(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 531 176 A1**

# (12) EUROPEAN PATENT APPLICATION

(21) Application number : **92308091.5**

(22) Date of filing : **07.09.92**

(51) Int. Cl.[5] : **B65D 81/34,** B65D 65/40, A47J 36/02

(30) Priority : **06.09.91 EP 91308175**

(43) Date of publication of application : **10.03.93 Bulletin 93/10**

(84) Designated Contracting States : **AT BE CH DE DK ES FR GB GR IE IT LI NL PT SE**

(71) Applicant : **UNILEVER PLC**
**Unilever House Blackfriars**
**London EC4P 4BQ (GB)**
(84) **GB IE**

(71) Applicant : **UNILEVER N.V.**
**Weena 455**
**NL-3013 AL Rotterdam (NL)**
(84) **BE CH DE DK ES FR GR IT LI NL PT SE AT**

(72) Inventor : **Ghaffari, Ramin**
**H. Schaftstraat 69**
**NL-2264 DP Leidschendam (NL)**

(74) Representative : **Ford, Michael Frederick et al**
**MEWBURN ELLIS 2 Cursitor Street**
**London EC4A 1BQ (GB)**

## (54) Packaging material.

(57) A packaging material is intended for packaging food products which will be heated, e.g. from a frozen state, while still in the pack. The packaging material has two layers 10,12. The layer 10 is air and steam tight. The layer 12 is provided with apertures 14 which face the food product. The two layers 10,12 are laminated together with at least one channel extending from the apertures 14 along the interface between the two layers. When the food product is heated in a pack formed from the packaging material, vapour escaping from the food product passes out to the exterior through the apertures 14 and along the channels 18 between the layers 10,12 and is vented at an edge of the packaging material.

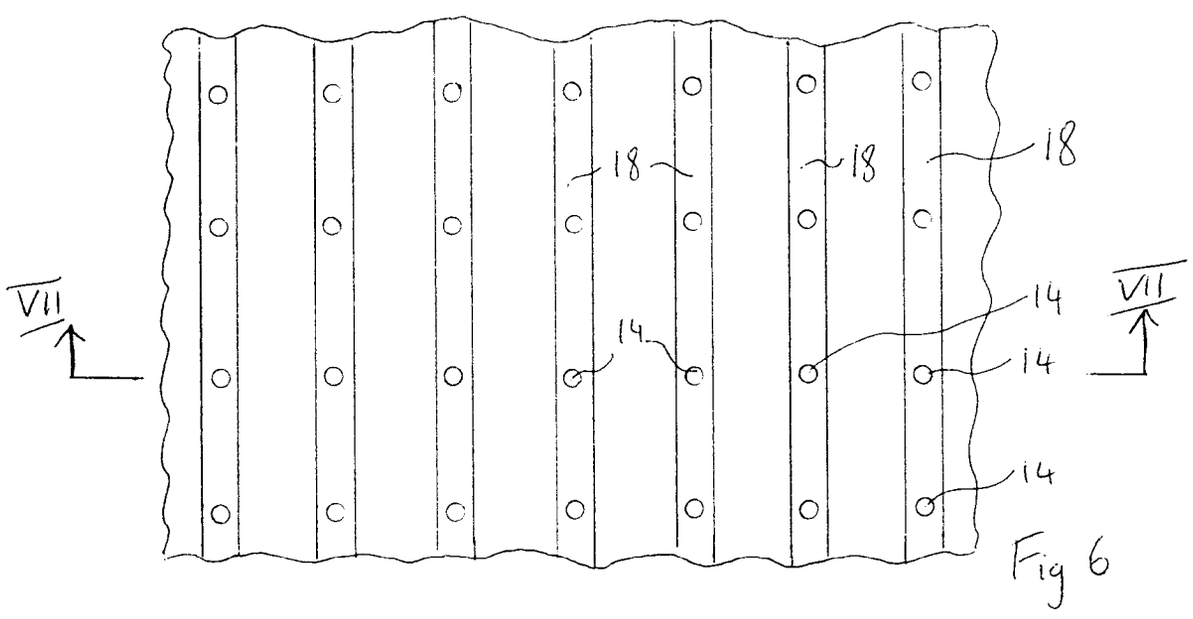


Fig 6

EP 0 531 176 A1

The present invention relates to packaging for food products. It is applicable in particular where the food product is intended to be heated from frozen, or is a "boil-in-the-bag" product.

Convenience food products are intended to be heated in a microwave oven with minimal work by the consumer prior to microwave heating. Conventionally, such products are packed in a completely sealed package so as to prevent contamination of the food during storage. Since the intention is to provide convenience, it may be desirable that the product should be heated in a microwave without first removing the cover of the packaging. However, heating a product in a microwave causes steam to be generated and this can cause an unacceptable rise in pressure within a fully sealed pack.

In consequence, customers have been required either to remove a cover prior to heating in a microwave oven, or to puncture the cover to allow steam to escape through the puncture. There remains, however, the possibility that the consumer will neglect to do this and heat the product while it is still completely sealed, leading to bursting of the pack.

Certain food products, referred to in English as "boil-in-the-bag" products are supplied in a closed bag with the intention that the entire bag will be immersed in boiling water to heat its contents. Again generation or expansion of gas or vapour within the bag is a relevant consideration.

EP-A-160978 discloses a sealing membrane for containers whose contents develop gas during storage. Kefir, a fermented milk product, is particularly envisaged. One embodiment of this membrane is a laminate of two impermeable layers. One layer is perforated. Lamination is accomplished by applying discrete spots of adhesive so as to create a criss-cross grid of channels, between the layers, leading from the perforations to the edge of the sealing membrane.

EP-A-205431 discloses a laminated packaging material which at one face has layers that are permeable to oxygen but not water. The other, generally impermeable surface has perforations leading to spaces inside the laminate which communicate with the oxygen-permeable part of the laminate. The packaging material is used for wrapping cheese. The perforated surface faces the exterior with the result that the cheese remains in contact with atmospheric oxygen through the perforations and the oxygen-permeable layers of the laminate. This is stated to permit continued ripening of the wrapped cheese during storage.

Both of these documents are concerned with edible products which are usually eaten cold. Neither document indicates any relevance to foodstuffs which are eaten hot, nor to doing anything with the packed product (apart from storing it) before it is removed from its container.

A first aspect of this invention is a method of providing a heated food product, the method comprising

(i) enclosing the food product in a package formed at least partly from a packaging material which comprises at least two layers laminated together, one layer being air and steam tight while the second layer is provided with one or more apertures, the two layers being laminated together with at least one channel extending from the aperture(s) along the interface between the two layers, in which package the apertured layer of the packaging material faces the interior of the package so that the said apertures open to the interior of the package;

(ii) heating the package with the enclosed food product therein before opening the package and removing the food product therefrom.

Because the apertures open to the interior of the package, any build-up of pressure within the package can vent through the aperture(s) and the channel(s) at the interface between the two layers to an edge of the packaging material and hence to outside atmosphere. The air and steam tight layer faces towards the exterior and preferably is at the exterior of the package. It then serves to prevent entry of contaminants.

It is envisaged that the food product will generally be enclosed in the package by a manufacturer and retained in the package before and after retail sale. The packaging material's two layers will, preferably, be transparent so enabling the contents of the package to be seen, for example to display the food product prior to retail sale. The packaging material may well provide a cover of the package.

Desirably the package is sealed, except for the pathway to atmosphere via the aperture(s) and the channel(s).

A significant application of the invention, is for the packaging of foodstuffs intended to be heated in a microwave oven without first opening the package. For this application the layers in the packaging material should be microwave-transparent

A further application is for boil-in-the-bag food products and for this application the channels at the interface of the two layers should be such that capillary action opposes water entry whilst still allowing steam to vent to the exterior. This may be achieved by choice of the materials of the two layers so that the channels at the interface are hydrophobic and by choice of the dimensions of the channels.

The ability of the package to vent from its interior can also be utilized during vacuum packaging when it is desired to extract air from the package and so drag the film down onto the contents of the pack.

According to a second aspect, the invention provides a packaging material suitable to provide at least part of a package for a food product which material comprises at least two layers laminated together, one layer being air and steam tight while the second layer is provided with one or more apertures, the two layers

being laminated together with at least one channel extending from the aperture(s) along the interface between the two layers.

Suitably there are a plurality of channels which do not intersect but run side by side in a common direction.

The channels may be uniformly spaced apart but this is not essential.

Each of the two layers may consist of a single material or may be a laminate of more than one material. Transparent layers will be formed from thermoplastic material(s) but one or both layers may be opaque. Although it is not a preferred option it is possible that one layer may comprise an opaque metal foil. The latter could be employed for the gas tight outer layer, for instance, when the product was intended to be boiled in the bag.

The apertures in the inner layer may be distributed over the entire area of the inner layer or may be in selected portions of it only. Conveniently the width across individual apertures may lie in a range from 0.1 mm to 5 mm. If the apertures are not circular then the smallest dimension across them may be not less than 0.1 mm and the maximum dimension across them may be not greater than 5 mm. However, apertures with dimensions outside this preferred range are possible within the scope of the invention.

Provision of channels at the interface between the two layers may be accomplished by providing an adhesive layer at the interface and interrupting the adhesive material along the line of each intended channel. Another possibility is for the two layers to be pressed together while hot without applying pressure along the line of each intended channel.

Embodiments of the invention will now be described with reference to the accompanying drawings in which:

Fig. 1 diagrammatically shows portions of two layers;

Fig. 2 is a diagrammatic view onto a packaging material formed from the layers in Fig. 1;

Fig. 3 is a cross-section on line III-III through the material of Fig. 2;

Fig. 4 is a diagrammatic view of a pack;

Fig. 5 is a view on arrow A onto the rim of the pack;

Figs. 6 and 8 are diagrammatic views onto further forms of packaging material;

Figs. 7 and 9 are cross sections on lines VII-VII and IX-IX through the materials of Figs. 6 and 8 respectively;

Fig. 10 is an alternative cross-section.

As shown by Fig. 1, a layer 10, intended to be the outer layer of packaging material is a continuous web. In this embodiment this web is formed from nylon (polyamide) which is microwave-transparent. A second web 12 is a continuous web of polypropylene formed with a row of circular holes 14 each 1 mm in diameter. This web 12 is formed of polypropylene which is also microwave-transparent.

The two layers 10,12 are laminated together with an adhesive layer 16 between them. A two component polyurethane based adhesive would be appropriate for this. Laminating two webs together with adhesive between them is common practice in the manufacture of packaging materials. However, for this invention, the adhesive material is omitted from a strip 18 positioned to overlie the row of holes 14 in the bottom web 12. This strip where the adhesive was omitted thus provides a continuous channel 18 at the interface between the two webs. In this embodiment the row of holes 14 and the channel 18 run in the direction of the web.

Subsequently the web is cut into portions. As shown in Fig. 4, a portion of the web is used to provide the cover of a pack having a base 20 and containing a food product 21. The apertures 14 through the inner layer 12 open into the interior of the pack and the channel 18 extends from the apertures to the edge of the cover. The cover is heat sealed to a rim of the base 20 of the pack, as indicated at 22. Fig. 5 is a view onto a portion of this heat sealed rim. As shown the heat sealing joins the lower layer 12 to the base 20 but does not unite the layers 10 and 12, so the channel 18 opens to atmosphere at this rim of the pack. Thus pressure within the pack can vent to the exterior. The length of the channel 18, however, prevents particulate contaminants from entering the interior of the pack.

Although only one row of apertures 14 and channel 18 has been mentioned in the above description, in practice it will usually be found convenient to provide a number of separate, parallel rows of apertures 14 each with an aligned channel 18 so that the interior of a pack may vent to atmosphere along more than one channel 18. This arrangement is illustrated in Fis. 6 and 7. A further possibility illustrated in Figs. 8 and 9 is to have apertures distributed over the whole area of web 12, and one or more channels 18 which communicate with some of the apertures 14 leaving others as blind cavities (indicated 14′ in Fig. 8).

Fig. 10 is a cross section which illustrates an alternative method of making channels. The two webs 10,12 are formed from nylon and polypropylene as before with a row of apertures 14 in the polypropylene web 12, also as in Figs. 1 to 3.

The holes 14 were punched in the web 12 almost immediately after it was extruded. The nylon web was extruded at the same time as the polypropylene web and the two webs were brought together while still hot from the extrusion process, but after punching the holes 14. The pair of webs were passed between rollers applying pressure so as to unite the hot webs into a single laminate. However, the rollers were shaped so as not to apply pressure to a strip coinciding with the row of apertures 14. Consequently the two webs

are not united together along this strip and excess pressure from the interior of a pack can force its way along the resulting channel 18 where the two layers are not united together.

When the two webs are united by co-extrusion there is the possibility that the channels 18 may be closed during heat sealing.

Materials and heat sealing temperatures should therefore be chosen so that the heat seal between the web 12 and the base 20 of the pack can be, and is, formed at a temperature below that required to fuse the webs 10,12.

For a boil-in-the-bag product it will be necessary to prevent water from penetrating into the bag along the channels 18. This may be done by choosing hydrophobic materials for the webs 10, 12 so that capillary action acts to urge liquid outwardly from the bag into the bulk of the (boiling) water which is being used to heat the bag and its contents.

The dimensions of the channels 18 may be kept small, to promote this capillary action. Suitable dimensions may be investigated by trial experiments. It is also possible to calculate capillary effects, as explained for instance in "An Introduction to Fluid Dynamics" by K.K. Batchelor. It is necessary to know the contact angle. The angle of contact between water and a thermoplastic can be measured from a photograph of a water droplet resting on a sheet of the thermoplastic held edge-on to the camera.

## Claims

1. A method of providing a heated food product, comprising
   (i) enclosing the food product in a package formed at least partly from a packaging material which comprises at least two layers laminated together, one layer being air and steam tight while the second layer is provided with one or more apertures, the two layers being laminated together with at least one channel extending from the aperture(s) along the interface between the two layers, in which package the apertured layer of the packaging material faces the interior of the package so that the said apertures open to the interior of the package;
   (ii) heating the package with the enclosed edible product therein before opening the package and removing the edible product therefrom.

2. A method according to claim 1 wherein the two layers are laminated together with adhesive and each said channel is formed by an interruption in the adhesive layer.

3. A method according to claim 1 or claim 2 wherein the two layers are both transparent.

4. A method according to claim 3 wherein the air and steam tight layer is made of polyamide.

5. A method according to claim 3 or claim 4 wherein the apertured layer is made of polypropylene.

6. A method according to any one of claims 1 to 5 wherein the heating is by microwave radiation.

7. Use of a packaging material which comprises at least two layers laminated together, one layer being air and steam tight while the second layer is provided with one or more apertures, the two layers being laminated together with at least one channel extending from the aperture(s) along the interface between the two layers, to form at least part of a package enclosing a food product which is to be heated in the package before opening the package and eating the product, with the apertured layer facing the interior of the package so that the said apertures open to the interior of the package.

8. A packaging material comprising at least two layers laminated together, one layer being air and steam tight while the other layer is provided with one or more apertures, the two layers being laminated together with at least one channel extending from the aperture(s) along the interface between the two layers, the channels, if more than one, running side by side without intersecting.

9. A packaging material according to claim 8 wherein the two layers are laminated together with adhesive and each said channel is formed by an interruption in the adhesive layer.

10. A packaging material according to claim 8 or claim 9 wherein the two layers are both transparent.

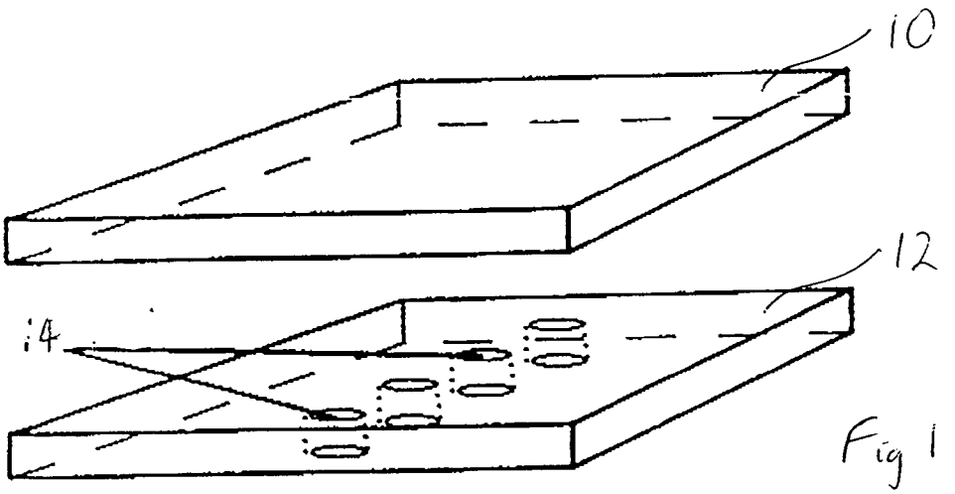


Fig 1

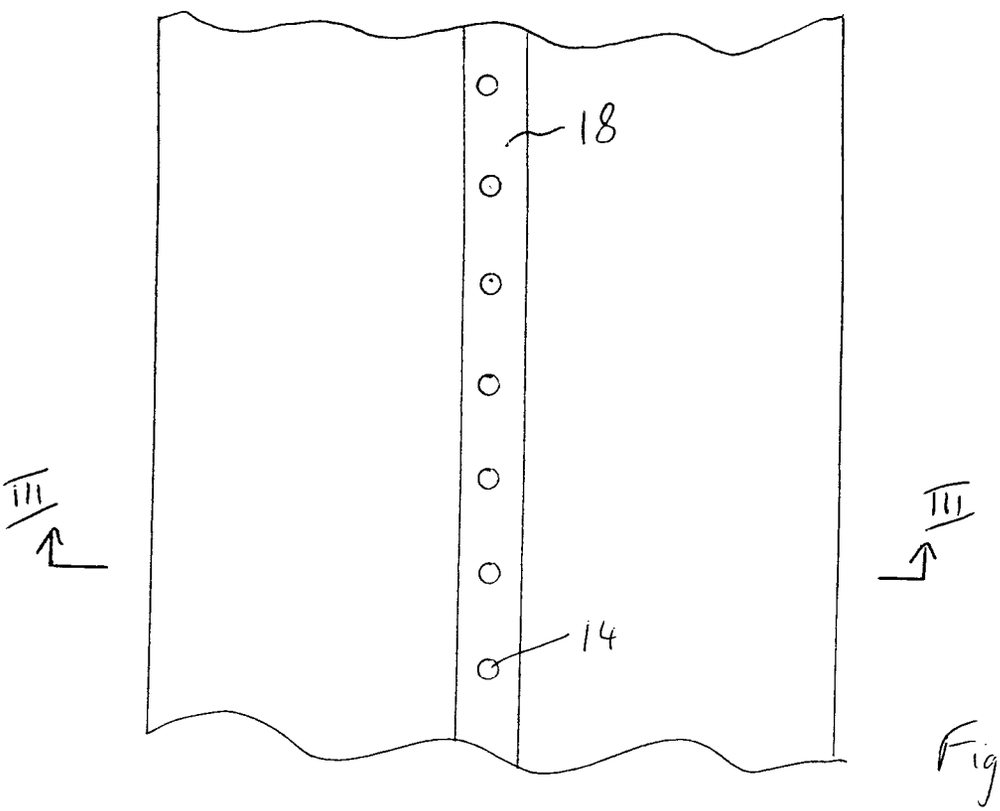


Fig 2

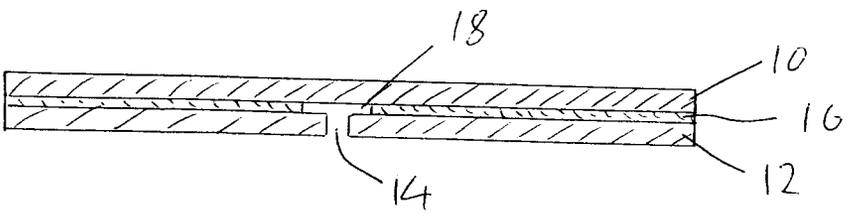


Fig 3

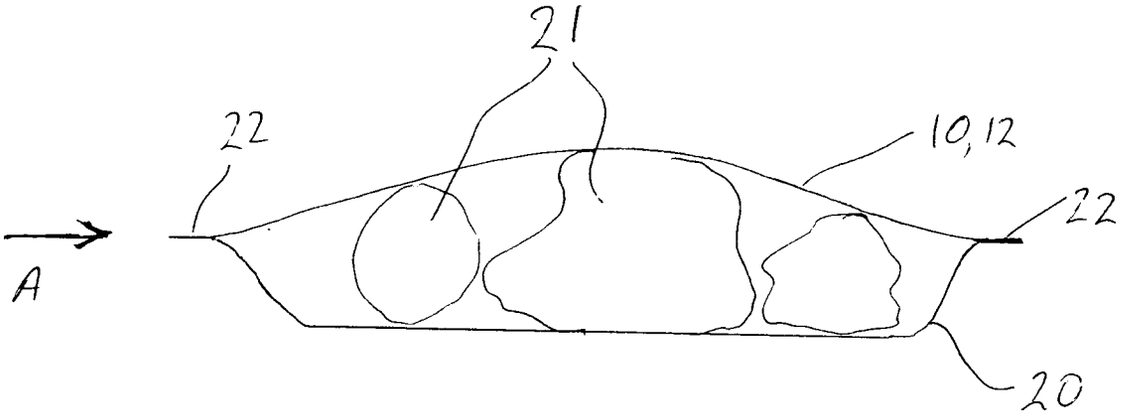


Fig 4

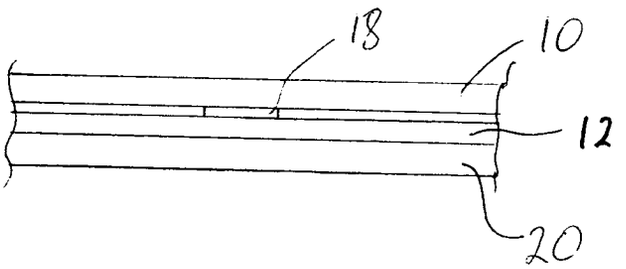


Fig 5

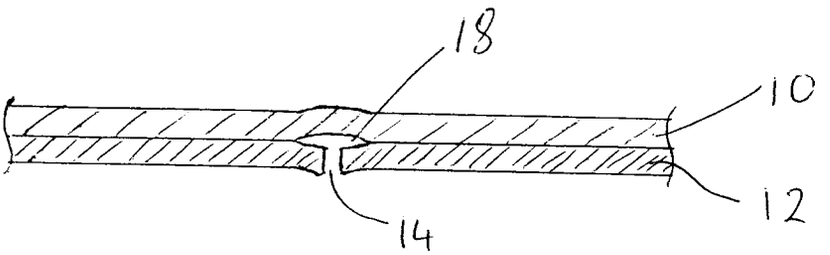


Fig 10

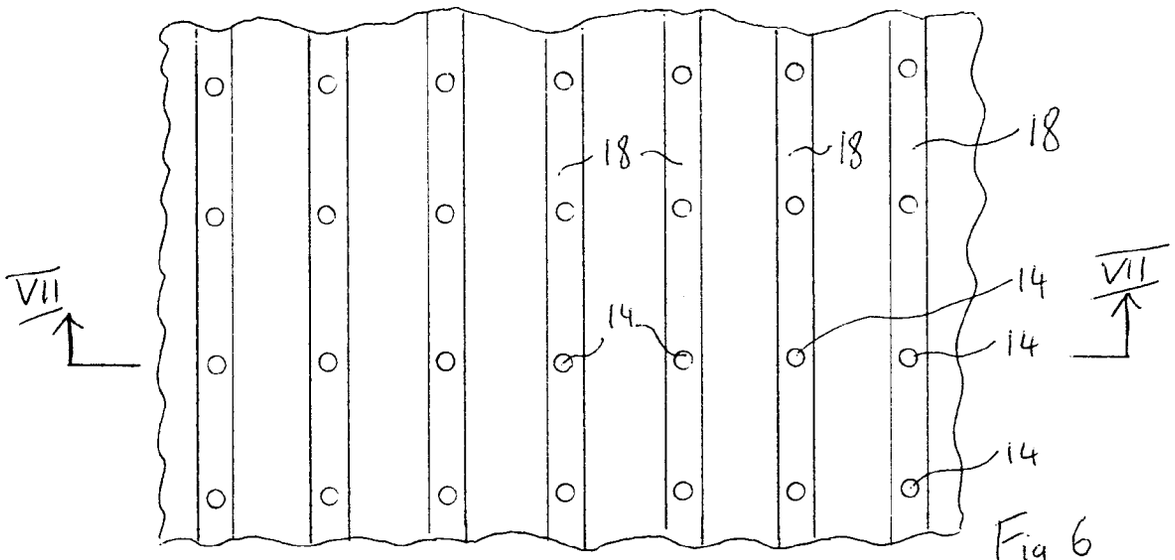


Fig 6

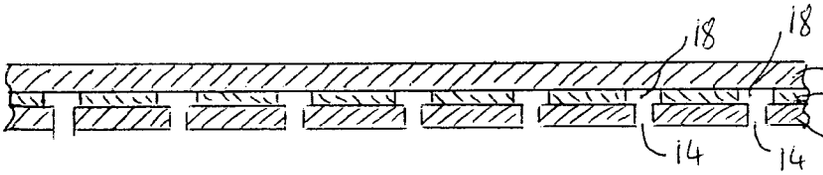


Fig 7

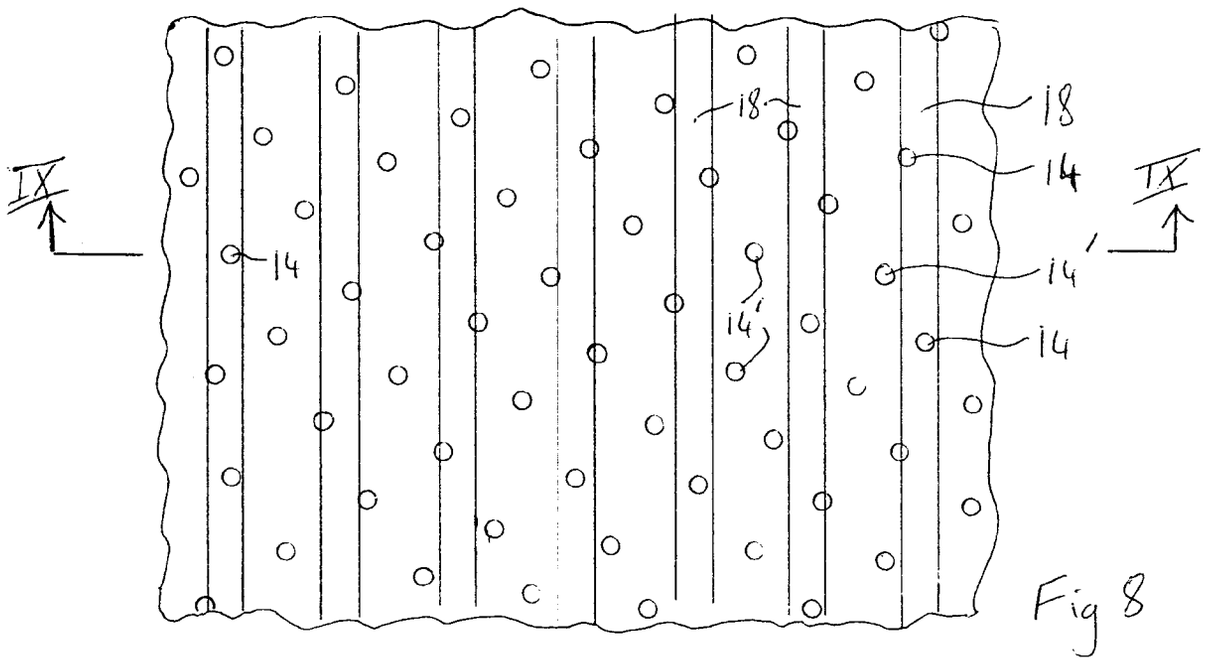


Fig 8

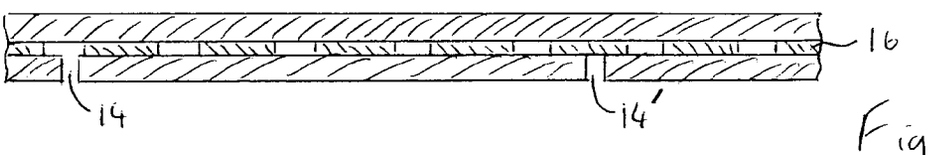


Fig 9

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 92 30 8091

## 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.5) |
|---|---|---|---|
| X | US-A-4 866 786 (NAGLER)<br>* column 1, line 6 - line 24 *<br>* column 1, line 44 - line 56 *<br>* column 3, line 11 - line 31; figures 1,2 *<br>--- | 1,2,6,7 | B65D81/34<br>B65D65/40<br>A47J36/02 |
| A | | 8 | |
| X | DE-A-3 801 122 (UNILEVER)<br>* column 1, line 1 - line 40; figures 1-3 *<br>--- | 1 | |
| A | DE-A-3 142 762 (PFANNI-WERK)<br>* page 4, last paragraph - page 5, paragraph 2 *<br>* page 6, line 7 - line 12; figures 1-4 *<br>--- | 1 | |
| D,A | EP-A-0 160 978 (NYFFELER, CORTI)<br>* page 1, line 26 - line 37 *<br>* page 3, paragraph 2 -paragraph 3 *<br>* page 4, line 26 - line 35; figure 3 *<br>--- | 7-10 | |
| A | EP-A-0 198 362 (GOURMEC LABORATORY ET AL.)<br>* column 11, line 22 - line 37 *<br>* column 12, line 4 - line 7 *<br>* column 12, line 16 - line 17; figures 8,9 *<br>--- | 7,8,10 | TECHNICAL FIELDS SEARCHED (Int. Cl.5)<br>B65D<br>A47J |
| A | EP-A-0 025 431 (FOLIENWALZWERK BRUEDER TEICH)<br>* page 3, line 10 - line 15; figure *<br>----- | 7,8 | |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| BERLIN | 02 DECEMBER 1992 | SPETTEL J.D.M.L. |

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

EPO FORM 1503 03.82 (P0401)