

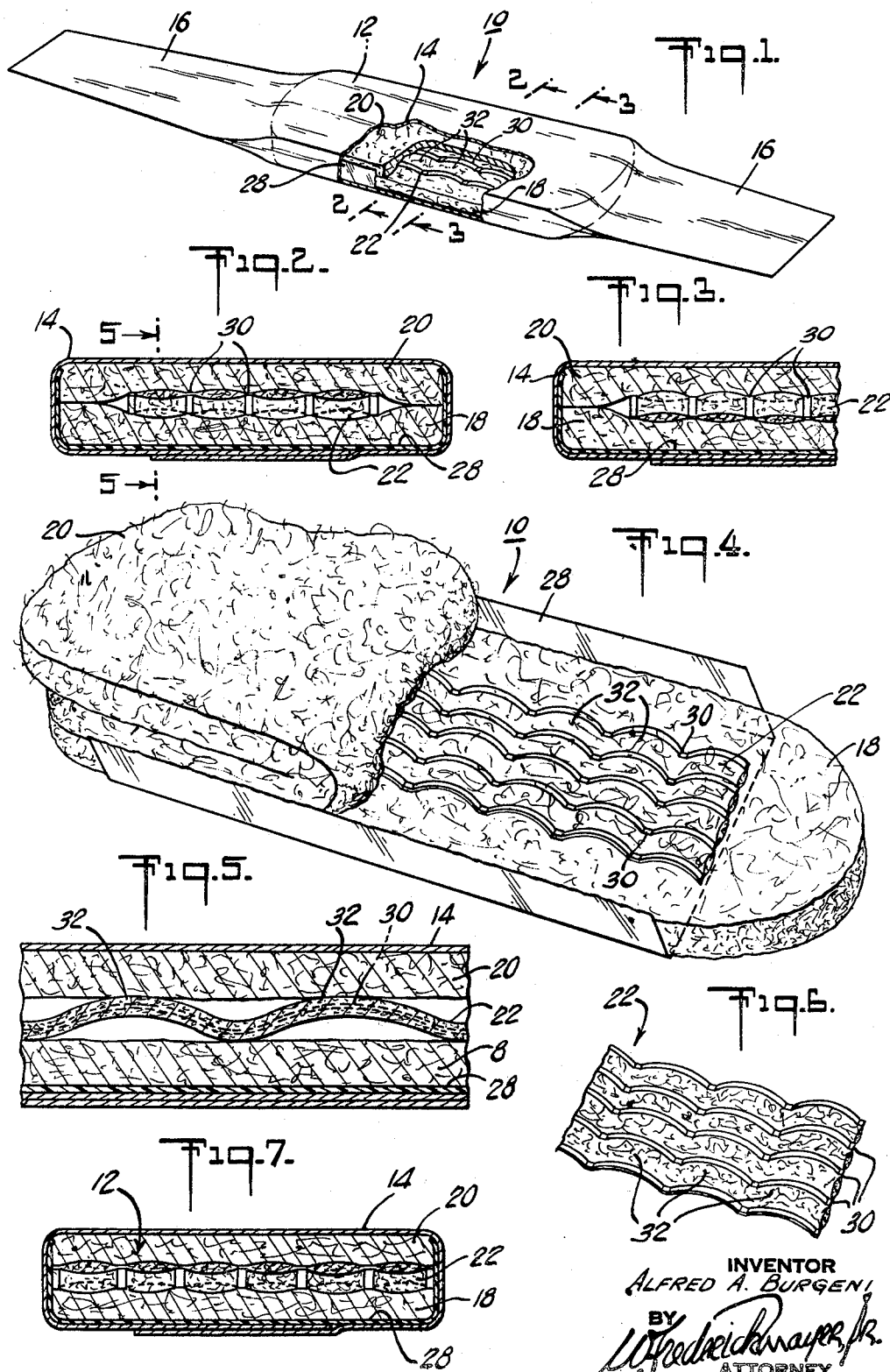
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ABSORBENT PAD

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ABSORBENT PAD

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3 Claims

ABSTRACT OF THE DISCLOSURE

This application discloses absorbent, fibrous bodies consisting essentially of short, cellulosic fibers such as comminuted wood pulp fibers and cotton linters, which pads are given form stability and fluid transfer properties by having incorporated therein an insert of the same short, absorbent, cellulosic fibers, which insert is longitudinally wet embossed and transversely corrugated.

BACKGROUND OF THE INVENTION

This invention relates to an absorbent pad and more particularly, is directed to an absorbent, fibrous body consisting essentially of short, absorbent, cellulosic fibers which can be used as an absorbent component in sanitary napkins and similar products for absorbing body fluids.

Short, absorbent, cellulosic fibers such as comminuted wood pulp fibers and cotton linters, whose lengths are in the region of about 2 millimeters, are low in cost and readily available. They are particularly suitable for use as absorbent components in numerous absorbent articles in the form of thick bats or plies because such bats have high bulk and volume and rapidly adsorb fluids. However, bats of such fibers are unstable due mainly to the shortness of the fiber length. They are tenuous and have low cohesive and tensile strength, do not retain their shape and volume when compressed or moistened, and have low capillary attraction and low fluid retentivity. When a bat of such fibers is saturated with fluid, it mats, becomes distorted and falls apart readily. When incorporated into an absorbent pad, such as a sanitary napkin, it has been common practice to include with such bats other components such as gauze, paper, or high bulk wadding to impart to the napkin form and structural stability and desired fluid flow and fluid absorbency characteristics. A sanitary napkin without these additional components lacks form and structural stability and is distorted readily in use upon the absorption of fluid.

The fluid absorption and fluid flow characteristic of bats of wood pulp fibers and like short, cellulosic fibers, while suitable in some respects, are unsatisfactory in others. When fluid is applied to the surface of a bat of such fibers, it penetrates the bat rapidly and strikes through to the bottom surface. The fluid absorbed remains essentially confined in the part of the bat directly under the area of application, i.e., it is not distributed laterally through the bat to any appreciable extent. Due to the low capillarity of the bat, it becomes quickly saturated with fluid in the region of application and its full absorbent capacity is not utilized. When a plurality of such bats is used, the bats still have poor fluid flow and fluid absorbency characteristics and, in effect, act as a single bat.

Attempts to overcome the problems noted above have included incorporating spacing elements and separate elements of paper, wadding, and other like materials having higher densities and capillarities than the bats of wood pulp fibers and like short, absorbent, cellulosic fibers so as to aid in the distribution of fluids. Also, multiple plies of bats of short, absorbent, cellulosic fibers which have had elongated, compressed patterns embossed therein have been used in such absorbent pads to form channeling areas

also to aid in the distribution of fluids. However, in the first instance, in addition to increasing the cost of manufacture of such pads, the inclusion of such high density elements produced only moderate improvements in the structural stability of the pad, and did not effectively solve the problem of dispersing and storing the absorbed fluid safely within predetermined channels. In the second instance, the embossed plies of short, absorbent, cellulosic fibers, while greatly aiding in the dispersion and safe storage of the fluid, did not fully provide the form and structural stability that is desirable in the pad. Accordingly, in both instances, the pads containing or consisting of short, absorbent, cellulosic fibers still possessed to a greater or lesser degree in herent disadvantages, and the functional potential of such fibers had not been fully utilized.

SUMMARY OF THE INVENTION

In accordance with this invention, absorbent products, such as sanitary napkins, having as an inner core thereof, one or more normally unstable fibrous bats consisting essentially of short, absorbent, cellulosic fibers such as comminuted wood pulp fibers, cotton linters, and the like, are provided with form and structural stability and improved fluid flow and fluid absorbency characteristics by incorporating within said inner core a fibrous insert also consisting essentially of such short, cellulosic fibers, which insert is provided with transversely spaced, longitudinally extending, wet compressed areas and further, is corrugated in its longitudinal cross section, said corrugations being compressed to a lesser extent than said wet compressed areas, except where said corrugations are traversed by said compressed areas. The absorbent products of the invention as contrasted to like products which do not have incorporated therein the improved internally disposed fibrous insert of the invention, have increased capillarity, increased fluid retentivity and provide increased structural stability to the fibrous core of the absorbent product particularly in the transverse direction.

The invention contemplates an absorbent product consisting mainly of a fluid pervious cover and an absorbent core consisting essentially of short, absorbent, cellulosic fibers of about 2 millimeters in length. Disposed within said inner core and consisting also of said short, cellulosic fibers is a fibrous insert that is provided with transversely spaced, longitudinally extending, wet compressed areas to direct absorbed fluid lengthwise through the core while at the same time imparting longitudinal stability to the core. Further, the insert is corrugated in its longitudinal cross section which serves, to a certain extent, to direct absorbed fluid transversely through the core and to impart a great degree of transverse stability thereto. The corrugations of the fibrous insert are compressed to a lesser extent than the longitudinally extending compressed areas, except where the corrugations are traversed by the transversely spaced, longitudinally extending, wet compressed areas.

Referring now, more particularly, to the accompanying drawings and the following description, wherein for illustrative purposes, the invention is described in connection with a sanitary napkin, the invention will be even more apparent. It is to be understood, however, that the invention is not to be limited solely to sanitary napkins, but can be utilized in other products of similar function.

In the drawings:

FIG. 1 is a perspective view of a sanitary napkin incorporating the internally disposed, fibrous insert of the invention cut away to reveal its interior construction;

FIGURE 2 is an enlarged transverse sectional view of FIGURE 1 along lines 2—2;

FIGURE 3 is an enlarged transverse sectional view of FIGURE 1 along lines 3—3;

FIGURE 4 is an enlarged perspective view of the absorbent core of the sanitary napkin of FIGURE 1 with the upper layer of fibrous material peeled back to reveal in more detail the fibrous insert of the present invention and its relationship to the fibrous core of a sanitary napkin;

FIGURE 5 is a partial, longitudinal cross sectional view of FIGURE 2 along lines 5—5;

FIGURE 6 is a partial perspective view of the fibrous insert of the present invention; and

FIGURE 7 is an enlarged transverse sectional view similar to FIGURE 2 but wherein the fibrous insert extends laterally to the edges of the fibrous core of the sanitary napkin to form one variation within the scope of the present invention.

One form of an absorbent pad, a sanitary napkin 10 incorporating the invention is illustrated in FIGURES 1-5 and includes a relatively thick elongated absorbent core 12 enclosed within a liquid pervious wrapper 14 whose ends extend beyond the ends of the absorbent core to provide the usual attachment tabs 16. The absorbent core is about 2½ inches wide and 8 inches long and consists of a bottom layer 18 of comminuted wood pulp fibers about ⅝ inch thick and weighing about 50 grains (8 grains per cubic inch). Positioned internally of the absorbent core 12 between the bottom layer 18 and the top layer 20 is a fibrous insert 22 which is about 6 inches long, 1⅜ inches wide and averages about ¼ inch in thickness, and its placement is approximately equidistant from the front and rear ends of the absorbent core 12 as well as from the edges of the absorbent core 12. The entire assembly is enclosed within the liquid pervious wrapper 14.

A thin, flexible film 28 of polyethylene, approximately ½ mil thick, is positioned intermediate the liquid pervious wrapper 14 and the pulp or fluff layer 18 and covers the bottoms and sides of the absorbent core. The top surface of the absorbent core which is not covered by the film is the surface which is placed against the body when the napkin is worn to absorb fluid which impinges upon it.

The fibrous insert 22 that is positioned internally of the absorbent core 12 is made of the same short, cellulosic wood pulp fibers as is the core 12 and weights approximately 50 grains (an average bulk density of about 24¼ grains per cubic inch). The insert 22 is formed with transversely spaced, longitudinally extending, wet compressed areas 30 and transverse corrugations 32 to provide a structure that is corrugated in longitudinal cross section. (See FIGURE 5.) In the embodiment shown in the drawings the longitudinally extending compressed areas 30 are about 2 millimeters wide and are transversely spaced from one another a distance of about 2.7 millimeters. The described construction is a preferred one, and it will be understood that many variations thereof are possible without departing from the principle of the construction. The number and width of the embossing lines, for example, may be reduced or increased, and instead of forming a pattern of discrete, equidistant, embossing lines, insert 22 may be uniformly compressed across its total width or a part thereof. References made hereinafter to embossing or transversely spaced, compressed areas refer to any and all embossing patterns, including uniform compression across the width of the insert.

The longitudinally compressed areas 30 and transversely extending corrugations 32 are formed in the insert 22 by first spraying one or preferably both surfaces of the bat of comminuted wood pulp fibers with about 0.003 ml. of water per square centimeter of web surface. The water spraying techniques and skin formation in bats of short, cellulosic fibers are set forth in greater detail in my United States Patent Nos. 2,955,641 and 3,017,304 and need not be repeated here.

Subsequent to being wetted, the moistened web is passed beneath compressing rollers having circumferential ribs transversely spaced thereon to form the densified com-

pressed areas 30 in the moistened web. The amount of compression applied by the compressing rollers can generally be varied over a range of from about 10 to about 50 pounds per square inch.

Immediately following the formation of the transversely spaced, longitudinally extending, densified compressed areas 30 in the moistened fibrous bat, it is passed between transversely extending corrugating rollers adapted to intermesh with sufficient spaces provided therebetween so as to impart less compression to the moistened web than was applied thereto in forming the transversely spaced, longitudinally compressed areas 30.

Generally, the pressure applied to the moistened web by the corrugating rollers need only be sufficient to set the corrugation 32 therein and accordingly, can range from about 1.5 to about 7 pounds per square inch.

Following the embossing and corrugating of the fibrous insert, it is then permitted to dry or is dried by the application of heat which causes the fibers to set thereby providing a distorted web of short, cellulosic fibers with form stability, particularly in the transverse direction.

The distorted web of short, cellulosic fibers from which the insert 30 is made is then led into a cut-off mechanism and cut into appropriate lengths. In the embodiment of the sanitary napkin described above, the distorted web is cut into lengths of about 6 inches and is then laid down centrally on top of a substantially uncompressed web of short, cellulosic fibers from which the lower layer 18 of the sanitary napkin is to be formed. The lengths of embossed and corrugated web are spaced longitudinally on the uncompressed fibrous web and are then covered by another substantially uncompressed fiber web which will ultimately form the upper fibrous layer 20 of the core 12 of the sanitary napkin 10. The thus joined webs 18, 22 and 20 are then fed into a cut-off mechanism where they are formed appropriately into individual pads 12. Preferably, the pads will also have placed on the lower surface thereof, extending up over the sides, a thin polyethylene sheet 28 which ultimately will form a fluid impervious barrier on the side of the napkin adapted to be worn away from the body. This whole assembly then is wrapped in the usual manner in a cover 14 with longitudinally extending tab portions 16 forming the usual attachment tabs of the sanitary napkin.

In the embodiment shown in FIGURES 1 through 4 it is noted that the fibrous insert 22 is positioned internally of the fibrous core 12 such that its lateral edges are spaced inwardly at an equal distance from each of the lateral edges of the fibrous core 12. Similarly, the ends of the fibrous insert 22 are spaced an equidistance from the ends of the fibrous pad 12. By being so positioned internally of the sanitary napkin core 12, the ends of the core where the insert is not located as well as the longitudinal edges of the core where the fibrous insert 22 is not located provide soft, form-fitting edges to the sanitary napkin while the fibrous insert at the center, thereof, provides the necessary form stability and because of its corrugations particularly, excellent form stability in the transverse direction while providing for high loft being maintained in the napkin during use.

As shown, however, in FIGURE 7, the invention contemplates as well the incorporation of the fibrous insert 22 within a sanitary napkin where the lateral edges of the fibrous insert 22 extend all the way to the lateral edges of the fibrous core 12. In this embodiment, the wider fibrous insert assures even greater transverse stability of the sanitary napkin by way of the corrugations extending throughout the width at the center of the napkin core. Particularly in those embodiments employing the thin, polyethylene, fluid impervious barrier 28 which extends upwardly over the sides of the absorbent core of the napkin, any harshness that normally would result from the fibrous insert 22 extending all the way to the lateral edges of the core is mostly obliterated by being covered at the lateral edges by the polyethylene sheet 20.

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In use, an absorbent pad, such as a sanitary napkin employing the longitudinally embossed and transversely corrugated fibrous insert, provides for excellent transfer of fluids laterally and longitudinally in the fibrous core 12. The densified, compressed, longitudinally extending areas 30 are highly effective in transferring the fluids impinging at the center of the fibrous core longitudinally therein while the lesser compressed transverse corrugations in the fibrous insert are effective to distribute the fluid laterally in the fibrous core. In addition, however, and most importantly, the corrugations combined with the longitudinally compressed areas provide for excellent transverse stability of the fibrous core of short, cellulosic fibers while at the same time maintaining high loft in the fibrous core of the sanitary napkin which also consists essentially of the short, cellulosic fibers such as wood pulp or cotton linters. This loft stability is effective in preventing collapse of the fibrous core of the sanitary napkin when wetted with large quantities of fluid thereby maintaining substantial bulk in the absorbent portion of the sanitary napkin.

While I have described my invention with particular reference to a sanitary napkin, it is to be understood that the construction and principles described are equally applicable to absorbent products of other types such as absorbent dressings, bandages, diapers and the like. It is also apparent and should be appreciated that the details of such construction as described by way of a preferred or preferred embodiments may be more or less modified within the scope of the claims without departure from the principles of construction or material sacrifice of the advantages of the preferred embodiments.

I claim:

1. In a sanitary napkin of fibrous material having a fluid pervious outer cover and an inner core consisting

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essentially of short, cellulosic fibers of from about 2 to about 5 millimeters in length, said cover extending beyond the ends of said core to provide attachment tabs, the improvement comprising a fibrous insert disposed within said inner core and consisting also of said short, cellulosic fibers, said insert being provided with transversely spaced, longitudinally extending, wet compressed areas, and being corrugated in longitudinal cross section, said corrugations being compressed to a lesser extent than said compressed areas, except where said corrugations are traversed by said compressed areas.

2. The sanitary napkin of claim 1 wherein said insert is positioned within said absorbent core with its lateral edges spaced equidistant inwardly of the lateral edges of said core.

3. The sanitary napkin of claim 1 wherein said insert is centrally disposed in said absorbent core and extends transversely to the lateral edges of said absorbent core.

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