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(54) Storage and/or transit stacking of articles

(57) A thermoformed topping-off tray (4) of a bottle-stack (Figure 1) has rows of recesses (8) in its under-surface (6) for receiving respectively the tops of the bottles (1) of the uppermost array of the stack. The tray (4) is strengthened by parallel ribs (10) that are upstanding from its upper-surface (5) throughout the row-lengths. Each rib (10) is configured by a deep channel (11) that is moulded into the under-surface (6) of the tray (4) to cut centrally through the recesses (8) of its row. The channels (11) are deeper than the recesses (8) so as to give the ribs (10) unbroken continuity through the recess locations (12). The flanks (9) of the recesses (8) flare down into the recesses (8) to assist with nesting the tray (4) down onto the bottles (1).

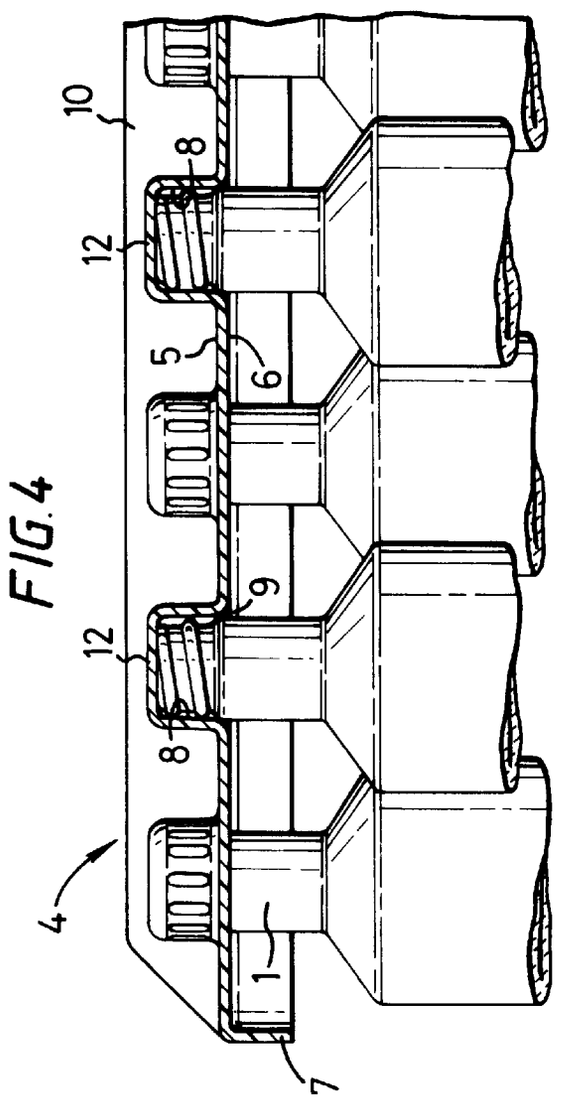

FIG.4

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Description

This invention relates to storage and/or transit stacking of bottles or other articles, and to trays for use therein.

The invention is concerned especially with the stacking of bottles or other articles in a stack of the kind (hereinafter referred to as of "the kind specified") in which the articles stand upright side by side with one another in a plurality of arrays with the arrays stacked one upon the other on individual trays, and the tops of the articles of the uppermost array are engaged within socket recesses in the under-surface of a further tray that tops off the stack. An example of the stacking of bottles in this way is described in GB-A-2240326.

In the bottle stacking described in GB-A-2240326, the same form of tray is used for topping-off the stack as for the trays on which the bottles stand. This has significant advantage, but there are circumstances in which enhanced rigidity is required of the uppermost tray, and it is an object of the present invention to provide for this.

According to one aspect of the present invention there is provided a stack of the kind specified, wherein the topping-off tray is of a moulded-sheet form and the socket recesses are intersected in the tray under-surface by elongate channels that are deeper than the recesses such that the channels configure upstanding ribs on the tray upper-surface that are unbroken in longitudinal continuity at the recess locations.

According to another aspect of the invention there is provided a tray for topping off a stack of bottles or other articles, wherein the tray is of a moulded-sheet form having socket recesses in its under-surface to engage with the tops of the articles standing side by side with one another in the uppermost array of the stack, and the socket recesses are intersected in the tray under-surface by elongate channels that are deeper than the recesses such that the channels configure upstanding ribs on the tray upper-surface that are unbroken in longitudinal continuity at the recess locations.

The topping-off tray referred to in both of the preceding paragraphs may have a down-turned peripheral rim, and may be of thermoformed sheet-plastics. The socket recesses may each have a surrounding flank that flares down into the respective recess to assist with nesting the topping-off tray down onto the tops of the articles. Furthermore, the channels may be substantially parallel to one another, and may each run unbroken in longitudinal continuity substantially the full length of the tray.

A stack of bottles including a topping-off tray in accordance with the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows the stack of bottles according to the invention;

Figures 2 and 3 are plan views from above and below, respectively, of part of the topping-off tray of the stack of Figure 1; and

Figures 4 and 5 are sectional side elevations of the topping-off tray of the stack, the sections of Figures 4 and 5 being taken on the lines IV-IV and V-V, respectively, of Figure 2.

Referring to Figure 1, three hundred identical glass bottles 1 are loaded together on a wooden pallet 2 to stand upright side by side with one another in five rectangular arrays of five rows each, that are stacked one upon the other. Five identical moulded-sheet trays 3 are included in the stack to locate and retain the bottles 1 together in the five arrays, and a special, sixth moulded-sheet tray 4 stands on the tops of the bottles 1 in the fifth, uppermost array, to top off the stack. The stack is bonded tightly together by bands (not shown) that encircle it from top to bottom and/or within a shrink-film envelope.

A tray 3 of the first, bottom array of the stack stands directly on the pallet 2 with the bottles 1 of that array standing upright side by side in the tray 3, and with a tray 3 of the second array standing on the tops of those bottles 1. The bottles 1 of the second array similarly stand upright in their tray 3, and a third tray 3 of the next, third array stands on them. This stacking arrangement in which each successive array of bottles 1 stands in its individual tray 3 on the array beneath, is repeated for the third to fifth arrays.

The trays 3 are each, for example, of a form as described in GB-A-2240326 so that the bottoms of the bottles 1 are located within individual sockets or recesses of the tray on which they stand, and the tops of the bottles 1 in the first to fourth arrays engage in individual, cylindrical socket recesses in the trays standing upon them. The tops of the bottles 1 of the fifth array engage in individual sockets recesses of the tray 4, and the resultant interlocking of the bottles 1 from tray to tray and array to array throughout the stack, endows the stack with a significant measure of inherent rigidity and stability.

The topping-off tray 4 is of a special form having, in particular, an enhanced rigidity as compared with the trays 3 so as to ensure that its engagement with the tops of the bottles 1 of the uppermost array is maintained during handling and transportation of the stack. The tray 4 is shown in greater detail in Figures 2 to 5 and will now be described.

Referring to Figures 2 to 5, the tray 4, is of rectangular sheet form having reciprocally configured upper- and under-surfaces 5 and 6 respectively, and a down-turned peripheral rim 7. The under-surface 6 is configured to define substantially-cylindrical recesses 8 that locate in register with the tops of the individual bottles 1 of the uppermost array. More particularly, each recess 8 is generally cylindrical to conform closely to the shaping of the bottle-top and has a surrounding flank 9 that flares down in diameter into the recess 8. The flaring down of the flanks 9 into the recesses 8 assists with the

nesting of the tray 4 on the tops of the bottles 1; as the tray 4 is pushed down onto the uppermost array, so the tops of the bottles 1 are guided positively for firm and full reception and engagement in their individual recesses 8.

Strengthening of the tray 4 to ensure that engagement of the bottle-tops within the recesses 8 is maintained throughout handling and transportation of the stack, is provided by upstanding ribs 10 on its upper-surface 5. The ribs 10, which have chamfered ends and run the full length of the tray 4, are configured by deep channels 11 that are moulded into the under-surface 6. The channels 11 run parallel to one another along respective rows, each cutting centrally through the recesses 8 of its row. The depth of the channel 11 in each case is greater than that of the recesses 8 so that the ribs 10 project above the pocket-projections 12 that are manifested on the upper-surface 5 by the recesses 8. The longitudinal continuity in this respect of the channels 11 (and correspondingly of the ribs 10) through the locations of the recesses 8, enhances rigidity of the tray 4 significantly.

In the latter respect, the ribs 10 enhance the rigidity of the tray 4 in withstanding the weight of other stacks loaded on top, but more particularly, assist in withstanding tendency of the uppermost tray to bow upwardly under vibration and shock experienced during handling and transportation of the stack. The top tray of a stack when tightly bound (for example within a shrink-film envelope) has a tendency under such shock and/or vibration to bow upwardly in the middle to an extent that may be sufficient to break its engagement with the tops of the bottles of the upper array. With the tray 4 of the present invention, however, the ribs 10 running through the top-engaging recesses 8 (rather than between them), give a continuity of strengthening along the full row-length that has been found to overcome the bowing problem to a substantial extent, in a simple and economical way. The rim 7 adds to the rigidity, especially laterally of the rows.

The tray 4 is thermoformed from a sheet of high-impact polystyrene or of a plastics material based on a blend of polystyrene and polyethylene. The sheet, which for example, may have a thickness of 2 mm, is thermoformed over a male mould to the configuration of the under-surface 6. The mould is located on a platform that has a thickness of some 18 mm so that the tray 4 is formed with the peripheral, downwardly depending rim 7 to that depth.

The closed bottom of each recess 8 (top of the pocket-projection 12) may be ridged for strength, and its cylindrical wall may be grooved axially (as indicated in Figure 5) for restraining the engaged bottle against rotation. In the latter respect, the tops of some types of bottle have one or more vertical bars which will engage with the grooving to restrain bottle rotation.

Although the bottles 1 in the example described above are empty and without closure caps, it will be appreciated that the tray described is readily adapted to the stacked storage and/or transit of filled and capped bottles.

Claims

1. A stack in which bottles or other articles (1) stand upright side by side with one another in a plurality of arrays with the arrays stacked one upon the other on individual trays (3), and the tops of the articles (1) of the uppermost array are engaged within socket recesses (8) in the under-surface (6) of a further tray (4) that tops off the stack, characterised in that the topping-off tray (4) is of a moulded-sheet form and the socket recesses (8) are intersected in the tray under-surface (6) by elongate channels (11) that are deeper than the recesses (8) such that the channels (11) configure upstanding ribs (10) on the tray upper-surface (5) that are unbroken in longitudinal continuity at the recess locations (12).

2. A stack according to Claim 1 wherein the topping-off tray (4) has a down-turned peripheral rim (7).

3. A stack according to Claim 1 or Claim 2 wherein the socket recesses (8) each have a surrounding flank (9) that flares down into the respective recess (8) to assist with nesting the topping-off tray (4) down onto the tops of the articles (1).

4. A stack according to any one of Claims 1 to 3 wherein the channels (11) are substantially parallel to one another.

5. A stack according to Claim 4 wherein each channel (11) runs unbroken in longitudinal continuity substantially the full length of the topping-off tray (4).

6. A stack according to any one of Claims 1 to 5 wherein the topping-off tray (4) is of thermoformed sheet-plastics.

7. A tray for topping off a stack of bottles or other articles (1), wherein the tray (4) is of a moulded-sheet form having socket recesses (8) in its under-surface (6) to engage with the tops of the articles (1) standing side by side with one another in the uppermost array of the stack, and the socket recesses (8) are intersected in the tray under-surface (6) by elongate channels (11) that are deeper than the recesses (8) such that the channels (11) configure upstanding ribs (10) on the tray upper-surface (5) that are unbroken in longitudinal continuity at the recess locations (12).

8. A tray according to Claim 7 having a down-turned peripheral rim (7).

9. A tray according to Claim 7 or Claim 8 wherein the socket recesses (8) each have a surrounding flank (9) that flares down into the respective recess (8) to assist with nesting of the tray (4) down onto the tops

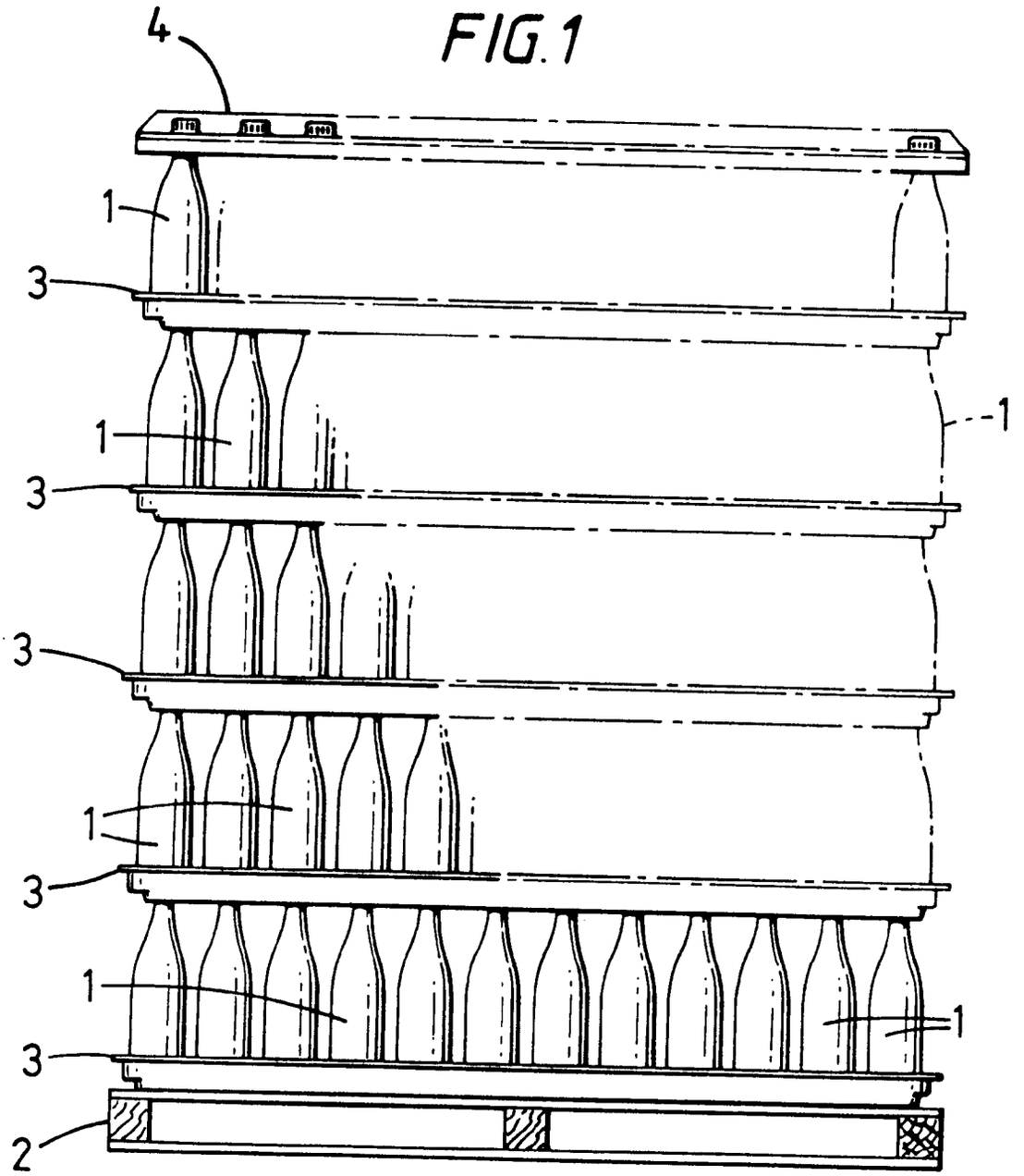
of the articles (1).

10. A tray according to any one of Claims 7 to 9 wherein the channels (11) are substantially parallel to one another.

11. A tray according to Claim 10 wherein each channel (11) runs unbroken in longitudinal continuity substantially the full length of the tray (4).

12. A tray according to any one of Claims 7 to 11 wherein the tray (4) is of thermoformed sheet-plastics.

FIG.1



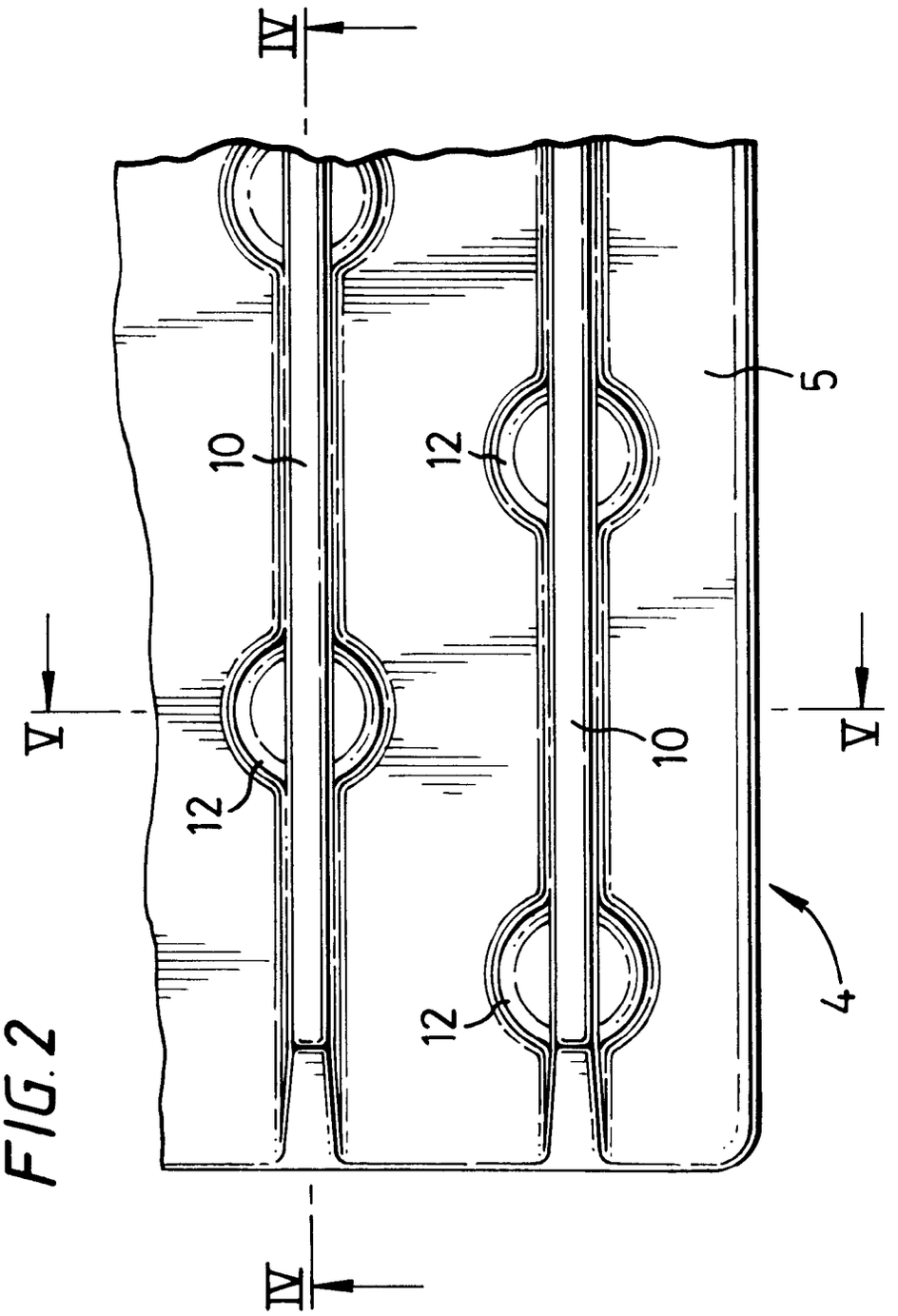
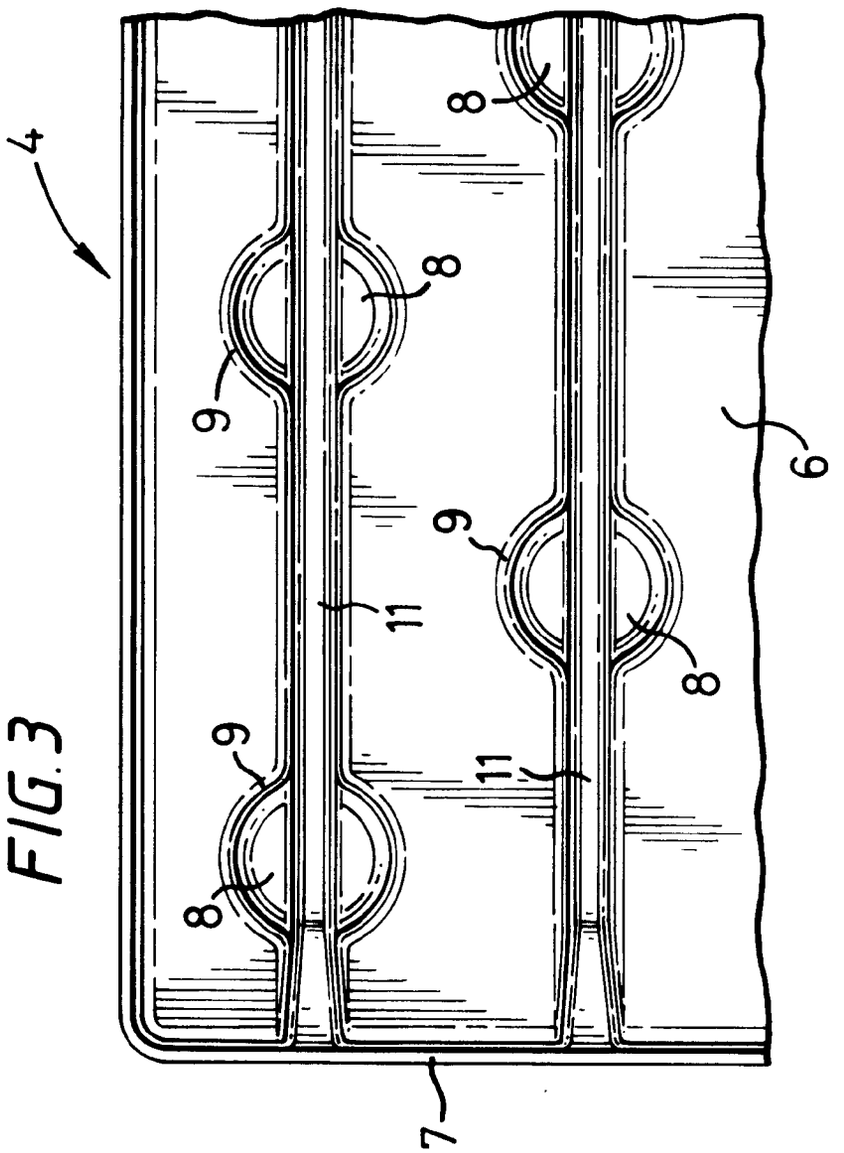


FIG.2

FIG.3



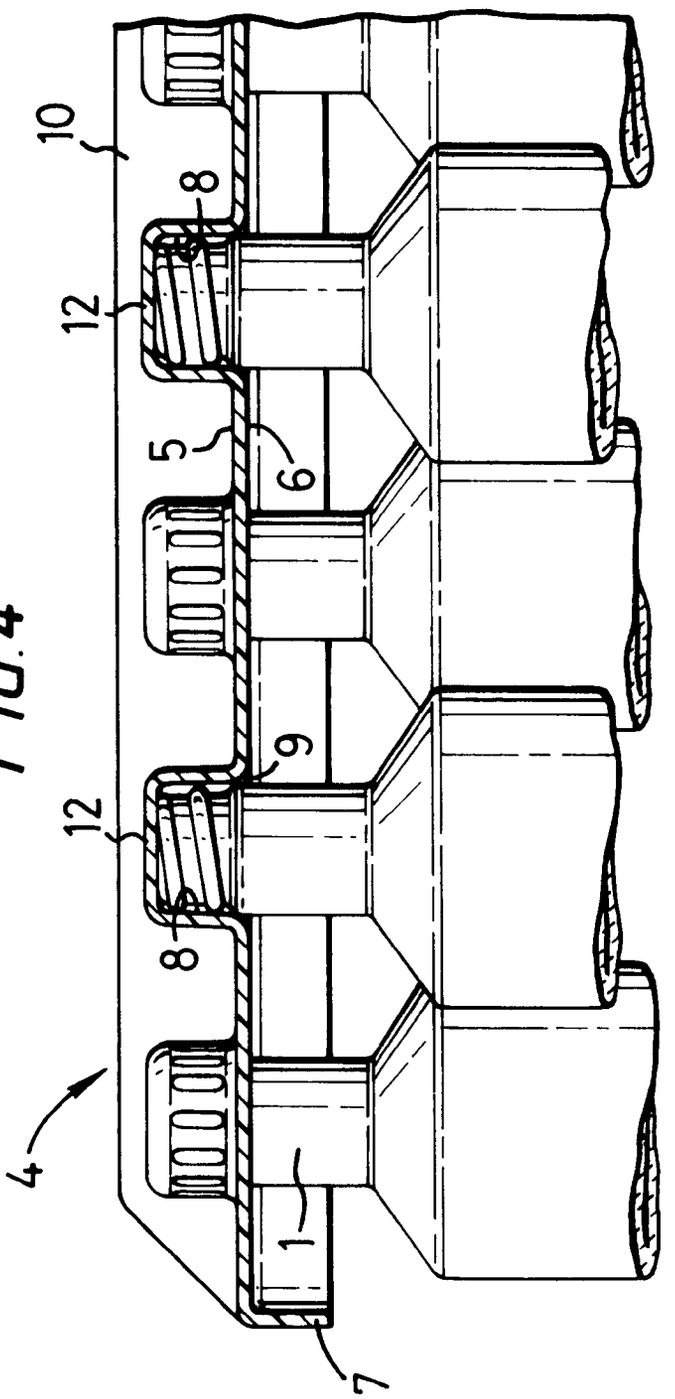
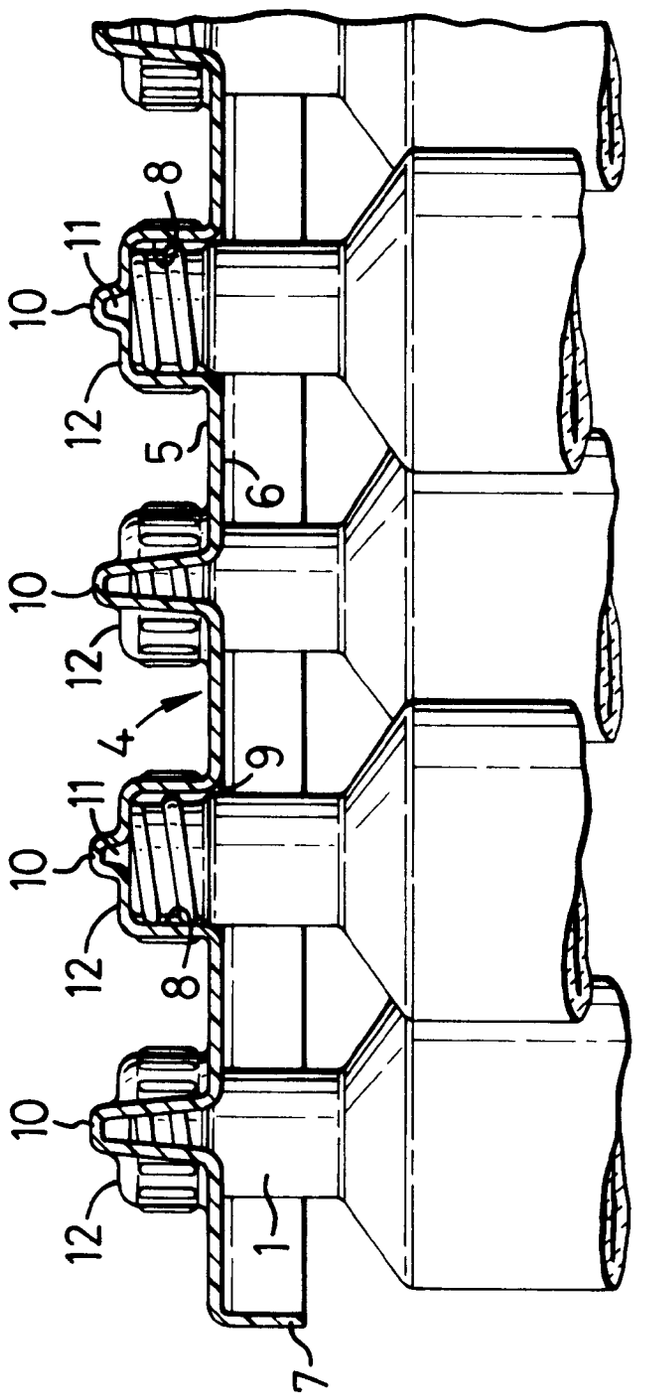


FIG.4

FIG.5



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EUROPEAN SEARCH REPORT

Application Number
EP 95 30 5046

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	FR-A-2 679 878 (SAINT GOBAIN EMBALLAGE) * the whole document *	1,2,4-8, 10-12	B65D71/00
A	US-A-3 338 406 (ANDERSON) * the whole document *	1-12	
A	US-A-4 911 300 (COLONNA) * abstract; figures *	1-12	
A	US-A-3 650 395 (HOBBS) * figures *		
A	FR-A-2 310 279 (ANIC) * figures *		
A	EP-A-0 521 705 (FORMOLD LTD) * abstract; figures *		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65D B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 November 1995	Gino, C

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