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PATENT SPECIFICATION

DRAWINGS ATTACHED

1,133,104

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COMPLETE SPECIFICATION

Pads or Napkins for Absorbing Human Body Fluids

We, KIMBERLY-CLARK CORPORATION, a corporation organised under the laws of the State of Delaware, United States of America, of Neenah, Wisconsin, 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:—

This invention relates to pads or napkins for absorbing human body fluids e.g. sanitary napkins.

A pad or napkin for absorbing human body fluids in accordance with the invention has a main fluid absorbent pad on which a fluid control element of absorbent material of substantially higher apparent density than that of the material of the main absorbent pad, is centrally positioned the length and width dimensions of the element being smaller than the corresponding dimensions of the pad. The fluid control element on the absorbent pad effectively collects body exudates and confines the collected exudate within a predetermined medial area of the pad.

The size and location of the control element helps to maintain the shape of the napkin during use.

If desired a second control element may be located on the other side of the absorbent pad.

The invention will now be further described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a perspective view of one embodiment of a sanitary napkin in accordance with the invention, with a top central portion partially cut away to show some details of construction.

Figure 2 is a section taken along line 2—2 of Figure 1.

Figure 3 is a similar view to Figure 2 showing an alternate embodiment.

Figures 4 and 5 are similar views to Figures 2 and 3 but with an additional control element shown along the bottom portion.

Figures 6, 7 and 8 are perspective views, partially in section, of various other forms of control elements.

It is desirable to have sanitary napkins of an absorbent structure, which (1) immediately accepts body ~~exuate~~ exudate, (2) rapidly transports the exudate away from the discharge source, and (3) effectively contains the exudate within the confines of the napkin, whilst maintaining the top surface of the napkin relatively dry. In addition, the absorbed exudate should not be allowed to spread to the sides of the napkin, run over the top edges of the napkin, or soak through the bottom of the napkin, especially if the absorptive capacity of the napkin has not been reached.

In order to avoid these problems, and to realise to a greater degree the absorptive and protective potential of sanitary napkins, various means of controlling the spreading of fluid in the pad have been proposed. Among these is the utilisation of density or compression differences within, or between, the material used for various absorptive elements.

An object of this invention is to provide better utilisation of the differences in density and pore size of absorptive elements so as to achieve more effective control of fluid distribution in sanitary pads.

As is well-known in the sanitary napkin art, fluid which is introduced into an absorptive element migrates more rapidly through dense areas of the elements than it does through areas of less density. That general principle was first taught in our U.S. patent No. 1,863,333.

As shown in the drawings, the sanitary napkin 12 comprises a main absorbent core of fluid absorbent material, generally shown at 13, a fluid control element 25, and a fluid-pervious wrapper 14 enclosing the absorbent

elements and over-lapped in a known manner, and providing end tabs for fastening purposes. The fluid-pervious wrapper 14 may consist of a woven gauze, a non-woven scrim, a perforated non-woven fibrous web, a light weight web of bonded fibres, or similar materials well-known in the art.

The main body portion 13 of the napkin may also be of varying construction, including top and bottom layers comprising multiple plies of cellulose wadding 16 and a central pad of wood fluff 18, as shown in Figures 2 and 4; or the main body portion 13 may be all fluff as shown at 18 in Figures 3 and 5. Other known absorbent materials such as batts of cotton and/or various types of synthetic fibres may also be used for the main body portion. The main body portion, in itself is of conventional construction, the important requisite being that it is of lower density and consequently has larger interstices than the control element 25 hereinafter described.

Other parts of the pad construction comprise fluid-impervious baffles 19 e.g. of plastic film which are employed to inhibit strike-through, thin sheets 21 of absorbent creped tissue or creped cellulose wadding, and side strips 20, of for example waxed tissue or water-resistant film to inhibit inadvertent side-staining caused by migration of exudate to side edges of the pad.

The pad includes fluid-control element 25 which co-operates with the main absorbent pad 13 to provide improved performance. The fluid control element may be used simply on the top surface as shown at 25 in Figures 1—3, or in combination with a similar supplementary element 30 at the bottom of the pad as shown in Figures 4 and 5.

In general, elements 25 and 30, comprise a compressed strip of absorbent material of smaller dimension in length and width, than the length and width of main absorbent pad 13. As shown, the element 25 is positioned centrally on the top, or body contacting side, of main pad 13, contiguous to the fluid-pervious wrapper 14. Element 25 is of substantially smaller peripheral dimension than main pad 13, accordingly the end and side edges of element 25 are spaced inwardly a substantial distance from the respective end and side edges of main pad 13. Such spacing of element 25 is extremely important for reasons of both fluid control and wearing comfort. As an example the space from the side edges of the main pad to the side edges of the control element may be 5/8". However, this spacing may be varied to be from 1/4" to 1" in width. The important considerations in placing the control element 25 with respect to the main pad 13 are: (1) that there be sufficient space from control element edge to main pad edge to prevent transverse migration from the control element to the pad edge, (2) that the control element have sufficient width to be able to transfer fluid along its length, and (3) that the control element be shorter in length than the main pad.

The element 25 may be compressed overall in a flat non-patterned configuration as shown at 25c in Figure 8, or may have an embossed pattern defining various degrees of compression such as shown at 25a in Figure 6, or in element 25b in Figure 7. In Figure 6 areas 26a are more highly compressed than areas 27a. In Figure 7 areas 26b are more highly compressed than areas 27b. It is apparent that many variations in pattern may be used. The important consideration in constructing the element is that it should have a significantly higher average density and smaller pores than the elements 16 and/or 18 which make up main absorbent pad 13.

In conventional sanitary napkins cellulose wadding components such as at 16 and fluff components such as at 18, have an average apparent density of 1.9 pounds per cubic foot, or an apparent density range within the component varying from 1.5 pounds per cubic foot to 2.5 pounds per cubic foot.

When material of the above density is used to make up the main pad 13, the control element 25 should have an apparent density of at least 5 pounds per cubic foot or an apparent density within the element ranging from as low as 5 pounds per cubic foot at the points of lowest compression to as high as 100 pounds per cubic foot at the points of highest compression. An average apparent density in the range of 7.5 pounds per cubic foot to 50 pounds per cubic foot is preferred. It is understood that when a patterned compression, such as shown in Figures 6 and 7, is employed for element 25 that the density and pore size will vary from point to point within the element itself according to the pattern used. However, for the most effective functioning, the lowest density in the major part of element 25 should be substantially higher than the highest density existing in the major part of main absorbent pad 13.

It is believed that during use, the following reaction occurs in a sanitary napkin of the above construction. When fluid strikes compressed element 25, the contacted area immediately expands and the pores in the wetted area become larger. The fluid is then drawn to the immediately adjacent smaller pores, which also expand. The absorption and spread of fluid then moves through the element in a continuous flow pattern from the source point of the fluid as long as fluid is being supplied. Very little fluid appears to transfer to the main absorbent pad 13 in the early stages of use because of the strong capillary action of the small pores which exist within denser element 25 as compared with the larger pores which exist within the main absorbent pad 13. However, depending upon the length of time the pad is worn,

more and more of the fluid in element 25 is transferred by gravity or free flow to the main absorbent pad 13, and the rate of transfer between the element 25 and the main absorbent pad 13 increases as local areas in element 25 are temporarily saturated.

Thus, as a fluid is introduced to element 25, it tends to spread rapidly in both the lengthwise and transverse directions even if the fluid is introduced at a remote end thereof, before any substantial amount reaches, or is transferred to the main absorbent pad 13. The transfer of fluid to the main absorbent pad which starts at a slow rate and gradually increases is largely confined to an area in the main absorbent pad defined by the marginal edges of element 25. This is believed to be true because the forces which govern the transverse and lengthwise migration of fluid stronger, due to higher ~~capillary~~ within the smaller pores of the compressed element, than are such forces in the main absorbent pad, and the transfer to the main absorbent pad is largely the result of gravity or free flow. As a result, the fluid which first strikes the surface of the napkin is effectively confined within the dimensions of the compressed element and fluid will not overflow the sides or edges of the main absorbent pad unless all of its central absorbent capacity is utilised.

The higher density of the control element 25 also aids in maintaining the dimensional stability of the pad so that the pad has increased ability to hold its shape during use. By locating the element centrally of the top surface of the main absorbent pad, it is possible to provide a relatively planar surface in the principal area of contact between the pad and the perineal area of the wearer. The relatively less dense main body portion of the pad extending beyond the edges of the compressed element is soft and fluffy and conforms readily to the thighs and body movement to ensure against chafing and avoid discomfort.

The dimensional stability is further improved when a second control element 30 is located at the bottom of the main absorbent pad. The second or bottom control element 30 is preferably of the same dimensions and density as the first, or top, control element 25 and is positioned centrally of the main absorbent pad's bottom surface similarly to, and congruent with, the position of top element 25 with respect to the top pad surface.

A structure of this latter type is shown in Figures 4 and 5. In Figure 4 the main absorbent pad comprises multiple layers of absorbent cellulose wadding 16 on each side of a central fluff section 18. In Figure 5, the main absorbent pad is comprised only of a fluff section 18.

The compressed elements, 25 and 30, provide dimensional stabilising components and are made relatively narrow more readily to accommodate the narrow dimension of the perineal crotch without undue side compression. The soft central element, or main absorbent pad, is wider than the compressed element permitting it to contract and expand as required by body movements and pressures while the top and bottom compressed elements remain essentially planar.

The structure shown in Figures 4 and 5 is also suitable for two-sided or reversible sanitary napkins, i.e., napkins which may be worn with either side facing upwardly. When a reversible napkin is desired, the conventional polyethylene baffle, shown at 19 in Figures 2 and 3 is either eliminated entirely, or is located within the main absorbent pad intermediate the top and bottom surfaces of the napkin. If a napkin of such construction is worn "upside down", the element 30 acts to control spread of the exudate in the same manner as described previously for element 25.

In producing the compressed elements 25 and 30, a large variety of embossing patterns may be used. The elements may be totally compressed without a pattern (Figure 8), or they may be compressed with a range of patterns to provide gradient densities which result in varying degrees of resilience and softness to the touch (Figures 6 and 7). Dimensions of the compressed element and main pad may also be varied to provide a range of sizes to accommodate the normal range of perineal dimensions.

In one specific example, the compressed elements were 5" long and 1-1/4" wide and the soft middle section comprising the main absorbent pad was 8-7/8" long and 2-11/16" wide. The middle section had an average apparent density of 1.9 pounds per cubic foot and the compressed elements had an average apparent density of 24 pounds per cubic foot. While the drawing shows the control elements as being rectangular, the ends may be rounded or the element may have an oval configuration. In each of these alternate forms, however, the peripheral edges of the control element must still be spaced from the respective peripheral edges of the main absorbent pad.

A variety of absorbent materials may be employed for the control elements for example wood fluff, a combination of wood fluff and uniformly interspersed pieces of shredded sponge such as polyurethane and cellulose sponge, multilayers of cellulose wadding, absorbent cotton, and various combinations of such materials.

In connection with the control element 25a, illustrated in Figure 6, it will be observed that the more highly compressed areas 26a in adjacent rows are staggered with respect to each other. We have found, with this staggered relationship, that fluid migrates easily from one compressed area 26a to adjacent compressed areas 26a in adjacent rows, diagon-

ally across the control element. This migration occurs particularly within the lower surfaces of the control element, leaving the relatively uncompressed areas on the top surface of the element, as appearing in Figure 6, dry for a time while the fluid continues to migrate and flow within the element 25a. If the fluid flow to the control element 25a is quite limited, the fluid remains on the lower surface of the control element and penetrates from there onto the main body of the pad while leaving the top surface of the control element 25a in contact with the human body in a dry condition. The compression of the areas 26a apparently reduces the capillary voids in cross section within the control element 25a causing migration of fluid to occur particularly internally of and on the underside of the control element 25a, between the compressed areas 26a, leaving the outer, less compressed, surfaces drier.

WHAT WE CLAIM IS:—

1. A pad or napkin for absorbing human body fluids having a main fluid absorbent pad and a fluid control element of absorbent material of substantially higher apparent density than that of the material of the main absorbent pad, the element, which is centrally positioned, on the pad, having its length and width dimensions smaller than the corresponding dimensions of the pad.

2. A pad or napkin as claimed in claim 1 in which the pad and control element are enclosed with a fluid pervious wrapper.

3. A pad or napkin as claimed in either claim 1 or 2 in which two control elements are provided on each opposite face of the pad.

4. A pad or napkin as claimed in any of the preceding claims in which the main absorbent pad has an apparent density of from 1.5 lbs per cubic ft. to 2.5 pounds per cubic ft., the control element having an apparent density of from 5 lbs per cubic ft. to 100 lbs per cubic ft. preferably 7.5 lbs per cubic ft. to 50 lbs per cubic ft.

5. A pad or napkin as claimed in any of the preceding claims in which the space between the periphery of the element and the periphery of the pad is from ¼" to 1".

6. A pad or napkin as claimed in any of the preceding claims in which the control element(s) has a pattern impressed on its face to form areas of relatively high, and relatively low, density, the apparent density of the low density areas being substantially higher than the average apparent density of the pad.

7. A pad or napkin substantially as hereinbefore described with reference to Figure 1 and any of Figures 2 to 5 of the accompanying drawings.

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