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(54) FOLDABLE BOX

(57) The box is of the type which comprises a flat laminar plate of heat-formed synthetic material, on which the lateral walls are articulated with the base wall along fold lines, said lateral walls having respective end tabs which coincide on the respective vertical corner edges of the box, being retained in corner brackets, characterized in that the heat-formed laminar part constituting the development of the box has in the regions of the vertices of the base respective comer pieces separated by cuts from the end tabs of the lateral walls, said corner pieces having respective centring means for stacking, and the end tabs of the lateral walls being retained in the regions of the vertical corner edges by respective comer brackets which assume a structure of extruded profiles that can be coupled with said tabs of the vertical edges.

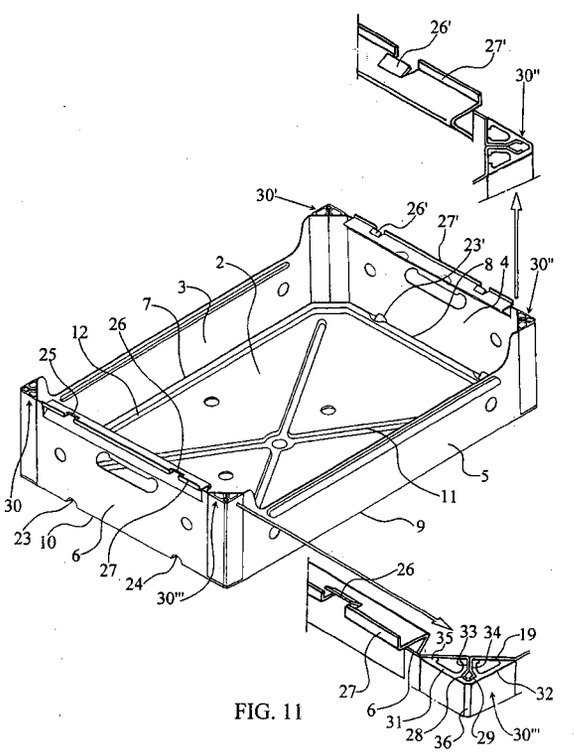

FIG. 11

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Description

[0001] The present invention relates to a folding box intended especially to contain fruit, vegetables and the like. The folding box of the present invention is of the type which comprises a single laminar element constituted by heat-forming, which has several fold lines on which the lateral walls of the box can be pushed back into the assembled position of the box. In the unfolded position, the different elements of the box are arranged in one plane, forming an assembly which is easy to store and transport.

[0002] The aim of the box of the present invention is to provide the box assembly with high strength by means of special extruded comer brackets which make it possible to obtain characteristics of great economy and of significant strength in the manufactured box, making it possible, in particular, to have smooth lateral walls, without the depressions or ribs customarily used, so that ample surfaces can be available for the placing of labels, instructions for use, etc.

[0003] An essential element of the box of the present invention consists in the special extruded comer brackets which join the adjacent edges of the lateral walls in the assembled position of the box, very simply and very strongly. This is possible owing to the extruded structure in a synthetic material of said corner brackets, which in cross section have a structure of several walls arranged radially from the comer edge, all being arranged so as to project from the actual comer edge receiving the adjacent edges of the walls which meet in a corner edge of the box. By means of this formation, it is possible for the comer bracket to have great rigidity, imparting a high strength to the box assembly. These comer brackets may be coupled simply by sliding on the corner edges of the box, that is to say, vertically, in a very simple manner, and in addition their cost of manufacture is very much reduced by using a simple extrusion method. At the same time, the elements of the comer brackets arranged so as to project from the corner edge have sufficient flexibility to be effectively coupled.

[0004] A further feature of the box of the present invention consists in that the floor of the box comprises, besides the ribs pressed into the central part, which in cross section are directed downwards, communicating with a central opening to permit the evacuation of liquids, a peripheral rib which extends over its entire perimeter and the cross section of which is arranged so as to protrude upwards, that is to say, in the opposite direction to the central depressions, achieving, as a whole, greater rigidity of the floor and reducing the flexing thereof under load. In addition, the floor has at its corners small areas delimited by cuts which separate the lateral walls from the floor, improving the folding characteristics for the assembly of the box, there being arranged in each of the said corner areas a depression in the form of a protuberance which projects towards the lower face of the box, being capable of permitting the centring of one box on another in the stacking position.

[0005] In order to improve the stacking characteristics of the box, the latter has at least on two lateral walls, for example, the minor lateral walls, slight depressions on the edges and other small depressions on the actual lateral face but on the lower corner edge common to the floor of the box, of a complementary shape to the first ones, so that when stacking the boxes it is possible to centre one upon the other additionally as the small reentrant depressions of the lower edge coincide with the inwardly protruding depressions of the upper edges of the lateral walls of the box.

[0006] In order to increase the rigidity of the lateral edges, both of the longer walls and the shorter walls, in one version of the present invention, depressions may be arranged in the central parts of said edges.

[0007] Likewise, in order to improve the introduction of the corner brackets on the edges of the boxes, the edges may have, in an alternative version, on the end down-turns of the lateral tabs intended to coincide within the corner brackets, a progressive profile which, starting with simply flat expansions, widens out to the structure of the end expansions in the form of an obtuse angle which are received within the corner bracket.

[0008] In order to improve the retention of the elements of the box with respect to the corner bracket, the coincident edges of the lateral walls fit into the four sides of the longitudinal opening of the corner bracket.

[0009] For greater understanding thereof, drawings of preferred embodiments of the present invention are appended by way of non-limiting example.

[0010] Figure 1 shows a plan view of the whole of the laminar part constituting the box.

[0011] Figures 2, 3 and 4 are respective details in section and in plan showing the bottom of the box.

[0012] Figure 5 shows a plan view of the box, with the lateral walls raised, without corner brackets.

[0013] Figure 6 is a view similar to Figure 5, showing the corner brackets in place.

[0014] Figures 7 and 8 show respective details of the corner bracket of the box.

[0015] Figures 9 and 10 show respective details of the placing of the corner bracket and of the stacking of two boxes.

[0016] Figure 11 shows a perspective view of the box with details of the centring depressions of the upper edges.

[0017] Figure 12 shows a perspective view in which can be seen a detail of the stacking of two boxes.

[0018] Figure 13 shows a plan view of a laminar part similar to Figure 1, according to a variant.

[0019] Figure 14 shows a perspective view of the folded box corresponding to the variant of Figure 13.

[0020] Figures 15 and 16 are views in side elevation and front elevation, respectively, of an alternative embodiment of the expansions of the lateral tabs of the walls of the box with a profile of the progressive type.

[0021] Figures 17, 18 and 19 are respective trans-

verse sections through the planes shown in Figure 16, to show the progressive variation in the shape of said expansions.

[0022] Figures 20, 21 and 22 show cross sections corresponding to Figures 17, 18 and 19 with the corner bracket incorporated.

[0023] Figure 23 shows a section of one of the minor lateral walls of the development shown in Figure 24.

[0024] Figure 24 shows a development of a laminar part for a box which comprises the variants constituted by the depressions on the lateral edges and the progressive profile of the expansions.

[0025] Figure 25 is a section through the plane indicated in Figure 24.

[0026] Figure 26 shows a perspective view of the assembled box in the variant provided with depressions on the edges.

[0027] Figure 27 shows a detail in section through the section plane shown in Figure 28.

[0028] Figure 28 shows a plan view of an embodiment of a box with reinforcing depressions exclusively in the minor sides.

[0029] Figure 29 shows a perspective view of the box of the variant shown in Figure 28.

[0030] As shown in the drawings, the present invention relates to a box constituted from a heat-formed principal element of laminar type 1, on which can be seen a laminar bottom or base part 2 and the integral parts of the lateral walls 3, 4, 5 and 6, hinged on the bottom by the corresponding fold lines 7, 8, 9 and 10. The laminar part constituting the box may be stacked and transported easily, and at the time of assembly the lateral walls 3, 4, 5 and 6 are folded back according to the vectors indicated in Figure 1 in order to erect the box, the vertical corner edges of which are fixed by means of specific devices called corner brackets.

[0031] This construction, which is already known in the prior art, has drawbacks, especially with regard to the complexity and cost of the parts which make up the so-called corner brackets, and also owing to the difficult folding of the corresponding areas at the corner edges of the base in their articulation with the end tabs of the lateral walls.

[0032] In order to remedy the drawbacks existing hitherto in said type of boxes, the present invention provides a new type of extruded corner bracket having very advantageous features as well as a specific composition of the whole of the part 1, with regard to the bottom and its comers, as well as the upper and lower edges of lateral walls in order to permit the centring of the box and other features which will be described.

[0033] Firstly, in the base or bottom 2, in addition to the conventional downwardly protruding ribs 11, Figure 2, to allow the exit of liquids, for example, washing water, the present invention provides for the formation of a peripheral rib 12 which extends over the entire perimeter of the base 2 and which in cross section projects upwards, Figure 2, so that it imparts greater rigidity to the floor 2 of the box, avoiding excessive flexing of the central part of the box when it is subjected to the load which it is intended to carry.

[0034] In the four corners of the base 2, indicated by 13, 14, 15 and 16, the present invention makes provision for longitudinal cuts on the two sides in contact with the respective lateral flaps, such as, for example, the cuts 18 and 19 of the lateral walls 3 and 6. Said grooves or cuts, shown by the numbers 20 and 21, will allow the folding back of the lateral walls without producing creases in the area of the corners.

[0035] In order to improve the centring of a box with another located below for the purpose of stacking, the corners 13 to 16 of the base will have centring protuberances which protrude downwards, below the lower plane of the base 2. Said protuberances may be produced during the pressing of the actual part 1, there being shown in Figures 3 and 4 the protuberance 22 of the corner 13, produced by pressing.

[0036] The lateral walls, for example, the end walls 4 and 6, also have specific characteristics according to the present invention in order to achieve the centring of a box with another located below it when stacking the boxes. Said characteristics, which will be explained specifically with reference to Figures 1, 11 and 12, comprise the provision of depressions on the lower edge and on the upper edge of the lateral walls 4 and 6, the depressions of the lower edge having a shape complementary to those of the upper edge and having the same longitudinal arrangement, so that the depressions of the lower edge can coincide with those of the upper edge of a box arranged below when stacking the boxes. Thus, for example, in the lateral wall 6 there can be seen the depressions 23 and 24 provided in the lower edge which have a re-entrant shape and the depressions 25 and 26 in the upper edge, of projecting shape, so that they can be fitted into one another when stacking. In a specific embodiment, the depressions 25 and 26 are constituted by small deformed plates in the upper flange 27 of the folded-over edge of the lateral wall, which assumes an inwardly folded form and which extends slightly towards the outside a little further out from the actual lateral wall 6, in order to allow correct stacking.

[0037] Once the box has been folded as indicated in Figure 5, the tabs of the ends of the lateral walls, for example the tabs 18 and 19 of the lateral walls 3 and 6, are folded back on the respective chamfers of the base and finally folded back radially, constituting end regions in the form of an obtuse angle 28 and 29, intended to be encompassed by the special extruded corner brackets 30, Figures 7 and 8, which have a substantially radial structure with principal end walls 31 and 32 and inner walls 33 and 34, all terminating in inwardly folded edges such as the flange 35 of the wall 31. The corner bracket 30 will be produced by extrusion of a suitable plastics material, having a high degree of rigidity, due in part to its radial structure and likewise to the fact that the thickness of the walls may be selected within wide limits in

order to obtain a high degree of rigidity, although the lateral walls 31 and 32, owing to their radial arrangement projecting from the corner edge 36, will be capable of flexing smoothly in order to improve their operability.

[0038] Once the corner brackets 30, 30', 30" and 30‴ have been introduced into the vertical comer edges of the box, Figure 6, the box will be completely assembled and in a serviceable condition. One of the outstanding features of the box of the present invention consists in that in view of the high strength of the corner brackets, the lateral walls, for example the principal lateral walls 3 and 5, may have a large free surface without reinforcing ribs such as is customary at present, in order to allow the incorporation of advertising inscriptions, instruction sheets or other similar elements.

[0039] The composition which has been indicated of the lower and upper edges of the lateral wall 6 will be analogous on the opposed lateral wall 4, there being noted in a corresponding detail of Figure 11 the upper flange 27', one of the upper depressions 26', and also the depressions of the lower edge 23', for obtaining the same centring function.

[0040] Figures 13 and 14 show a variant of the box in which the longer lateral walls, for example 37 and 38, have a greater height, being level with the minor lateral walls 39 and 40. In this embodiment also the major lateral walls 37 and 38 have upper flanges 41 and 42 similar to the flanges 43 and 44 of the minor faces, thus improving the centring of the boxes when stacked.

[0041] Figures 15 to 22 show a variant of progressive profile edges in the lateral expansions intended to receive the corner brackets. Thus, for example, the flat expansions 45 and 46 will form firstly, in an upper region 47, the simply flat edges indicated in Figure 19, in which they have been indicated by the numbers 48 and 49. Said expansions 48 and 49 will have the upper corner 50 fully rounded in order to improve the entry of the corner bracket at the moment of its insertion, as can be seen from the position of the comer bracket 51 with respect to the straight edges, Figure 22.

[0042] After the straight region 47, the flat expansions 48 and 49 begin to assume progressively the shape of the expansions at an obtuse angle which are shown in Figures 17, 18, 20 and 21. In a first part 52 the expansions at an obtuse angle increase in size until the region 53 is reached, which is the actually functional region and in which, as shown in Figure 17, the lateral expansions 54 and 55 attain the desired structure of obtuse angles.

Claims

1. Folding box, of the type which comprises a flat laminar plate of heat-formed synthetic material, on which the lateral walls are articulated with the base wall along fold lines, said lateral walls having respective end tabs which coincide on the respective vertical corner edges of the box, being retained in corner brackets, **characterized in that** the heat-formed laminar part constituting the development of the box has, in the regions of the vertices of the base, respective corner pieces separated by cuts from the end tabs of the lateral walls, said corner pieces having respective centring means for stacking, and the end tabs of the lateral walls being retained in the regions of the vertical corner edges by respective corner brackets which assume a structure of extruded profiles that can be coupled with said tabs of the vertical edges, by simple vertical displacement.

2. Folding box according to claim 1, **characterized in that** the extruded corner brackets of synthetic material have in cross section a radial structure from the corner edge, with surrounding outer faces and two shorter inner sides determining between them the seating for the end tabs of the lateral walls.

3. Folding box according to claim 2, **characterized in that** the end edges of the sides of the corner bracket are folded inwards.

4. Folding box according to claims 1 and 2, **characterized in that** the lateral walls have on their upper and lower edges depressions arranged in the same longitudinal position, and the shape of those of the lower edge being complementary to those of the upper edge, in order to permit the stacking of the boxes.

5. Folding box according to claim 4, **characterized in that** the depressions of the upper edge of the lateral walls are provided in regions of the edges which assume an angled structure, forming a flange projecting slightly outwards with respect to the lateral walls in order to facilitate stacking.

6. Folding box according to claim 1, **characterized in that** the centring protuberances of the corner pieces of the base of the box are produced by means of downwardly directed depressions, capable of coinciding within the corner brackets for the purpose of centring a box in an upper position with another in a lower position when they are stacked.

7. Folding box according to claim 1, **characterized in that** the end tabs of the lateral walls have regions folded back at a right angle which terminate in respective expansions at an obtuse angle, intended to coincide within the profile of the corner bracket when the latter is inserted into each two of said coincident expansions on the corner edges.

8. Folding box according to the preceding claim, **characterized in that** the expansions intended to coincide within the comer bracket have on their upper

edge a first straight, flat region in continuation of which the expansions intended to coincide in the form of an obtuse angle within the corner brackets increase progressively in size until the final form of the expansions in the shape of an obtuse angle is reached, which latter extend for the major part of the height of the corner edge.

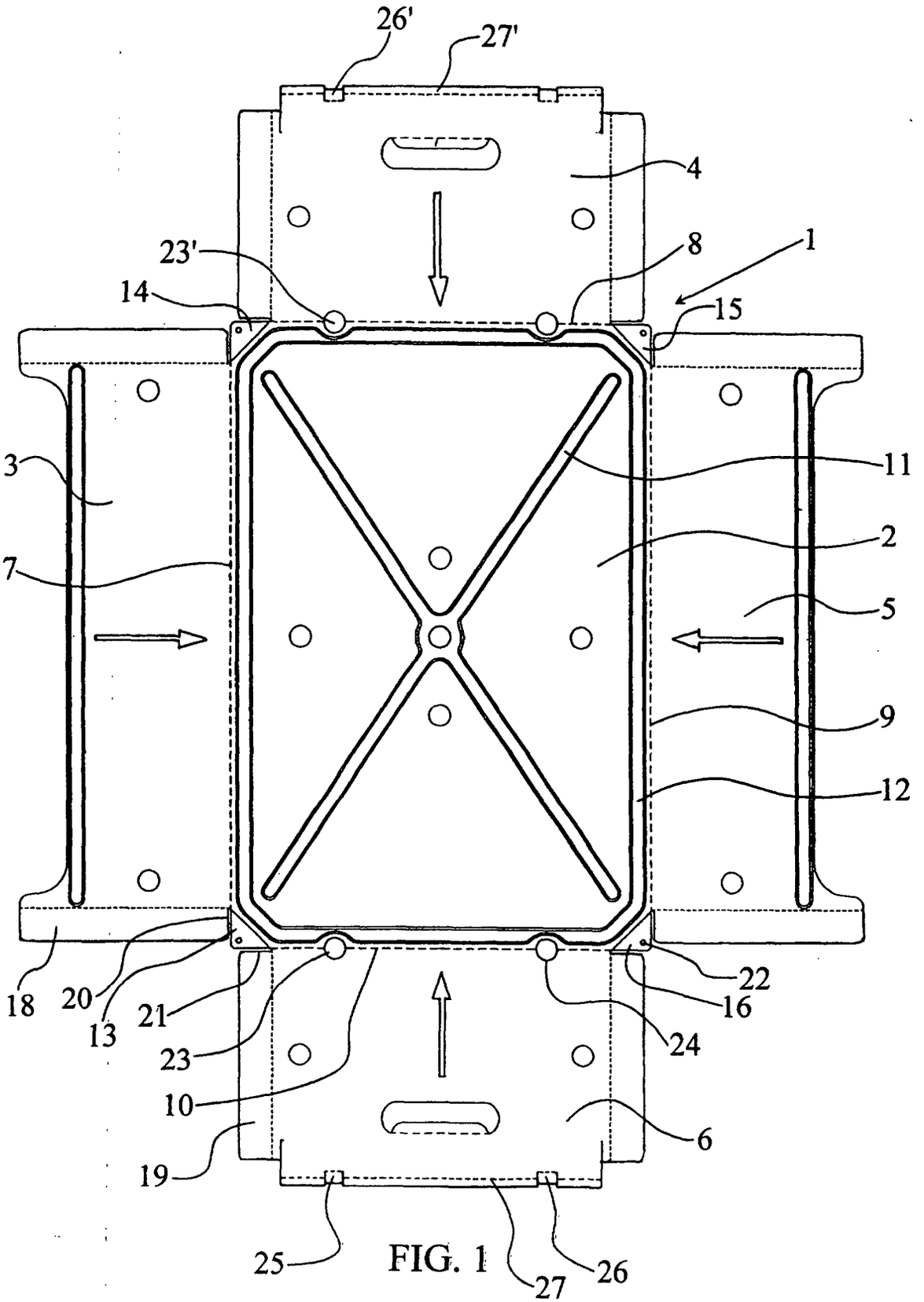

FIG. 1

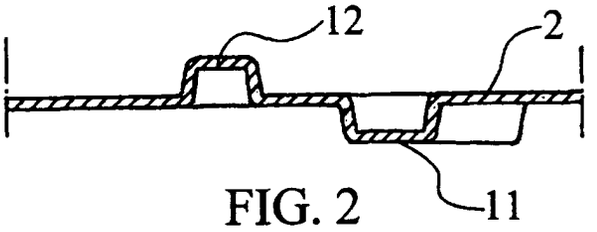

FIG. 2

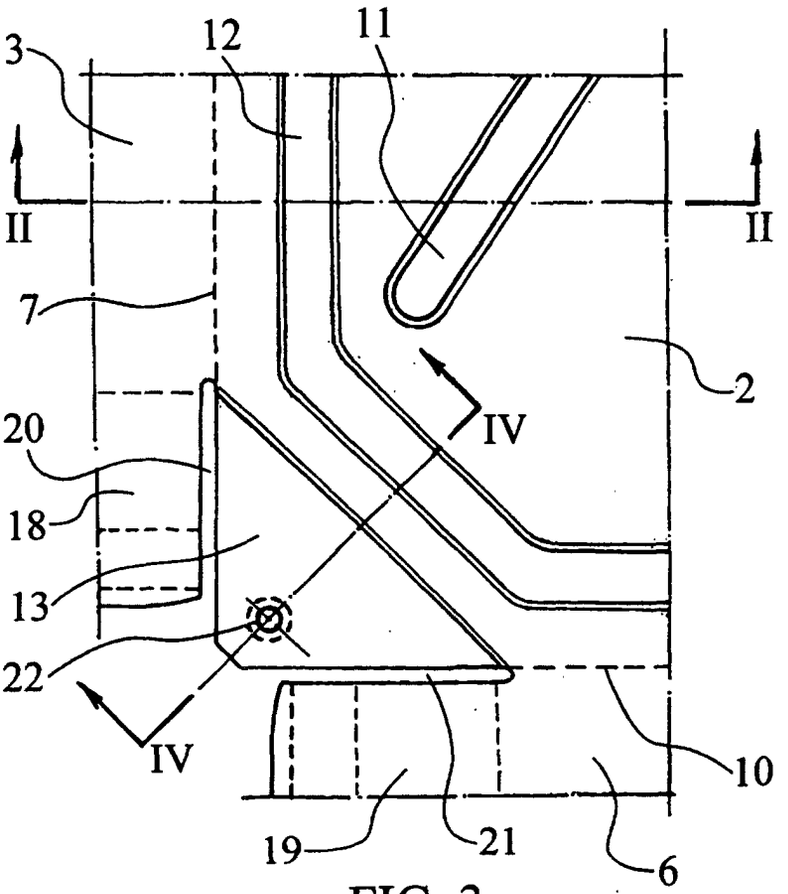

FIG. 3

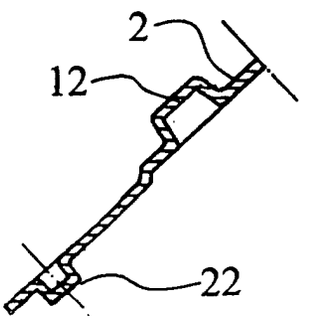

FIG. 4

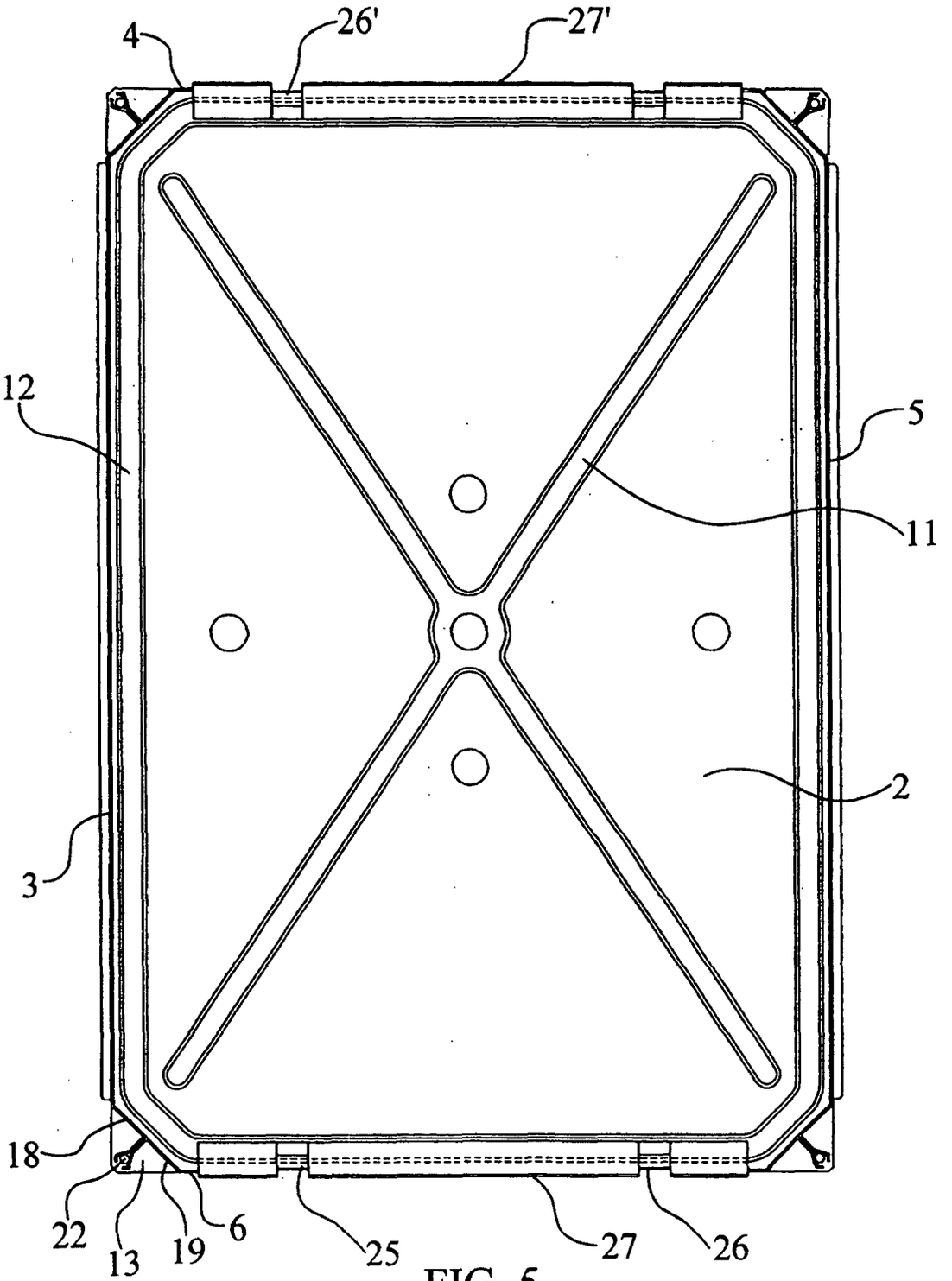

FIG. 5

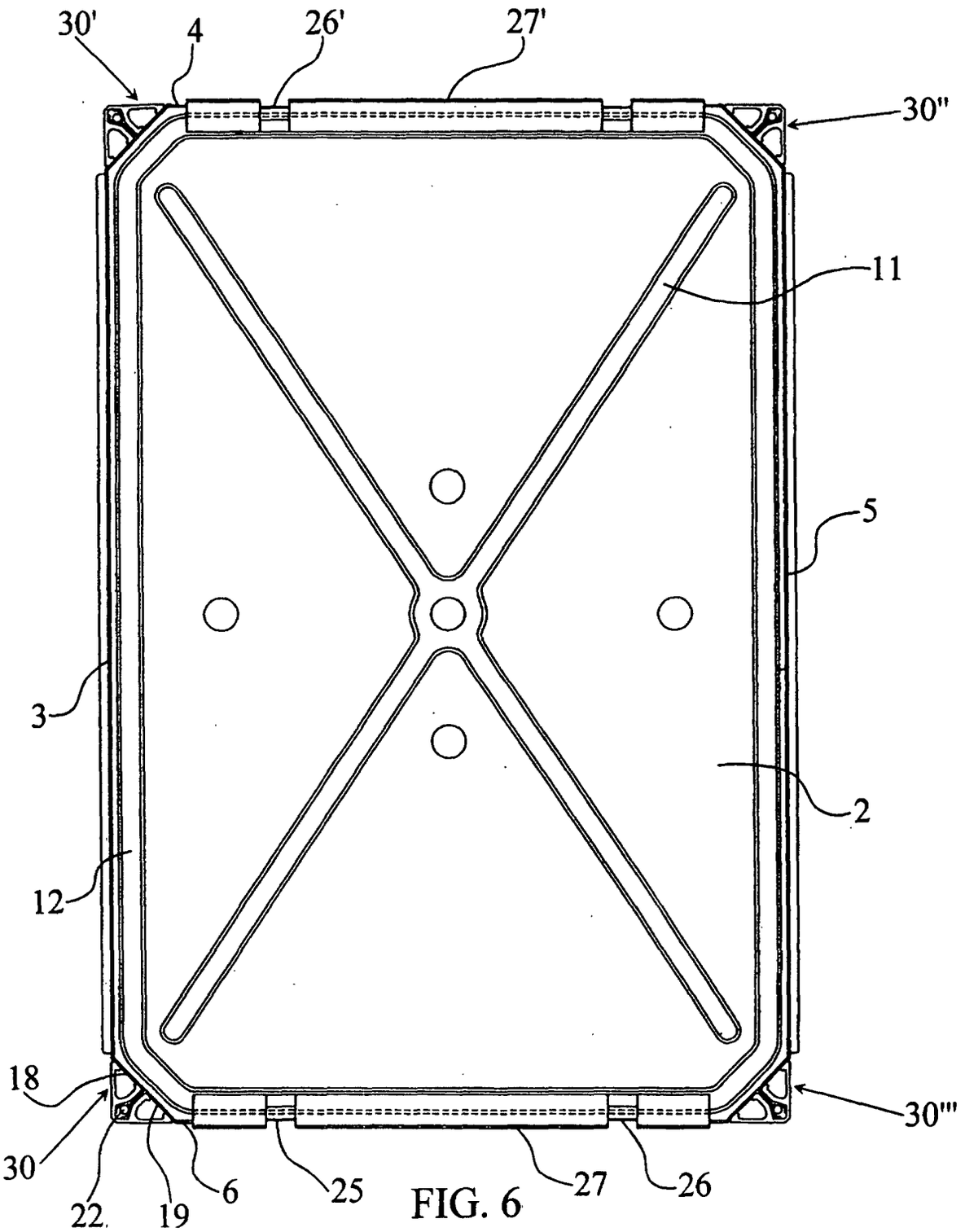

FIG. 6

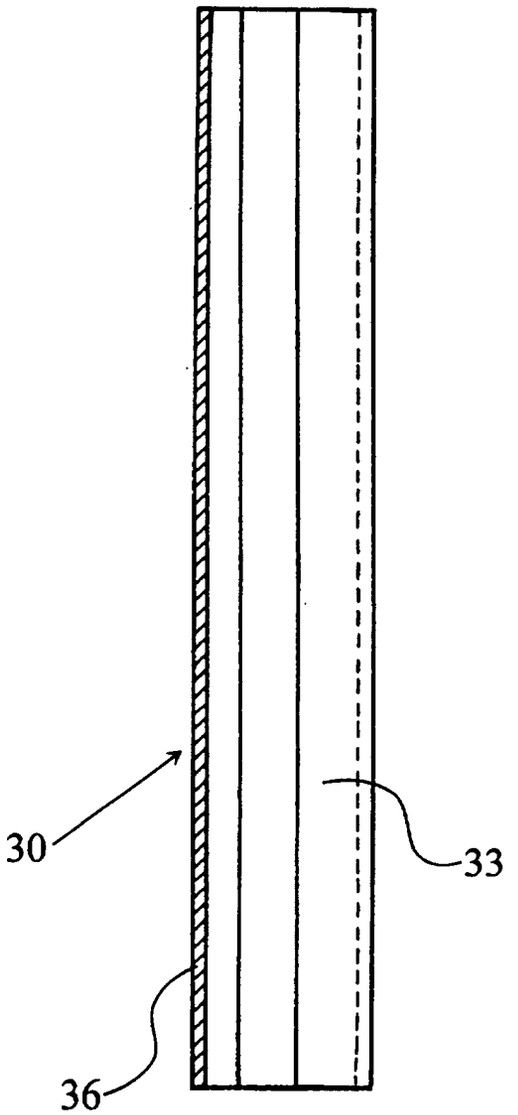

FIG. 7

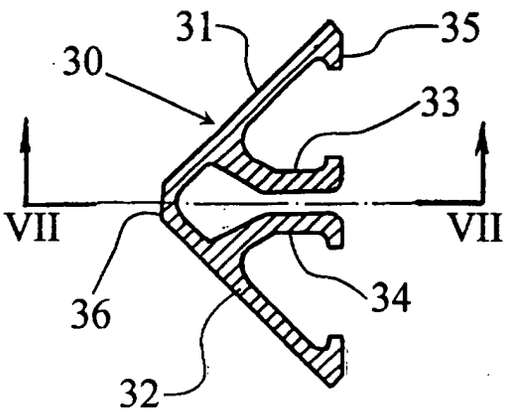

FIG. 8

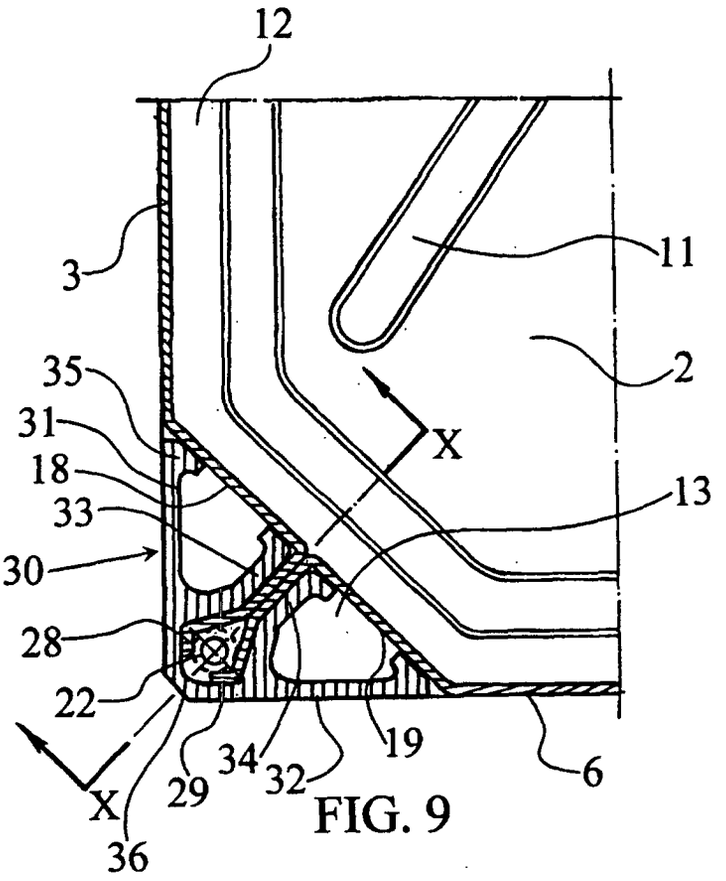

FIG. 9

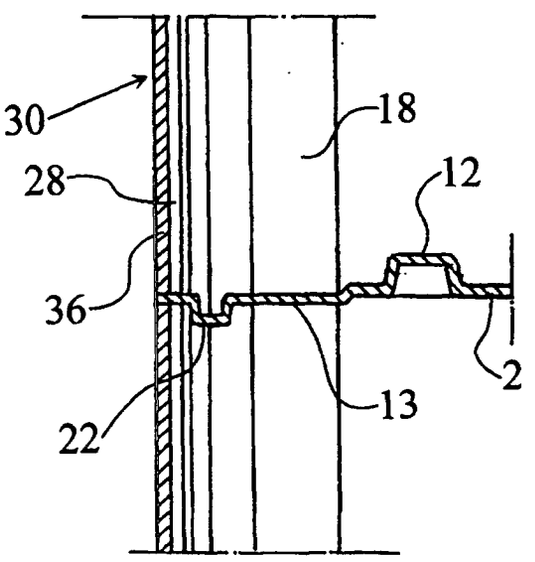

FIG. 10

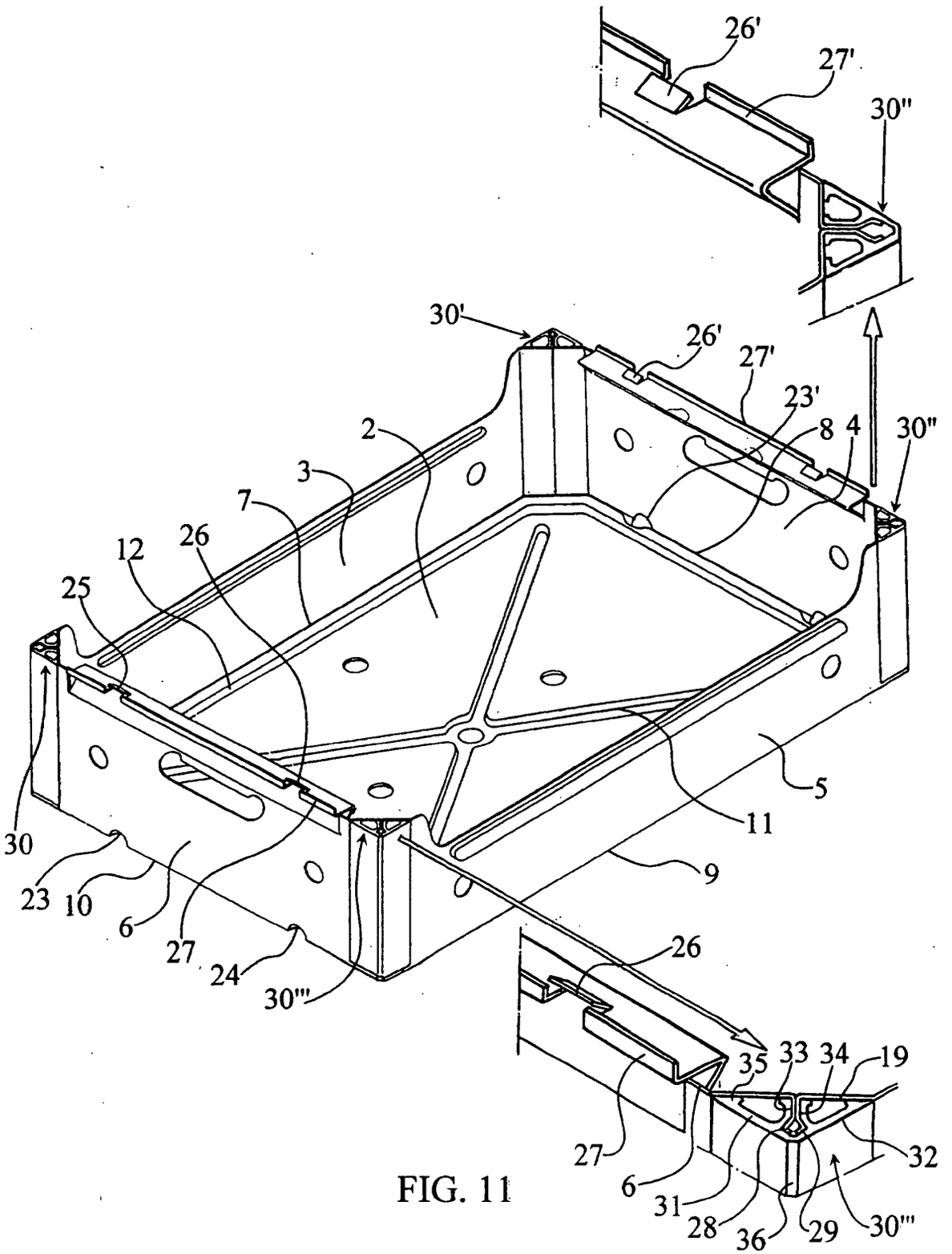
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FIG. 11

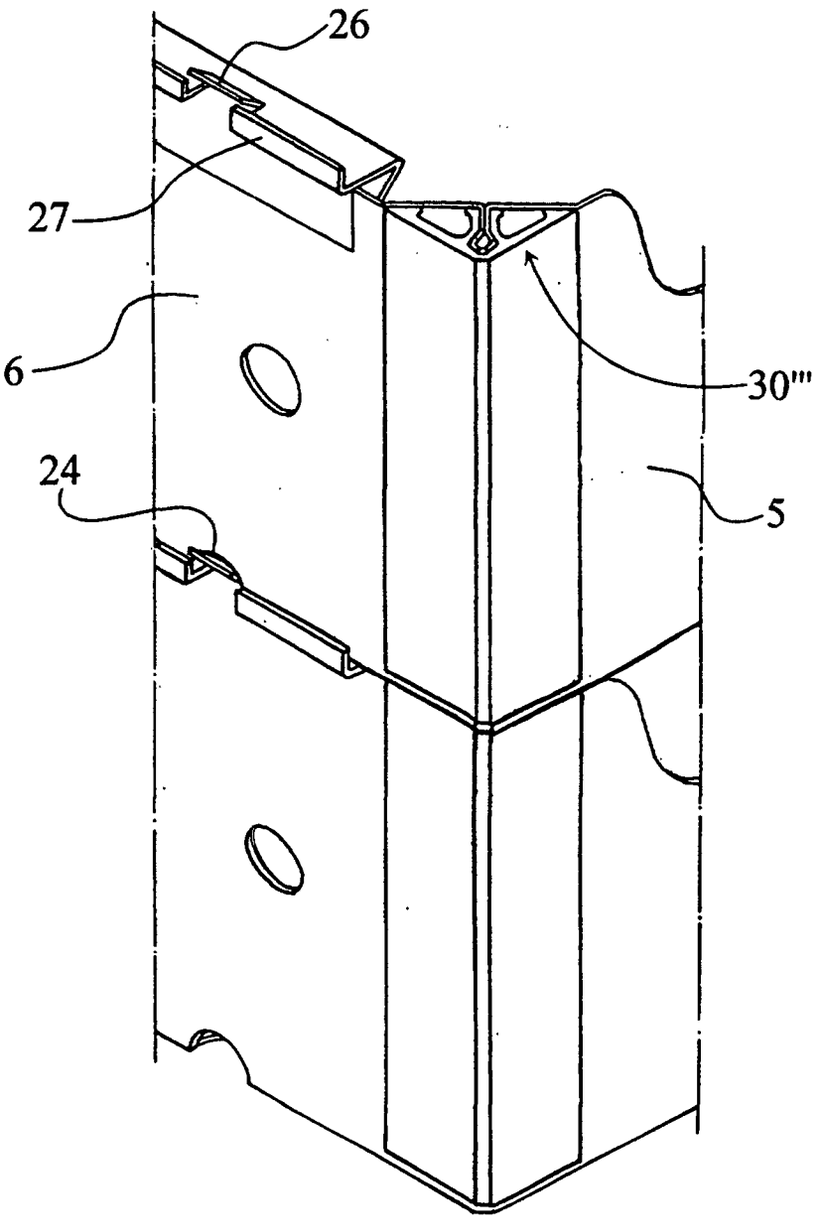

FIG. 12

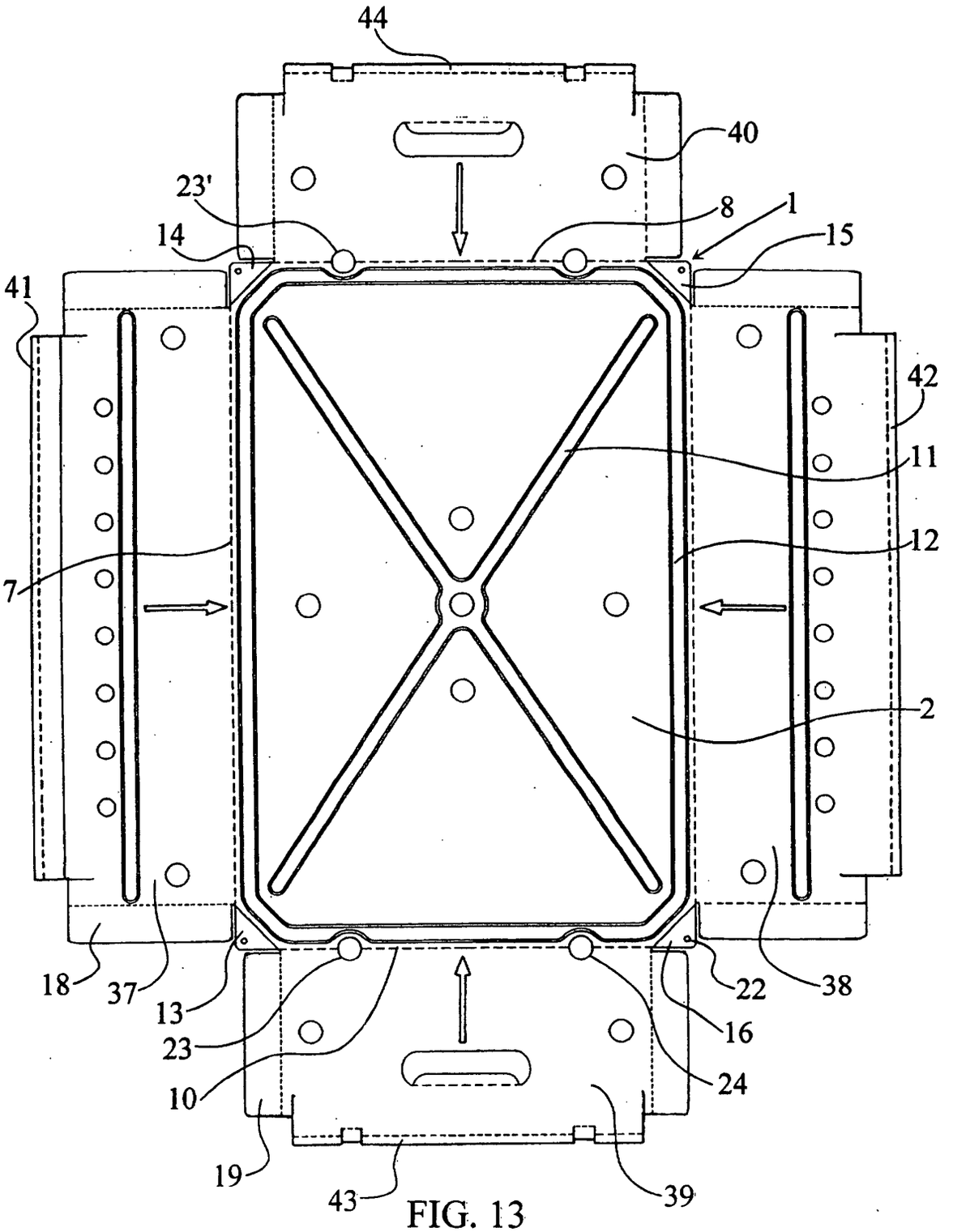

FIG. 13

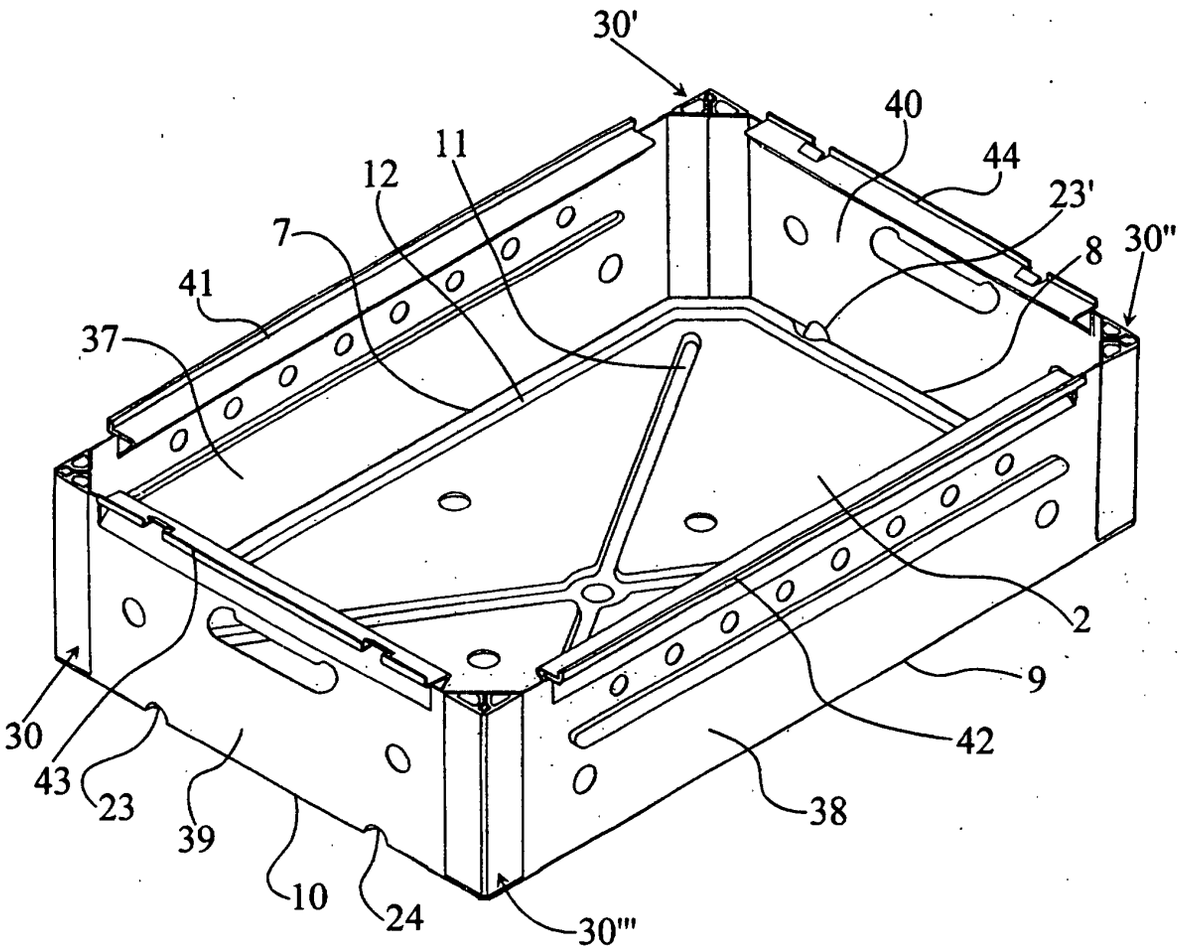

FIG. 14

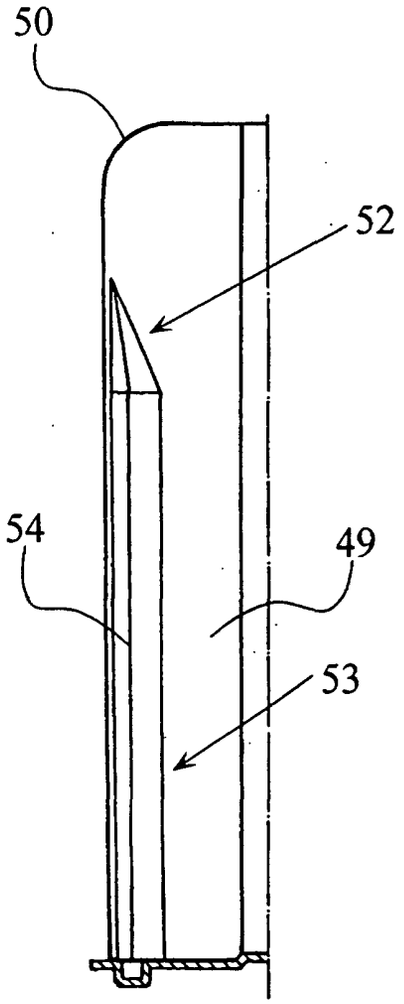

FIG. 15

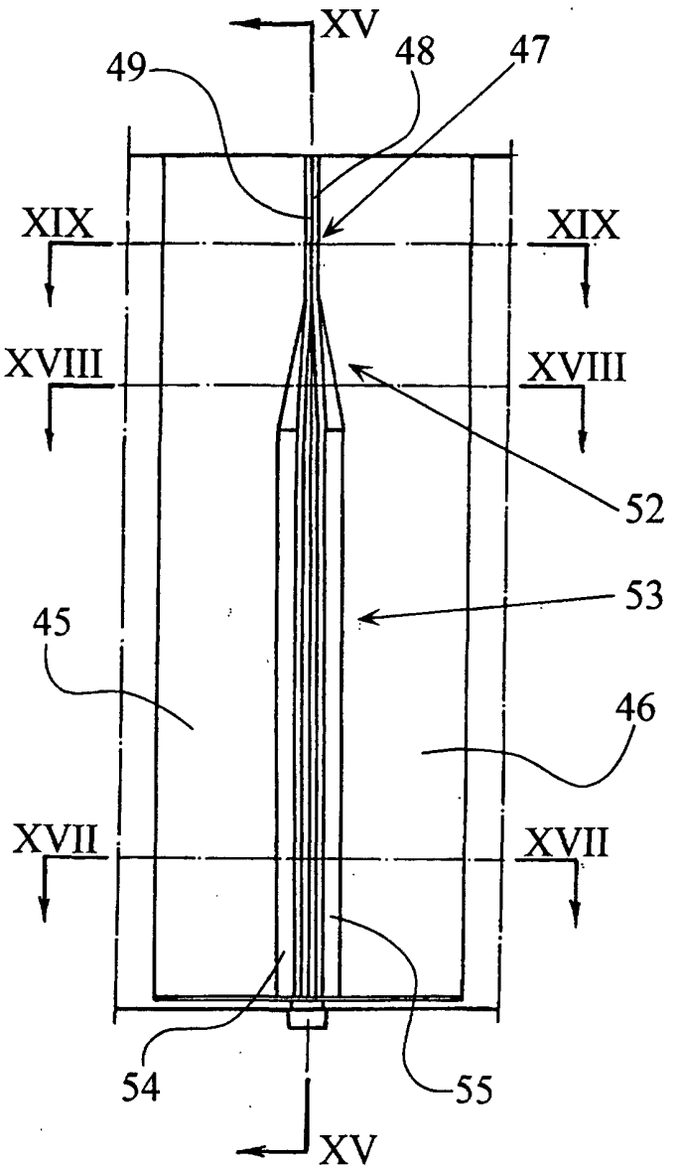

FIG. 16

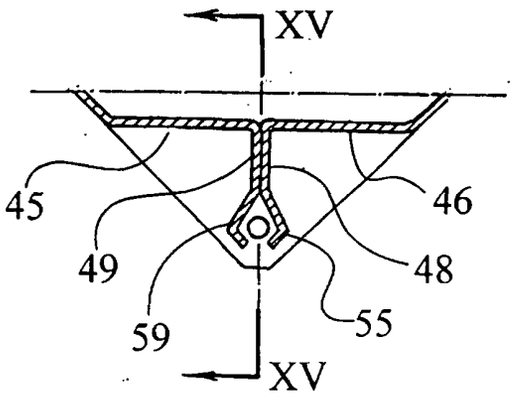

FIG. 17

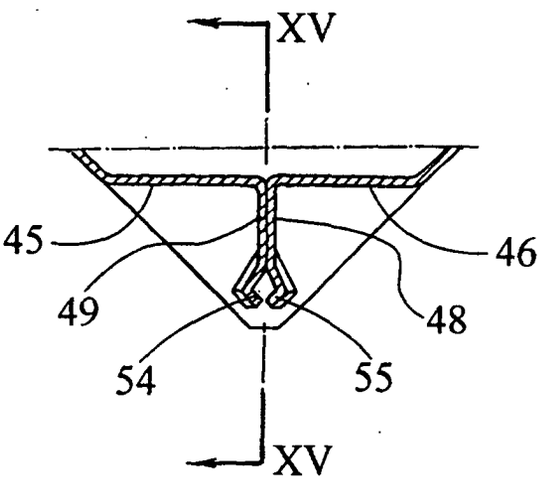

FIG. 18

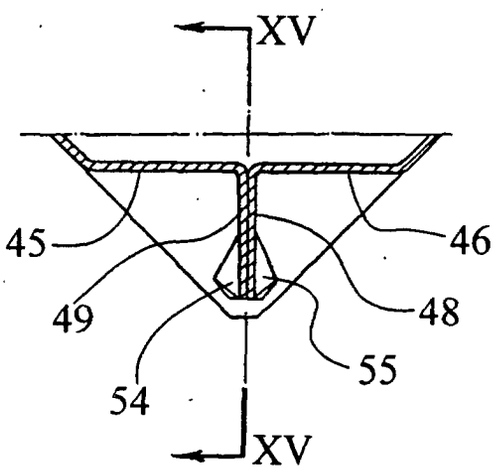

FIG. 19

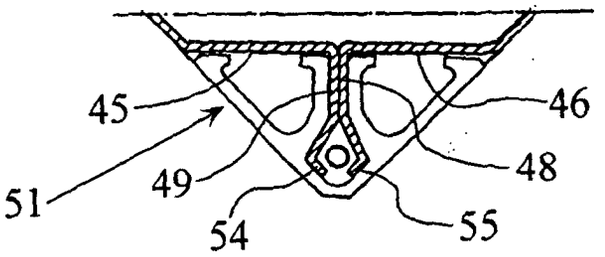

FIG. 20

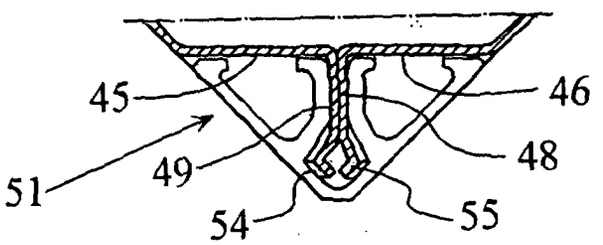

FIG. 21

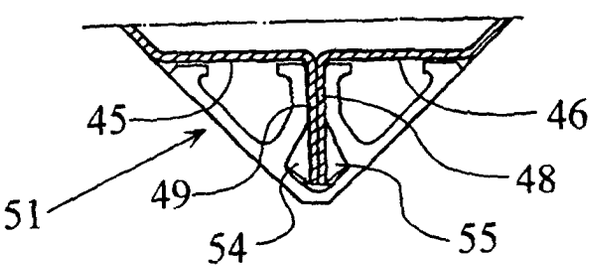

FIG. 22

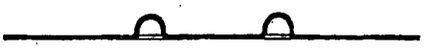

FIG. 23

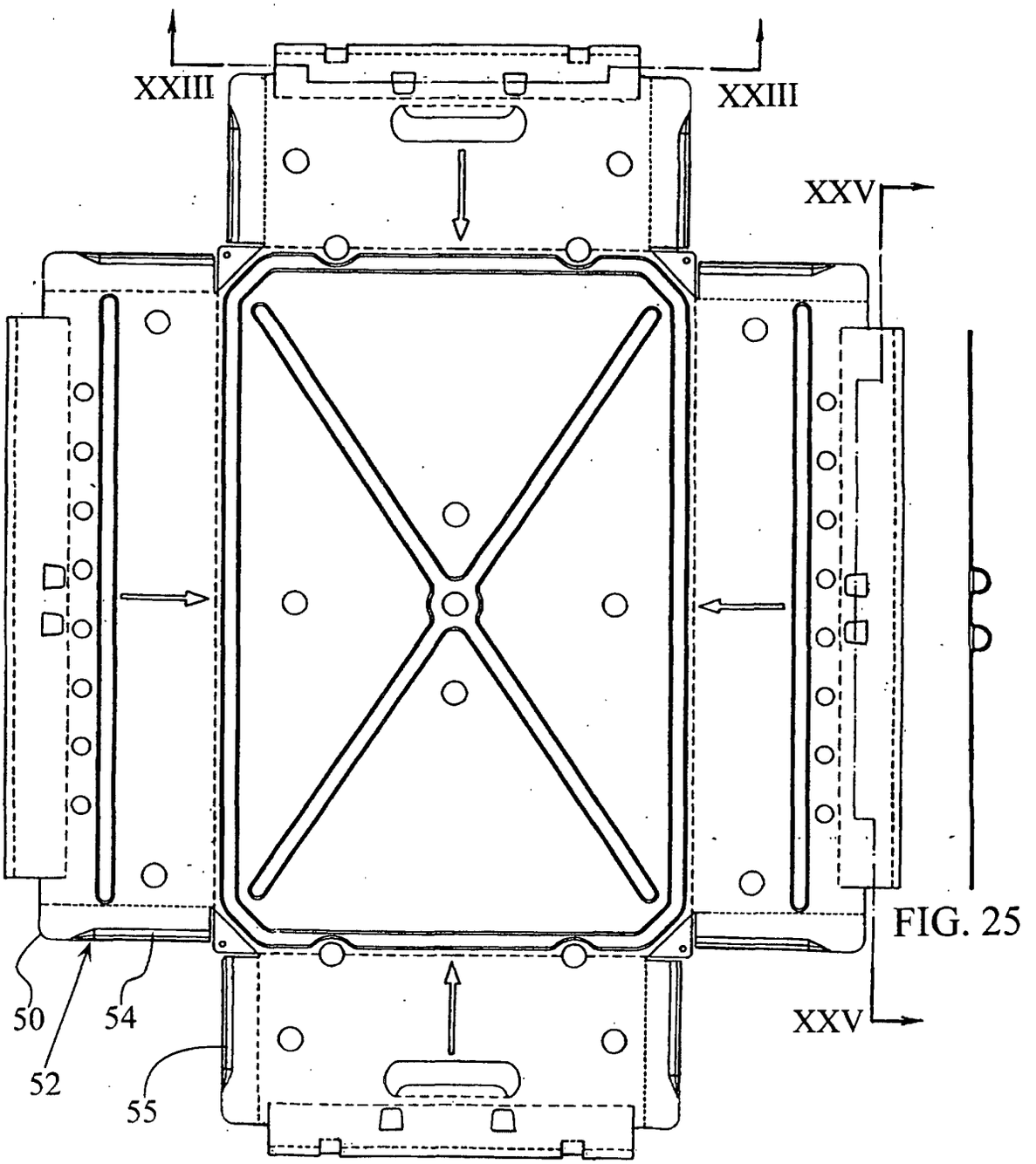

FIG. 24

FIG. 25

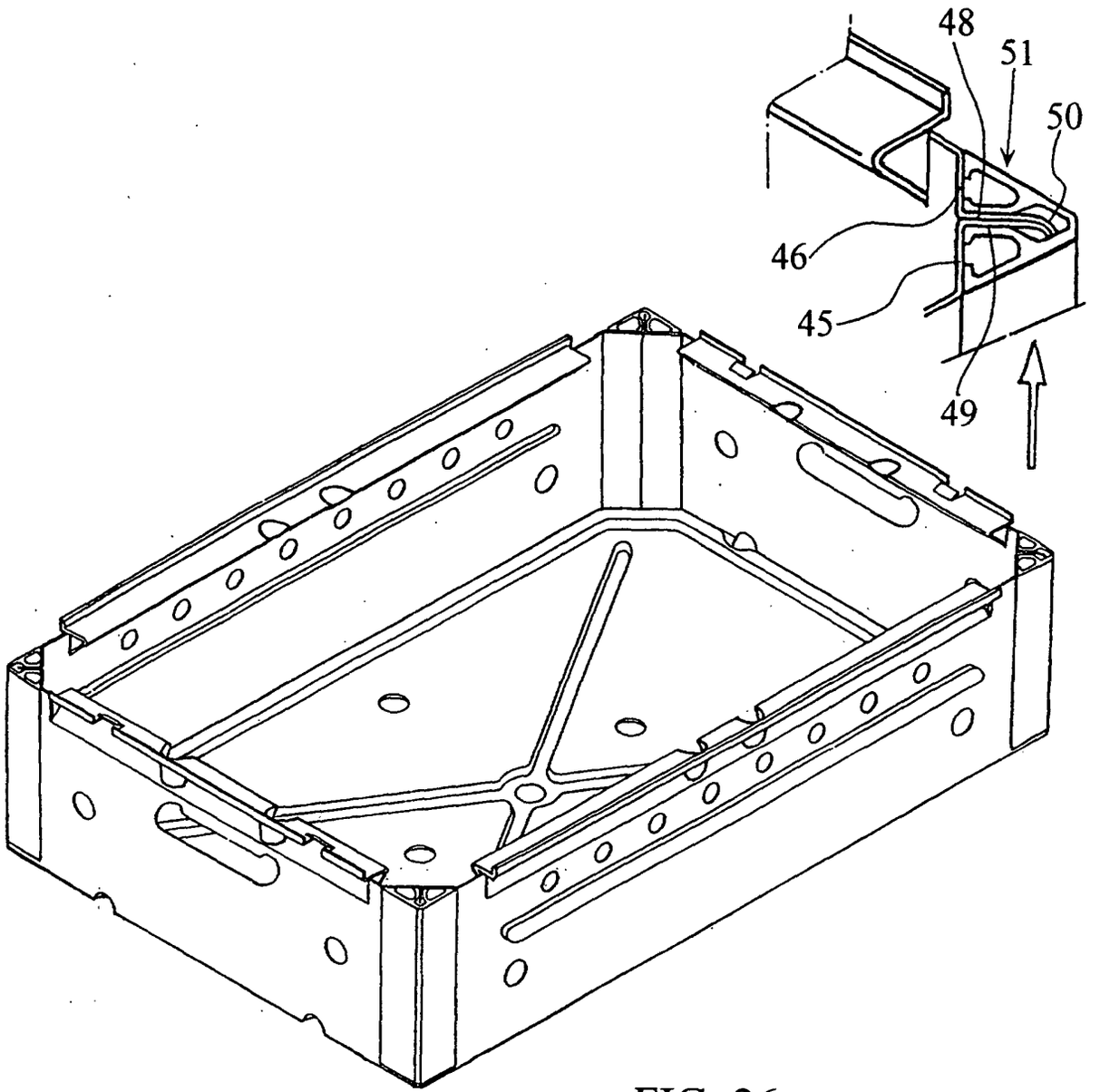

FIG. 26

FIG. 27

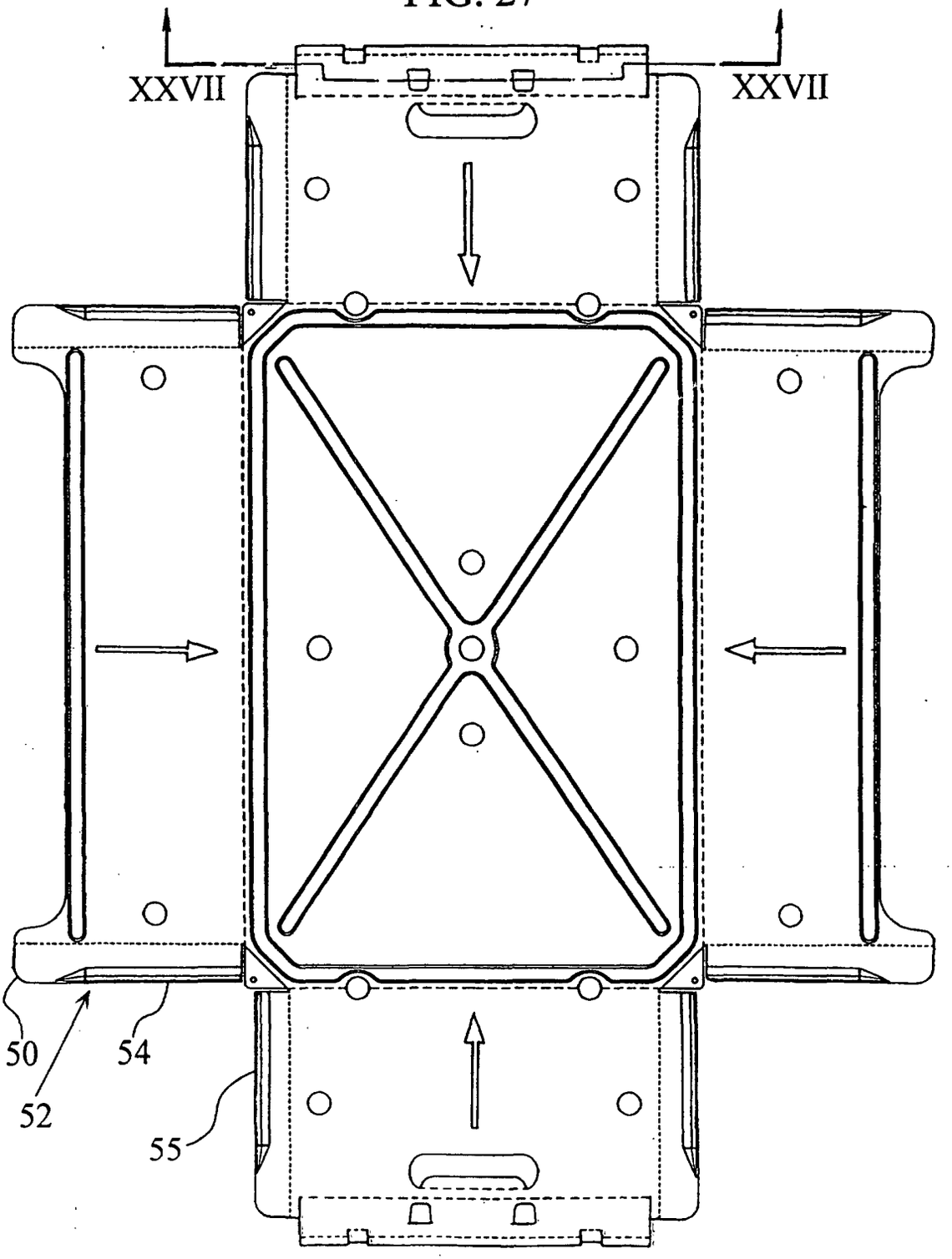

FIG. 28

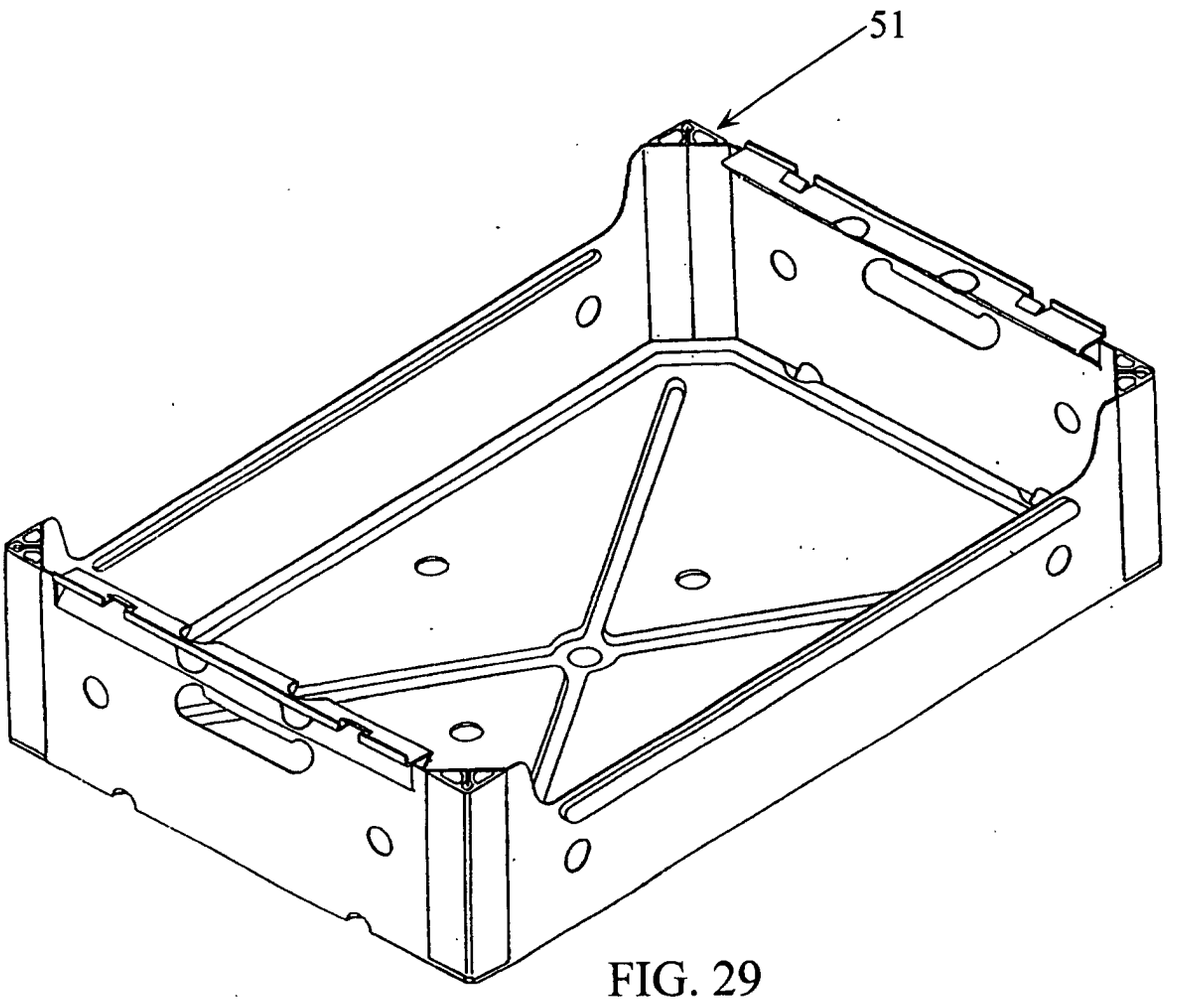

FIG. 29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 99/00051

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B65D5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65D5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, PAJ, CIBEPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 573729 A1 (Cesano, Franco) 15 December 1993 (15.12.93) column 1, lines 1-10; column 2, line 45-column 3, line12; figures 1-3.	1,2,4
A	US 4210274 A (Leonard) 1 July 1980 (01.07.80) the whole document.	1,2,6,7
A	GB 2108573 A (Unilever) 18 May 1983 (18.05.83) page 2, lines 50-55; figures; abstract.	6

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 May 1999 (24.05.99)	2 June 1999 (02.06.99)
Name and mailing address of the ISA/ S.P.T.O.	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/ ES 99/00051

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Form PCT/ISA/210 (patent family annex) (July 1992)