

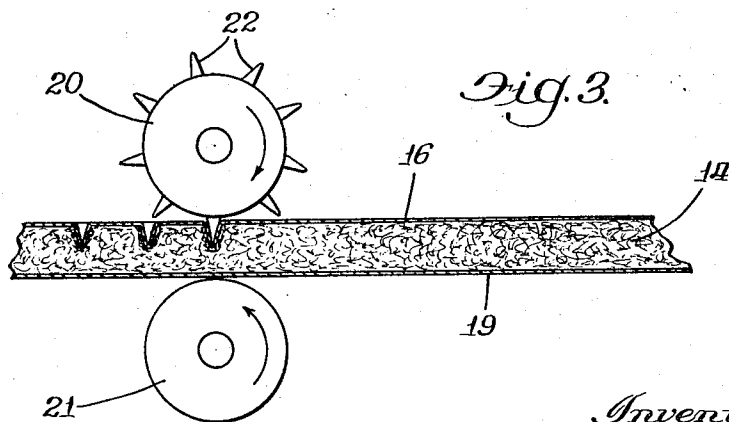
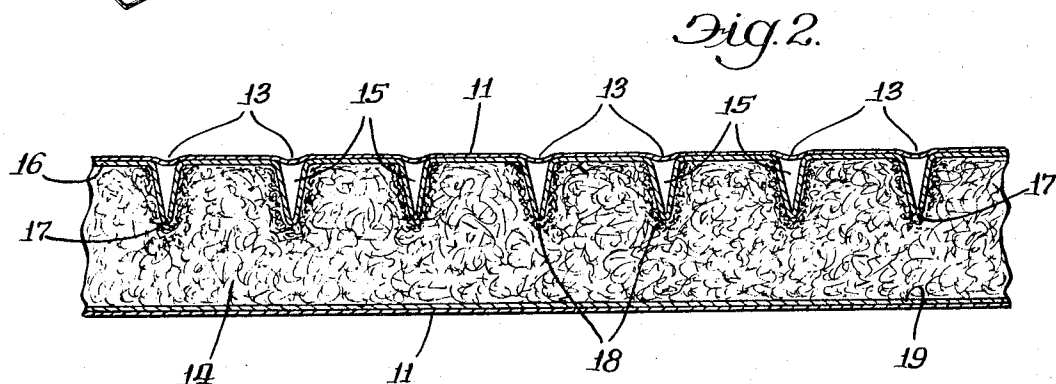
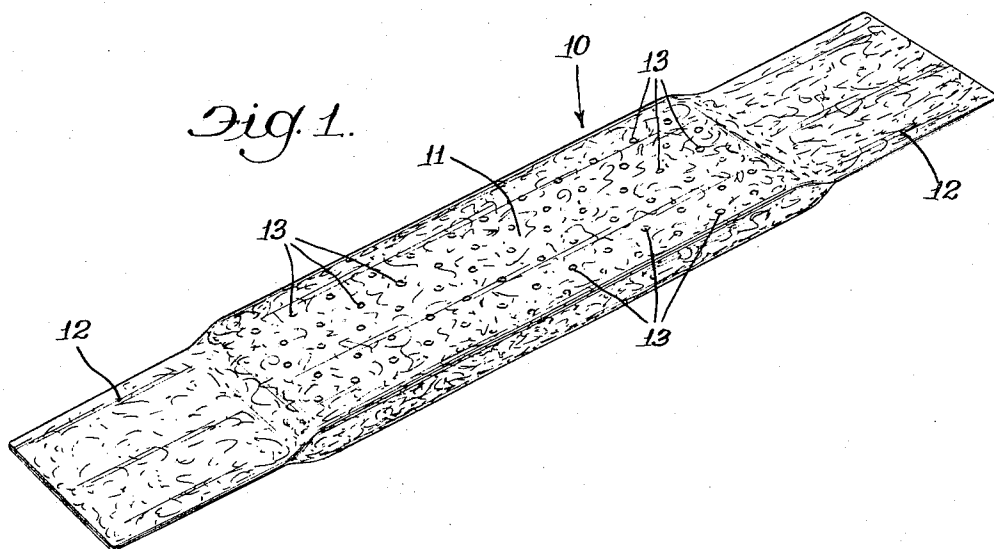
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SANITARY NAPKIN

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SANITARY NAPKIN

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ABSTRACT OF THE DISCLOSURE

The "fluff" absorptive core of a sanitary napkin is provided with lined channels leading from the top surface thereof into and terminating in the body of the core. A fluid conducting sheet covering the top surface follows at least a major part of the way into the channels and serves as a channel liner. The core contains regions of different fluff densities.

This invention relates to sanitary napkins. More particularly, this invention is directed to sanitary napkins wherein a mass of loosely associated fibers serve as the major fluid absorption or collection component of the napkin.

Sanitary napkins of the type to which this invention is directed are sometimes referred to as absorbent "fluff" type napkins, taking the name of the commonly used fibrous mass of comminuted wood pulp used as the absorption or collection component of the napkin, although fibers other than wood pulp fibers, such as shredded cellulose fibers generally, may be used. Popular acceptance of fluff napkins in no small measure is due to the inexpensiveness of fibrous pads or batts of this nature, even though the fluff itself lacks certain desirable absorption properties. Fluff itself, for example, has relatively poor fluid conductive powers: fluid placed upon the surface of a fluff pad is readily absorbed by the pad, but does not rapidly spread laterally from the site of the applied fluid. Various proposals have been made to overcome this deficiency, some of which have been adopted commercially when consistent with the economies of employing fluff in the manufacture of these sanitary napkins.

The type of napkin to which this invention is directed is the type in which the fluff mass (either wood pulp fibers or others) forms the core of the napkin and is covered on at least one surface thereof with one or more absorbent, fluid pervious sheets having capillary properties to distribute or conduct the fluid laterally over the core surface. This type napkin is well known and normally includes a fluid barrier component and an overwrap sheet confining all of the napkin components in a unitary assembly.

The fluid distributing sheet may be any soft, conformable, pervious, absorbent sheet material having the stated desired capillarity. Consistent with the economies of this product, creped tissue or wadding are commonly used. The creped tissue is positioned on the surface of the fluff core which is placed toward the body when in use and covers at least the central portion of this surface. In some instances this tissue sheet may be wrapped around the pad, in which case the tissue may serve as the wrapper to confine the loosely associated fibers of the fluff. For reasons known in the art, it is preferred to overwrap the fluff core and tissue with a fluid permeable, textile fabric. This textile fabric overwrap or outerwrap is the napkin component which is in contact with the body when in use. It is highly pervious to fluids, is less fluid conductive than the fluid conductive cover sheet and may even be somewhat water repellant. The textile fabric may either be a nonwoven or woven fabric. Examples of textile fabric overwraps are gauze, scrim, and nonwoven fabrics. The

fluid barrier component may be any suitable water repellant or impermeable sheeting. It may be positioned next to and cover the underside surface of the fluff core. As its name indicates, its function is to prevent fluid from striking through the napkin. Plastic films and water repellant fibrous sheets are examples of these barrier sheets.

It is an object of this invention to provide a fluff sanitary napkin improved with respect to the rate of the napkin to absorb menstrual or lochial fluids.

Another object of this invention is to provide a fluff sanitary napkin having improved distribution of fluids in the fluff.

Another object of this invention is to provide a fluff sanitary napkin improved with respect to utilization of the absorption capacities of the fluff.

A further object of this invention is to provide a fluff sanitary napkin improved with respect to retention of fluids absorbed in the fluff.

A still further object of this invention is a fluff sanitary napkin improved with respect to rate and capacity of the napkin to absorb, collect, retain and distribute fluid exudates in the napkin.

A still further object of this invention is to provide a fluff sanitary napkin within the objectives set forth above in a manner consistent with manufacturing economies of prior fluff napkins.

In accordance with this invention, the fluff core of a sanitary napkin is provided with a plurality of channels leading from a surface thereof into and terminating in the body of the core. The channels terminate short of the opposite surface of the core so that the channels are each surrounded by a concentration of fibers decreasing in density in all directions within the core from the walls of the channels, including the terminal bottom portions thereof. The fluid conducting or distributing sheet follows at least a major part of the way into the channels. The portions of the sheet inside the channels are held in place on the walls thereof and against displacement therefrom by engagement with the fibers in the core.

Specific constructions of the napkins of this invention, from which the above mentioned and other objects of the invention will be apparent to those skilled in the art, are set forth in the following description and in the drawings in which:

FIG. 1 is a plan view of a sanitary napkin of this invention;

FIG. 2 is an enlarged cross-sectional view of the fluff core portion of the napkin of FIG. 1; and

FIG. 3 is a generally schematic view of an apparatus for manufacturing the napkins in accordance with this invention in which the napkin components shown are in cross section.

The sanitary napkin 10 in FIG. 1 is shown with a nonwoven fabric outerwrap 11 which in its wrapped on form is of greater length than the core of napkin. The portions 12 of the outerwrap extending beyond the core ends may serve as tabs for attachment to a belt or the like to hold the napkin in place upon the body. The textile fabric outerwrap in addition to having the aforedescribed properties must be of sufficient strength for this purpose.

In the embodiment of the invention of FIGS. 1 and 2 the nonwoven fabric outerwrap 11 is shown with a plurality of apertures 13 overlying the fluff core 14 and in register with the openings of the channels 15 at the surface of the core. The apertures 13 conveniently may be formed in the overwrap 11 at the same time that the channels 15 are formed in the core and lined with the fluid conductive cover sheet 16. As will be subsequently explained, the apertures may be formed in such manner that the fibers of the outerwrap are parted and grouped to form

the peripheral edges of the apertures. These groupings of fibers provide areas of greater capillary attraction for fluids than the non-apertured areas of the nonwoven fabric between the apertures. This tends to promote the flow of fluid deposited on these areas to the apertures for entrance to the channels in register therewith. The registration between the apertures and the channels also permits unimpeded entry of fluids to the channels for fluid deposited thereover.

The fluid conductive sheet 16, such as creped tissue conventionally employed in fluff-type napkins, is positioned on a flat surface of the fluff core as shown in FIG. 2 and follows into and lines the channels 15. The creped tissue sheet 16 is pressed into the core in forming the channels 15 and into intimate contact with the core fibers at the interface between the sheet and the fibers in channel walls. The intimate contact with the fibers serves to aid in holding the sheet against dislodgement from the channels.

The creped tissue sheet should extend at least a major part of the way, say, at least about one-half of the channel depth, in to the channel. When depressed only part-way into a channel, the tissue sheet, of course, lines only a portion of the side walls of channel to the extent that the sheet is depressed to follow into the channel. The terminal bottom portion of the sheet may remain continuous, thus spanning the terminal bottom portion of channel. Alternatively, and preferably, the terminal bottom portion of the sheet in the channel may be ruptured to form an aperture therein. The fibers of the creped sheet at the periphery of such an aperture intertangle with core fibers of the channel wall to provide a positive interlocking engagement with the core, particularly when the aperture is located near or at the terminal bottom portion of a tapering channel.

The aperture which may be formed by rupture of the sheet 16 at the terminal bottom portion of a channel, as at 17 in FIG. 2 provides a ready exit for fluids in the channel to the core fibers. The creped tissue is deformable and sufficiently pliant to follow at least part-way into the channel depressions rather than to part at the point of pressure and form an aperture as in the case of the nonwoven fabric outerwrap 11. It is one of the advantages of this invention that the practice thereof does not require the development of new components or a substitution of components for the components presently in use in many sanitary napkins now commercially available.

The numeral 18 designates regions of dense concentrations of fibers in the fluff core 14 immediately surrounding the channels. The concentration of fibers in these regions is greater than the concentration of fibers in the other regions in the core adjacent thereto and spaced from the channels. The dense regions 18 exhibit greater absorption and distribution properties than other regions in the fluff core. In combination with the fluid distribution sheet 16 in the structure of this invention the fluid is rapidly directed into the interior of the fluff core. The function of the fluid distribution sheet 16, as to its fluid distribution properties, is essentially the same as in the case of the same sheet covering the substantially flat, planar surface of the core in a conventional sanitary napkin. In the present invention, however, the sheet 16 lining the walls or portions of the walls of the channels 15 positively direct and distribute the fluid into the body of the fluff core 14 and thus rapidly remove the fluid from the body surface of the wearer of the napkin. The fluid is brought into contact with the high concentrations of fluff fibers in the interior of the core surrounding the channels for rapid distribution to regions of the core further into the interior of the core and hence further removed from the body of the wearer. It will be appreciated that the densification of fibers not only around the side walls but also the terminal bottom portions of the channels provides for the collection and concentration of fluids in regions

removed from the napkin's top surface, as viewed in FIG. 1. Strike through of fluid at the bottom of the pad is prevented by means of barrier sheet 19.

The channels 15 may extend to any depth in the fluff core 14. There is a preference for the present napkins wherein the channels terminate at a depth not more than midway between the top and bottom surfaces of the pad. The cross-sectional shape of the channel opening is a matter of choice, but substantially circular shapes are preferred. The channel need not be a right angle cylinder in shape and preferably may have tapering side walls, tapering to a point at the terminal bottom portion of the channel.

The channels are located in at least the central portion of the napkin which normally is the site of initial contact with the fluid exudate. Channels may be located as well in the remaining portions of the napkin defined by the edges of the core as shown in the drawings. Sanitary napkins having as few as about ten uniformly spaced channels per square inch of the napkin surface area and channel openings of about $\frac{1}{16}$ " in diameter have been found to function satisfactorily in accordance with the invention. The size of the openings at the surface of the napkin and the number of the channels may be chosen to satisfy the conditions of use to which the napkin is to be put. Generally, the size of the channel openings and the number of channels should not be so great as to result in a highly dimpled surface effect which may cause a feeling of discomfort in normal use.

The channels may be formed in the pad and lined with the cover sheet in the manner illustrated in FIG. 3. As shown in this figure, the fluff is positioned as a core 14 between a sheet 16 of creped tissue and a barrier sheet 19. This composite is introduced into a nip between the tips of protuberances 22 on a roll 20 and the smooth surface of a roll 21. The rolls rotate counterclockwise with respect to each other as shown by the directional arrows on the rolls. The material moves through the nip from the right to left as viewed in the drawings. In passing between the rolls, the protuberance 22 which may be cone-shaped presses upon the cover sheet 16 pushing it into the core. The fluff fibers immediately beneath are pushed aside and down, resulting in a greater accumulation, and in some instances, compaction of fibers immediately around the channel thus formed. As shown, the cover sheet 6 is also pressed into the channel, at least partially lining the walls thereof. Due to the pressure or the configuration of the very tip of the protuberance, the sheet 16 may be ruptured at the bottom portion of the channel. Upon removal of the protuberance 22 some fluff fibers may enter the ruptured opening in the sheet and become engaged with the peripheral edge of the opening. The fibers extending through the opening into the channel provide added wicking action for removal of fluid in the channel.

The invention claimed is:

1. A sanitary napkin comprising:

- (a) a core of loosely associated, fluid absorbent fibers having a top surface and opposite thereto a substantially planar bottom surface, said core having a plurality of channels leading from the top surface thereof into the body of said core and terminating therein short of the bottom surface of said core, said loosely associated fibers occupying the regions with in the core between the channels and between the surfaces of said core so that the channels are each surrounded by fibers of the core, the regions of the core immediately adjacent each of the channels having a denser concentration of fibers than regions spaced therefrom between the channels and regions between the terminal bottom portions of said channels and said bottom surface of the core;
- (b) a soft, conformable, fluid pervious, absorbent sheet covering said top surface and following at least a major portion of the way into said channels in lining contact with the walls thereof, said sheet having aper-

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tures therein located near the terminal bottom portion of said channels, said sheet engaged with said fibers surrounding said channels and fibers of said sheet at the peripheral edges of said apertures entangled with core fibers at the terminal bottom portions of said channels to maintain said sheet as a contiguous liner for said channels; and

(c) a fluid barrier sheet underlying the terminal bottom portions of said channels.

2. A sanitary napkin comprising:

(a) a core of loosely associated, fluid absorbent fibers having a top surface and opposite thereto a substantially planar bottom surface, said core having a plurality of channels leading from the top surface thereof into the body of said core and terminating therein short of the bottom surface of said core, said loosely associated fibers occupying the regions within the core between the channels and between the surfaces of said core so that the channels are each surrounded by fibers of the core, the regions of the core immediately adjacent each of the channels having a denser concentration of fibers than regions spaced therefrom between the channels and regions between the terminal bottom portion of said channels and said bottom surface of the core;

(b) a soft, conformable, fluid pervious, absorbent tissue sheet covering said top surface and following at least a major part of the way into said channels in lining contact with the walls thereof, said sheet having apertures therein located near the terminal bottom portion of said channels, said sheet engaged with fibers of said core at the interface between said sheet and core in the walls of said channels and fibers of said sheet at the peripheral edges of said apertures entangled with core fibers at the terminal bottom portions of said channels to maintain said sheet as a contiguous liner for said channels; and

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(c) a fluid barrier sheet underlying the terminal bottom portions of said channels.

3. A sanitary napkin in accordance with claim 2 wherein said terminal bottom portions of said channels are located at a distance not more than about one-half the distance between the top surface and the bottom opposite surface of said core.

4. A sanitary napkin in accordance with claim 2 wherein said core and said tissue sheet are encased in a fluid pervious wrapper having apertures therein in register with the openings of said channels.

5. A sanitary napkin in accordance with claim 2 wherein said barrier sheet is positioned on said bottom surface, said tissue sheet extends around and at least partly over the bottom surface of said core and wherein said core and tissue sheet cover are encased in a fluid pervious wrapper having apertures therein in register with the openings of said channels.

6. A sanitary napkin in accordance with claim 2 wherein said barrier sheet is positioned on said bottom surface, said tissue sheet extends around and at least partly over the bottom surface of said core and wherein said core and tissue sheet are encased in a fluid pervious wrapper having apertures therein in register with the openings of said channels.

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