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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B65D 19/28

A1

(11) International Publication Number: WO 97/26197

(43) International Publication Date: 24 July 1997 (24.07.97)

(21) International Application Number: PCT/DK96/00338

(22) International Filing Date: 8 August 1996 (08.08.96)

(30) Priority Data:
0036/96 15 January 1996 (15.01.96) DK

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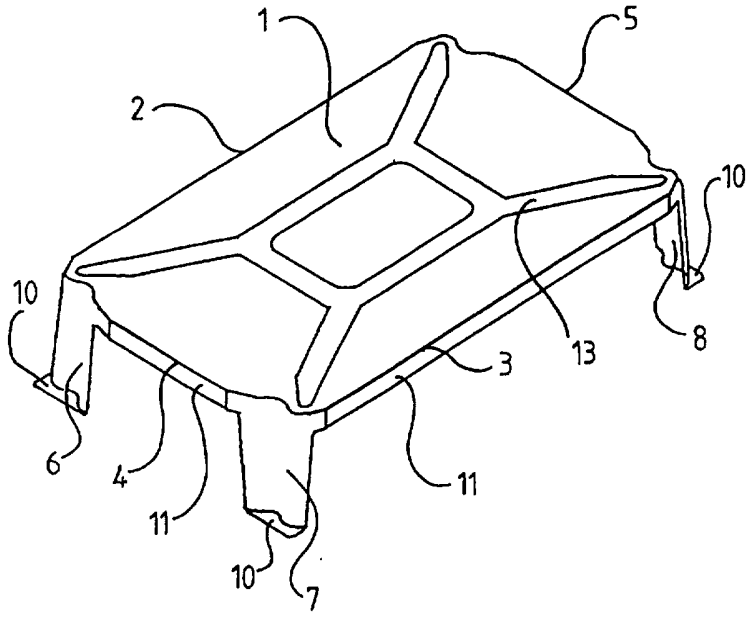
(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: PALLET



(57) Abstract

The invention relates to a single sheet pallet comprising an upwards facing loadbearing surface, the loadbearing surface having four side edges which two by two are essentially mutually parallel, four legs each of which is arranged at a respective corner of the loadbearing surface and extending downwards from this, and side flanges extending downwards from each of the four side edges. The invention further relates to an assembly comprising four such pallets, each pallet covering an area corresponding to one fourth of a standardized pallet, and further comprising a support element having a central cutout for one leg of each of the four pallets, and along the circumferential edge cutouts for the remaining three legs of each pallet, and means for connecting the support element to the pallets.

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Pallet

The invention relates to a single sheet pallet comprising an upwards facing loadbearing surface, the loadbearing surface having four side edges which two by two are essentially mutually parallel, four legs each of which is arranged at a respective corner of the loadbearing surface and extending downwards from this.

Various types of pallets are known within the area of transportation, storage and presentation of different goods.

From US patent No. 1 508 898 a pallet of the above-mentioned type is known. In this previously known construction edge portions at two apposite sides are bent downwards to form a side portion comprising legs. In order to provide a sufficient strength and rigidity of this construction it is necessary to manufacture the pallet from a sheet material having a considerable thickness, which influences the weight and, moreover, the costs of both manufacturing and transportation.

A similar construction is known from US patent No. 1 741 189. The problem relating to the strength and rigidity of the construction is realized in this later publication. In order to provide a sufficient rigidity, separate support elements are arranged between the top part and each side part of the pallet. This is a time and cost consuming operation.

Both these previously known pallets are obviously not constructed for stacking as the sides and legs extend downwards in a vertical manner.

Further previously known pallet constructions include wooden pallets and plastic material pallets.

The wooden pallets, e.g. the so-called EUR-pallets, are heavy and therefore difficult to handle. Moreover, the wooden

material inherent provides numerous dead spaces where bacteria growth can take place. As the wooden pallet is difficult to clean it is not possible to use this in connection with food products. Such pallets occupy a considerable space when stacked.

The known plastic material pallets, like the wooden pallet, are difficult to clean due to constructions including ribs in the loadbearing surface and legs also being provided with internal ribs. Due to the internal ribs in the legs these pallets like the wooden pallets, occupy a considerable space when stacked.

The wooden and the plastic material pallets as known today are not considered relevant in relation to the single sheet pallets which under almost all circumstances provide for a high hygienic standard.

The object of the present invention is to provide a single sheet pallet of the type mentioned in the introductory part of the description by which a sufficient rigidity is obtained with a reduced thickness of the sheet from which the pallet is manufactured.

According to the invention this object is obtained by a single sheet which further comprises side flanges extending downwards from each of the four side edges.

By providing sideflanges at all four sides of the pallet an improved rigidity is obtained in all load directions. This allows for the use of a reduced thickness of the material sheet used for manufacturing the pallet.

The rigidity of the construction is further increased when the legs at each side are connected to the adjacent flange. In this manner a continuous circumferential flange is formed

on the pallet, the legs of the pallet forming parts of this flange.

The legs preferably have a non-linear cross section, e.g. an S-shaped cross section. Hereby an increased second moment of area is obtained for the legs resulting in an improved rigidity of the legs. Use of a reduced thickness manufacturing material is hereby possible.

The free edge portion of at least two, preferably all, side flanges at mutually parallel side edges are preferably bent inwards so as to be essentially parallel to the loadbearing surface. This feature allows for a better and more comfortable manual handling of the pallets. Moreover, the inwards bent edge portions provide a supporting surface towards pallet lifting and transporting equipment and a supporting surface for stacking of the pallet on a subjacent pallet.

The legs are preferably inclined downwards and outwards from the loadbearing surface in order to allow a stacking of several pallets. Hereby the angle of inclination preferably is so that the inwards bent edge portions of the side flanges of one pallet abut on the loadbearing surface of a second subjacent pallet without any contact between the legs of the two pallets. This means that the height of the side flange defines the minimum angle of inclination. This pallet construction allows for a compact stacking of pallets according to the invention. A pallet placed on top of a subjacent pallet will only add the height of the side flange to the total height of the stack.

A support part is preferably provided at the lower end of each leg.

In a preferred embodiment this support element is constituted by an outwards bent end portion of the leg.

The loadbearing surface of the pallet is preferably provided with corrugations or impressions in order to obtain a profile with an improved rigidity.

The pallet according to the invention is preferably manufactured with dimensions corresponding to a quarter of the area of the standardized pallet, e.g. a so-called EUR-pallet, which measures 1200 x 800 mm. Other standard pallet sizes are used in e.g. the USA or GB. The quater-pallet is used in e.g. supermarkets, in order to transport and present a limited amount of goods in the sales area.

This means that the quarter-pallet corresponding to the EUR-standard measures 600 x 400 mm. In this connection it is of particular importance that the projection of the pallet falls within these measures, hereby assuring that four of these pallets require the same area as a standardized full size pallet. Further it is required that the side edges of the pallet extend to the requested dimension. This means that the legs in order to extend downwards and outwards from the loadbearing surface must extend from an edge within the outer rectangular dimension. Hereby the lower part of the leg or the optional support part at the lower part of the leg still falls within the rectangular quater-pallet dimension.

Standard pallet lifting and transporting equipment requires a certain width between the legs of the pallet and a certain height to the support edge or surface to abut on the lifting and transporting equipment. By a quater-pallet the legs therefore are arranged at the shorter sides of the pallet bearing a sufficiently wide space at the longer sides to allow a lifting and transporting apparatus to be introduced under the pallet from this side.

A further object of the invention is to provide for a simple and efficient handling of the pallets according to the invention.

The invention therefore further relates to an assembly comprising four pallets according to the invention, each pallet covering an area corresponding to one fourth of a standardized pallet, the assembly further comprising

- a support element having a central cut-out for one leg of each of the four pallets, and along the circumferential edge cut-outs for the remaining three legs of each pallet, and

- means for connecting the support element to the pallets.

Hereby it is possible to handle an assembly comprising four pallets as a full size standardized pallet without arranging these pallets on a full size pallet. Hereby the one-piece full size pallet can be omitted and when necessary separate the pallets from each other by removing the support elements for subsequent individual handling of the pallets. The support element can be a metal or plastic material plate. Where the hygenic requirements are lower a wooden plate element, e.g. a plywood plate element, can be used. Such plate element may at the circumferential edge be reinforced by means of a metal band fastened to the element.

In order to allow the assembly to be transported on conveyor systems comprising rollers the assembly may further comprise at least two support rails, each arranged under one row of legs, hereby constituting continuous support planes abutting the rollers.

In the following a preferred embodiment of the pallet according to the invention will be described more detailed with reference to the drawings, wherein

Figure 1 is a perspective view of a pallet,

Figure 2 is a top view of the pallet shown in Figure 1,

Figure 3 is a side view of the pallet shown in Figures 1 and 2,

Figure 4 is an end view of the pallet shown in Figures 1 through 3,

Figure 5 is a bottom view of the pallet shown in Figures 1 through 4,

Figure 6 is an enlarged side and end view of a corner area of a pallet,

Figure 7 is an enlarged top view of a corner area of a pallet,

Figure 8 shows an embodiment with enhanced side flange rigidity,

Figure 9 shows two pallets immediately before stacking,

Figure 10 is a side view of three stacked pallets,

Figure 11 is a top view of a metal sheet for manufacturing a pallet, and

Figure 12 shows an assembly comprising four pallets.

Figure 13 is a side view of the assembly shown in figure 12.

From fig. 1 it appears that the preferred embodiment of the pallet according to the invention comprises a loadbearing upwards facing surface 1. The loadbearing surface 1 has four side edges 2, 3; 4, 5 which two by two are mutually parallel. At respective corners of the loadbearing surface 1 legs 6, 7,

8, 9 extend downwards and outwards from the loadbearing surface. The lower free end portion of each leg forms a support portion 10. From each side edge 2, 3; 4, 5 a side flange 11 extends downwards, and provides an improved rigidity of the construction. In the loadbearing surface an impression 13 has been provided. The impression comprises a central essentially rectangular part and rectininear parts which extend from the corners of this rectilinear part towards the corners of the pallet.

From figs 2 and 7 it appears more clearly that the legs in cross section are double curved, e.g. are formed with an S-shape. In this context the wording "double curved" is to be understood as being convex or concave seen from both sides. From fig. 7 it appears that the leg 7 extends downwards from the loadbearing surface along a curved line which innermost limitations are indicated by a dotted line 16. Since the construction due to the load imparted thereon in this area will be influenced by considerable forces it is of importance that the impression 13 extends beyond this imaginary line in order to provide an improved rigidity of the construction in this area.

Figs 3 and 4 show the pallet seen from the side and the end, respectively.

From fig. 5, which shows the pallet seen from below, the inwardly bent edge portions of the side flanges appear. As previously explained, these edge portions provide for an improved manual handling and moreover serve as support portions when a pallet is lifted and transported by means of a transporting device.

Fig. 8 shows a modified pallet where impression 17 has been made in the side flange 11 and at the same time in the loadbearing surface 1 and the inwardly bent portion 12, in order to improve the rigidity of the side flange in the

transversal direction towards and away from the opposed side flange. However, the impression does not necessarily include an impression in the loadbearing surface or the indwardly bent portion as a sufficient rigidity can be obtained by making an impression in the side flange and either the loadbearing surface or the inwardly bent portion. The impression can in this case be partly spherical.

Fig. 9 shows two pallets immediately before a stacking. Fig. 10 shows three stacked pallets. It is clear that a pallet placed on top of a subjacent pallet only adds the height of its side flange to the total stack height.

Fig. 11 shows a sheet 14 for manufacturing a pallet according to the invention. The pallet is indicated in a topview by a dotted line.

Fig. 12 shows an assembly comprising four pallets according to the invention. The four pallets are for the sake of clarity indicated by dotted lines. The side edges abut opposed side edges of adjacent pallet hereby providing a continuous loadbearing surface only interrupted in the leg area. A support element 15 in the form of a plate 15, having a central cutout 18 and further cutouts 19 along the circumference. From fig. 13 it appears that the support element 15 abuts the inwardly bent lower portion of the side flanges. The support element is secured by connecting means, e.g. a strap.

C l a i m s

1. A single sheet pallet comprising:

- an upwards facing loadbearing surface, the loadbearing surface having four side edges which two by two are essentially mutually parallel,

- four legs each of which is arranged at a respective corner of the loadbearing surface and extending downwards from this,

c h a r a c t e r i z e d in further comprising

- side flanges extending downwards from each of the four side edges.

2. A pallet according to claim 1, c h a r a c t e r i z e d in that the legs at each side are connected to an adjacent side flange.

3. A pallet according to any one of claims 1 or 2, c h a r a c t e r i z e d in that the legs have a non-linear cross section, e.g. an S-shaped cross section.

4. A pallet according to any one of the claims 1 through 3, c h a r a c t e r i z e d in that a free edge portion of at least two, preferably all, side flanges at mutually parallel side edges are bent inwardly so as to be essentially parallel to the loadbearing surface.

5. A pallet according to any one of claims 1 through 4, c h a r a c t e r i z e d in that the legs extend in an inclined manner downwards and outwards from the loadbearing surface.

6. A pallet according to any one of claims 1 through 5, c h a r a c t e r i z e d in that each leg at its lower end has a support part.

7. A pallet according to any one of claims 1 through 6, c h a r a c t e r i z e d in that the loadbearing surface comprises corrugations and/or impressions.

8. A pallet according to claim 7, c h a r a c t e r i z e d in that at least one corrugation or impression (13) extends beyond a line (16) between the outer upper corners of each leg.

9. A pallet according to any one of claims 1 through 8, c h a r a c t e r i z e d in being manufactured from a single sheet of formable material, preferably a metal sheet, such as a steel plate, an aluminum or aluminum alloy plate, a composite material plate or the like.

10. An assembly comprising four pallets according to any on of claims 1 through 9, each pallet covering an area corresponding to one fourth of a standardized pallet, c h a r a c t e r i z e d in further comprising

- a support element having a central cut-out for one leg of each of the four pallets, and along the circumferential edge cut-outs for the remaining three legs of each pallet, and

- means for connecting the support element to the pallets.

11. An assembly according to claim 10, c h a r a c t e r i z e d in comprising at least two support rails each arranged under a row of pallet legs.

12. A support element for an assembly according to claim 10 or 11, c h a r a c t e r i z e d in being constituted by a plate element

- having a central cut-out for one leg of each of the four pallets, and along the circumferential edge cut-outs for the remaining three legs of each pallet.

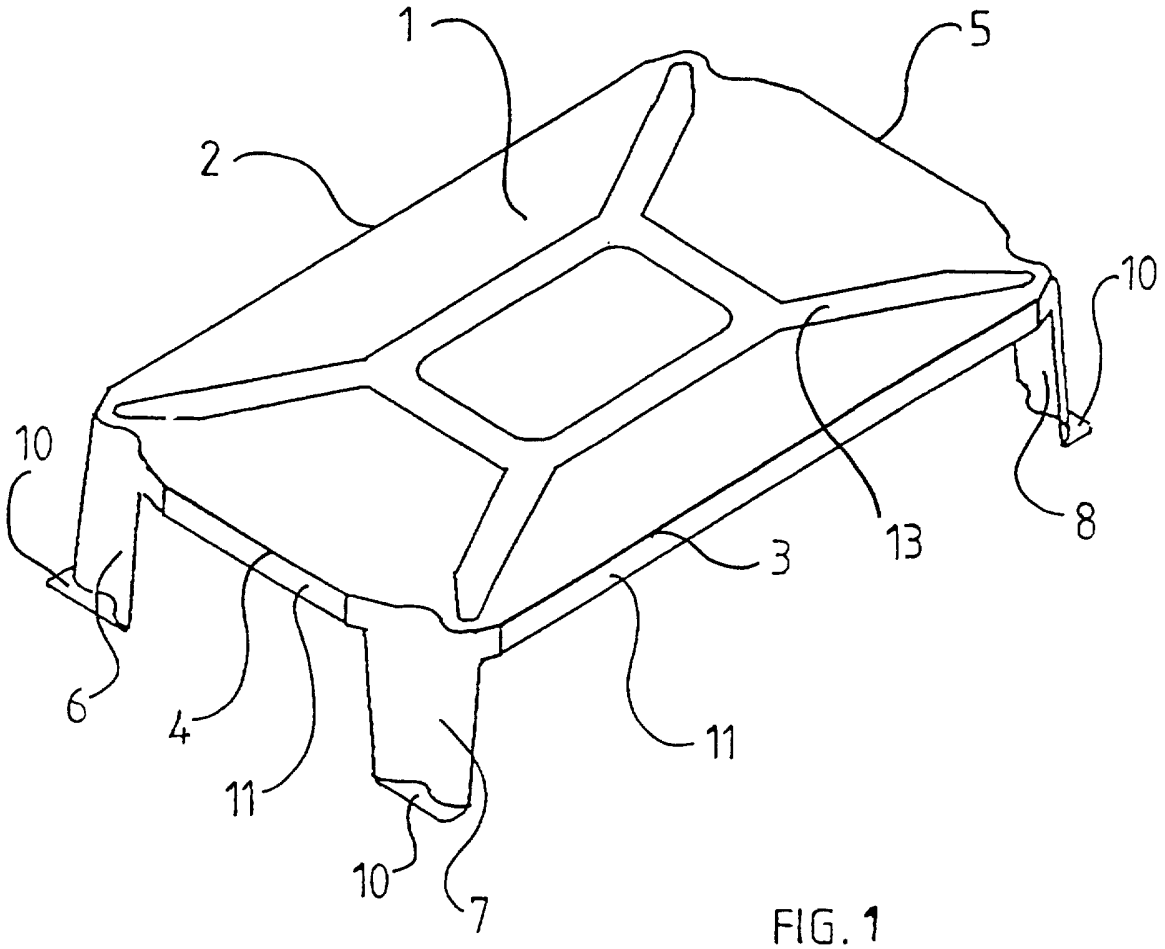

FIG. 1

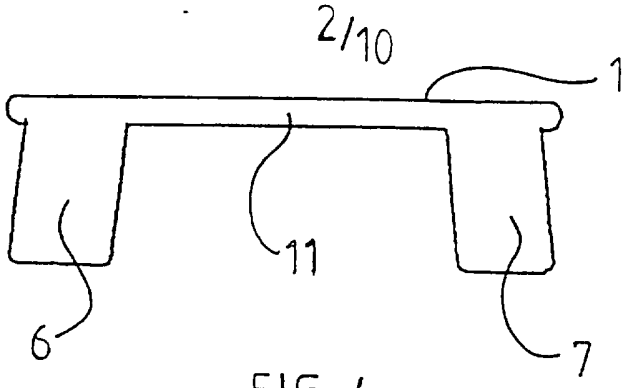

FIG. 4

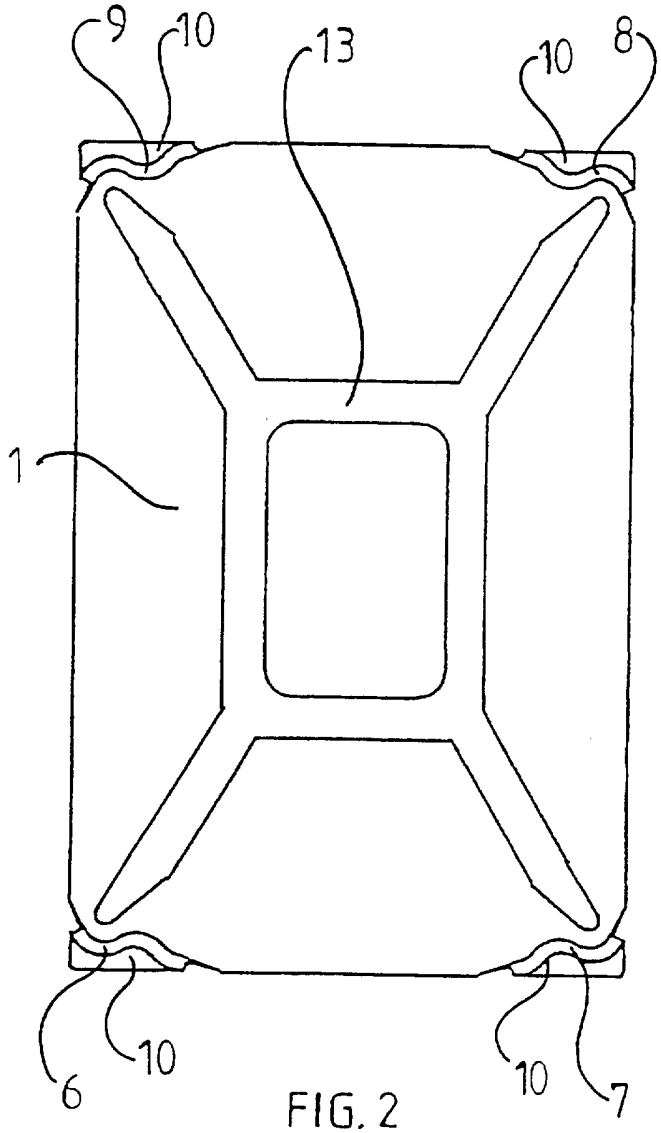

FIG. 2

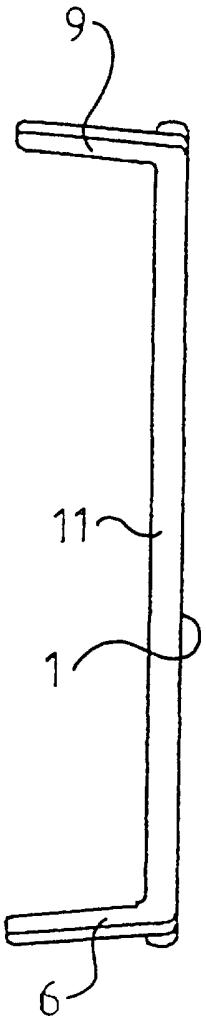

FIG. 3

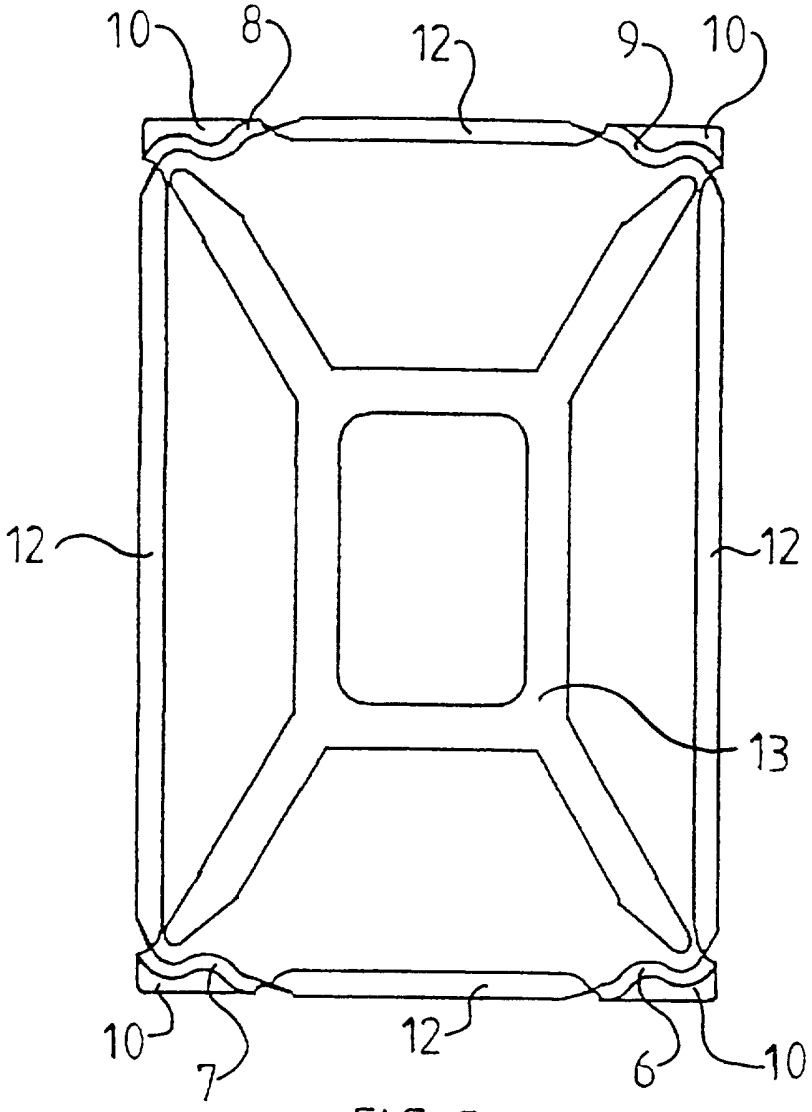

FIG. 5

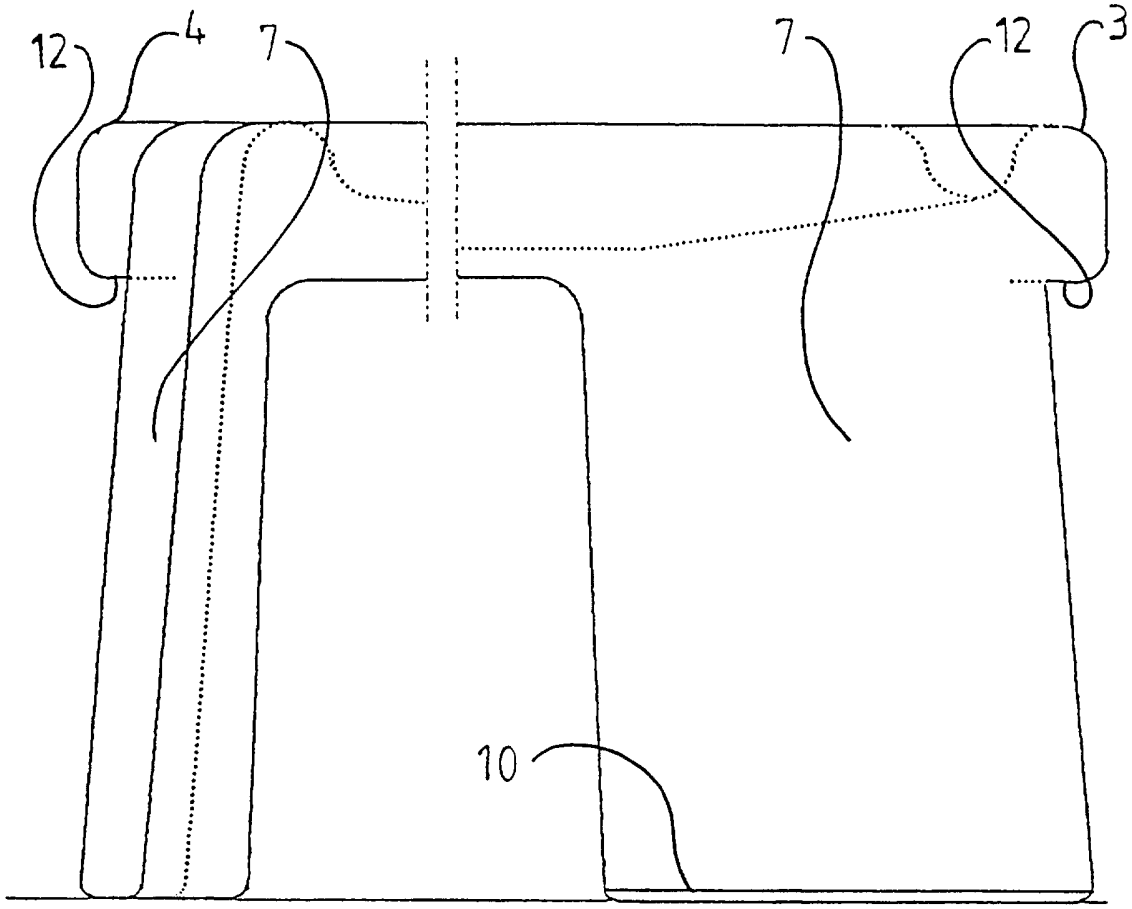

FIG. 6

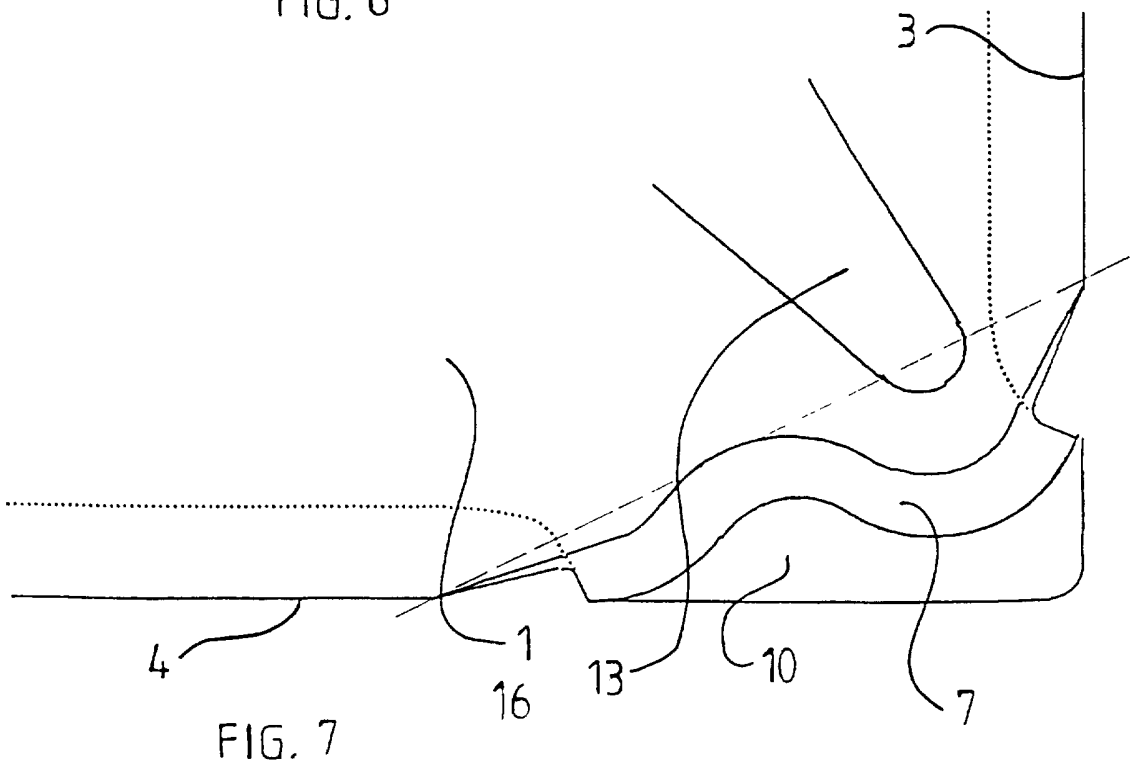

FIG. 7

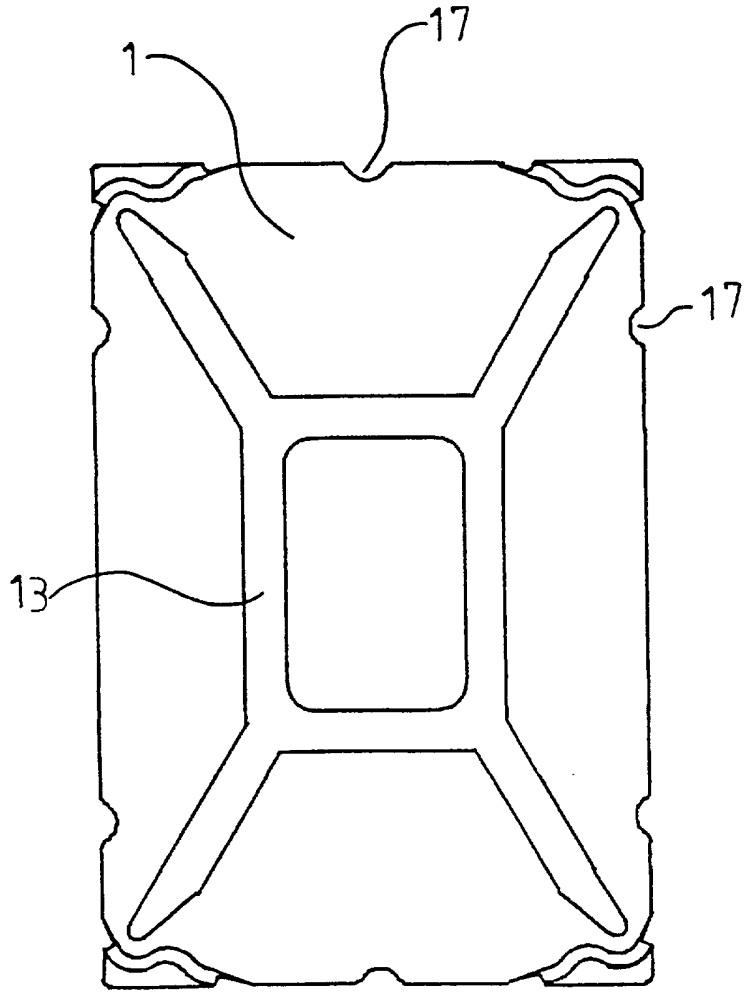

FIG. 8

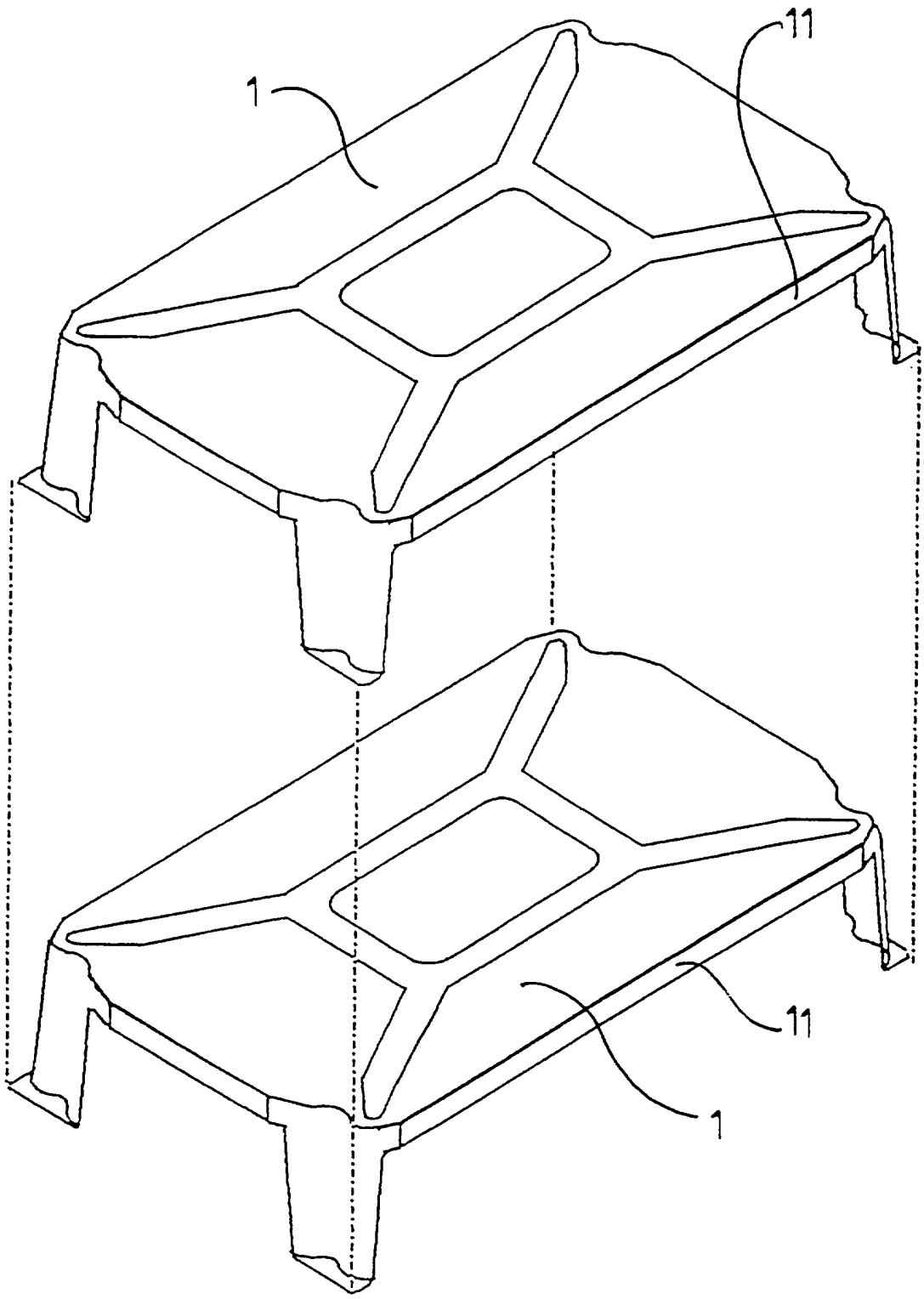

FIG. 9

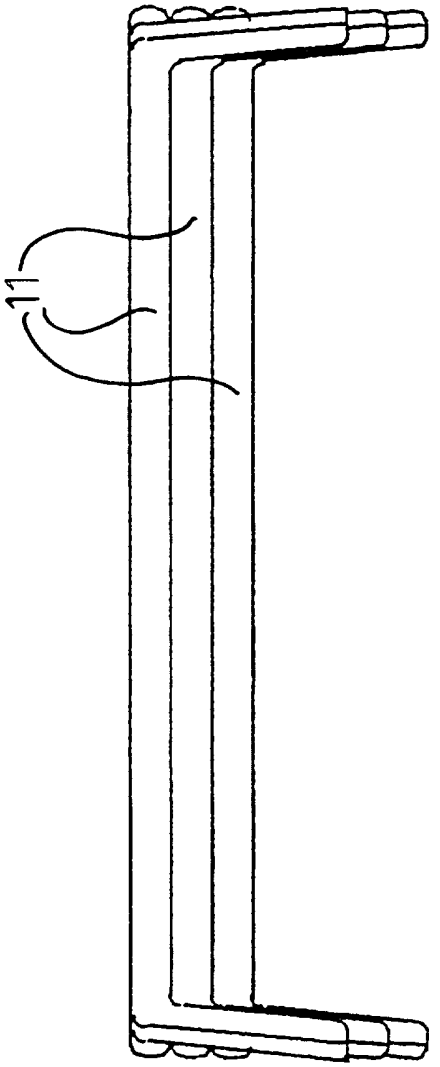

FIG. 10

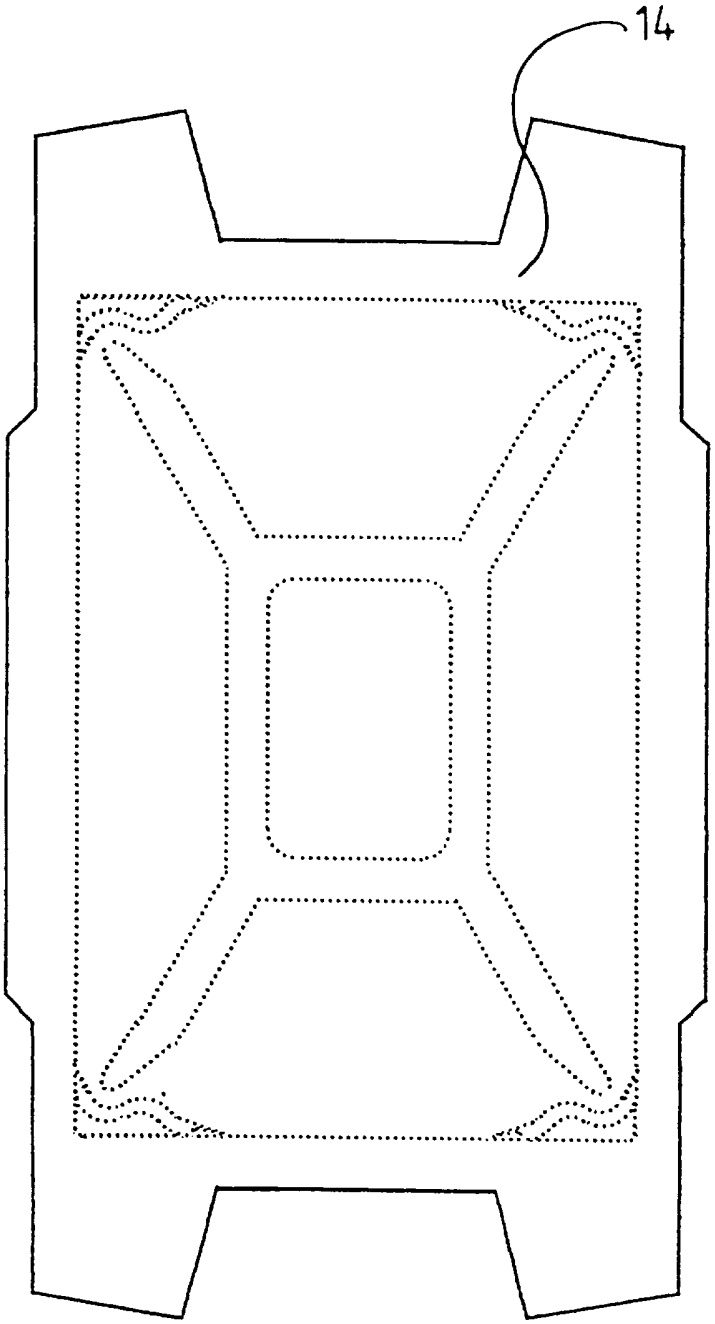

FIG. 11

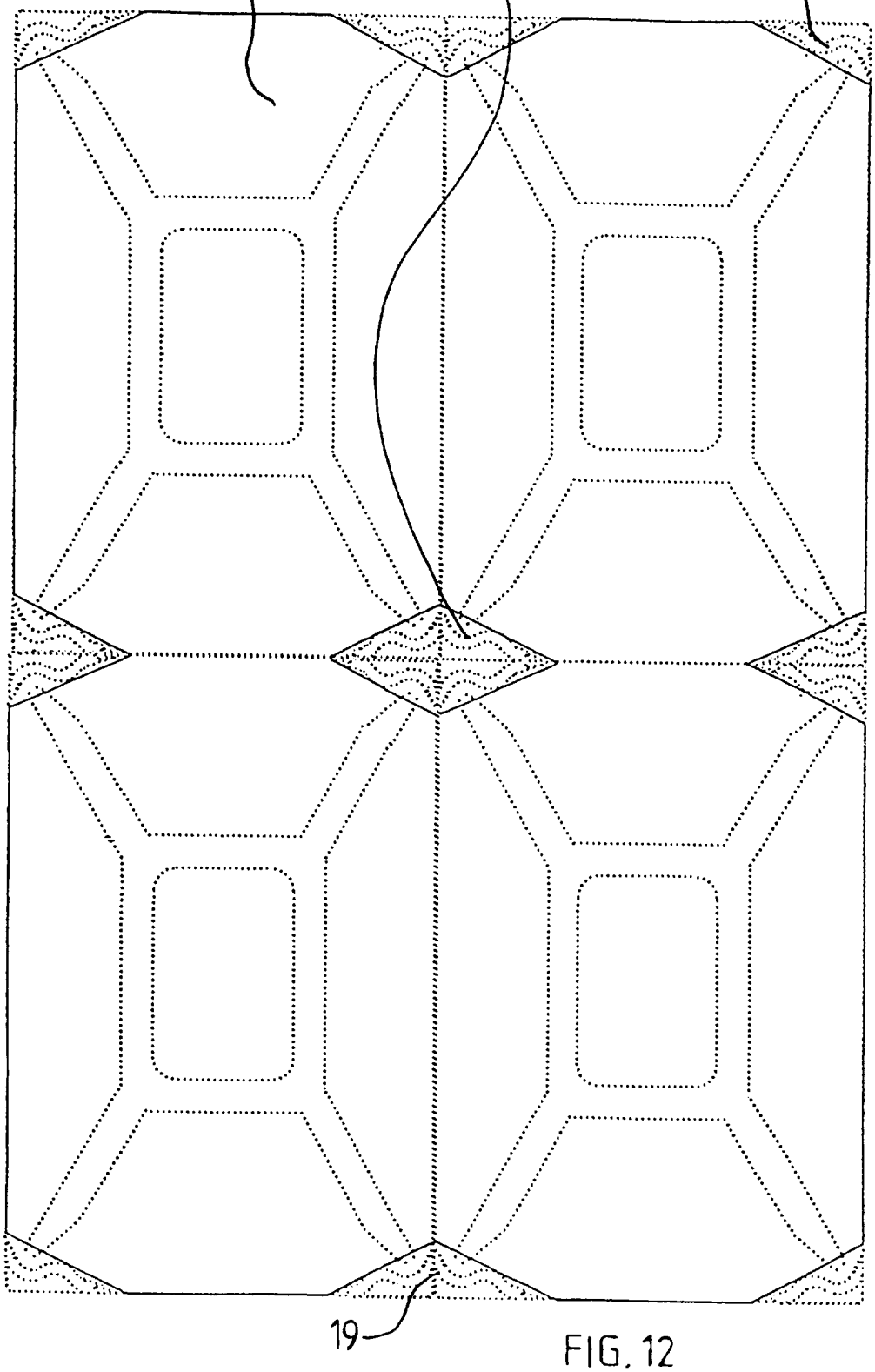

FIG. 12

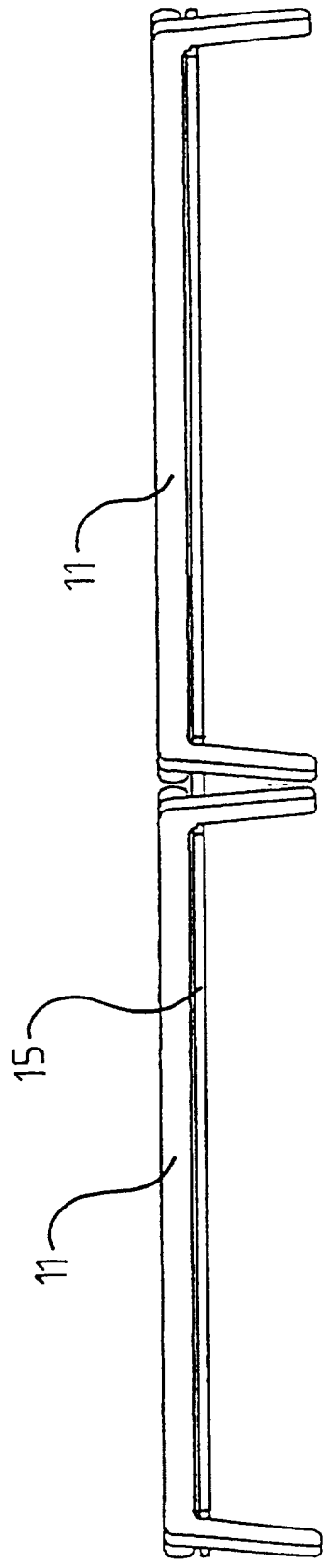

FIG.13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 96/00338

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65D 19/28
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)

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

SE,DK,FI,NO classes as above

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 1508898 A (E.H. SMITH), 16 Sept 1924 (16.09.24) --	1-9
A	US 2256750 A (E.W. RIEMENSCHNEIDER), 23 Sept 1941 (23.09.41) --	1-9
A	US 1741189 A (H.W. JENCKS), 31 December 1929 (31.12.29) -- --------	1-9

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 November 1996	21 -11- 1996
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Ulrika Öhman Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/10/96

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 1508898	16/09/24	NONE	
US-A- 2256750	23/09/41	NONE	
US-A- 1741189	31/12/29	NONE	