



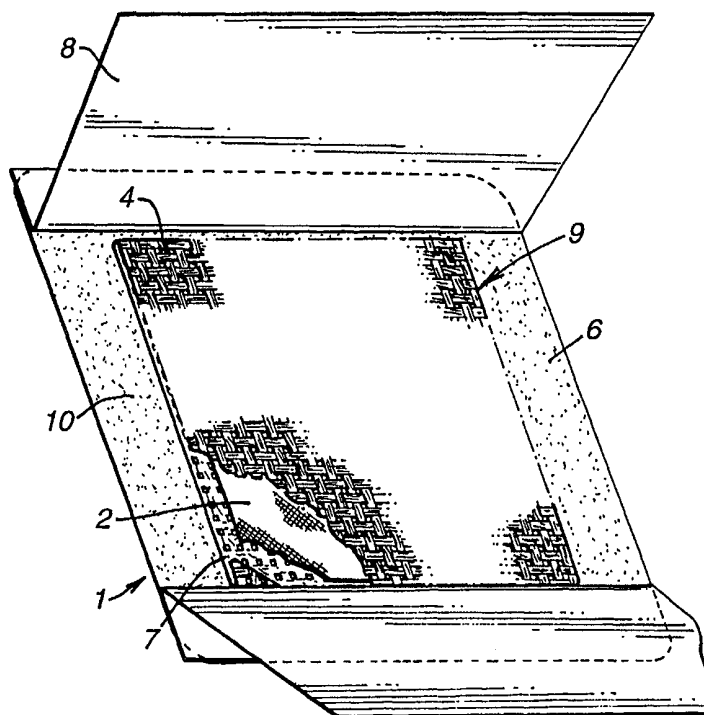
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB00/01105</p> <p>(22) International Filing Date: 23 March 2000 (23.03.00)</p> <p>(30) Priority Data: 9906809.0                      24 March 1999 (24.03.99)                      GB</p> <p>(71) Applicant (for all designated States except US): JOHNSON &amp; JOHNSON MEDICAL LIMITED [GB/GB]; Erskine House, 68-73 Queen Street, Edinburgh EH2 4NH (GB).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): ADDISON, Deborah [GB/GB]; 2 Dovenanter Cottage, Keasden, Near Clapham, Via Lancaster LA2 8HB (GB). MELLOR, James, Sebastian [GB/GB]; 5 Neville Street, Skipton, North Yorkshire BD23 2EU (GB). STOW, Martin, William [GB/GB]; 8 Parkwood Way, Rockwood Estate, Skipton, North Yorkshire BD23 1UZ (GB). BIOTT, Maurice, Charles [GB/GB]; 20 Bradley Avenue, Silsden, Keighley, West Yorkshire BD20 9LT (GB).</p> <p>(74) Agent: JAMES, Anthony, Christopher, W., P.; Carpmals &amp; Ransford, 43 Bloomsbury Square, London WC1A 2RA (GB).</p>		<p>(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: WOUND DRESSINGS HAVING LOW ADHERENCY

## (57) Abstract

The invention provides wound dressings, in particular wound dressings of low- or non-exuding wounds or bleeding wounds. The wound dressings are of the island type, having an adhesive-coated backing sheet (6) and an absorbent island (9) supported on the backing sheet. The island (9) comprises a layer (2) of liquid absorbent material enclosed in an envelope of textured perforated thermoplastic film. The film (3) on one side of the island (9) presents a ribbed or embossed perforated surface having low adherency to the wound. The film (7) on the rear surface of the envelope is perforated and smoothed to provide good attachment to the backing sheet (6) and controlled water vapor transmission rate. The invention also provides a method of manufacture of the wound dressings according to the invention, according to which the absorbent layer (2) is wrapped in a textured perforated thermoplastic film, and the film on the rear face of the envelope is then preferably smoothed by blowing hot air onto it.



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## WOUND DRESSINGS HAVING LOW ADHERENCY

The present invention relates to wound dressings, and in particular to such dressings having low adherency for use on low- to non-exuding wounds. The present invention also  
5 relates to processes for the preparation of such wound dressings, and to an apparatus specifically adapted for use in such processes.

Wound dressings are known that consist of a layer of absorbent material, such as an absorbent gauze or foam layer, wherein the layer is supported on an adhesive-coated  
10 semipermeable backing sheet. An adhesive-coated margin of the backing sheet extends outwardly from the edges of the absorbent layer for attachment of the dressing over a wound by adhesion to the skin surrounding the wound. The absorbent layer serves to absorb wound exudate. Such dressings are commonly known as island wound dressings.

15 A difficulty that can arise with island wound dressings is that most absorbent layers, such as nonwoven fibrous webs, are somewhat adherent to a wound surface, and in particular tend to dry out and adhere to wounds having a low rate of exudate production, or to non-exuding wounds. Adherence can also be a problem with bleeding wounds because of clot formation in the dressing. Adherence is unfavorable for wound healing, and can  
20 result in discomfort when the island wound dressing is changed. There is a further risk that the absorbent island could shed fibers or particles into the wound.

Another drawback of such dressings is that many absorbent island materials, such as nonwoven fibrous webs, show relatively poor attachment to the adhesive coating of the  
25 backing sheet. There is therefore a risk that the absorbent island can detach from the backing sheet. The problem of poor attachment of the island to the backing sheet is exacerbated when attempts are made to render the island less adherent to the wound., for example by using a bonded or coated island.

30 GB-A-2074029 describes island-type wound dressings having a top sheet of perforated polytetrafluoroethylene (PTFE) film covering the absorbent layer. The PTFE film provides a non-adherent wound contacting layer for the dressing.

GB-A-2085305 describes wound dressings in which the absorbent island is entirely embraced by a cellular plastics film having perforations which have been produced by passing electrical discharges therethrough. The film may be provided with a layer of adhesive for attachment around a wound.

5

GB-A-1526778 describes wound dressings comprising an absorbent layer and a top sheet over the absorbent layer, wherein the top sheet is a textured perforated plastic film that provides improved passage of fluids into the absorbent layer.

10 It is an object of the present invention to provide improved wound dressings, in particular improved island-type wound dressings, especially suitable for the treatment of wounds that produce little or no exudate, and for bleeding wounds.

It is a further object of the present invention to provide an improved wound dressing  
15 that has low adherency to the wound surface, and preferably substantially no adherency to the wound surface.

Is a further object of the present invention to provide an improved wound dressing that provides improved securement of the absorbent island to the backing sheet.

20

Is a further object of the present invention to provide an improved wound dressing that has less tendency to cause low- to non- exuding wounds and bleeding wounds to dry out and form scabs, and to optimise wound healing conditions under the wound dressing.

25 If a further object of the present invention to provide an improved wound dressing that has reduced tendency to shed fibers or particles into the wound during treatment.

The present invention provides a wound dressing comprising:

an absorbent layer;

30 an envelope formed from thermoplastic film enclosing the absorbent layer, wherein the film has a textured perforated surface on a front side of the envelope and a smoothed perforated surface on a rear side of the envelope;

a semipermeable backing sheet covering the rear side of the envelope and extending outwardly therefrom; and

a layer of adhesive on the backing sheet adjacent to the rear side of the envelope and bonding the rear side of the envelope to the backing sheet.

5

The wound dressings according to the present invention are especially suitable as wound dressings for use on low- or non-exuding wounds or bleeding wounds. The area of the absorbent layer is typically in the range of from 1cm<sup>2</sup> to 200cm<sup>2</sup>, more preferably from 4cm<sup>2</sup> to 100cm<sup>2</sup>.

10

The absorbent layer may be any of the layers conventionally used for absorbing wound fluids, serum or blood in the wound healing art, including gauzes, nonwoven fabrics, superabsorbents, hydrogels and mixtures thereof. Preferably, the absorbent layer comprises a layer of absorbent foam, such as an open celled hydrophilic polyurethane foam prepared in accordance with EP-A-0541391, the entire content of which is expressly incorporated herein by reference. In other embodiments, the absorbent layer may be a nonwoven fibrous web, for example a carded web of viscose staple fibers. Since the wound dressings according to the present invention are generally only intended for use on low- or non-exuding wounds or bleeding wounds, it follows that the thickness and absorbency of the absorbent layer is preferably not very high. Preferably, the basis weight of the absorbent layer is in the range of 50-500g/m<sup>2</sup>, more preferably 100-400g/m<sup>2</sup>. The uncompressed thickness of the absorbent layer is preferably in the range of from 0.5mm to 5mm, more preferably 1mm to 4mm. The free (uncompressed) liquid absorbency measured for physiological saline is preferably in the range of 5 to 30 g/g at 25°C.

25

The thermoplastic film enclosing the absorbent layer may be formed from substantially any thermoplastic film-forming polymer. Preferably, the polymer is conformable but not substantially elastomeric. Preferably, the polymer is hydrophilic. Suitable polymers include, but are not limited to, polyethylene, polypropylene, polyester, polyamides such as nylons, fluoropolymers such as polyvinylidene fluoride (PVDF) or polytetrafluoroethylene (PTFE), and mixtures thereof. The currently preferred film-forming thermoplastic polymer is ethylene methyl acrylate (EMA).

30

The thermoplastic film is textured and perforated. The term "textured" indicates that the film is patterned in relief, for example, patterned with protruding ridges or nubbles, for example by embossing. The texturing renders the film less adherent to a wound bed. The ridges or nubbles are preferably rounded, and preferably project by 0.1 to 1.5 mm  
5 above the median plane of the film surface. More preferably they project by 0.2 to 1.0 mm above the median plane of the film.

Preferably, the thermoplastic film is both textured and perforated by means of mesh perforation. In this method, the film is supported on a reticulated mesh surface and heated  
10 to its softening temperature. Suction is then applied through the mesh, or air is blown onto the film above the mesh, which results in impression of the mesh into the film and the formation of perforations in the film at the interstices of the mesh. Mesh perforation techniques are described in more detail in US-A-3054148, the entire content of which is expressly incorporated herein by reference.

15

Preferably, the thermoplastic film has from 5 to 50 perforations/cm<sup>2</sup>, more preferably from 10 to 30 perforations/cm<sup>2</sup>. Preferably, the perforations have an area of from 0.01 to 2.0 mm<sup>2</sup>. The hole-to-land ratio, defined as the ratio of the total area of the perforations to the total area of the film less the area of the perforations, both areas being  
20 viewed in plane projection, is preferably from 0.01 to 1.0, more preferably from 0.05 to 0.5 and most preferably from 0.1 to 0.3.

The thermoplastic film should be as thin as possible, consistent with the need for physical integrity during manufacture and use. Typically, the film has a basis weight of from 1 to  
25 500g/m<sup>2</sup>, preferably from 10 to 200g/m<sup>2</sup>.

The thermoplastic film is formed into an envelope for the absorbent layer. The term "envelope" signifies that the front and back faces of the absorbent layer are substantially completely covered (substantially completely embraced) by the thermoplastic film. For  
30 example, two sheets of the thermoplastic film may be located above and below the absorbent layer substantially covering the top and bottom faces of the absorbent layer, the two sheets being bonded along two or more edges to form the envelope. However, preferably, the envelope is formed from a single piece of the thermoplastic film that has

been folded around the absorbent layer so that opposed longitudinal edges of the film overlap, the overlapping edges being bonded together in the overlapping region, typically with hot melt adhesive or by heat bonding, to form the envelope. Such envelopes may be made by minor modification of conventional form-fill-seal equipment, as described further  
5 below.

The backing sheet is semipermeable. That is to say, the backing sheet is permeable to water vapour, but not permeable liquid water. Preferably, the backing sheet is also microorganism-impermeable. Suitable continuous conformable backing sheets will have a  
10 moisture vapor transmission rate (MVTR) of the backing sheet alone of 300 to 5000  $\text{g/m}^2/24\text{hrs}$ , preferably 500 to 2000  $\text{g/m}^2/24\text{hrs}$  at 37.5 °C at 100% to 10% relative humidity difference. The backing sheet thickness is preferably in the range of 10 to 1000 micrometers, more preferably 100 to 500 micrometers.

15 The MVTR of the dressing according to the present invention as a whole is lower than that of the backing sheet alone, because the thermoplastic film envelope partially obstructs moisture transfer through the dressing. Preferably, the MVTR of the dressing (measured across the island portion of the dressing) is from 20% to 80% of the MVTR of the backing sheet alone, more preferably from 20% to 60% thereof, and most preferably about 40%  
20 thereof. It has been found that such moisture vapor transmission rates allow the wound under the dressing to heal under moist conditions without causing the skin surrounding the wound to macerate.

Suitable polymers for forming the backing sheet include polyurethanes and poly  
25 alkoxyalkyl acrylates and methacrylates such as those disclosed in GB-A-1280631. Preferably, the backing sheet comprises a continuous layer of a high density blocked polyurethane foam that is predominantly closed-cell. A suitable backing sheet material is the polyurethane film available under the Registered Trade Mark ESTANE 5714F.

30 The adhesive layer should be moisture vapor transmitting and/or patterned to allow passage of water vapor therethrough. The adhesive layer is preferably a continuous moisture vapor transmitting, pressure-sensitive adhesive layer of the type conventionally used for island-type wound dressings, for example, a pressure sensitive adhesive based on

acrylate ester copolymers, polyvinyl ethyl ether and polyurethane as described for example in GB-A-1280631. The basis weight of the adhesive layer is preferably 20 to 250 g/m<sup>2</sup>, and more preferably 50 to 150 g/m<sup>2</sup>. Polyurethane-based pressure sensitive adhesives are preferred.

5

Preferably, the adhesive layer extends outwardly from the absorbent layer and the envelope to form an adhesive-coated margin on the backing sheet around the adhesive layer as in a conventional island dressing. Preferably, the wound dressings according to the present invention further comprise a release coated cover layer to protect the adhesive and  
10 absorbent layer before use. Preferably, the cover layer comprises silicone release-coated paper.

Preferably, the wound dressings according to the present invention are sterile, and are packaged in a microorganism-impermeable container, preferably a pouch.

15

The thermoplastic film enclosing the absorbent layer has a smoothed perforated surface on the rear side of the envelope. That is to say, the thermoplastic film on the rear side of the envelope (that is to say the side that faces away from the wound surface and towards the backing sheet in use) is smoother than the thermoplastic film covering the  
20 front (wound contacting) side of the envelope. Preferably, the surface roughness or degree of texturization of the rear side of the envelope is no more than 80% of the surface roughness or degree of texturization of the front side of the envelope, more preferably no more than 70% thereof, still more preferably no more than 50% thereof, and even more preferably no more than 30% thereof.

25

The textured wound contacting front surface of the envelope provides low adherence combined with good wicking of liquid from the wound into the absorbent layer through the perforated thermoplastic film. In contrast, the smoothed thermoplastic film layer on the rear side of the envelope provides excellent adhesion to the adhesive layer on the backing  
30 sheet, whilst retaining perforations that enable water vapour to diffuse out through the semipermeable backing sheet, thereby preventing saturation of the absorbent layer.



The term "smoothed" signifies that the rear thermoplastic film layer has less surface texturing (roughness, unevenness) than the front thermoplastic film layer of the envelope. Preferably, substantially none of the smoothed film surface projects 100  $\mu\text{m}$  or more above the median plane of the smoothed film surface. More preferably substantially none of the  
5 smoothed film surface projects more than 25  $\mu\text{m}$  above the median plane of the smoothed film surface.

The wound dressings according to the present invention provide a number of advantages as wound dressings for low- or non-exuding wounds or bleeding wounds.  
10 Firstly, the textured thermoplastic film wound facing layer (top sheet) is substantially or completely non-adherent by virtue of its non-fibrous composition and textured surface. Wound exudate liquid can pass through the perforated top sheet into the absorbent layer, but the hole-to-land ratio of the top sheet is low enough to prevent the wound becoming excessively dried out. The perforated top sheet also prevents fibers or particles of the  
15 absorbent layer from shedding into the wound.

The envelope structure further provides for secure attachment of the absorbent layer to the backing sheet. This is because the smoothed rear surface of the envelope ensures reliable attachment of the envelope to the backing sheet. Furthermore, the hole-to-land  
20 ratio as hereinbefore defined of the smoothed rear film enables the rate of water vapour diffusion through the backing sheet to be controlled so as to prevent drying out of the wound. Finally, the wound dressings according to the present invention are especially easy to manufacture using conventional equipment, as will be described in more detail below.

25 The present invention also provides a process for the production of a wound dressing comprising the steps of:

providing a layer of absorbent material;

wrapping the layer in an envelope of a textured perforated thermoplastic film;  
followed by

30 smoothing the thermoplastic film on one side of the envelope; and

applying an adhesive-coated backing sheet onto the smoothed thermoplastic film on the said one side of the envelope.

Preferably, the process according to the present invention is specifically adapted for the manufacture of a wound dressing in accordance with the present invention.

Preferably, the step of wrapping the absorbent layer in an envelope of a textured  
5 perforated thermoplastic film comprises wrapping a single sheet of the thermoplastic film  
around the absorbent layer so that two opposed edges of the thermoplastic film overlap  
longitudinally, and forming a seal along said overlap, for example with hot melt adhesive or  
by heat sealing. This step of wrapping and sealing can be carried out on modified form-fill-  
seal equipment. Preferably, the steps of wrapping and sealing are carried out continuously  
10 on the form-fill-seal equipment, in which case the steps are followed by the step of cutting  
the envelope into lengths for use as islands in the island-type dressings.

Normally the front and back faces of the envelope will be formed from the same  
textured perforated thermoplastic film. As a result, the back surface of the envelope needs  
15 to be smoothed subsequently to the wrapping step. In practice, the step of smoothing is  
difficult to perform, since hot rolling or pressing the thermoplastic film frequently results in  
adhesion of the film to the roller or press and/or undesirable penetration of the softened hot  
film into the absorbent material unless the conditions are carefully controlled.

20 It is therefore a further novel feature of the process according to the present  
invention that the step of smoothing the textured perforated thermoplastic film is preferably  
carried out by blowing hot air onto one side of the envelope containing the absorbent  
material in a controlled fashion. The step of blowing hot air onto the film causes the film to  
flatten and smooth out, without flowing into the absorbent material, and without any need  
25 to apply mechanical pressure to the film. Preferably, the temperature of the film is  
monitored, and the temperature of the hot air being blown onto the film is continuously  
optimised in response to the measured temperature of the film.

In the continuous process hereinbefore described, the step of blowing hot air onto  
30 one surface of the envelope to flatten the film is preferably carried out after continuous  
formation of the envelope on form-fill-seal equipment, but before cutting the envelope into  
lengths. Preferably, there is a cooling step intermediate the smoothing step and the cutting  
step, since otherwise the hot film may stick to the cutting knife.

The present invention further provides an apparatus specifically adapted for carrying out a process according to the present invention as hereinbefore described. The apparatus comprises:

5 a conveyor for conveying a layer of absorbent material enclosed between two layers of perforated textured thermoplastic film;

a hot air blower configured to blow hot air onto one of the layers of thermoplastic film to soften and flatten the said one of the layers, thereby smoothing said one of said layers;

10 a temperature sensor to measure the temperature of the said one of the layers adjacent to the hot air blower; and

control means connected to the temperature sensor to regulate the conveyor and/or the hot air blower in response to signals from the temperature sensor.

15 The conveyor may be any vertical or horizontal conveying means, including a conveyor belt. The hot air blower is preferably a heat gun, preferably adjustable to blow hot air in a temperature range above the softening temperature of the thermoplastic film but below its melting temperature. For example, for an ethylene methyl acrylate (EMA) film, the hot air is preferably blown at a temperature in the range of from 110 to 160°C. The  
20 temperature sensor is preferably an infrared radiant temperature sensor located adjacent to the hot film just downstream from the hot air blower. The control means is preferably connected to the heater input of the hot air blower, whereby the temperature of the hot air can be controlled continuously to optimise the smoothing and production speed.

25 Specific embodiments of the products, process and apparatus according to the present invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a perspective view of an island-type wound dressing according to the present invention, with the cover sheet partially peeled back and the island partially cut  
30 away to show hidden details;

Figure 2 shows a view on B of Fig. 1, being a top plan view of part of the front surface of the wound contacting layer of the perforated film envelope;

Figure 3 shows a view on A of Fig. 1, being a bottom plan view of the rear face of the perforated film envelope after smoothing;

Figure 4 shows a partial cross-section through the dressing of Fig. 1 along the section line IV-IV; and

5 Figure 5 shows a partial perspective view of the rear of the dressing of Fig. 1.

Referring to Figure 1, the wound dressing 1 according to the present invention comprises an absorbent island 9 supported on an adhesive-coated backing sheet 6 that extends beyond the edges of the island 9 to provide an adhesive-coated margin 10 for attachment of the dressing 1 over a wound. The island comprises an absorbent layer 2, consisting of a hydrophilic polyurethane foam layer, for example prepared as described in EP-A-0541391, having a basis weight of  $350 \text{ g/m}^2$  and a thickness of approximately 1.5 mm. In other embodiments the absorbent layer 2 is a nonwoven fabric of viscose staple fibers having a basis weight of about  $150 \text{ g/m}^2$ . The absorbent layer 2 is enclosed in an envelope formed from a single sheet of mesh perforated EMA film. The EMA film has a basis of  $50 \text{ g/m}^2$ , and contains 25 perforations/cm<sup>2</sup>, each perforation having dimensions of approximately 1 mm x 1 mm. The perforations are arranged in a square grid pattern, corresponding to the pattern of interstices on the mesh used for perforation of the film. The hole to land ratio of the film is about 0.1. The envelope is formed from a single piece of EMA film that has been wrapped around the absorbent layer 2 and bonded using a hot-melt adhesive along a longitudinal overlap (not shown) of opposed edges of the film on the back face of the envelope.

The front face 4 of the EMA film envelope comprises the original mesh-perforated surface of the EMA film, with the back of the film (i.e. the surface to which suction was applied in the mesh perforating step) facing the absorbent layer 2 and the front surface of the EMA film facing outwardly to form the wound contacting surface of the wound dressing 1. This is shown more clearly in Figs. 2 and 4. The perforations 5 provide rapid passage of free fluid such as wound fluid into the absorbent layer, but the hole-to-land ratio of the film is low enough to avoid excessive dehydration of the wound surface. The land portions 6 of the mesh perforated EMA film are embossed in relief with the pattern of the mesh as shown in Fig. 2. This embossed, textured surface is very non-adherent and wound friendly.

The back surface 7 of the EMA film has been smoothed to a substantially flat, perforated film as described further hereinbelow and as shown in Figs. 3, 4 and 5. The smoothed surface of the back surface 7 provides improved adhesion to the adhesive-coated  
5 backing sheet.

The wound dressing further comprises a backing sheet 6 formed from a substantially closed-cell microporous polyurethane foam having a water vapor transmission rate as hereinbefore defined of 1200-1300 g/m<sup>2</sup>/24hrs. The backing sheet is coated on its  
10 lower surface with a continuous layer of water vapor permeable, pressure-sensitive polyurethane adhesive in an amount of 90-110 g/m<sup>2</sup>.

The wound contacting surface of the dressing is covered by two silicone release-coated protective sheets 8 that are folded to allow easy removal of the sheets 8 before use,  
15 as shown in Figs. 1 and 5. The dressing is sterilised by gamma-irradiation and packaged in a microorganism-impermeable pouch (not shown).

The wound dressing according to the present invention is prepared as follows. A continuous strip of the polyurethane foam is wrapped in the EMA perforated film using  
20 form-fill-seal equipment. The continuous, wrapped envelope is then passed by a conveyor underneath a hot air gun that blows hot air onto the rear side of the envelope to soften and smooth the film on the rear side of the envelope. The absorbent layer 2 provides sufficient thermal insulation to prevent the heat from the hot air gun from significantly softening and smoothing the textured film on the front face of the envelope.

25

The temperature of the gun is regulated by a control means connected to an infrared-type thermocouple sensor mounted in front of the gun to measure the temperature of the thermoplastic film on the rear side of the envelope. The sensor provides feedback to the control means to achieve continuous control of the film temperature for optimum  
30 smoothing of the rear surface of the envelope. For an EMA film this corresponds to hot air preferably at a temperature of 110-160°C.

After smoothing, the envelope is allowed to cool and is then cut into lengths, each length corresponding to an island for a wound dressing according to the present invention. The islands are then applied to the adhesive-coated backing sheet with the smoothed rear side of the envelope contacting the adhesive, followed by application of the silicone coated  
5 protective sheets, sterilisation and packaging.

The above examples have been described for the purpose of illustration only. Many other embodiments of the present invention falling within the scope of the accompanying claims will be apparent to the skilled reader.

## CLAIMS

1. A wound dressing comprising:  
an absorbent layer;  
5 an envelope formed from thermoplastic film enclosing said absorbent layer, wherein the film has a textured perforated surface on a front side of said envelope and a smoothed perforated surface on a rear side of said envelope;  
a semipermeable backing sheet covering said rear side of said envelope and extending outwardly therefrom; and  
10 a layer of adhesive on said backing sheet adjacent to said rear side of said envelope and bonding said envelope to said backing sheet.
2. A wound dressing according to claim 1, wherein said absorbent layer comprises a layer of a hydrophilic foam.  
15
3. A wound dressing according to claim 1 or claim 2, wherein the absorbent layer has a basis weight in the range of 50-500 g/m<sup>2</sup>.
4. A wound dressing according to claim 3, wherein the absorbent layer has a basis  
20 weight in the range of 100-400 g/m<sup>2</sup>.
5. A wound dressing according to any preceding claim, wherein the absorbent layer has a free (uncompressed) liquid absorbency for physiological saline at 25°C of from 5 to 30 g/g.  
25
6. A wound dressing according to any preceding claim, wherein said thermoplastic film is formed from ethylene methyl acrylate (EMA).
7. A wound dressing according to any preceding claim, wherein said thermoplastic  
30 film is a mesh perforated film.
8. A wound dressing according to any preceding claim, wherein said film has from 5 to 50 perforations/cm<sup>2</sup>.

9. A wound dressing according to any preceding claim, wherein said perforations have an area of from 0.01 to 2.0 mm<sup>2</sup>.
- 5 10. A wound dressing according to any preceding claim, wherein said thermoplastic film has a basis weight of from 1 to 500 g/m<sup>2</sup>.
11. A wound dressing according to claim 10, wherein said thermoplastic film has a basis weight of from 10 to 200 g/m<sup>2</sup>.
- 10 12. A wound dressing according to any preceding claim, wherein said envelope is formed from a single piece of said thermoplastic film wrapped around said absorbent layer.
13. A wound dressing according to any preceding claim, wherein said backing sheet  
15 comprises a microporous polyurethane film.
14. A wound dressing according to any preceding claim wherein said backing sheet has a water vapor permeability of from 300 to 5000 g/m<sup>2</sup>/24hrs at 37.5°C at a humidity difference of 10% to 100%.
- 20 15. A wound dressing according to claim 14 wherein said backing sheet has a water vapor permeability of from 500 to 2000 g/m<sup>2</sup>/24hrs at 37.5°C at a humidity difference of 10% to 100%.
- 25 16. A wound dressing according to any preceding claim, wherein said adhesive layer extends outwardly from said envelope to form an adhesive margin around said envelope for attachment of said wound dressing to a surface.
17. A wound dressing according to any preceding claim, wherein said adhesive layer  
30 has a basis weight of from 20 to 250 g/m<sup>2</sup>.
18. A wound dressing according to claim 17, wherein said adhesive layer has a basis weight of from 50 to 150 g/m<sup>2</sup>.



19. A wound dressing according to any preceding claim, further comprising one or more release coated cover sheets covering said front side of said envelope and said layer of adhesive.
- 5
20. A wound dressing according to any preceding claim which is sterile and packaged in a microorganism-impermeable pouch.
21. A process for the production of a wound dressing comprising the steps of:
- 10 providing a layer of absorbent material;  
wrapping said layer in an envelope of a textured perforated thermoplastic film;  
followed by  
smoothing said thermoplastic film on one side of said envelope; and  
applying an adhesive-coated backing sheet onto said smoothed thermoplastic film
- 15 on said one side of said envelope.
22. A process according to claim 21 for the preparation of a wound dressing according to any one of claims 1 to 20.
- 20 23. A process according to claim 21 or 22, wherein said step of wrapping comprises wrapping a single sheet of said textured perforated thermoplastic film around said absorbent layer such that first and second longitudinal edges of said textured perforated thermoplastic film overlap, and bonding together said overlapping edges to form said envelope.
- 25
24. A process according to any one of claims 21, 22 or 23, wherein said step of smoothing comprises blowing hot air onto said one side of said envelope.
25. A process according to claim 24, wherein said step of smoothing further comprises
- 30 measuring the temperature of the film and regulating said hot air blowing to control the maximum temperature reached by the film.

26. A process according to any one of claims 21 to 25, further comprising the step of cutting said envelope into lengths prior to applying said adhesive-coated backing sheet.
27. A process according to claim 26, further comprising a step of cooling said envelope  
5 intermediate said smoothing and said cutting steps.
28. An apparatus for use in a process according to claim 24, said apparatus comprising:  
a conveyor for conveying a layer of absorbent material enclosed between two layers  
of perforated textured thermoplastic film;  
10 a hot air blower configured to blow hot air onto one of said layers of thermoplastic  
film to soften and flatten said one of said layers thereby smoothing said one of said layers;  
a temperature sensor to measure the temperature of the said one of said layers  
adjacent to said hot air blower; and  
control means connected to said temperature sensor to regulate said conveyor and/or  
15 said hot air blower in response to signals from said temperature sensor.
29. An apparatus according to claim 28, wherein said temperature sensor is an infrared  
radiation detector.
- 20 30. An apparatus according to claim 28 or 29, wherein said hot air blower is adapted to  
blow hot air at a temperature between the softening temperature of the thermoplastic film  
and the melting temperature the thermoplastic film.
31. An apparatus according to claim 30, wherein said thermoplastic film is an ethylent  
25 methyl acrylate film and said hot air blower is adapted to blow hot air at a temperature  
between 110°C and 160°C.

FIG. 1

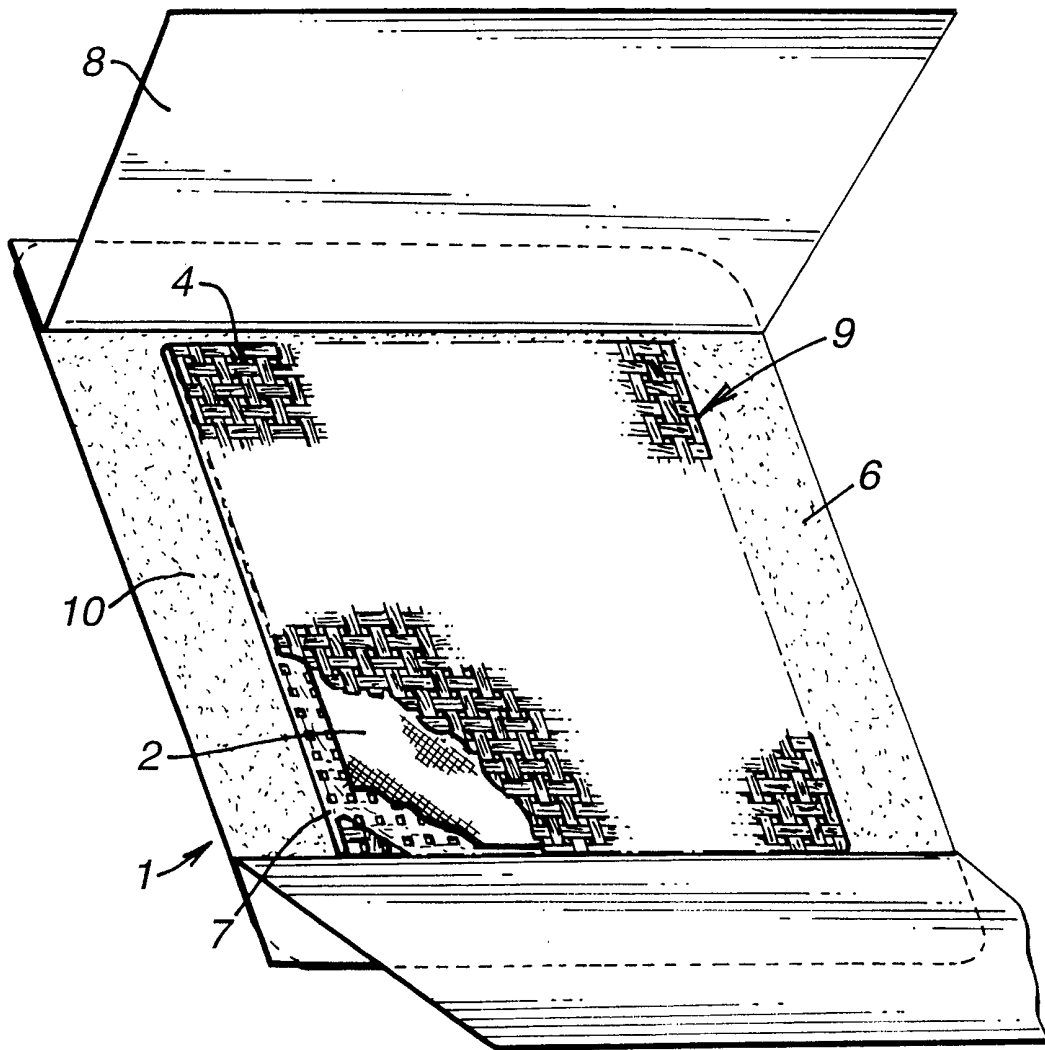


FIG. 2

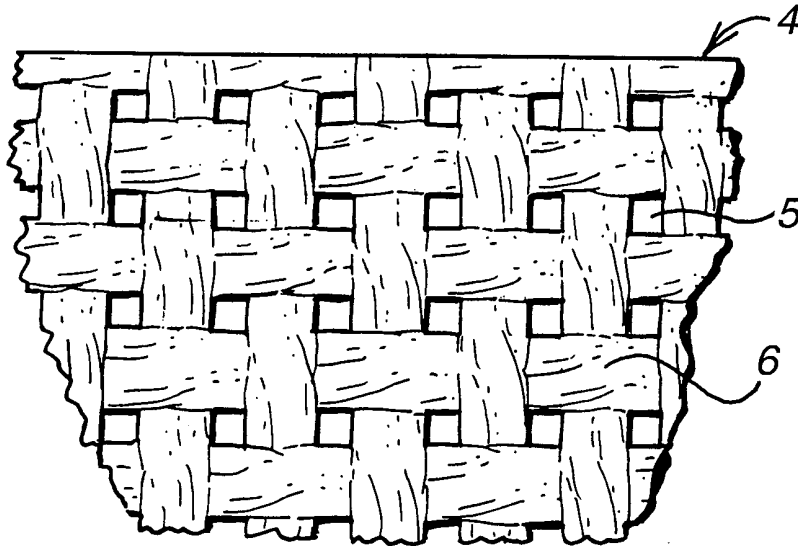


FIG. 3

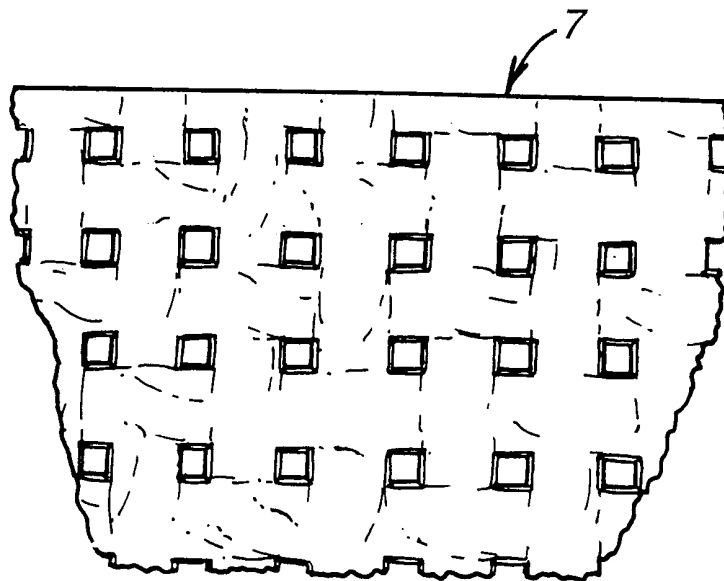


FIG. 4

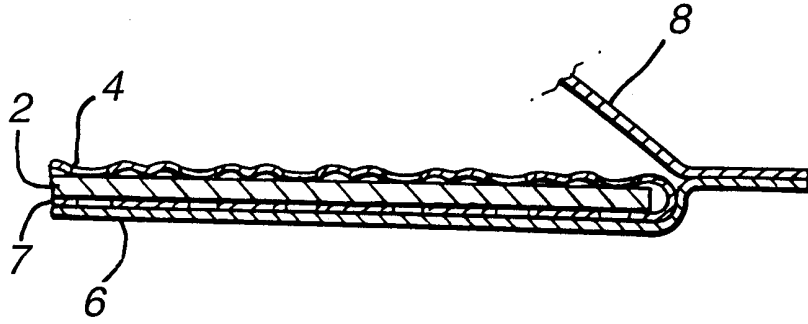
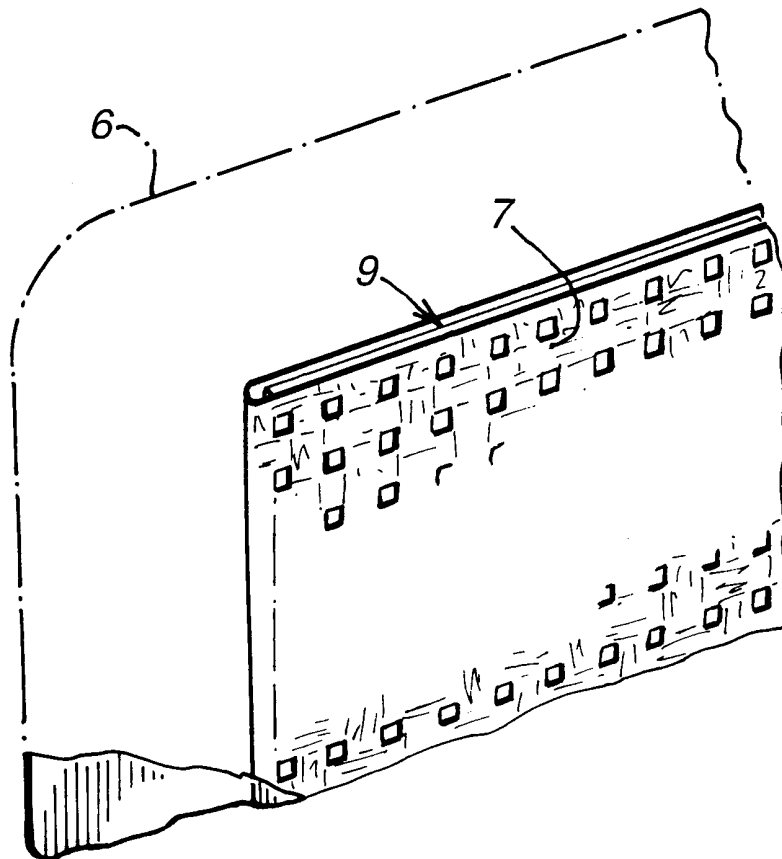


FIG. 5



# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 00/01105
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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 A61F13/02  According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61F  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 practical, search terms used)				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
A	GB 2 085 305 A (JOHNSON & JOHNSON) 28 April 1982 (1982-04-28) page 1, line 1 - line 19; figures 1-4 ---	1-18, 21-23		
A	GB 1 292 133 A (JOHNSON & JOHNSON) 11 October 1972 (1972-10-11) page 2, line 18 -page 4, line 9; figures 1-5 ---	1-19, 21-23		
A	DE 645 698 C (KURT WAGNER) 13 May 1937 (1937-05-13) claim 1; figure 2 -----	20		
<input type="checkbox"/> Further documents are listed in the continuation of box C. <span style="margin-left: 100px;"><input checked="" type="checkbox"/> Patent family members are listed in annex.</span>				
Special categories of cited documents :  <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">                     "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                      "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)                      "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                 </td> <td style="width: 50%; border: none;">                     "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.                      "&amp;" document member of the same patent family                 </td> </tr> </table>			"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 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "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
"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 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "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  <b>15 June 2000</b>		Date of mailing of the international search report  <b>26/06/2000</b>		
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer  <b>Louter, P</b>		

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Information on patent family members

International Application No

PCT/GB 00/01105

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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DE 645698	C		NONE	