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(54) A housing for mounting in the ground

(57) A housing (1) for mounting in the ground to provide an access manhole or the like has a pair of spaced-apart sides (2) interconnected by ends (3) to define a rectangular open-topped chamber (4). Each of the sides (2) has a twin wall construction with an inner wall (6) and an outer wall (7) which are spaced-apart and intercon-

nected by ribs (9) arranged in a zig-zag formation between the inner wall (6) and the outer wall (7). The outer wall (7) is convex to resist bending of the sides (2) under side loading of the housing (1) when in use mounted in a carriageway or the like due to traffic passing overhead.

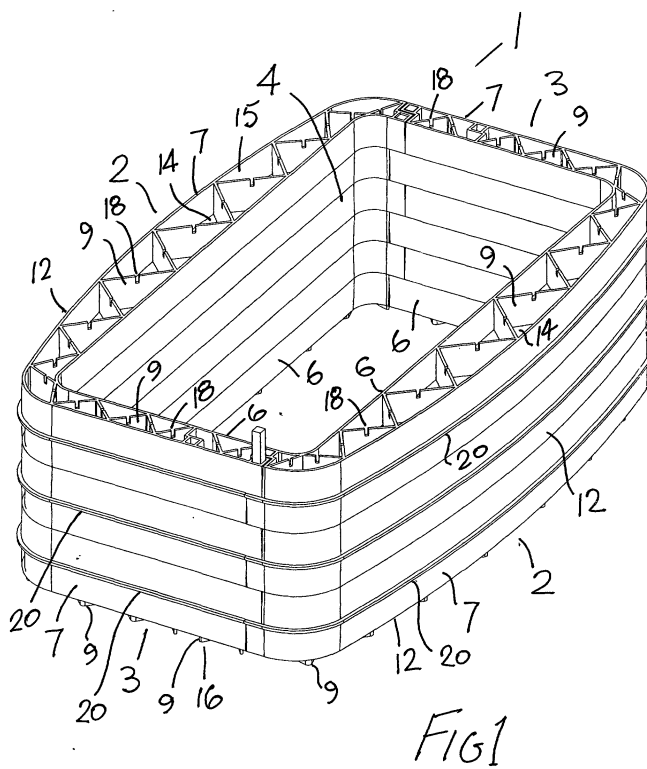


FIG 1

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Description

Introduction

[0001] This invention relates to a prefabricated housing for mounting in the ground, and particularly a housing of the type which provides an underground chamber, an access manhole, junction box or the like and is manufactured of plastics material.

[0002] The invention particularly relates to a housing of the type disclosed in Patent Specification No. US 5181793 which includes a pair of spaced-apart sides which are interconnected to define an open-topped chamber therebetween, each of said sides having a twin wall construction with an inner wall and an outer wall which are spaced-apart and interconnected by ribs which extend between the inner wall and the outer wall. Another housing of this type is described in Patent Specification No. EP-0641897.

[0003] The present invention is particularly concerned with the use of such housings in heavy duty applications such as in or adjacent carriageways where they are subjected to relatively high loadings due to traffic on the carriageway. Under such operating conditions, the sides of the housing have a tendency to move inwardly under side loading creating a cavity at a side of the housing which can lead to roadway subsidence.

[0004] The present invention is directed towards overcoming this problem.

Statements of Invention

[0005] According to the invention, there is provided a housing for mounting in the ground which includes a pair of spaced-apart sides which are interconnected to define an open-topped chamber therebetween, each of said sides having a twin wall construction with an inner wall and an outer wall which are spaced-apart and interconnected by ribs which extend between the inner wall and the outer wall, characterised in that the outer wall is convex. The provision of a curved outer wall in the sides provides sides which are better able to withstand side loading without deformation, than a comparable straight side wall.

[0006] In a particularly preferred embodiment, the ribs comprises a plurality of upright ribs angled between the inner wall and the outer wall, the ribs being connected end to end in a zig-zag configuration. This rib configuration reinforces the curved outer wall and also helps to resist deformation of the sides under loading. In some cases, secondary ribs may be provided which criss-cross with the ribs for added strength.

[0007] In a further embodiment, each side has a substantially horizontal intermediate web extending between the inner wall and the outer wall along the length of the side. Preferably, the intermediate web is located between a top and a bottom of the side. Ideally, the intermediate wall is located roughly midway between the

top and the bottom of the side.

[0008] In another embodiment, the housing has ends extending between the sides, said ends being of twin wall construction having an inner wall and an outer wall interconnected by ribs which extend therebetween.

[0009] In another embodiment, the housing is of composite construction formed by a number of stacked ring elements, the ring elements having complementary interengagable formations at a top and at a bottom of each ring element for interlocking engagement of stacked ring elements.

[0010] Conveniently, male and female formations are provided. Preferably, these are arranged so that different types of formations are provided at the top and the bottom so that only one ring element type may be provided. However, it will be appreciated that two different ring types could be provided, one with male formations at both top and bottom, and the other with female formations at both top and bottom.

[0011] Conveniently, the male formations may be provided by extending the ribs outwardly of the walls and the female formations may be provided by receiver slots in ribs for reception of the outwardly projecting ribs of an adjacent ring element with which it is engaged.

[0012] In a particularly preferred embodiment, two sets of ribs are provided between the inner wall and the outer wall of each side and end, namely, an upper rib set located above the intermediate web and a lower rib set located below the intermediate web, one of said rib sets projecting outwardly of the walls and the other rib set having receiver slots in the ribs for reception of the outwardly projecting ribs of an adjacent ring element with which it is engaged. Preferably, the lower rib set projects outwardly at a bottom of the walls and the upper rib set has receiver slots therein.

[0013] In another embodiment, each ring element comprises two or more interlocked parts. This conveniently facilitates adjustment of the size of the ring element.

[0014] In a preferred embodiment, a pair of J-shaped parts are provided, each part including a side and an end of the ring element. Optionally, an intermediate spacer element may be mounted between associated ends of the J-shaped parts to provide for length adjustment of the ends.

[0015] In a further embodiment, the parts are interlocked by means of mutually aligning slots in each part secured together by locking pins. Preferably, vertically and laterally offset pairs of slots are provided on each part for nesting engagement and vertical alignment with the complementary offset pair of slots of an associated part.

[0016] In a further embodiment, a bedding flange projects outwardly of the outer walls. This keys the housing into the ground within which it is received and prevents vertical movement of the housing in the ground. Ideally, a bedding flange is provided on an exterior of each ring element. The bedding flange is preferably lo-

cated midway between a top and a bottom of the outer walls of the ring element.

[0017] In another aspect, the invention provides a stacking ring element for a housing as previously described, the stacking ring element including a generally rectangular ring having a pair of spaced-apart side walls interconnected by end walls, the side and end walls each being of twin wall construction having an inner wall and an outer wall which are spaced-apart and interconnected by ribs which extend between the inner wall and the outer wall, the outer wall of each side being convex.

[0018] Preferably, the ribs comprise a plurality of upright ribs angled between the inner wall and the outer wall, the ribs being connected end to end in a zig-zag configuration.

[0019] Ideally, each side has a substantially horizontal intermediate web extending between the inner wall and the outer wall along the length of the side. Ideally, the intermediate web is located midway between the top and bottom of the side.

[0020] Each ring element may be of one piece construction or may be of composite construction formed by a number of interlocking parts.

Detailed Description of the Invention

[0021] The invention will be more clearly understood by the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a housing of the invention,

Fig. 2 is a side elevational view of the housing of the invention formed by a number of stacked ring elements,

Fig. 3 is a perspective view of a ring element forming portion of the housing of the invention,

Fig. 4 is a side elevational view of the ring element,

Fig. 5 is an end elevational view of the ring element,

Fig. 6 is a plan view of the ring element,

Fig. 7 is an underneath plan view of the ring element,

Fig. 8 is an enlarged detail exploded perspective view illustrating interconnection of parts of the ring elements,

Fig. 9 is a plan view of the ring element parts shown in Fig. 7, and

Fig. 10 is a plan view similar to Fig. 6 showing an

alternative construction of ring element.

[0022] Referring to the drawings, there is illustrated a housing according to the invention, indicated generally by the reference numeral 1. The housing 1 is generally rectangular and has a pair of spaced-apart sides 2 which are interconnected by ends 3 defining an open-topped chamber 4 therebetween. The sides 2 and ends 3 are of twin wall construction with an inner wall 6 and an outer wall 7 which are spaced-apart and interconnected by ribs 9 which extend between the inner wall 6 and outer wall 7. It will be noted that the outer wall 7 is convex at the sides 2, being curved in a longitudinal direction between the ends 3.

[0023] The housing 1 is of composite construction, being formed by a number of stacked ring elements 12. Each ring element 12 is of generally rectangular construction comprising spaced-apart sides 2 which are interconnected by ends 3. The sides 2 and ends 3 of the ring element 12 are all of twin wall construction. Each of the sides 2 has an upright straight inner wall 6 and, spaced outwardly therefrom, an upright convex outer wall 7. Each of the ends 3 has substantially parallel upright inner wall 6 and outer wall 7. Upstanding ribs 9 extend between the inner walls 6 and outer walls 7 in a zig-zag formation, as indicated in the drawings. The ribs 9 are angled between the inner wall and the outer wall, the ribs being connected end to end in a zig-zag configuration.

[0024] A horizontal web 14 also extends between the inner walls 6 and outer walls 7 midway between a top and a bottom of the walls 6, 7. The web 14 divides the ribs 9 into a set of upper ribs 15 above the web 14 and a set of lower ribs 16 below the web 14. It will be noted that the set of lower ribs 16 project downwardly below a bottom end of the walls 6, 7. Also, the set of lower ribs 16 is offset from the set of upper ribs 15 by half the pitch such that when one ring element 12 is stacked over another ring element 12, the ribs 9 of the set of lower ribs 16 of the uppermost ring element 12 sit perpendicularly across the ribs 9 of the upper set of ribs 15. Further, each rib 9 in the set of upper ribs 15 has a central slot 18 for reception of and engagement with a downwardly projecting rib 9 of the set of lower ribs 16 of the ring element 12 above it.

[0025] An outer bedding flange 20 extends around an outside of the outer walls 9, 11, projecting outwardly therefrom. The bedding flange 20 is located roughly midway between a top and a bottom of each outer wall 7.

[0026] The ring elements 12 may be moulded as a continuous ring. Alternatively, as illustrated in the drawings, each ring element 12 may be of composite construction which allows for adjustment of the ring size. In the arrangement shown, each ring element 12 is formed by J-shaped parts which include all of one side 2 and an end 3. Interlocking of the parts is shown in Figs. 8 and 9. Pairs of box section slots 30, 31 are provided in engaging ends of the parts which overlap and are se-

cured together by square section locking pins 32. It will be noted that the pairs of slots 30, 31 extend for half the depth of the ring element 12 and are vertically and laterally offset to resist both vertical movement between the parts and also longitudinal movement.

[0027] In use, the ring elements 12 are assembled to the required dimension or, as the case may be, fully formed one piece ring elements 12 may be provided. A number of the ring elements 12 are then stacked one above the other, as shown in Figs. 1 and 2, to build a housing 1 of the required depth. It will be noted that the ribs 9, projecting from a lower portion of each ring element 12, engage the associated ribs 9 at an upper portion of the ring element 12 below it. This keying of the ring elements 12 together ensures good rigidity in the housing 1 thus formed. When mounted in the ground, the bedding flanges 20 of the ring elements 12 key into the backfill material to resist any vertical movement of the carriageway box. Also, it will be noted that the construction of the sides 2 with the curved outer wall 7 and zig-zag rib 9 formation is such as to resist lateral loading and bending of the sides 2 in use.

[0028] Fig. 10 is a plan view of another ring element 40. In this case, secondary ribs 41 are provided which extend between the inner wall 6 and outer wall 7 and criss-cross with the ribs 9 for added strength.

[0029] It will be appreciated that any suitable cover may be provided for the housing. For example, a conventional concrete or ductile iron cover may be provided which seats on and closes a top of the housing 1. Furthermore, if required, a base may be included at a bottom of the housing to close the bottom of the housing, a base panel extending between the inner walls 6 of the sides 2 and ends 3.

[0030] The invention is not limited to the embodiments hereinbefore described which may be varied in both construction and detail within the scope of the appended claims.

Claims

1. A housing (1) for mounting in the ground which includes a pair of spaced-apart sides (2) which are interconnected to define an open-topped chamber (4) therebetween, each of said sides (2) having a twin wall construction with an inner wall (6) and an outer wall (7) which are spaced-apart and interconnected by ribs (9) which extend between the inner wall (6) and the outer wall (7), **characterised in that** the outer wall (7) is convex
2. A housing (1) as claimed in claim 1, wherein the ribs (9) comprise a plurality of upright ribs (9) angled between the inner wall (6) and the outer wall (7), the ribs (9) being connected end to end in a zig-zag configuration.

3. A housing (1) as claimed in claim 1 or claim 2, wherein each side (2) has a substantially horizontal intermediate web (14) extending between the inner wall (6) and the outer wall (7) along the length of the side (2).
4. A housing (1) as claimed in claim 3, wherein said intermediate web (14) is located between a top and a bottom of the side (2), and preferably the intermediate web (14) is located midway between the top and the bottom of the side (2).
5. A housing (1) as claimed in any preceding claim, wherein the housing (1) has ends (3) extending between the sides (2), said ends (3) being of twin wall construction having an inner wall (6) and an outer wall (7) interconnected by ribs (9) which extend therebetween.
6. A housing (1) as claimed in any preceding claim, wherein the housing (1) is of composite construction formed by a number of stacked ring elements (12), the ring elements (12) having complementary interengagable formations (9) at a top and at a bottom of each ring element (12) for interlocking engagement of stacked ring elements (12).
7. A housing (1) as claimed in claim 6, wherein two sets of ribs (15, 16) are provided between the inner wall (6) and the outer wall (7) of each side (2) and end (3), namely, an upper rib set (15) located above the intermediate web (14) and a lower rib set (16) located below the intermediate web (14), one of said rib sets (15, 16) projecting outwardly of the walls (6, 7) and the other rib set (15, 16) having receiver slots (18) in the ribs (9) for reception of the outwardly projecting ribs (9) of an adjacent ring element (12) with which it is engaged.
8. A housing (1) as claimed in claim 6 or claim 7, wherein each ring element (12) comprises two or more interlocked parts.
9. A housing (1) as claimed in claim 8, wherein a pair of J-shaped parts are provided which include a side (2) and an end (3) of the ring element (12).
10. A housing (1) as claimed in claim 8 or claim 9, wherein the parts are interlocked by means of mutually aligning slots (30, 31) in each part secured together by locking pins (32) and preferably vertically and laterally offset pairs of slots (30, 31) are provided on each part for nesting engagement and vertical alignment with the complementary offset pair of slots (30, 31) of an associated part.
11. A housing (1) as claimed in any preceding claim, wherein a bedding flange (20) projects outwardly of

the outer walls (7).

12. A stacking ring element (12) for a housing as claimed in any of claims 1 to 11, which includes a generally rectangular ring having a pair of spaced-apart side walls (2) interconnected by end walls (3), the side walls (2) and end walls (3) each being of twin wall construction having an inner wall (6) and an outer wall (7) which are spaced-apart and interconnected by ribs (9) which extend between the inner wall (6) and the outer wall (7), the outer wall (7) of each side (2) being convex.

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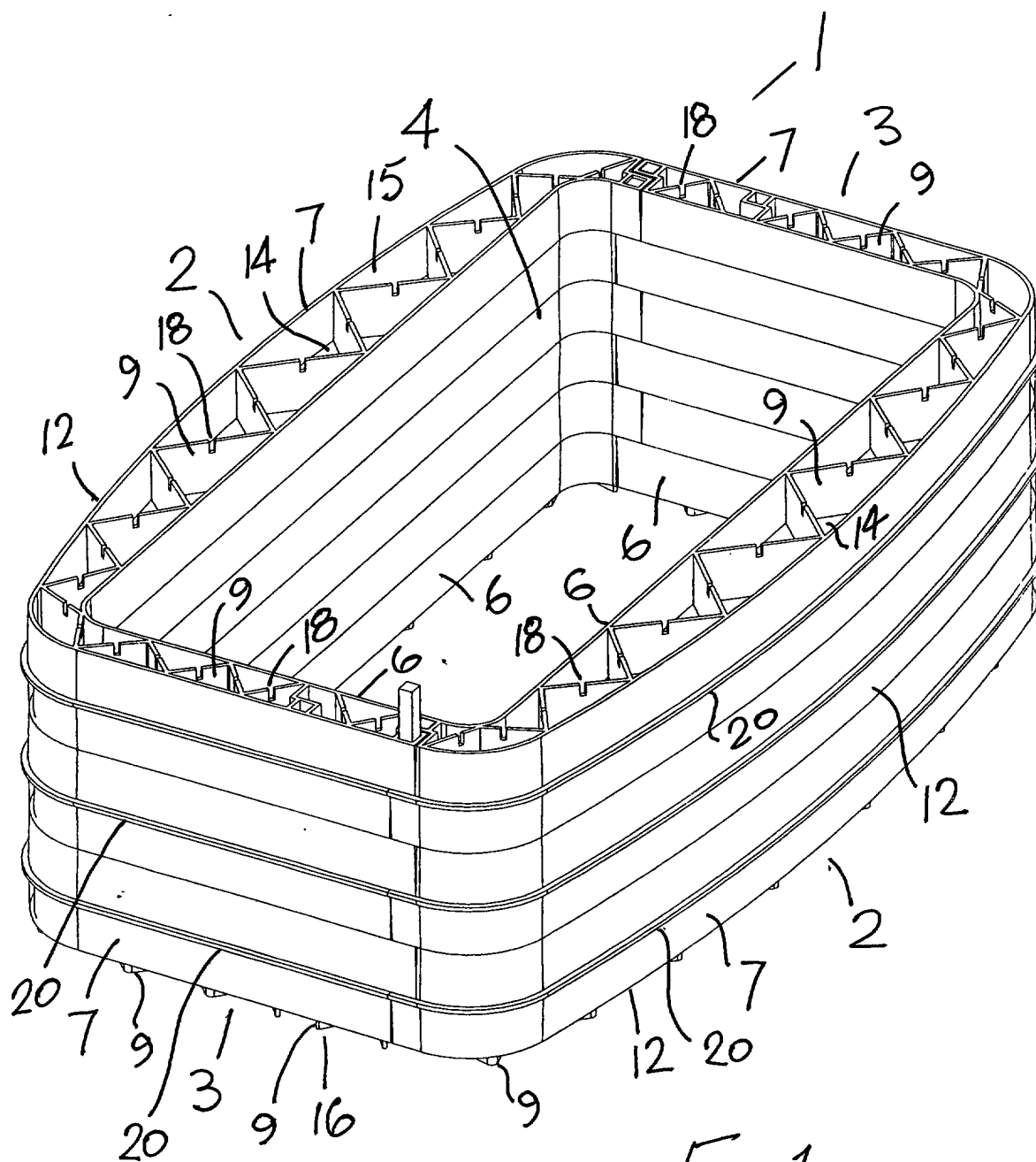


FIG 1

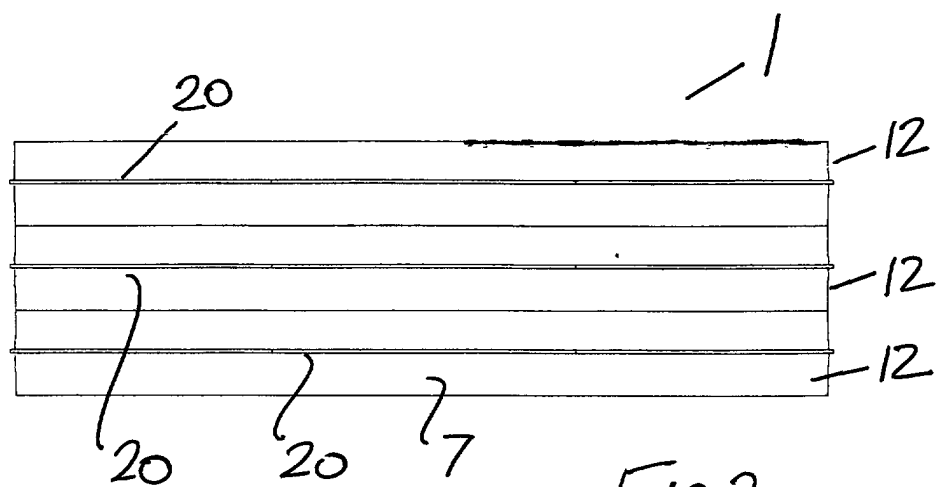


FIG 2

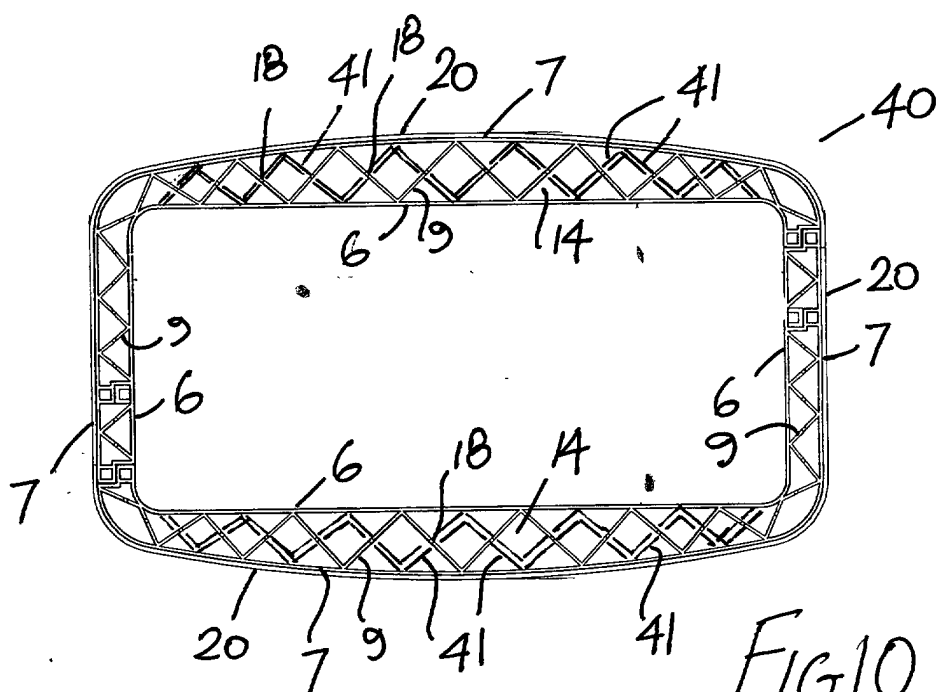
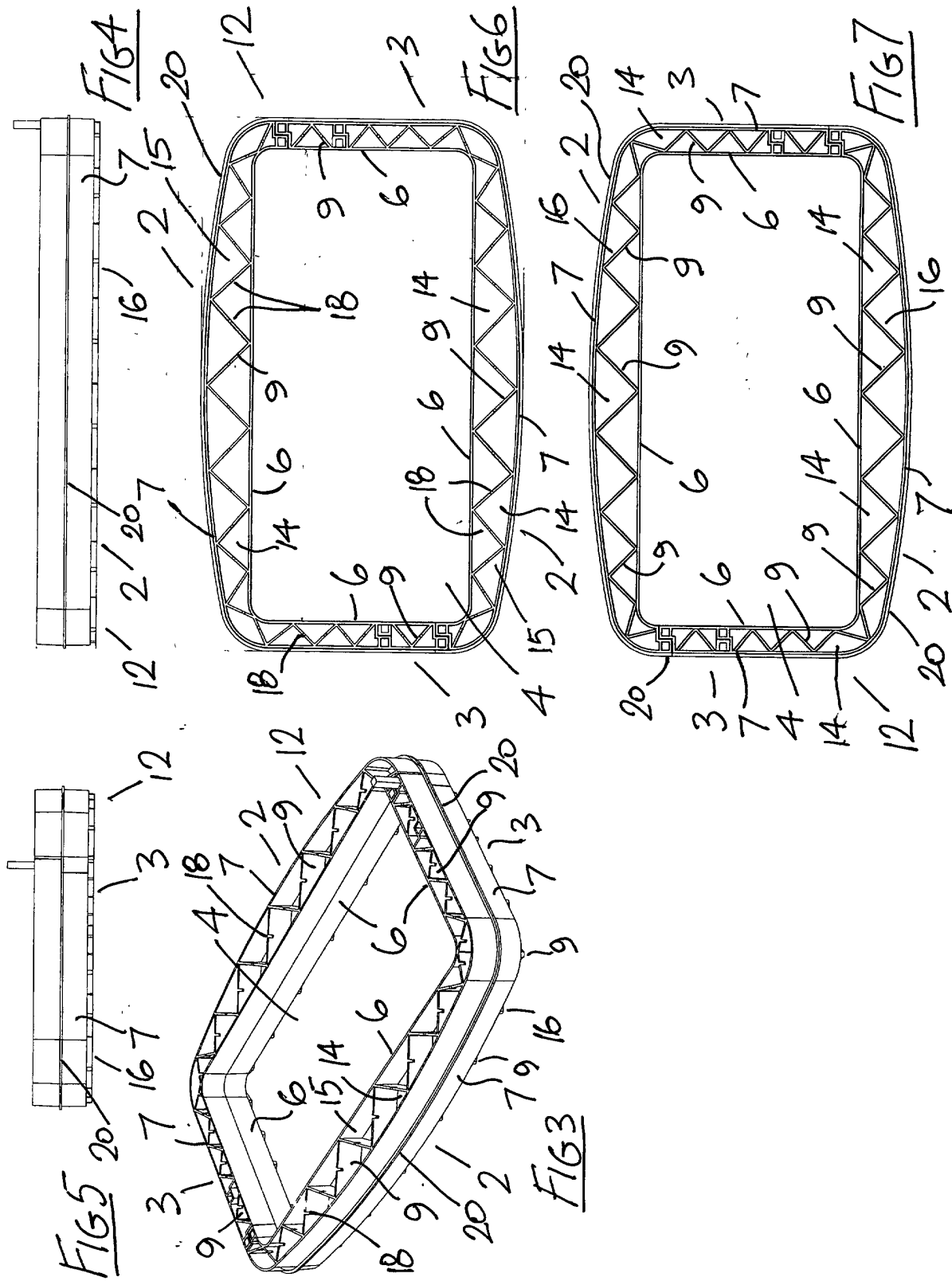


FIG 10



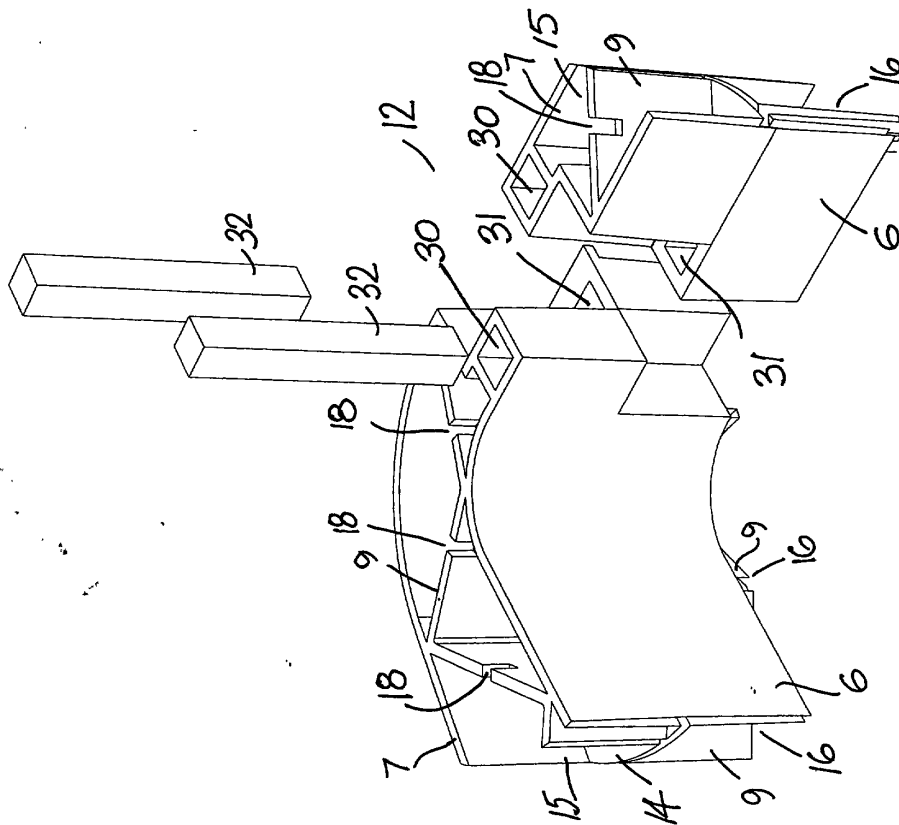
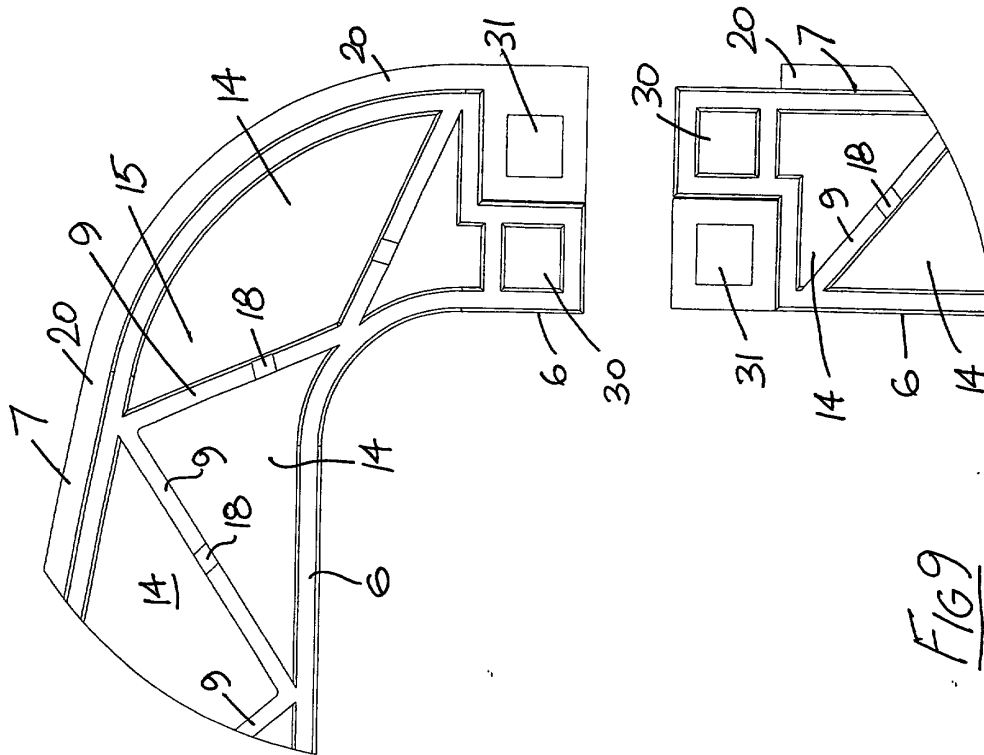


FIG 8

FIG 9



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 01 65 0034

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Y	* column 5, line 43-51; figure 16 *	6,8,12		
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A	* figures 2,3,5 *	11		
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A	* paragraphs '0031!-'0043!; figures 1-5,10,11 *	5		
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A	* column 1, line 55 - column 2, line 41; figures 1,2 *			
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The present search report has been drawn up for all claims				
Place of search THE HAGUE		Date of completion of the search 22 May 2001	Examiner Kergueno, J	
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document				

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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