53 are also bent and welded in the region of the corners of the walls 12 and 13 to the inside thereof. The bending of the apices of the junction piece 53 may be inwardly or outwardly in relation to the corner fitting. At any event the junction piece 53 no longer extends precisely in the three-dimensional diagonal plane of the cube as shown in Figure 10, but is displaced towards the corner of the container

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relative to that plane in the direction of the cut-off corner of the cube. In addition, in contrast to the diagrammatic view shown in Figure 10, the rearward edge of the upper wall 12 is bevelled or chamfered off by virtue of the junction piece 53 being formed at that location
5 and bent over.

In the case of the blank shown in Figure 12, the three walls are each individually formed by means of the corners thereof at the apices of the junction piece 53. The blank is bent along the broken lines and the walls 12, 13 and 16 are welded together at their short
10 free edges 63, 63', 64, 64', 65, 65' so that the edges 63 and 63' of the walls 13 and 16 form the perpendicular edge of the corner fitting which is at the front in Figure 10, the edges 64 and 64' of the walls 12 and 13 form the upper edge of the cube which extends inclinedly rearwardly in Figure 10 and the edges 65 and 65'
15 of the walls 12 and 16 form the upper edge which extends towards the left in Figure 10. In that case, in contrast to the diagrammatic view shown in Figure 10, the three corners of the walls 12, 13 and 16 which are in opposite relationship to the cut-off outer corners of the cube are bevelled off or chamfered, corresponding to the bending
20 lines.

In a further alternative form, the corner fitting may also be produced from a blank which is similar to that shown in Figure 11 but which does not have the junction piece 53 formed thereon. In that case the junction piece may be provided without the apices shown in
25 broken lines in Figures 11 and 12, that is to say it may be substantially hexagonal, in which case the corners of the walls 12, 13 and 16 are bent over about the short edges of the hexagon of the junction piece 53 and welded to the junction piece. A corner fitting produced in that way is shown for example in Figure 13.

30 In the embodiment shown in Figures 14 and 15, the corner fitting again comprises the three walls 12, 13 and 16 and a separately formed junction piece 53, with a strip-like shackle 56 formed at one apex thereof. In that region in which the shackle is

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formed on the junction piece 53, it extends parallel to the upper wall 12 of the corner fitting and is welded thereto. The shackle extends out of the corner fitting at the inclined edge of the upper wall 12, which forms the triangular opening 37, and is bent over inclinedly
5 upwardly at that point. The inclinedly upwardly and outwardly extending face 57 of the shackle forms a contact and centering face for the corresponding inclined edge of the lower corner fitting of a further container to be stacked thereon. If the shackles shown in Figures 14 and 15 with the inclined faces 57 are provided at all four
10 corner fittings of the lower container, that necessarily produces centering of the upper container relative to the lower container.

The inclined face 57 of the shackle 56 terminates outwardly in a rounded configuration with which the shackle 56 leads back into the interior of the corner fitting through the triangular opening 37
15 thereof. As can be seen in particular from Figure 15, the free end 58 of the shackle 56 is welded to the junction piece 53. To reinforce the junction piece 53 and the shackle 56, the stiffening portion 59 shown in Figure 15 may also be inserted, extending in a perpendicular plane and being welded to the junction piece 53 and
20 to the two limbs of the shackle 56.

As shown in Figures 14 and 15, a ring 60 is engaged into the shackle 56, which ring may be of a circular, semicircular or, as shown in Figure 14, triangular configuration, corresponding to the opening 37. The ring 60 is provided for engaging for example a
25 crane hook or some other hoisting or pulling element. In the condition of use the ring 60 is disposed in the curved portion of the shackle 56, which extends out of the corner fitting, the curvature being so selected that the ring is freely rotatable. In the condition in which the corner fitting is not in use, on the other hand, the
30 ring 60 can slide through the triangular opening 37 into the interior of the corner fitting, if the arrangement is such that it is smaller in regard to its outside dimensions than the opening 37.

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Instead of the shackle 56 shown in Figures 14 and 15, it is also possible, as shown in Figure 13, for a rigid hook 61 to be fixed to the junction piece 53, with an open helical eye. The hook 61 does not project beyond the outline of the cube of the corner fitting and is provided for engaging a ring, crane hook or wire or cable loop therein. The eye of the hook 61 may be open, as shown in Figure 13, or it may be welded with both ends to the junction piece 53.

In the drawings it has been assumed that the junction piece 53 comprises a flat sheet metal portion. However it may also be curved, in which case curvature towards the outer corner of the corner fitting is advantageous, having regard to the space available for the actual container, while a curved configuration in the other direction is advantageous for example, ^{when} the fitting has a hook 61 as shown in Figure 13, which is subjected to greater pulling forces.

Translation of the German claimsCLAIMS

1. Corner fitting for freight containers consisting of at least three walls (12, 13, 16) extending at right angles with respect to each other and forming three outer faces, at least one of those walls having an opening (19, 20) for introducing coupling or carrying elements, characterised in that the apex of the corner fitting is cut off to form an oblique triangular face (14) defining the three walls (12, 13, 16) and having a further opening (15).

2. The corner fitting of claim 1 characterised in that the remaining length of the cut edges of the corner fitting is one half to one quarter and preferably one third of the full edge length.

3. The corner fitting of claim 1 or claim 2 characterised in that the opening (15) in the triangular face (14) is in the shape of a circle inscribed in the triangle.

4. The corner fitting of claim 1 or claim 2 characterised in that the opening (15', 15'') in the triangular face (14) is of a hexagonal shape leaving only the three corner regions thereof.

5. The corner fitting of claim 1 or claim 2 characterised in that the triangular face (14) has three bores each adjacent to the centre of a respective side of the triangle.

6. The corner fitting of any one of claims 1 to 5 characterised in that the outer wall (12) forming the upper and the lower face respectively has a slot (20), the longitudinal axis of which extends perpendicularly to the cut edge of said wall (12).

7. The corner fitting of any one of claims 1 to 6 characterised in that each of the two side walls (13, 16) has a respective bore (19).



8. The corner fitting of any one of claims 1 to 7 characterised in that the edge formed by the upper or lower wall (12) respectively, with the triangular face (14), is reinforced.

9. The corner fitting of claim 8 characterised in that a fin (21) which is inclined with respect to the upper wall (12) is fitted to the edge formed by the upper wall (12) with the triangular face (14).

10. The corner fitting of any one of claims 1 to 9 characterised in that a bracket (22) is fitted to the edge formed by the upper or lower wall (12) respectively with the triangular face (14).

11. The corner fitting of claim 10 characterised in that the bracket (22) extends in a plane perpendicular to the upper wall (12).

12. The corner fitting of claim 10 characterised in that the bracket (22) extends in a plane parallel to the lower wall (12).

13. The corner fitting of any one of claims 1 to 9 characterised in that a three-armed bracket (23) is provided in the region of the cut-off apex of the corner fitting, the bracket having its three ends mounted to the corner points of the triangular face (14).

14. The corner fitting of any one of claims 1 to 13 characterised in that it is formed from a sheet metal blank welded at some edges.

15. The corner fitting of claim 14 characterised in that the triangular portions of the blank corresponding to the cut-off apex are welded on to each other in overlapping relationship to form a reinforced triangular face (14).

16. The corner fitting of claim 14 characterised in that the triangular parts of the blank corresponding to the cut-off apex are folded inwardly and welded ^{overlappingly} to the cut outer walls (12, 13, 16)



to reinforce said outer walls (12, 13, 16).

17. The corner fitting of claim 16 when dependent on claim 7 characterised in that the bore (19) is disposed in the reinforced part of the respective wall (13, 16).

18. The corner fitting of claim 15 when dependent on claim 9 characterised in that the fin (21) is formed by one of the three triangular parts of the blank corresponding to the cut-off apex.

19. The corner fitting of any one of claims 1 to 13 characterised in that it is formed from a flat blank (30) which is bent at a right angle along a first substantially straight line (35) and is bent at a right angle along a second straight line (36) which perpendicularly intersects the first line (35) on one half as far as the point of intersection with the first line (35) and is cut in the other half, and that the two quarter faces (33, 34) separated from each other by the cut are connected in superposed relationship.

20. The corner fitting of claim 19 characterised in that the blank (30') is in the shape of a circle centered at the point of intersection of the two lines (35', 36').

21. The corner fitting of claim 19 characterised in that the blank (30) comprises a semicircle (31, 32) of a radius (r) and a rectangle formed from two of the quarter faces (33, 34) with a ratio between the sides of $2r:r$, the rectangle joining the base of the semicircle along the first line (35) with its longer side.

22. The corner fitting of any one of claims 19 to 21 characterised in that the opening (37') is formed by a circular cut-out centered at the point of intersection of the two lines (35, 36).



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23. The corner fitting of any one of claims 19 to 21 characterised in that the opening (45') is formed by a cut (46) in the form of a semicircular arc which is centered with respect to the point of intersection of the two lines (35', 36'), which extends symmetrically with respect to the second line (36') and which intersects the cut half of the second line (36'), that a hole (42) is disposed symmetrically with respect to the second line (36') and in the bent part thereof, and that the web portion (51) provided between the semicircular arc (46) and the hole (42) is cut through along the second line (46') and the two web parts which are formed in that way are connected together in overlapping relationship (Figure 8).

24. The corner fitting of any one of claims 19 to 22 characterised in that the opening (37) in the blank is of a quadrilateral kite-like configuration, the diagonals of which coincide with the two lines (35, 36).

25. The corner fitting of claim 24 characterised in that the corners of the cut-out portion (37) are rounded (38).

26. The corner fitting of any one of claims 1 to 25 characterised in that the opening (37') is reinforced by a ring (41), which is welded therein or thereon or by a bead formed thereon.

27. The corner fitting of any one of claims 1 to 26 characterised by a reinforcing wall (48) in the form of an isosceles triangle, which is provided with an opening (50) and which is fitted into the corner fitting in such a manner that its apex (49) projects inclinedly outwardly through the opening (37) and which is welded with its edges corresponding to the legs of the triangle to the inner faces (31, 32) of the corner fitting.

28. The corner fitting of claim 27 characterised in that the opening (37) is triangular and is welded by one edge to the reinforcing wall (48).



29. The corner fitting of claim 27 or claim 28 characterised in that the outwardly projecting apex (49) of the reinforcing wall (48) is bent outwardly for stiffening and centering purposes.

30. The corner fitting of any one of claims 1 to 26 characterised by a lattice-like reinforcing rod system welded into the corner fitting.

31. The corner fitting of one of claims 27 to 30 characterised in that an engagement element which is accessible from the outside is attached to the reinforcing wall (48) or to the reinforcing rod system.

32. The corner fitting of any one of claims 1 to 9 characterised in that the three walls (12, 13, 16) are connected in the region of their wall corners disposed diagonally opposite to the cut-off apex of the corner fitting by a substantially triangular junction piece (53) which is substantially parallel to the triangular face.

33. The corner fitting of claim 32 characterised in that the apices of the junction piece (53) are bent and welded in overlapping relationship to the corner regions of the three walls (12, 13, 16).

34. The corner fitting of claim 32 characterised in that the apices of the junction piece (53) are cut off and the thus formed hexagonal junction piece is welded in overlapping relationship to the bent corner regions of the walls (12, 13, 16).

35. The corner fitting of any one of claims 32 to 34 characterised in that an engagement element (56, 61) for a hoisting or connecting device is fixed to the inner face of the junction piece (53) which faces the cut-off apex of the corner fitting.

36. The corner fitting of claim 35 characterised in that the engagement element comprises a shackle (56) having its one end formed



to an apex of the junction piece (53) and its other end (58) welded to the inner face of the junction piece (53).

37. The corner fitting of claim 36 characterised in that the shackle (56) projects through the opening (37) of the triangular face and forms an abutment surface (57) which is inclined upwardly and outwardly with respect to the upper wall (12) of the corner fitting.

38. The corner fitting of one of claims 36 or 37 characterised in that a ring (60) is engaged into the shackle (56), the ring fitting through the opening (37) of the triangular face.

39. The corner fitting of any one of claims 36 to 38 characterised in that a reinforcing web (19) is inserted between the junction piece (53) and the two arms of the shackle (56).

40. The corner fitting of claim 35 characterised in that the engagement element comprises a hook (61) having a helical eye.

41. The corner fitting of any one of claims 32 to 40 characterised in that it is formed from a blank in which the three walls (12, 13, 16) are each formed on the junction piece (53) in the region of the apices thereof and are welded together at their three edges (63, 64, 65) which form the outer edges of the corner fitting.

42. The corner fitting of any one of claims 32 to 40 characterised in that it is formed from a blank in which the three walls (12, 13, 16) are interconnected by two bends and a weld lying in the third outer edge of the corner fitting, and the junction piece (53) is formed to a wall (12) in the region of one of the apices of the junction piece and is welded to the other walls (13, 16) by its other two apices.



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43. The corner fitting of any one of claims 32 to 42 characterised in that the junction piece (53) is curved.

44. A freight container with container edge elements which are interconnected by way of corner fittings according to any one of claims 32 to 43 characterised in that the container edge elements (55) are inserted into the openings which are defined by the junction portion (53) and the walls (12, 13, 16) defining the cut-off apex of the respective corner fitting, and are welded to the edge regions of the corner fitting.

45. The freight container of claim 44 characterised in that the edge elements (55) are welded to the edges of the junction piece (53).