

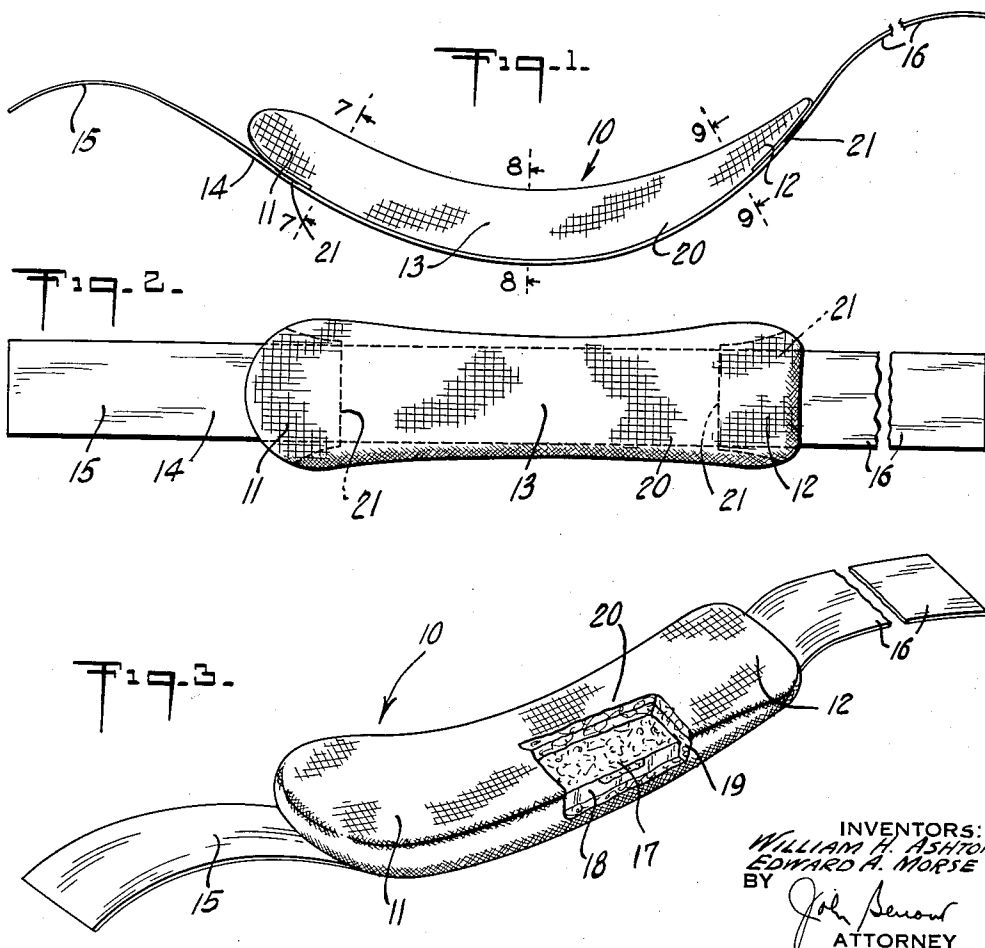
Dec. 13, 1960

W. H. ASHTON ET AL
ABSORBENT PRODUCT

2,964,041

Filed June 17, 1959

3 Sheets-Sheet 1



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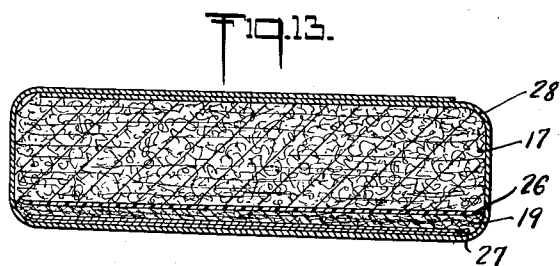
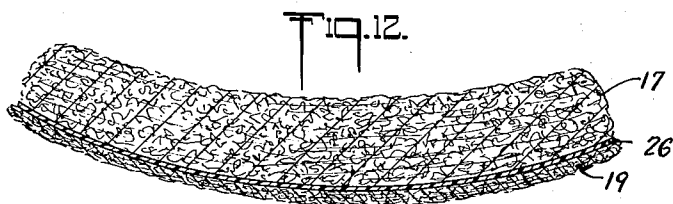
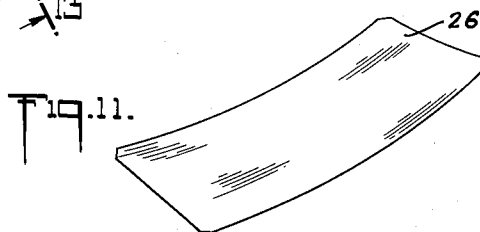
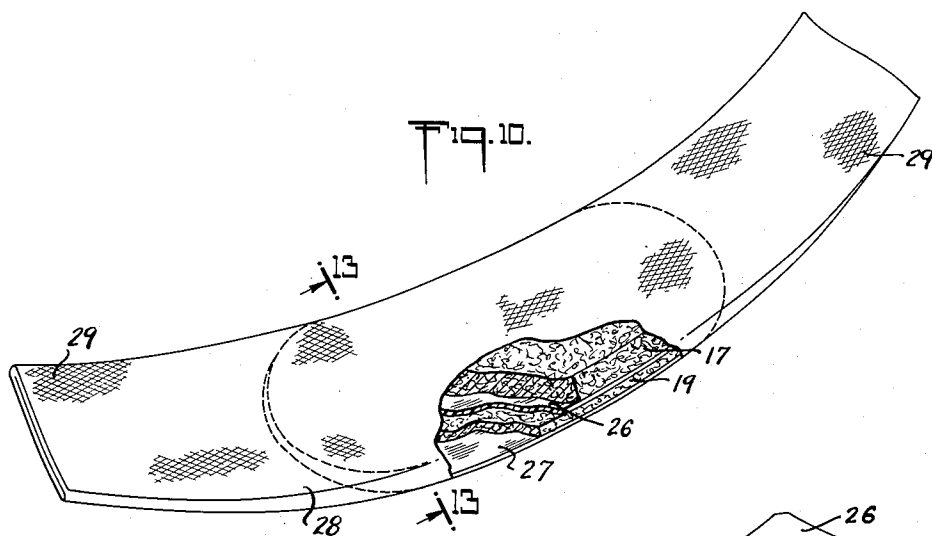
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ABSORBENT PRODUCT

2,964,041

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3 Sheets-Sheet 2



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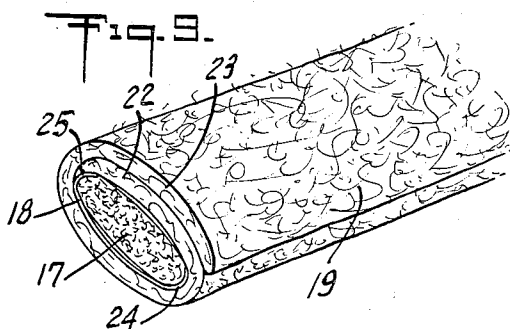
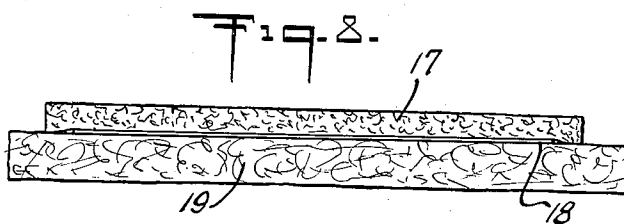
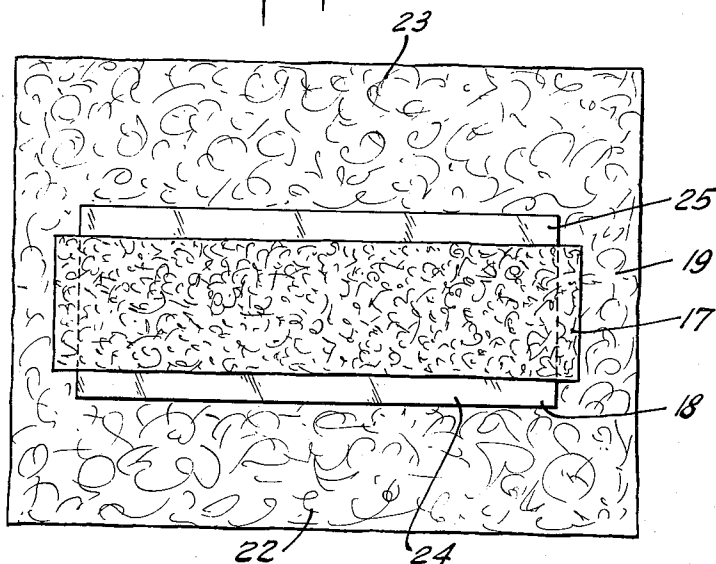
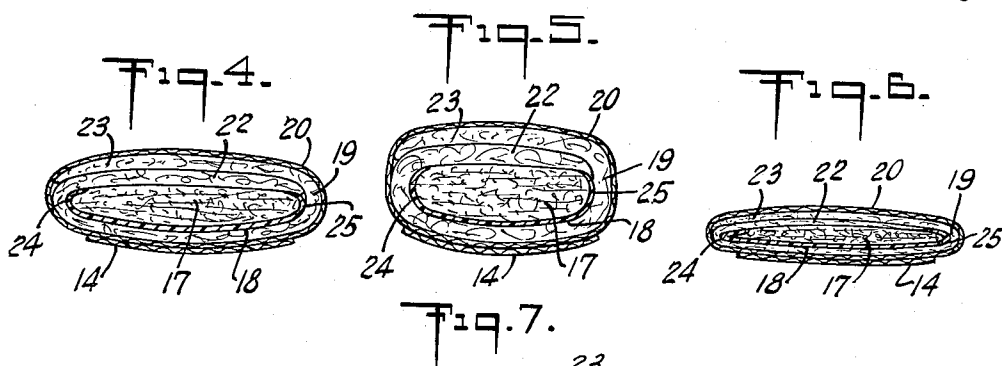
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W. H. ASHTON ET AL
ABSORBENT PRODUCT

2,964,041

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3 Sheets-Sheet 3



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2,964,041

ABSORBENT PRODUCT

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Filed June 17, 1959, Ser. No. 820,928

16 Claims. (Cl. 128—290)

This invention relates to sanitary napkins and more particularly to sanitary napkins of improved form and of improved fluid absorbency and fluid retentivity characteristics.

Conventional sanitary napkins are generally of a flat, rectangular shape. To conform them to the contours of the female pubic area, it is necessary that they be bent transversely into a curved shape. Also, because a conventional napkin is generally wider than the space between the legs adjacent the female pubic area, it must be folded longitudinally with its edge portions extending downwardly.

In so conforming a conventional napkin to the body contours, a series of corrugations and folds are formed on the surface of the napkin which contacts the body. These corrugations and ridges prevent the desired intimate contact between the napkin and that portion of the body of the wearer where a snug fit is necessary for proper functioning of the napkin. To cause a napkin of conventional form to conform to the contours of the body, it is necessary to apply tension to the sanitary belt to which the napkin is customarily attached. This produces discomfort.

Distorting the napkin to fit the female pubic area also affects the fluid retentivity and absorption characteristics of the napkin. When the napkin is so distorted, certain portions thereof are compressed, and the ability of the napkin, particularly the compressed portions, to absorb and retain fluid is reduced. Often, such distortion causes absorbed fluid to be squeezed out, thus wetting adjacent body surfaces.

In accordance with this invention, there is provided a sanitary napkin having an arcuate shape generally approximating the arcuate shape of the exterior female pubic area to which it is applied which permits the napkin to be worn comfortably. The arcuate shape of the napkin is preformed and stabilized so that it is not required, as with napkins of conventional shape, to distort the napkin of the invention to make it conform to the configuration of the pubic area. The longitudinal and transverse corrugations and ridges resulting from deforming conventional napkins are avoided. In addition, the napkin of the invention contemplates interior constructions which, besides imparting form stability to the napkin, also confine absorbed fluid to a selected area and impede its penetration through to the sides and the lower surface of the napkin. The napkin of the invention further includes added advantages through exterior constructions which provide softness which minimize irritation due to rubbing and chafing, and thus make the napkin more comfortable to wear.

In the accompanying drawings:

Fig. 1 is a side view of the napkin illustrating the position of a suitable pinning strip for attaching the napkin;

Fig. 2 is a view of the napkin of Fig. 1 as seen from above;

Fig. 3 is an isometric view of the napkin, cut away to reveal its inner construction;

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Figs. 4, 5 and 6 are sectional views on an enlarged scale of Fig. 1 taken in the direction of planes 7, 8 and 9, respectively;

Fig. 7 is a top view of a multi-ply pad from which the napkin may be formed;

Fig. 8 is a side elevation of the pad of Fig. 7;

Fig. 9 is an isometric view of the pad illustrated in Figs. 7 and 8, showing the manner in which the pad may be formed prior to being formed into a napkin;

Fig. 10 is a perspective view of another form of napkin incorporating the invention;

Fig. 11 is a view of a barrier film which is incorporated into the napkin, illustrating the curved shape it assumes;

Fig. 12 is a longitudinal sectional view on an enlarged scale of the napkin of Fig. 10 with its cover removed; and

Fig. 13 is a sectional view on an enlarged scale of Fig. 10, taken along lines 13—13.

Referring to the drawings, there is shown a napkin 10, generally of an elongated shape to cover the area between the labia majora and the anus, having front and rear ends 11 and 12 respectively which are relatively broad in width, as best seen in Fig. 2, and a center portion 13 which is preferably somewhat narrower. By tapering the napkin inwardly from the ends toward the center, the napkin will fit comfortably between the legs and buttocks. The center portion of the napkin is also preferably somewhat thicker than the end portions to provide maximum absorbency in the region where it is needed. The end portions of the napkin are desirably, as seen in Fig. 1, tapered in thickness so that the ends will lie flat against the body and merge smoothly with adjacent body surfaces to eliminate bulges. Preferably, the front end is slightly thicker than the rear end.

The napkin has an arcuate shape approximating that of the exterior female pubic area where it is positioned in use, thereby eliminating the formation of ridges and corrugations, especially in the transverse direction, as has been experienced heretofore with conventional napkins. By providing the napkin with such arcuate shape, the napkin can be placed in intimate contact with the body without resorting to deformation.

To secure the napkin in position for use, a pinning or carrier strip 14 is attached to the bottom of and is extended beyond the ends of the napkin to provide front and rear attaching tabs 15 and 16. The pinning strip may be any of the materials found suitable heretofore possessing sufficient strength to bear the stresses imposed during use. Pinning strips of gauze or a nonwoven fabric are satisfactory. The strip may be adhesively secured throughout the entire length of the napkin, to the ends 11 and 12 thereof, or secured in any other suitable manner. Alternatively, the napkin may be covered with a wrapper whose ends extend beyond the ends of the absorbent portion to provide attaching tabs.

To provide fluid absorbency and to retain fluid in the interior, the napkin is provided with an elongated core 17 of absorbent material, such as comminuted wood pulp fibers; other fibers may be used, including cotton linters, rag waste and absorbent cotton, but comminuted wood pulp fibers are preferred because they are highly absorbent, inexpensive and readily available.

Structural stability in an arcuate shape is imparted to the napkin by incorporating a layer or film of heat activatable material 18 in the interior of the napkin. The heat activatable material serves a dual function in that it also acts as a barrier to the flow of fluid through the napkin as will be explained below. The material may be thermoplastic or thermosetting; it may be in the form of a continuous film, as a woven or nonwoven fabric layer, or it may be in other forms.

Thermoplastic materials soften when heated, and when

soft, can be molded into different shapes which they retain upon cooling. Thermosetting materials, on the other hand, rigidify when heat is applied. To mold the napkin into the desired form with a thermosetting material, the napkin is formed into the desired shape by placing it in a mold and heating. The heat causes the thermosetting material to set and form the napkin. Such thermoplastic materials include the resins of phenolformaldehyde, urea formaldehyde and resorcinol formaldehyde. Napkins containing thermoplastic materials may be formed by heating the napkin, placing in a suitable mold and cooling. Examples of thermoplastic materials include polyethylene, polyvinyl, polyvinyl chloride, cellulose acetate, and polypropylene. Papers or fabrics coated, sprayed or impregnated with a variety of thermosetting or thermoplastic materials may be used. These materials include polystyrene, polypropylene, the vinyl polymers, vinyl chloride polymers, the copolymers of vinyl chloride-vinyl acetate, phenol-formaldehyde, urea formaldehyde and aniline formaldehyde. The type and amount of heat activatable material used is so selected that the napkin is not made unduly stiff while still having structural stability. Polyethylene films from about 0.002 to about 0.006 inch thick are particularly suitable and effective.

Fluid absorbed by the napkin is also confined in the interior thereof by the heat activatable film or layer 18 due to its relatively continuous form and to its fluid repellent characteristics. As fluid strikes the upper surface of the napkin, it penetrates rapidly into the interior, whereupon it is retained and confined in the absorbent core. The area on the surface of the napkin upon which fluid normally impinges is usually small with the result that the napkin becomes saturated rapidly in the moistened area. When this occurs, fluid contacting the fluid repellent layer 18 is spread in the absorbent core towards the ends of the napkin, thereby more fully utilizing the absorbing effectiveness of the core. Because of the way it is positioned, the fluid repellent layer also prevents fluid absorbed by the napkin from striking through to the sides and bottom of the napkin and wetting adjacent body surfaces.

The core of absorbent fibers and the fluid repellent heat activatable layer are covered with an outer layer 19, preferably containing absorbent fibers, to impart softness to the napkin so that it may be comfortably worn. Outer layer 19 is desirably made sufficiently thick and fluffy to cover the absorbent core 17 and the fluid repellent layer 18 to prevent the layer from contacting the body and causing irritation due to chafing and rubbing. Where the features of comfort are not as important, the outer layer 19 may be one or more sheets of paper, such as tissue paper, which are preferably absorbent.

The napkin has an outer wrapper 20 of a fluid pervious material which preferably conforms closely to the shape of the napkin. Stockinet material made of cotton or rayon yarn has been found particularly suitable as an outer wrapper in that it is of an open mesh structure, and permits fluid to pass through readily. It is also extensible and elastic so that it will stretch, or contract, as necessary, to conform it to the configuration of the napkin. The absorbent portion of the napkin may be placed into a tube of such stockinet material whose length is slightly longer than the length of the absorbent portion of the napkin, and the ends 21 of the stockinet material tucked under the bottom surface of the napkin adjacent the ends 11 and 12, as illustrated in Figs. 1 and 2. The adhesive material used to attach the pinning strip to the underside of the napkin may also be used to attach the folded ends of the stockinet wrapper in position. Other fluid pervious materials in similar tubular form, or other forms of wrappers, may be used if desired, such as creped fabrics, knitted fabrics, including tricot knits, woven fabrics and nonwoven fabrics. Knitted fabrics, or fabrics possessing similar extensibility characteristics, are preferred because they can be made to conform to the

napkin shape to provide a smooth surface, free of folds and wrinkles.

As has been experienced with conventional napkins, the efficiency of a napkin and the protection it provides will be unsatisfactory if the napkin is not maintained in intimate contact with the body. To obtain the desired intimate contact with conventional napkins, it has been necessary to deform the napkin to the shape of the pubic area by applying tension to the belt to which the napkin is attached. The tension required often causes the belt to slide on the body and produces discomfort. By positioning the pinning strip 14 on the bottom of the napkin and extending it along its length and beyond the ends thereof to provide the attaching tabs, a better suspension of the napkin and a more comfortable, intimate fit between the napkin and the body is obtained. When a napkin having a pinning strip so located is attached to a belt or otherwise secured in position, the forces exerted on the pinning tabs 15 and 16 are distributed through the pinning strip to the underside of the napkin. By underslinging the napkin's pinning strip in this manner, the napkin can be held in intimate contact with the adjacent body surfaces so that the advantages present in the napkin due to its configuration and construction will be fully utilized.

A napkin embodying the invention may be prepared from a laminate of the type illustrated in Figs. 7, 8 and 9. The laminate consists of the thick, fluffy, fibrous bottom layer 19 of carded absorbent fibers, such as cotton, approximately six and one-half inches wide, eight and one-half inches long and weighing from about five to six grams. A thin sheet of polyethylene film 18 about two mils thick, three and one-half inches wide and six and three-quarters inches long, is placed centrally upon the upper surface of the fibrous layer 19. The thick layer of absorbent fibers 17, such as disintegrated wood pulp fibers weighing about six grams, and which forms the core of the napkin, is then placed centrally upon the polyethylene film 18. The layer may be about the same length as the polyethylene film upon which it is placed, and approximately two inches wide.

After the laminate has been formed, the longitudinal edges 22 and 23 of the bottom layer of fibers 19 are brought upwardly around the polyethylene film and fibrous absorbent core and overlapped on the top surface thereof, as seen in Fig. 9, thus enveloping the polyethylene film and absorbent core. In bringing the longitudinal edges of the fibrous layer up around the film and core and overlapping the edges on top, the longitudinal edges 24 and 25 of the polyethylene film are also preferably brought upward to extend along the adjacent sides of the edges of the absorbent core, thus covering the absorbent core on the bottom and side edges. The laminate is then heated dielectrically to heat the interior of the laminate until the polyethylene film starts to soften and the wood pulp fibers adjacent the film begin to adhere to it. It is then placed into a mold of the desired configuration and the mold closed to form the napkin into the stabilized arcuate shape. As the mold is closed, suitable cutting devices may be incorporated with the mold to cut the ends of the laminate during the mold closing operation. After the napkin has been molded into the desired form, it is removed from the mold, cooled, covered with the wrapper 20 and the pinning strip 1 attached to complete the napkin.

The softened polyethylene film is formed into the arcuate shape by the mold. Upon cooling, it sets into shape and retains the napkin in the molded form. During the heating operation, the film softens sufficiently so that often the fibers adjacent the film adhere to it and contribute to the form stability of the napkin. The amount of heat applied to the napkin during the forming process is determined by the type of material used. The amount of heat applied should be sufficient to cause the film to

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soften, if thermoplastic, or set, if thermosetting, so that it can be formed and retained in the desired shape.

In Fig. 10 there is illustrated another form of sanitary napkin embodying the invention. In this form, the napkin includes elements similar to those disclosed in the embodiment illustrated in Figs. 1, 2 and 3, namely, an elongated core 17 of absorbent fibers having a layer 26 of heat activatable material which is similar to layer 18 in the embodiment disclosed above, but which covers the bottom surface of the core and does not extend up the sides thereof. The bottom surface of the layer of heat activatable material is covered with a layer 19 of absorbent fibrous material, such as cotton, similar to but somewhat thinner than layer 19 in the napkin referred to above. The bottom surface of the absorbent layer 19 may, in turn, be covered with one or more plies of creped paper 27. Alternatively, the creped paper may extend around all the interior components of the napkin, e.g. the absorbent core, the layer of heat activatable material and the layer of absorbent fibrous material, in the form of an envelope to minimize dusting of the fibers, particularly when the wrapper for the napkins is of an open porous construction, such as gauze, or when the core 17 or the absorbent layer 19 is formed of short length fibers, such as wood pulp fibers. The absorbent core is covered with a wrapper 28 of a liquid pervious material whose ends 29 extend beyond the ends of the core to provide attachment tabs for securing the napkin in position on the body of the wearer. The longitudinal edges of the wrapper are preferably overlapped on the bottom of the napkin, as illustrated in Fig. 13, so that the side of the napkin to be placed against the body presents a continuous, unbroken surface.

The form assumed by the layer of heat activatable material after the napkin has been heated and molded into shape is illustrated in Figs. 11 and 12. The layer, although originally flat, assumes a generally arcuate configuration in its longitudinal direction upon heating and then cooling, thereby imparting form stability to the napkin.

As noted above, as a consequence of the heat activatable properties of the layers 18 and 26, and as in the napkin embodiments described above, and as illustrated in Fig. 12 in connection with layer 26, the fibers in the absorbent core 17 adjacent the surface of the layer of heat activatable material may adhere to some extent to the surface of the heat activatable material, thereby further stabilizing the napkin in its arcuate shape. In addition, the fibers in absorbent layer 19 adjacent the surface of the layer of heat activatable material may also adhere to the surface thereof further stabilizing the napkin. Such bonding of the fibers to the layer of heat activatable material stabilizes the position of the heat activatable material with respect to the other components of the napkin to minimize shifting thereof.

While in the foregoing there has been shown and described various illustrative embodiments of the invention, it is to be understood that changes in the details of construction, combinations and arrangements of the parts may be resorted to without departing from the scope and spirit of the invention.

This application is a continuation-in-part of our applications U.S. Serial Nos. 599,407, filed July 23, 1956, and 696,529, now abandoned, filed November 14, 1957, both for "Absorbent Product."

What is claimed is:

1. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a liquid repellent layer of heat activatable material covering the bottom of said core, a soft layer of absorbent material covering said repellent layer and core, and a liquid pervious outer wrapper, said napkin having extending ends

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forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said layer of heat activatable material, said material also providing a barrier to the flow of liquid through said napkin.

2. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape in the direction of its length approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a liquid repellent layer of heat activatable material covering the bottom of said core, and a liquid pervious outer wrapper, some of the fibers in said core in contact with the said heat activatable layer being adhered thereto, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said layer of heat activatable material, said material also providing a barrier to the flow of liquid through said napkin.

3. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a liquid repellent layer of heat activatable material covering the bottom and extending up the sides of said core, a soft layer of absorbent material covering said repellent layer and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said layer of heat activatable material, said material also providing a barrier to the flow of liquid through said napkin.

4. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a liquid repellent layer of heat activatable material covering the bottom of said core, a soft layer of absorbent material covering said repellent layer and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said layer of heat activatable material having an arcuate shape in the direction of the length of said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said layer of heat activatable material, said material also providing a barrier to the flow of liquid through said napkin.

5. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin tapering inwardly from its ends to a relatively smaller width at its center to fit comfortably in said area, said napkin having an elongated absorbent core, a liquid repellent layer of heat activatable material covering the bottom of said core, a soft layer of absorbent material covering said repellent layer and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said layer of heat activatable material, said material also providing a barrier to the flow of liquid through said napkin.

6. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a liquid repellent layer of thermoplastic material covering the bottom of said core, a soft layer of absorbent material covering said repellent layer and core, and a liquid pervious outer wrapper, said napkin having extending ends

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forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said layer of thermoplastic material, said material also providing a barrier to the flow of liquid through said napkin.

7. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a liquid repellent layer of thermosetting material covering the bottom of said core, a soft layer of absorbent material covering said repellent layer and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said layer of thermosetting material, said material also providing a barrier to the flow of liquid through said napkin.

8. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a heat activatable, liquid repellent plastic film covering the bottom and sides of said core, a soft layer of absorbent material covering said repellent plastic film and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said plastic film, said film also providing a barrier to the flow of liquid through said napkin.

9. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core of wood pulp fibers, a liquid repellent thermoplastic film covering the bottom of said core, a soft layer of absorbent material covering said film and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said thermoplastic film, said film also providing a barrier to the flow of liquid through said napkin.

10. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a polyethylene film covering the bottom of said core, a soft layer of absorbent material covering said film and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said polyethylene film, said film also providing a barrier to the flow of liquid through said napkin.

11. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent fibrous core, a heat activatable plastic layer covering the bottom of said core, some of the fibers in said core in contact with said plastic layer being adhered thereto, a layer of soft absorbent material covering said plastic layer and core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said arcuate shape by said plastic layer, said layer also providing a barrier to the flow of liquid through said napkin.

12. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover

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said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core of short cellulosic fibers, a polyethylene film covering the bottom of said core, a soft fibrous layer covering said polyethylene film and core, and a liquid pervious outer wrapper, some of the short cellulosic fibers in said core in contact with said polyethylene film being adhered thereto, said polyethylene film having an arcuate shape in the direction of the length of said napkin, said napkin having extending ends forming tabs for attaching said napkin, said napkin being structurally stabilized in said preformed arcuate shape by said polyethylene film, said film also providing a barrier to the flow of liquid through said napkin.

13. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin tapering inwardly from its ends to a relatively smaller width at its center to fit comfortably in said area, said napkin having an elongated absorbent core, a fluid repellent layer of heat activatable material covering the bottom and sides of said core, and a fluid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, the arcuate shape of said napkin being structurally stabilized by said layer of heat activatable material, said material also providing a barrier to the flow of fluid through said napkin.

14. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent fibrous core, a fluid repellent layer of heat activatable material covering the bottom and sides of said core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, the arcuate shape of said napkin being structurally stabilized by said layer of heat activatable material, said material also providing a barrier to the flow of fluid through said napkin.

15. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent fibrous core, a fluid repellent layer of heat activatable material covering the bottom and sides of said core, and a liquid pervious outer wrapper, some of the fibers in said napkin in contact with said layer of heat activatable material being adhered thereto, said napkin having extending ends forming tabs for attaching said napkin, the arcuate shape of said napkin being structurally stabilized by said layer of heat activatable material, said material also providing a barrier to the flow of fluid through said napkin.

16. A sanitary napkin comprising absorbent material, said napkin having a preformed arcuate shape in the direction of its length approximating that of the exterior female pubic area to cover said area from forward of the labia majora to the anus, said napkin having an elongated absorbent core, a fluid repellent layer of heat activatable material covering the bottom of said core, and a liquid pervious outer wrapper, said napkin having extending ends forming tabs for attaching said napkin, the arcuate shape of said napkin being structurally stabilized by said layer of heat activatable material, said material also providing a barrier to the flow of fluid through said napkin.

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