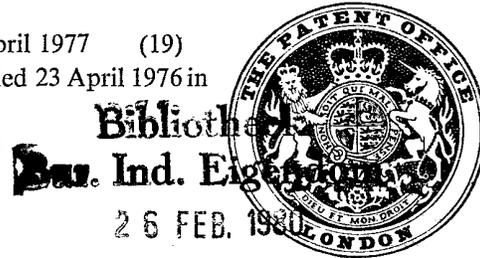


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(54) ABSORBENT ARTICLES

(71) We, COLGATE-PALMOLIVE COMPANY, a Corporation organised under the laws of the State of Delaware, United States of America, of 300 Park Avenue, New York, New York 10022, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to absorbent articles for absorbing and retaining body fluids, such as disposable diapers and sanitary towels. Such articles often have a bulky absorbent pad in order to provide the necessary absorbency and fluid-holding capacity. For example, disposable diapers are commonly made from a fluid-impervious backing sheet, a fluid-pervious cover sheet, and an absorbent pad made from a material such as comminuted wood pulp, known in the art as wood fluff, located between the backing and cover sheets. The pads of such conventional diapers are bulky, particularly in the crotch region, which may result in a poor fit and some discomfort to the infant.

It has been proposed to include more highly absorbent materials, such as hydrocolloid polymers, in the pads. In theory, the hydrocolloid materials permit a reduction in pad bulk while increasing desirable absorbent and fluid-holding characteristics of the pads, since such materials are capable of absorbing and retaining many times their weight of liquid, such as urine or other body fluids. In practice, use of such materials in absorbent articles has been limited due to difficulties caused by the nature of the materials.

It is preferred that the hydrocolloid materials be utilized in a particulate form, such as granules or flakes, since the particles provide a large surface area in relation to their volume. However, it has been found that when placed in the pad, the particles tend to migrate in the pad before the article has been used by the wearer. Particle migration may take place during packaging, storage, transportation or other handling of the

articles, from the initial location of the particles to remote parts of the pad where they are less effective.

When wetted, the hydrocolloid materials swell and become gelatinous, and assume a slippery or slimy texture which facilitates further migration of the particles when wetted, causing the pad to become unstable. Thus, it has been found that the wetted materials cause the pads to shift, ball, split and shred during use of the articles. Further, certain of the wetted hydrocolloid materials may be somewhat irritating to the skin, and it is thus desirable to minimize contact of such materials with the skin.

According to the present invention an absorbent article includes an absorbent assembly comprising a fluid-pervious top sheet, a backing sheet of fluid-impervious material, a plurality of discrete pockets between the top and backing sheets, and hydrocolloid material in the pockets.

Thus the present invention provides an absorbent article which retains a hydrocolloid material at a fixed location in the article. The pockets prevent migration of the hydrocolloid material prior to and during use of the article. Also, contact of the wetted hydrocolloid material with the wearer's skin is prevented by the intervening fluid-pervious top sheet of the absorbent pad assembly.

The invention may be performed in various ways, and some embodiments will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a fragmentary plan view of an absorbent article embodying the present invention, namely a disposable diaper;

Figure 2 is a fragmentary sectional view taken along the line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional view of another embodiment;

Figure 4 is a fragmentary sectional view of a third embodiment;

Figure 5 is a diagrammatic plan view of a fourth embodiment;

Figure 6 is a diagrammatic plan view of a fifth embodiment;

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Figure 7 is a diagrammatic fragmentary plan view of a sixth embodiment;

Figure 8 is a diagrammatic plan view of a seventh embodiment;

5 Figure 9 is a fragmentary sectional view of an eighth embodiment;

Figure 10 is a fragmentary sectional view of a ninth embodiment;

10 Figure 11 is a fragmentary plan view showing a retaining portion of a tenth embodiment;

Figure 12 is a fragmentary sectional view of an eleventh embodiment; and

15 Figure 13 is a fragmentary sectional view taken along the line 13—13 of Figure 12.

In the illustrations and descriptions of the several embodiments, like parts are designated by the same reference numerals throughout.

20 Referring to Figures 1 and 2, there is shown an absorbent article 20 having an absorbent pad assembly 22. For convenience, the article 20 is described in the form of a disposable diaper, although it will be understood that the invention is applicable to other absorbent articles, such as sanitary towels and maternity napkins.

25 The pad assembly 22 has a fluid-imperious backing sheet 24, such as polyethylene, defining a back or outer surface 26 of the diaper, a fluid-pervious top sheet or cover sheet 28 defining a front or inner surface 30 of the diaper, and an absorbent pad 32 positioned between the top sheet 28 and the backing sheet 24. The absorbent pad 32 has a pad portion 34 comprising a cellulosic material, such as one or more sheets of cellulosic wadding or comminuted wood pulp known in the art as wood fluff, a back wadding sheet 36 of cellulosic material defining a back surface 38 of the pad 32, and a front wadding sheet 40 of cellulosic material defining a front surface 42 of the pad 32. The front and back wadding sheets 40 and 36, respectively provide structural integrity for the pad portion 34 during use of the article.

30 As illustrated in Figure 1, the pad assembly 22 has a pair of side edges 44 and a pair of end edges 46, and the absorbent pad 32 has a pair of side edges 48 and a pair of end edges 50. In a preferred form of diaper as illustrated, the side edges 48 of the pad 32 are located adjacent the side edges 44 of the pad assembly 22, and the backing sheet 24 has lateral side margins 52 folded over and secured to the top sheet 28 over lateral side margins of the pad 32. The diaper illustrated has conventional tape fasteners 54 for use in securing the diaper in place about an infant.

35 The pad assembly 22 has a retaining sheet 56 positioned between the top sheet 28 and the front wadding sheet 40. The material of the retaining sheet is fluid-imper-

40 vious except for some perforations referred to below. The retaining sheet 56 is free of attachment to, and spaced from, the wadding sheet 40 in a plurality of spaced regions 58, defined by embossments or protuberances of the retaining sheet as shown, and is attached to the front surface 42 of the wadding sheet 40 in areas 60 surrounding the regions 58. Thus, the retaining sheet 56 and the front wadding sheet 40 define a plurality of spaced discrete pockets 62 between the embossments or protuberances of the retaining sheet 56 and the front wadding sheet 40. In the embodiment shown in Figures 1 and 2 the pockets 62 have a generally circular shape, and are aligned laterally across and longitudinally along the pad assembly 22.

45 Although the retaining sheet 56 may be attached to the front wadding sheet 40 by any suitable means, such as adhesive, in a preferred form the retaining sheet 56 comprises a film of thermoplastic material, such as polyethylene, and the film is fused to the front wadding sheet in the areas 60 by suitable means, such as by localised heating. As shown, the areas 60 of the retaining sheet 56 have a plurality of perforations 64 extending through the sheet 56 to permit passage of body fluids through the perforations 64 into the pad 32. Although the perforations 64 may be formed in any suitable manner, in one form of the invention small perforations are enlarged by heating when the sheet 56 is fused to the pad, in a manner similar to that described in our copending application British Patent Application No. 6175/76 (Serial No. 1540474). In the present embodiment the retaining sheet 56 is imperforate in the regions 58 to prevent passage of fluids between the pockets 62 and the front surface 30 of the pad assembly 22.

50 The pad assembly 22 has disposed in the pockets 62 a hydrocolloid material 66, such as (a) hydrolyzed starch polyacrylonitrile copolymer H-span. Product 35-A-100, Grain Processing Corp., Muscatine, Iowa, U.S.A., disclosed in U.S. Patent No. 3,661,815, (b) Product No. XD-8587 . OIL, which is cross-linked, Dow Corning Chemical Co., Midland, Michigan, U.S.A., (c) Product No. SGP 502S, General Mills Chemical, Inc., Minneapolis, Minnesota, U.S.A., (d) Product No. 78-3710, National Starch and Chemical Corp., New York, New York, U.S.A., (e) a hydrogel base product, Carbowax, a trademark of Union Carbide Corp., Charleston, West Virginia, U.S.A., or (f) base-saponified starch-polyacrylonitrile and graft copolymers, United States Department of Agriculture, Peoria, Illinois, U.S.A., disclosed in U.S. Patent No. 3,425,971. Such hydrocolloid materials have the capability of absorbing many times their weight in

liquids, such as urine or other body fluids, and swell and form a gelatinous mass when wetted. In general, the hydrocolloid materials useful in the articles of the present invention may be organic or inorganic, are physiologically non-objectionable (non-toxic), and are characterized by swelling in the presence of water, by a relatively high affinity for water, and by normally at least partially assuming a suspension in the presence of water. Preferably, the hydrocolloid materials are utilized in a particulate form, such as powders, granules or flakes, although they may be coated as a solution on one or more of the sheets defining the pockets, if desired.

The retaining sheet 56 and the front wadding sheet 40 retain the hydrocolloid materials 66 in the pockets 62, and prevent migration of the materials 66 into and throughout the pad portion 34 during transportation, storage, or other handling of the articles prior to use. Thus, the materials 66 are retained at desired locations in the pad assembly 22 for maximum benefit during use, and are prevented from migrating to undesired locations in the pad assembly prior to use of the article.

During use of the article 20, body fluids pass through the perforations 64 of the retaining sheet areas 60 and into the pad 32, after which the body fluids are permitted to pass through the front wadding sheet 40 into the pockets 62 for absorption and retention by the hydrocolloid materials 66. The front wadding sheet 40 has a sufficient wet strength to prevent passage of the wetted hydrocolloid material 66 through the wadding sheet 40 into the pad portions 34, such that the wadding sheet 40 serves as a second retaining sheet to retain the wetted materials in the pockets during use of the article. Additionally, the wetted materials 66 are prevented from entering the pad portion 34 to eliminate degradation of the pad, such as shifting, balling, splitting, or shredding of the pad portion 34, which otherwise might occur due to the unstable and slippery texture of the wetted materials 66. Moreover, the imperforate regions 58 of the retaining sheet 56 prevent passage of the wetted materials 66 to the front surface of the pad assembly, and thus prevent contact of the wetted materials with the wearer's skin.

However, if desired, the regions 58 of the retaining sheet 56 may have small perforations 68, as shown in Figure 4, smaller than the hydrocolloid particles. Thus, the perforations 68 permit passage of body fluids into the pockets 62, but are sufficiently small to prevent passage of the wetted materials to the front surface of the article. The particles swell when wetted, further limiting the possibility of passage of the particles through the perforations 68.

Although the retaining sheet 56 has been described as being attached to the front surface of the pad, it will be appreciated that the sheet may be attached to the back surface of the pad, or to a surface of a pad layer, if desired.

In the embodiment illustrated in Figure 3 the pad assembly 22 has a second retaining sheet 70 attached to the first retaining sheet 56 in the areas 60, and defining pockets 62 in the regions 58, such that the hydrocolloid material 66 is retained in the pockets 62 between the retaining sheets 56 and 70. In a preferred form, the second retaining sheet 70 comprises a perforated but otherwise fluid-impervious material, such as polyethylene, and has a plurality of perforations 72 aligned with the perforations 64 of the first retaining sheet 56 to permit passage of body fluids through the retaining sheets 56 and 70. The second retaining sheet 70 also has a plurality of perforations 74 in the regions 58 to permit passage of body fluids into the pockets 62. Thus, in the embodiment shown, the second retaining sheet 70 is positioned adjacent the front surface 42 of the pad 32, such that body fluids pass through the perforations 64 and 72 of the retaining sheets 56 and 70, respectively, into the pad during use of the article, and from the pad 32 through the perforations 74 of the sheet 70 into the pockets 62 for absorption and retention by the hydrocolloid materials 66. As in the previous embodiment, the material 66 is retained in the pockets 62 before and during use of the article. The perforations 74 are preferably smaller than the hydrocolloid particles 66 in the pockets 62 so that the particles cannot pass through these perforations.

If desired, the second retaining sheet 70 may comprise a cellulosic sheet additional to the wadding sheet, with sufficient wet strength to prevent passage of the wetted hydrocolloid materials 66 through the sheet 70, or the sheet 70 may be arranged with the top wadding sheet 40 to prevent passage of such wetted materials. In a preferred form, at least one of the first and second retaining sheets 56 and 70 comprises a film of thermoplastic material, and the sheets are fused together in the areas 60. If desired, the first and second retaining sheets 56 and 70 may be located between the backing sheet 24 and the back surface 38 of the pad 32, or may be positioned between layers of absorbent pad material.

Figure 5 is a diagrammatic view showing an arrangement of the pockets. In this embodiment, the regions 58 and the pockets 62 retaining the hydrocolloid materials have a generally circular shape and are arranged in rows only in a longitudinally central zone of the article 20. For example, in a dispos-

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able diaper, the pockets 62 may be located in a crotch region 76 at the point of contact of body fluids during use of the diaper.

5 However, as shown in Figure 6, if desired the pockets 62 may be provided only adjacent at least one of the end edges 46 of the article, for example, in waistline portions 78 of a disposable diaper.

10 In an alternative form, as shown in Figure 7, the pockets 62 and regions 58 are elongated, and extend laterally between the side edges 44 of the article 20.

15 In a further form, as shown in Figure 8, the elongated regions 58 and pockets 62 extend longitudinally between the end edges 46 of the article 20.

20 In the embodiment illustrated in Figure 9, the pad assembly 22 has first and second layers 32a and 32b of absorbent pads, and first and second retaining sheets 56 and 70 positioned between the pad layers 32a and 32b. The sheets 56 and 70 are preferably made from a perforated but otherwise fluid-impervious material, such as polyethylene, and are attached together in the areas 60, such as by fusing, while being spaced in the regions 58 or otherwise defining pockets 62 between the retaining sheets 56 and 70. The sheets 56 and 70 have aligned perforations 64 and 72 to permit passage of body fluids through the sheets 56 and 70 in the areas 60. The retaining sheet 56 has a plurality of small perforations 68 in the regions 58 to permit passage of body fluids from the pad 32a into the pockets 62, while the retaining sheet 70 has a plurality of small perforations 74 in the regions 58 to permit passage of body fluids from the pad 32b into the pockets 62. Thus, the sheets 56 and 70 permit passage of body fluids between the pads 32a and 32b, and permit passage of body fluids from both of the pads 32a and 32b into the pockets 62 for absorption and retention by the hydrocolloid materials in the pockets 62. As in previous embodiments, the perforations 68 and 74 are preferably smaller than the size of the hydrocolloid particles to minimize the possibility of particles passing through the sheets 56 and 70. In an alternative form of the article 20, the perforated retaining sheets 56 and 70 may be positioned between the top or backing sheets and the pad.

55 In the embodiment illustrated in Figure 10 the retaining sheet 56 is attached to the inner surface of the backing sheet 24 in the areas 60, while defining pockets 62 in the regions 58. The hydrocolloid material 56 is retained in the pockets 62 defined between the retaining sheet 56 and the backing sheet 24 in the regions 58. As shown, the retaining sheet 56 is fluid-impervious except for a plurality of small perforations 68 in the regions 58 to permit passage of body fluids

from the pad 32 into the pockets 62 for absorption and retention by the hydrocolloid materials 66. In a preferred form, at least one of the sheets 56 and 24 comprises a film of thermoplastic material, and the sheets 56 and 24 are fused together in the areas 60. In the embodiment of Figure 10, the regions 58 and the pockets 62 may have a generally circular shape, as previously described, although they may have any other suitable shape, such as the elongated pockets and regions as shown in Figures 12 and 13.

80 In the embodiment illustrated in Figure 11 the retaining sheet 56 is attached to the packing sheet 24, such as by fusing the sheets together, in areas of attachment 60. The retaining sheets 56 and 24 define pockets 62 in regions 58 for retaining the hydrocolloid materials between the retaining sheet 56 and the backing sheet 24. The retaining sheet 56 and the backing sheet 24 are free of attachment at locations defining channels 80 extending between the sheets 56 and 24 and communicating with the pockets 62. As shown, the retaining sheet 56 has a plurality of perforations 82 extending through the sheet 56, at least some of the perforations 82 communicating with the network of channels 80. In this embodiment, the regions 58 of the sheet 56 are imperforate to prevent passage of body fluids through the sheet 56 in the regions 58. However the body fluids are permitted to pass through the perforations 82 into the channels 80, after which the body fluids pass through the channels 80 into the pockets 62 for absorption and retention by the hydrocolloid materials retained in the pockets. In an alternative form, the perforations 82 extend through the joined sheets, and the sheets may be positioned adjacent a front surface of the pad, or may be located between separate layers of the pad.

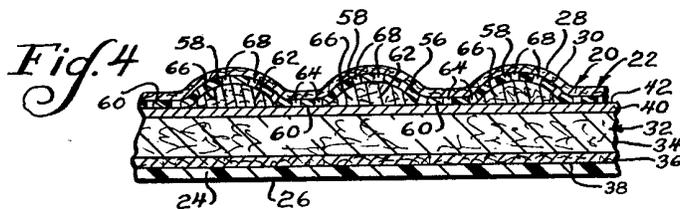
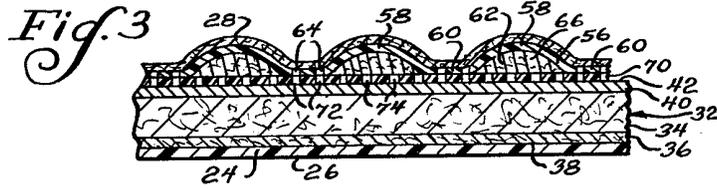
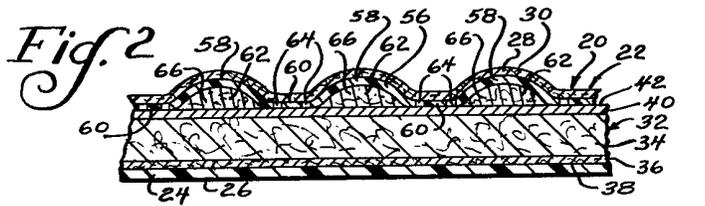
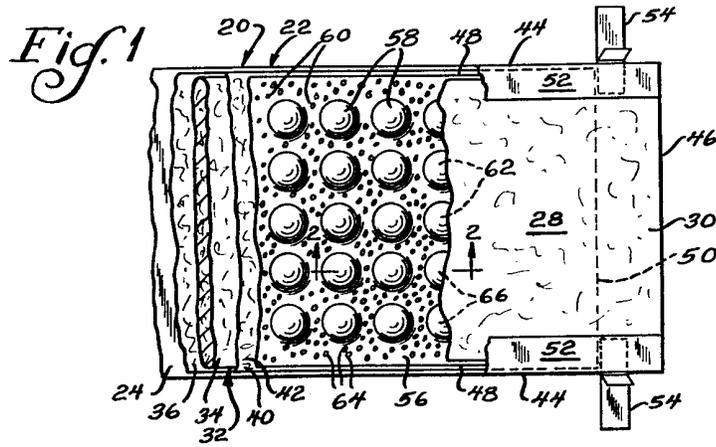
110 In our co-pending British Patent Application No. 23691/78 (Serial No. 1561402) which has been divided herefrom there is claimed an absorbent article which includes an absorbent pad assembly, the pad assembly comprising an absorbent pad, a hydrocolloid material, and means retaining the hydrocolloid material at a plurality of spaced locations on and projecting from a surface of the pad and permitting passage of body fluids to the retained hydrocolloid material.

#### WHAT WE CLAIM IS:—

1. An absorbent article which includes an absorbent assembly comprising a fluid-impervious top sheet, a backing sheet of fluid-impervious material, a plurality of discrete pockets between the top and backing sheets, and hydrocolloid material in the pockets. 125
2. An absorbent article as claimed in 130

- Claim 1 in which the assembly has a retaining sheet forming part of the pockets.
3. An absorbent article as claimed in Claim 2 in which the retaining sheet and the backing sheet are attached together in areas defining the pockets in regions between the retaining sheet and the backing sheet.
4. An absorbent article as claimed in Claim 3 in which the retaining sheet comprises a perforated but otherwise fluid-impervious material having in the said regions a plurality of perforations communicating with the pockets.
5. An absorbent article as claimed in Claim 3 in which the retaining sheet comprises a perforated but otherwise fluid-impervious material which is imperforate in the regions covering the pockets, the retaining sheet also defining channels communicating with the pockets and having a plurality of perforations communicating with the channels.
6. An absorbent article as claimed in any of Claims 3 to 5 in which at least one of the retaining sheet and the backing sheet comprises a film of thermoplastic material fused to the other of these sheets in the said areas.
7. An absorbent article as claimed in Claim 2 in which the assembly includes an absorbent pad, and the retaining sheet is attached to a surface of the pad in areas defining the pockets in regions between the areas, the pockets projecting from the said surface of the pad.
8. An absorbent article as claimed in Claim 7 in which the pad includes a wadding sheet defining a surface of the pad, and the retaining sheet is attached to the wadding sheet.
9. An absorbent article as claimed in Claim 7 in which the retaining sheet is attached to a front surface of the pad.
10. An absorbent article as claimed in Claim 9 in which the retaining sheet comprises a perforated but otherwise fluid-impervious material having perforations in the said areas for passage of fluid through the retaining sheet.
11. An absorbent article as claimed in Claim 10 in which the retaining sheet is imperforated in the said regions covering the pockets.
12. An absorbent article as claimed in Claim 10 in which the retaining sheet has in the said regions perforations communicating with the pockets.
13. An absorbent article as claimed in Claim 2 in which the assembly has a second retaining sheet attached to the first-mentioned retaining sheet in areas defining the pockets in regions between the areas.
14. An absorbent article as claimed in Claim 13 in which that retaining sheets comprise perforated but otherwise fluid-impervious material having perforations in the said areas for passage of fluid through the retaining sheets.
15. An absorbent article as claimed in Claim 14 in which the said first-mentioned retaining sheet is imperforate in the said regions and the second retaining sheet has in the said regions perforations communicating with the pockets.
16. An absorbent article as claimed in Claim 15 in which the assembly comprises an absorbent pad having a front surface, and the retaining sheets are positioned between the pad and the top sheet with the second retaining sheet adjacent the front surface of the pad.
17. An absorbent article as claimed in Claim 14 in which both the retaining sheets have in the said regions perforations communicating with the pockets.
18. An absorbent article as claimed in Claim 14 in which the assembly comprises an absorbent pad having first and second layers, and in which the said first-mentioned and second retaining sheets are located between these layers.
19. An absorbent article as claimed in Claim 13 in which the said areas surround the said regions.
20. An absorbent article substantially as described with reference to Figures 1 and 2, or any of Figures 3 to 11, or Figures 12 and 13, of the accompanying drawings.
21. An absorbent article as claimed in any of the preceding Claims which is a disposable diaper.

KILBURN & STRODE,  
Chartered Patent Agents,  
Agents for the Applicants.



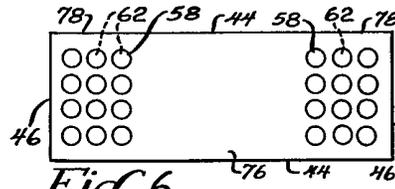
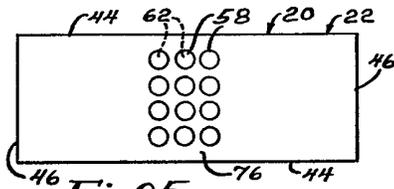


Fig. 5

Fig. 6

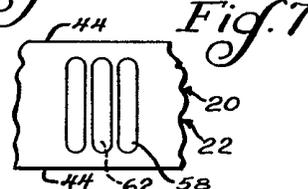


Fig. 7



Fig. 8

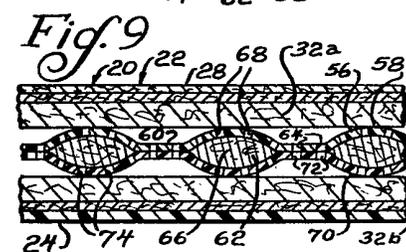


Fig. 9

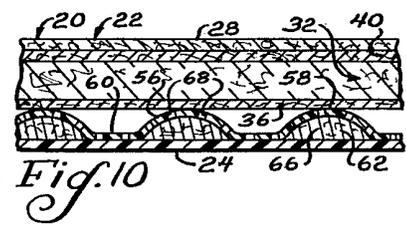


Fig. 10

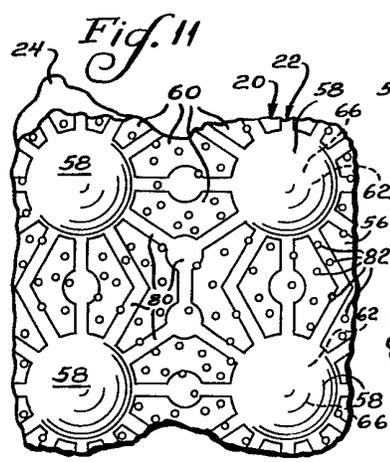


Fig. 11

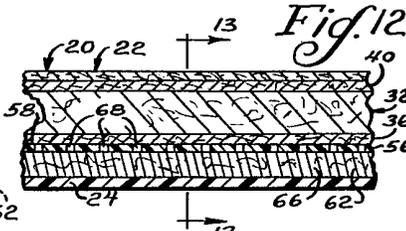


Fig. 12

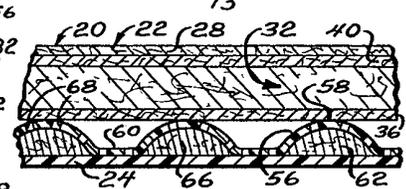


Fig. 13