

**EUROPEAN PATENT APPLICATION**

Application number: 89303765.5

Int. Cl.<sup>4</sup>: **B65D 81/02**

Date of filing: 17.04.89

Priority: 12.05.88 GB 8811243

Date of publication of application:  
15.11.89 Bulletin 89/46

Designated Contracting States:  
AT BE CH DE ES FR GR IT LI LU NL SE

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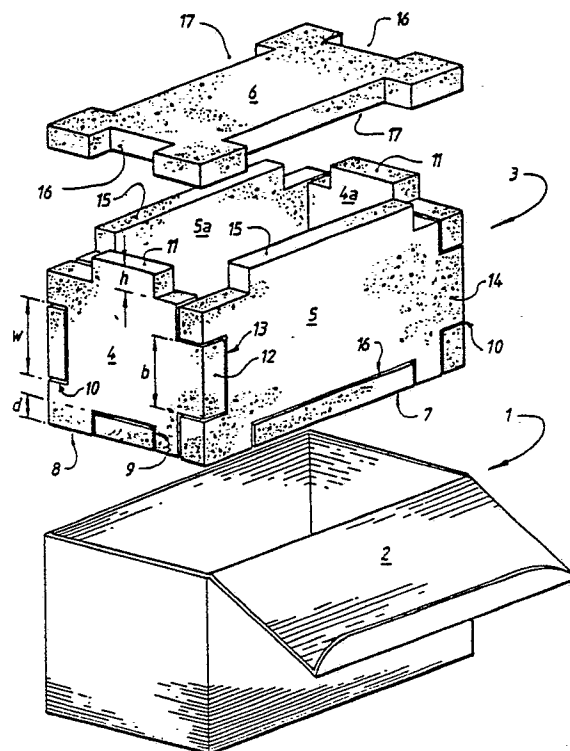
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**Improved packaging.**

There is described a package comprising an outer container (1) and a cushioning liner (3), the liner (3) being formed from a number of panels (4, 5, 6) equal to the number of faces of the container (1), and adjacent edges of adjacent panels of the liner being formed with cooperating lugs (7, 11, 12, 15) and recesses (9, 16, 10, 17). The liner is preferably of plastics foam material, and the panels are die-cut from a sheet with at least two adjacent panels (22, 23) having a common cut edge defining a lug (26) and a recess (28).

*Fig 1.*



## IMPROVED PACKAGING

The present invention relates to packaging materials, and particularly concerns the provision of shock-absorbing linings for conventional board or fibreboard boxes.

It is known in the art to provide an internal cushioning layer within a cardboard carton by bonding to the internal faces of the carton tablets of cushioning material, this bonding usually being performed prior to folding the carton blank into its final configuration.

It has also been proposed to form a liner by simply providing six rectangular sheets of cushioning material dimensioned to fit within the container, and positioning five sheets within the open container adjacent the walls and floor thereof prior to placing the contents of the container therewithin. Assembly is completed by placing the sixth sheet of material and closing the container.

The bonding of cushioning tablets to the card blank is an expensive procedure, and the use of plain rectangular sheets of cushioning material not only requires complicated assembly procedure, but also has the disadvantage that the sheets of cushioning material are not held against falling inwardly of the container.

The present invention seeks to overcome these difficulties by providing a cushioning liner for a card or board carton, or indeed for any container such as a crate, case or the like, which comprises a number of panels of a cushioning material such as foamed polystyrene, polyethylene or polyurethane which can line a parallelepipedal container and be secure against displacement from their intended positions.

According to the present invention, a lining for a container comprises a plurality of panels of cushioning material shaped to conform to the internal dimensions of the walls of the container, the adjacent edges of at least two of the panels being shaped to form a cooperating projection and recess adapted to retain the panels in their assembled position.

An embodiment of the present invention will now be described in detail with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a carton and a liner according to the present invention; and

Figure 2 shows an alternative set of panels for forming a liner.

Referring now to Figure 1, there is shown a card box 1 folded from a blank in a conventional way. The exact manner of constructing the box is immaterial, but in the embodiment shown the box 1 is of parallelepipedal form and has a hinged lid 2.

The liner according to the present invention is generally seen at 3. The liner shown is constructed from four different panel shapes: a pair of end panels 4, 4a; a pair of side panels 5, 5a; a top panel 6; and a base panel 7.

The end panels 4, 4a are generally square in shape, and are formed at their lower edges 8 with rectangular recesses 9. The left-hand side of end panel 4 (as seen in the Figure) and the right-hand side of panel 4a are formed with respective rectangular recesses 10, and the sides opposing the recesses 9 and 10 are formed with rectangular lugs 11, 12 corresponding in breadth (b) and height (h) respectively to the width (w) and depth (d) of the recesses 9 and 10. The depths of the recesses and the heights of the lugs are all arranged to be equal to the thickness of the cushioning material panels.

The side panels 5, 5a are of a similar configuration to the end panels 4, 4a except that the side panels are elongated. The right-hand vertical edge of side panel 5 is formed with a recess 13, of a size to accommodate the lug 12 of end panel 4. The opposite vertical edge of side panel 5 is formed with a lug 14 shaped to fit into the recess 10 of end panel 4a. The upper edge of side panel 5 has an elongate lug 15, and its lower edge has a correspondingly sized recess 16.

Although not apparent in the Figure, the side panel 5a and end panel 4a are shaped to correspond to side panel 5 and end panel 4 respectively.

Top panel 6 is a rectangular panel whose overall dimensions correspond to the internal length and breadth of the container 1. In each of its shorter edges, top panel 6 is formed with a recess 16 to accommodate a lug 11 of an end panel (4 or 4a), and in its longer edges recesses 17 are formed which accommodate lugs 15 of the side panels 5 and 5a respectively.

The base panel 7 is also rectangular in form, and is provided with lugs 18 and 19 on its longer and shorter sides respectively, the lugs 18 being received in recesses 16 of the side panels 5, 5a and the lugs 19 being received in recesses 9 of the end panels 4, 4a.

As may be appreciated from the Figure, the panels of the liner interlock in their assembled positions, thus preventing any of the panels from being displaced inwardly by an impact or other force acting on the outside of the container 1.

In use, the package may be supplied to a customer in one of two forms: either as a flat card blank and a set of lining panels, or as a fully assembled lined carton.

In the first case, the packer will first fold the

card blank to form box 1, leaving hinged lid 2 open. The base panel 7 of the liner is then placed into the box, to line the bottom.

The packer then assembles the end and side panels into a rectangular array and slides them into the box 1 so that the lugs of the base panel 7 enter the recesses 9, 16 at the lower edges of the end and side panels respectively. The contents of the package are then placed in the box, top panel 6 placed in position and the lid 2 closed.

It is clearly possible to produce liners in which the interdigitating lugs and recesses between the top panel and the end and side panels, and between the base panel and the end and side panels, are omitted. In such an embodiment, the top panel 6 and the base panel 7 will be rectangular sheets of cushioning material with a width and length corresponding to the interior dimensions of the box 1. The upper and lower edges of the end and side panels will be straight lines, and the vertical dimension of the end and side panels will be the vertical internal dimensions of the box less the combined thickness of the top and base panels.

It is also envisaged that, in the second case, the package will be supplied to the packer ready assembled as a closed lined box. The packer will then open the hinged lid 2 of the card box 1 and will remove top panel 6 of the lining. The contents will then be placed in the lined box, and top panel 6 replaced and the lid 2 closed.

The invention also encompasses a method of producing a liner, which will now be described with reference to Figure 2.

Figure 2 shows the outlines of six panels suitable for cutting from a sheet of cushioning material an assembly to form a liner for a parallelepipedal container whose internal dimensions are L (length), H (height) and B (breadth).

In this embodiment, the liner comprises four wall panels 20, 21, 22, 23, a base panel 24 and a top panel 25.

Each wall panel 20, 21, 22, 23 is generally rectangular in shape, with respective opposite shorter edges formed with a lug 26 and a corresponding recess 27. The depth of the recesses 27 and the height of the lugs 26 correspond, as in the previous embodiment, to the thickness of the cushioning material sheet from which the panels are cut.

The top panel 25 and base panel 24 are rectangles whose overall dimensions correspond respectively to the length L and breadth B of the assembled liner.

The panels 20 - 25 may be formed separately, or may be cut simultaneously from a single sheet to form a panel array such as that shown. Advantageously the panels are cut in a die-cutting operation which forms the panels but leaves at least two

panels in an interlocked configuration. Most preferably, the set of panels required to form a complete liner are formed together and leave the forming machine as a single unit, with the wall panels interlocking at three adjacent edge pairs.

In the die cutting operation preferred, a sheet of cushioning material such as polystyrene, polyurethane or polyethylene foam is placed on the stationary platen of a press, and a movable platen equipped with an array of blades is brought towards the fixed platen. Alternatively, the blade array may be arranged on a stationary platen and the cushioning material may be moved towards the blade array by a moving platen.

The blades penetrate the cushioning material and cut the requisite panel shapes therefrom. An advantageous feature of this process is that it allows the cutting depth to be selected so that the panels may be completely separated, or a thin frangible bridge may be left holding the panels of a set together. More than one set of panels may be formed at a single operation, depending of course on press capacity and the sizes of the panels.

Returning to Figure 2, a panel array is shown as it is formed in a die-cutting operation. Due to the resilience of the material, the cuts made by the blades close up after withdrawal of the blades, allowing the lugs 26 of panels 21, 22 and 23 to be gripped by the end faces of the recesses 27 of panels 20, 21 and 22 respectively. This facilitates the assembly of the liner, since adjacent wall panels tend to pivot about an axis passing through the end faces of the recess 27 and its respective cooperating lug 26, allowing the four wall panels 20, 21, 22, 23 to be simply brought into a tubular configuration by utilising this pivoting action to bring each wall panel to a perpendicular position relative to its neighbours. Lug 26 of wall panel 20 is inserted into recess 27 of wall panel 23 to complete the formation of the "tube".

To assemble a package using the liner panel array shown in Figure 2, a carton such as that referenced 1 in Figure 1 is first assembled from a blank.

The array of liner panels is then taken and, if necessary, base panel 24 and top panel 25 are separated therefrom by breaking frangible bridges attaching them to wall panels 20 and 22 respectively. Base panel 24 is then placed within the carton.

Next, the wall panels 20, 21, 22, 23 are formed into a rectangular "tube" as described above, and are slid into the carton to rest on base panel 24. It is noted that if wall panels 20 to 23 are joined by frangible bridges, these will rupture when the "tube" is formed. The contents of the carton are then placed therein, and top panel 25 laid to rest on the exposed upper edges of the wall panels.

The carton is then closed.

It is readily appreciable that the wall panels 20 to 23 have a distance D between their straight edges that is equal to the internal height H of the carton less twice the thickness of the cushioning material sheet.

Clearly, the liner may be supplied either as part of a complete package, or may be supplied as an array of panels joined together by frangible bridges for the packer to assemble and insert within a carton of his own manufacture.

To assist in the pivoting action the cutting operation may leave frangible connecting bridges between adjacent panels of a liner. This will also facilitate handling of the liner panel sets as all the panels necessary for a liner will be kept together.

While in each embodiment shown, each castellated panel edge has only one lug or recess, it is within the scope of the present invention to provide a plurality of lugs and/or recesses on each such panel edge.

In each of the embodiments shown, the cooperating lug and recess of each adjacent panel edge pair has been centrally positioned in relation to their respective edges. It is equally possible to position the lug and recess at an eccentric position along the panel edges, even to the extent that the panel edge is simply stepped to provide each edge with two parallel edge positions joined by a step whose height is equal to the panel thickness.

While the specific shapes of liner described are both parallelepipeds, it is foreseen that other shapes of carton and liner are possible, for example hexagonal or octagonal prisms, pyramids, tetrahedra, dodecahedra, etc. It is also foreseen that the outer container may be a sheet of heat-shrinkable material placed about an assembled set of liner panels and heat treated to hold the liner panels in place.

## Claims

1. A polyhedral package comprising an outer container having a number of faces and a liner formed from a like number of panels of a cushioning material, each panel positioned adjacent the interior surface of a face of the container, and each panel corresponding in overall dimensions to that face of the container, and wherein adjacent edges of at least one pair of adjacent panels are formed with a cooperating lug and recess.

2. A package as claimed in Claim 1, wherein respective adjacent edges of each adjacent panel pair are formed with a cooperating lug and recess.

3. A package as claimed in Claim 1 or Claim 2, wherein the height of the lug or lugs and the depth of the recess or recesses is equal to the thickness of the panels.

4. A package according to any preceding Claim wherein a plurality of cooperating lugs and recesses are formed along the adjacent edges of the or each panel pair.

5. A package according to any preceding Claim wherein the number of faces and panels is six.

6. A package according to Claim 5, wherein four of the panels are identical in shape.

7. A package according to Claim 5 or Claim 6, wherein two of the panels are rectangular in shape and correspond in length and width to the internal length and width of the container, and the remaining four panels each have a first pair of parallel straight edges separated by a distance equal to the internal height of the container less twice the panel thickness, and a second pair of parallel edges in one of which is formed a recess and on the other of which is formed a lug.

8. A liner for a polyhedral container comprising a number of panels corresponding to the number of faces of the container, each panel having overall dimensions substantially equal to those of the internal surface of a respective face of the container, and at least one pair of panels being formed at their respective edges adjacent in the assembled state with a cooperating lug and recess.

9. A liner as claimed in Claim 8, wherein each pair of adjacent edges of each pair of adjacent panels is formed with a cooperating lug and recess.

10. A liner as claimed in Claim 8 or Claim 9, wherein a plurality of lugs and recesses are provided along the or each adjacent pair of panel edges.

11. A liner according to any of Claims 8 to 10, wherein the panels are formed from polystyrene, polyethylene or polyurethane foam sheet material.

12. A method of forming a liner as claimed in Claims 8 to 10, wherein

a) a sheet of cushioning material is placed on a first platen of a press

b) a second platen of the press is provided with an array of blades, so that relative approximation of the platens causes the blades to cut the sheet to form the individual panels, the arrangement of blades being such that at least two of the panels which will be adjacent in the assembled liner are cut from adjacent portions of the sheet, and have a common edge defining a lug and a recess on the respective panels

c) separating the first and second platens, and

d) removing the cut panels from the press.

13. A method as claimed in Claim 12, wherein the first platen is fixed and the second platen is moved relatively thereto.

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14. A method according to Claim 12, wherein the second platen is fixed and the first platen is moved relatively thereto.

15. A method according to any of Claims 12 to 14, wherein the blades completely sever the material of the sheet.

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16. A method according to any of Claims 12 to 14, wherein the blades only partially sever the sheet, leaving frangible bridges between the panels of a liner.

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17. A method according to any of Claims 12 to 16, wherein the sheet of cushioning material is of polystyrene, polyurethane or polyethylene foam.

18. A package substantially as herein described with reference to Figure 1 of the accompanying drawings.

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19. A liner for a container, substantially as herein described with reference to Figure 2 of the accompanying drawings.

20. A method of making a liner, substantially as herein described.

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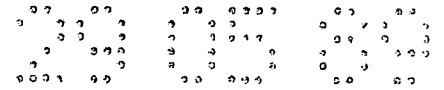
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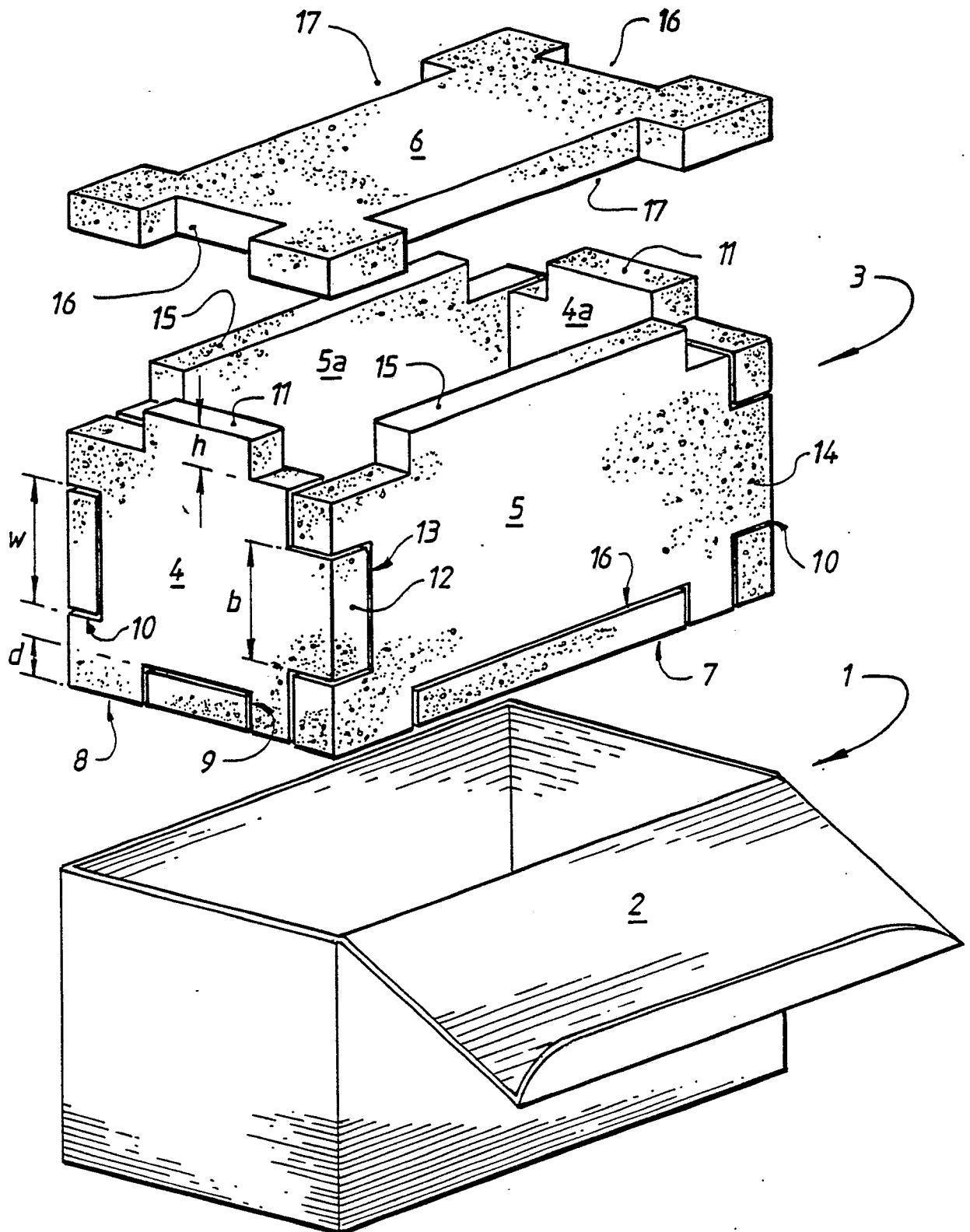
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Neu eingereicht / Newly filed  
Nouvellement déposé

Fig 1.



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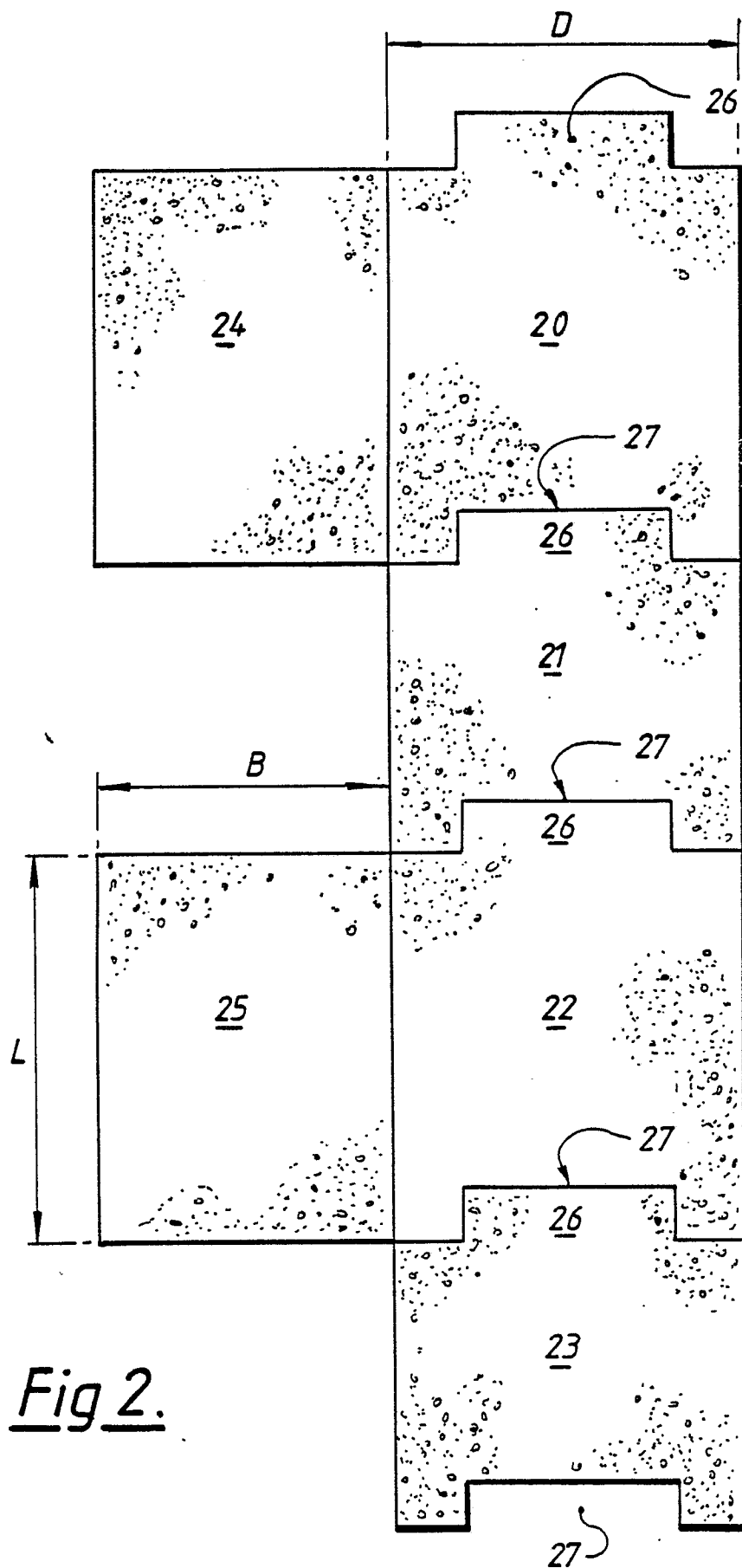


Fig 2.



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.4)
Y	US-A-4 682 708 (POOL)  ---	1,2,5-9 ,11,12, 15-17	B 65 D 81/02
Y	GB-A-2 064 056 (N.V. PHILIPS' GLOEILAMPENFABRIEKEN) * Page 1, lines 104-127; figures *	1,2,5-9 ,11,12, 15-17	
Y	FR-A-2 153 784 (LINCRUSTA) * Page 2, lines 7-12; figures *	12,15- 17	
A	FR-A-2 139 774 (SAMPEX S.A.) * Claims; figures *  -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21-08-1989	Examiner CLARKE A.J.
<b>CATEGORY OF CITED DOCUMENTS</b> 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			