

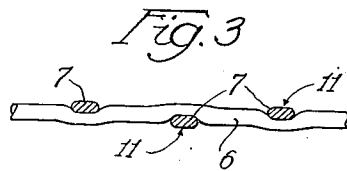
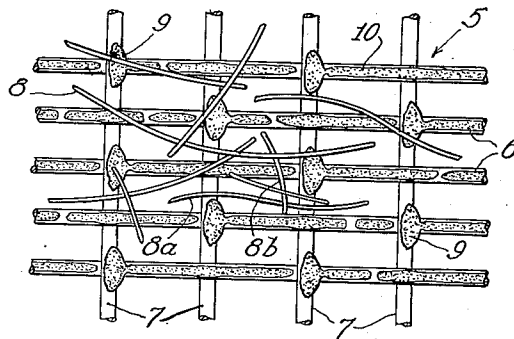
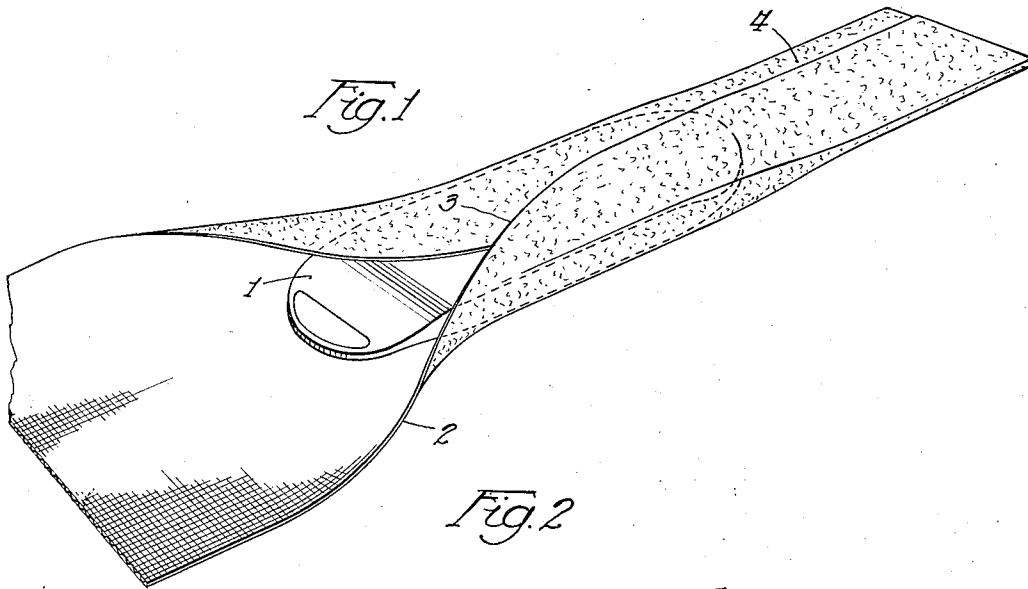
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K. J. HARWOOD ET AL

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SANITARY NAPKIN

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Inventors:
Kenneth J. Harwood.
and
Harvey J. LeDain.
By: *Swans, Pond & Anderson Attys*

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SANITARY NAPKIN

Kenneth J. Harwood, Neenah, and Harvey J. Le Dain, Appleton, Wis., assignors to International Cellucotton Products Company, Chicago, Ill., a corporation of Delaware

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This invention relates to improvements in sanitary napkins, especially catamenial napkins, and the invention is more particularly concerned with improvements in the covering of wrapping of the absorbent pad portion of such a napkin.

The main objects of the invention are to provide a sanitary napkin having improved outside surface characteristics which give the napkin highly important and advantageous non-chafing, smooth and soft cushion-like qualities, and also a readily permeable surface so as to facilitate transmission of fluid from the surface of the napkin to the interior thereof to thereby prevent the accumulation or extension of wetness on the surface of the napkin.

Additional objects of the invention are to provide a napkin embodying an unusually soft and smooth wrapper structure and which wrapper, notwithstanding its high degree of softness, is strong enough to prevent rupturing during normal use as well as under handling which occurs during high speed production of the improved napkin; and to provide a wrapper having the said attributes and which will not normally tear because of impalement of the wrapper by pins or buckles used for attaching the napkin to a supporting belt or the like.

In general, it is the object of the invention to provide an improved sanitary napkin which can be efficiently produced by modern, high-speed manufacturing methods and apparatus, and which will have improved characteristics, especially in respect of surface smoothness and softness.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawing (one sheet) wherein there is illustrated a sanitary napkin and certain details of construction thereof according to a preferred form of the invention.

In the drawing,

Fig. 1 is a perspective illustration of a sanitary napkin, a portion of the wrapper being inverted to more clearly reveal something of the interior construction;

Fig. 2 is a more or less schematic illustration on a greatly enlarged scale, of the construction of the wrapper employed in the sanitary napkin shown in Fig. 1, and

Fig. 3 is an edge view of a portion of the material shown in Fig. 2.

The sanitary napkin shown in Fig. 1 consists of an absorbent pad body 1 which may be of any desired construction. It may consist of a multiplicity of superposed plies of crepe tissue paper, 55

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or a pad of so-called fluff material, i. e. loosely matted wood pulp or other absorbent fibers which are usually enclosed in a jacket of porous tissue paper, or it may consist of combinations of the said materials in various layer-like arrangements, or of any other desired construction.

The pad is enclosed in a wrapper 2 of pervious material. In conventional practice this wrapper 2 has usually been of cotton gauze. The wrapper is elongated and is folded transversely around the napkin so that side margins of the wrapper overlap as indicated at 3 on one face of the absorbent pad. The wrapper is considerably longer than the absorbent pad so that end portions of the wrapper, such as represented at 4, may serve the function of attachment tabs whereby the napkin may be secured in place on the wearer by means of buckles, pins, or the like which pierce the tab.

The gauze wrapper which has conventionally been employed in sanitary napkin construction is a very costly part of the structure due largely to the high cost of the cotton thread which enters into its construction. Furthermore, the weaving operations by which gauze is produced are relatively slow and, therefore, contribute substantially to the high cost of the gauze. Waste of material and other factors also contribute to the high cost of gauze.

According to the present invention, gauze continues to be employed as a part of the wrapper structure but the gauze may be of much more open weave or mesh than has been permissible under conventional practice so that a substantially smaller quantity of expensive cotton thread is required per wrapper. Instead of employing gauze of an 18 x 14 thread count (18 lengthwise threads per inch and 14 crosswise or filler threads per inch) as has been common practice in the production of sanitary napkins, the present invention makes it practical to employ gauze having a reduced thread count such as 18 x 8 down to as open a mesh as 4 x 4, which has been satisfactorily employed with the present invention.

In Fig. 2, the gauze component of the wrapper 2 is represented in its entirety at 5. In this instance, the lengthwise and crosswise threads 6 and 7, respectively, are shown arranged in the proportions of gauze having a thread count of 18 x 8, the illustration being roughly six times normal size except that the thickness of threads and fibers is enlarged to a greater extent so as to more clearly illustrate some of the details of the invention.

On the gauze web 5 there is deposited a light

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facing or applique 8 of fibers, for example, cotton fibers. These fibers are of various lengths. In one practical embodiment they range from $\frac{1}{16}$ inch or even less to one inch or more in length with a large proportion of fiber being of an intermediate length, say around $\frac{1}{8}$ inch. The cotton fibers are deposited on the gauze by any suitable process which will permit the applique to be made very thin or of very light density since it is not desired to provide a heavy or tight mat or web of cotton on the gauze, and a large proportion of these fibers are adhesively attached to the gauze as will presently be explained.

In one practical embodiment of the invention, there may be as little as $1\frac{1}{2}$ to 2 grams of fiber deposited on a square yard of 18 x 8 gauze to produce an acceptable product. The fiber is, of course, uniformly distributed over the area of the gauze and it has been found that that weight of fiber is sufficient to prevent direct body contact with the gauze threads. In other words, the relatively harsh feel of the gauze is lost when the said small amount of fiber has been applied. More fiber may, of course, be applied to increase the softness or smoothness of the fiber-bearing face of the gauze, and we prefer to apply cotton fiber at the rate of from 4 to 6 grams per square yard. Fiber distributed at this rate forms a very tenuous, open, fluid permeable web which would not normally be self-sustaining in web form.

To prevent the fiber applique from being sloughed off the gauze incident to normal body movements against the napkin when being worn and otherwise, the fiber component is adhesively attached at discrete points to the gauze. For example as indicated in Fig. 2, adhesive is applied to the gauze in spaced areas indicated at 9, these areas being generally located at alternate intersections of the lengthwise and crosswise extending threads of the gauze and more on one side of the cross threads 7 (with reference to the ends of the length of gauze) than on the other. The adhesive is applied in said areas 9 in small accumulations or blobs which partially embrace both crossing portions of the threads at said alternate intersections or crossings, whereby said threads are bonded to each other at said crossings. The fibers 8, or at least some of them, are also bonded to the gauze by the said areas of adhesive. However, some of the fibers, for example a fiber represented at 8a (Fig. 2), may remain substantially free of adhesive attachment but such free fibers will generally be adequately held to the gauze by means of one or more other fibers which are adhesively attached to the gauze and which overlap the otherwise unattached fiber.

Some of the shorter fiber material will be adhesively attached and some will, of course, be free of attachment. These shorter fibers, being individually of very light weight tend to remain in place in the applique due at least in part to the normal cohesion between the fibers, and they will also to some extent be held by overlapping fibers which are adhesively anchored as already explained. A very short fiber is represented at 8b, such fiber being shown as being overlapped by one of the longer fibers and overlapping another such fiber. This may represent a typical arrangement of one of the shortest length fibers.

In addition to applying adhesive in blobs at the thread intersections as explained, we may also apply adhesive in a more or less continuous ribbon form on the lengthwise-extending threads as indicated at 10. These ribbons of adhesive on

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the longitudinal threads may be broken, especially adjacent one side of each of the areas 9 as indicated in Fig. 2, and also haphazardly at other points along the lengths of said longitudinal threads as indicated. The indicated small breaks in the adhesive ribbons 10 help to maintain flexibility of the product.

The adhesive may be applied in the manner described by roller coating means not necessary to describe here except to say that the gauze is guided over a roll coated with adhesive so that adhesive is applied to only one side of the gauze and on that side to only the said limited areas.

The adhesive employed is preferably of a thermoplastic character and it is preferably applied to the gauze and dried or partially dried before the fiber 8 is applied. It is sometimes advantageous to apply the fiber to the adhesive-bearing gauze before the adhesive is completely dried or set because the fiber will be gripped and held to the gauze immediately upon contact therewith, thereby avoiding the production of dust or lint incident to the operation of depositing the fibers on the gauze.

The adhesive should preferably be of permanently flexible character and such that it does not stiffen with age; it should also be non-irritating and preferably colorless and odorless. Also, the adhesive should be such that it does not penetrate into the threads of the gauze but instead remains on and adheres to the surface of said threads with little or no penetration into said threads. This will aid in avoiding objectionable stiffening of the gauze by the adhesive. Such adhesive is typified by suitably plasticized polyvinyl acetate initially in emulsion form containing also a small amount of solvent of the adhesive in which form it may be applied to the gauze as already explained. This type of adhesive is highly desirable because it softens and becomes exceptionally tacky at temperatures around 165° to 185° F. which is sufficiently above body temperature to avoid softening in use. Also, this melting temperature is not high enough to cause scorching of the gauze when the adhesive is applied thereto, and it is low enough to make it fairly easy to reactivate the material by the application of heat or pressure or both heat and pressure to permit the fiber applique to be pressed into binding engagement with the adhesive or with the adhesively coated areas of the gauze. Other adhesives may also be used and this one is mentioned merely as typifying a highly satisfactory kind.

After the fiber 8 is deposited to the required density on the adhesively coated gauze web, the gauze and fiber applique are passed through a calender or other means for pressing the two elements together and for heating and melting the thermoplastic adhesive material so as to cause the fiber 8 to be more or less embedded in such adhesive material.

When the adhesive is melted it may also flow somewhat around the intersections or crossings of the gauze threads 6 and 7 to improve the adhesive connection thereof which is, of course, initiated when the adhesive is first applied to the gauze. The heating and pressing means desirably should apply sufficient pressure to more or less flatten out the crossings of the gauze threads 6 and 7 more or less as indicated at 11 in Fig. 3, the thickness of the gauze web at the thread crossings being thereby reduced to not much more than the normal diameter of the individual threads. This may be accomplished without cut-

ting the threads by passing the material between a pair of rolls, one of which is a steel or similar hard roll and the other of which is a firm but at least slightly resilient roll, such as a compressed cotton roll, the steel being preferably in contact with the fiber-coated face of the gauze.

Flattening of the thread crossings as just described eliminates to a considerable extent, one of the causes of roughness or harshness of the gauze, and leaves it with a noticeably smoother surface which is very desirable. To a lesser extent the threads of the gauze are flattened throughout their lengths and this over-all flattening aids in producing the indicated improved smoothness, and it appears also to increase the flexibility of the gauze.

By passing the fiber-coated gauze web between heat and pressure-applying means, such as indicated, the intersecting portions of the fibers and threads are, of course, more or less welded together independently of the adhesive bonding and this pressure welding tends to aid in the retention of fibers which fail to enter one or more of the areas of adhesive to be thereby adhesively bonded to the gauze web. The normal cohesiveness of the fibers to each other and to the gauze threads, which also aids in attaching the facing fibers to the gauze, is also increased as a result of the intimate contact produced between the fibers with each other and with the gauze by the calendaring operation. Hence, there is a negligible amount of loose fiber which will fall from the web.

A composite woven gauze and fiber applique web made as above explained, not only presents a smooth cushion-like face which is a very satisfactory outside surface for a sanitary napkin, but it affords a number of additional advantages. As already indicated, it permits the use of less costly open mesh gauze fabric. The adhesive bonding of the gauze threads at their intersections or at some of their intersections as shown, serves to stabilize the threads in their positions relative to each other so that uniform thread distribution and good appearance are maintained notwithstanding the handling to which the gauze is subjected during converting processes. By thus stabilizing the thread positions in the gauze, the mesh of the gauze is maintained substantially uniform throughout the area of the gauze so that no large unsightly openings form, and an effective grid-like support is maintained for the fiber applique.

Open mesh gauze is, of course, very soft and flimsy and is normally very difficult to handle by high speed machinery such as is employed in making sanitary napkins, but the described cotton fiber applique adds body to the material and thereby improves its handling characteristic so that it may readily be handled by said machinery. Hence, the material is well adapted to sanitary napkin manufacture on high speed equipment, such as has been employed for making conventional napkins with plain relatively close mesh gauze wrappers.

The fiber material 8 is preferably deposited in a haphazard arrangement as indicated, rather than in a parallel card-like relationship which would be used, the haphazard arrangement being desirable because less expensive, shorter fibers may be used, and because the haphazard arrangement results in effective intertwining and locking of the fibers in place in the applique. The adhesively bonded gauze structure together with the adhesively bonded fiber applique also

provides sufficient firmness in the wrapper so effectively resist tearing of the wrapper on pins or on the prongs of a buckle passed through the wrapper for purposes of attaching the napkin to a supporting belt or other supporting means. This facilitates fastening of the napkin on the wearer so that the napkin will not readily shift out of the desired place of position, this being of significant importance since successful utilization of the product depends to a considerable extent upon the ability of the napkin to be held in proper place.

The cost of the wrapper may be somewhat further reduced by employing finer gauze threads in the production of the gauze component. Some reduction in the weight of the threads is permissible in the described structure incident to the general strengthening of the gauze attained by the adhesive inter-attachment of the threads at their crossing points and also as an incident to the addition of the fiber applique to one face of the gauze web.

A length of material prepared according to the foregoing explanation can be produced at less cost than a corresponding length of woven material of equivalent utility. By "equivalent utility" we refer to the usefulness of the woven material for a given purpose where its softness, smoothness, and similar characteristics are important considerations.

For example, in current, actual practice, a well known brand of sanitary napkins have a wrapper made of 18 x 14 gauze. Such gauze is quite expensive and its cost represents a very substantial part of the total cost of the said napkins. This costly, close-weave gauze, is employed because less expensive equivalent material has not been available on a commercially economical basis. Available lower cost, open mesh gauze is not satisfactory as a substitute because of its flimsiness, which impairs the effectiveness of wrapper tabs for attachment purposes, and also makes the material very difficult to handle in automatic napkin-making machinery; because of its tendency to irregularity of thread arrangement and hence its relative unsightliness; and other reasons.

The material herein described, embodying open mesh, 18 x 8 gauze with a light applique or facing of fibers, when used for wrapping a sanitary napkin, has been found to be very satisfactory in respect of all of the above-mentioned deficiencies of plain open mesh gauze and to have certain advantages of softness, smoothness, and better appearance over the usual plain, relative closely-woven wrapper. The faced material is nevertheless less costly than the said closely woven material, mainly because the faced material embodies a substantially reduced amount of the costly thread required for the production of gauze. The facing fiber may consist of relatively inexpensive short length fibers, the cost of which, together with the cost of the adhesive employed and other added production costs, per unit of the faced material is less than the value of the thread saved and other costs saved in the production of the open mesh gauze employed in the faced material. Hence, there is an important net saving in the cost of production of the improved, faced material as compared with more closely woven gauze which has heretofore been required for sanitary napkin production purposes.

It should be understood that considerable variation is possible in respect of the quantities and kinds of adhesive and fiber employed in producing the faced material. Variations of these quan-

titles serve to alter the characteristics of the product. Larger quantities of fiber per unit of material produced tend to impair permeability of the material while increasing the cushion characteristic. Larger quantities of adhesive tend to impair the softness and flexibility of the product.

For sanitary napkin purposes, the wrapper material should be readily fluid permeable so as to permit menstrual exudate to quickly reach and be absorbed by the absorbent pad enclosed in the wrapper.

The bonding together of the gauze threads and of the fiber threads and gauze as described does not have any significant hardening effect on the wrapper material probably because of the substantial spacing of the points of attachment between the fibers of the facing and the threads of the gauze which leaves substantial lengths of flexible, unaltered fiber and thread between the bonds. The employment of permanently flexible adhesive, substantially surfaced on limited portions of the circumference of the gauze threads also aids in avoiding stiffening of the fabric. The normal softness of the components of the laminated wrapper are thereby maintained in the composite fabric without impairment or at least to a significant degree.

The fibers in the applique 8 may be of any suitable material, natural or synthetic, or mixtures thereof. Some of the fibers may be of thermoplastic material, especially when a heavy or thick layer of fiber is applied, such thermoplastic fibers being operative to aid in the bonding of some of the fibers to other fibers of the applique and to the gauze as an incident to melting and resetting of the thermoplastic fibers when the wrapper is subjected to heat and pressure as explained.

For some purposes, we may avoid the application of adhesive to the gauze by employing gauze having in some or all of its threads, fibers of thermoplastic material distributed along the lengths of the threads. Such spaced threads will provide longitudinally spaced bonds between at least some of the crossing threads of the gauze and between the gauze and the fibers applied to the face of the gauze when the gauze and facing thereon are subjected to the heat of the calender which will reactivate said thermoplastic fibers to the same end that said heat reactivates thermoplastic applied to the gauze as hereinbefore described.

Instead of employing heat and pressure to reactivate the thermoplastic adhesive, or thermoplastic fibers spun into the threads of the gauze, we may employ either heat or pressure alone, or solvents of the thermoplastic material.

Because of the fiber applique on a face of the gauze wrapper, the width of the overlap 3 of the gauze margins may be substantially reduced while, at the same time, obtaining adequate self-interattachment of said lapped margins to maintain the napkin in its proper, usable condition. This follows from the increased cohesiveness of the gauze laps occasioned by the fibers and the applique which project from the underlying lap into more intimate engagement with the gauze of the overlying lap than occurs when plain folds of gauze are lapped. Hence, a narrower width of gauze may be employed with consequent savings.

The faced textile material and a preferred method for making it are described and claimed in a companion application for patent, Serial No. 71,904, filed by us on January 21, 1949.

Other changes of the described structure will appear to those skilled in the art, and changes in the described wrapper structure and in the procedure for fabricating the same are possible without departing from the invention.

We claim:

1. A catamenial napkin having an absorbent pad and a wrapper around said pad, said wrapper comprising a thread web, and an applique of fibers adhesively bonded to the threads of said web in a multiplicity of relatively spaced areas which occur where fibers of said applique and some of the threads of said web are in contiguous relation to each other, said applique having a basis weight in the range of about 1½ grams to 6 grams per square yard and providing such a paucity of fibers in relation to the area of the thread web on which said fibers are applied, that such a large proportion of the fibers in said applique will be disposed in contiguous relation to said threads so as to be bonded to said thread web as aforesaid, thereby attaining secure anchorage of said applique to said web and imparting to the wrapper a characteristic of high resistance to displacement of the applique fibers from the thread web by scuffing or rubbing which occurs as an incident to normal body action against the surface of the napkin when the napkin is worn in a normal manner.

2. A catamenial napkin having an absorbent pad and a wrapper around said pad, said wrapper comprising a gauze web, and an applique of fibers approximately uniformly distributed on said gauze web and of such light weight and density that it is highly pervious to liquid, said applique being adhesively bonded to the threads of said gauze web in a multiplicity of relatively spaced areas which occur where fibers of said applique and threads of said gauze web are in contiguous relationship to each other, there being such a paucity of fibers in relation to the area of the wrapper over which said fibers are distributed that a large proportion of the fibers in said applique contacts and is bonded to said web as aforesaid, thereby attaining secure anchorage of said applique to said gauze web and imparting to the wrapper a characteristic of high resistance to displacement of the fiber applique from said gauze web by scuffing or rubbing which occurs as an incident to normal body action against the surface of the napkin when the napkin is worn in a normal manner, and the crossing portions of the threads in said gauze being pressed into one another and the crossing knots flattened whereby said gauze is smoothed and said applique of fiber is enabled to a significant degree, to shield the body from chafing contact with the flattened knots.

3. A catamenial napkin having an absorbent pad and a wrapper around said pad, said wrapper comprising a gauze web, and an applique of fibers approximately uniformly distributed on said gauze web and of such light weight and density that it is highly pervious to liquid, said applique being adhesively bonded to the threads of said gauze web in a multiplicity of relatively spaced areas which occur where fibers of said applique and threads of said gauze web are in contiguous relationship to each other, there being such a paucity of fibers in relation to the area of the wrapper over which said fibers are distributed that a large proportion of the fibers in said applique contacts and is bonded to said web as aforesaid, thereby attaining secure anchorage of

said applique to said gauze web and imparting to the wrapper a characteristic of high resistance to displacement of the fiber applique from said gauze web by scuffing or rubbing which occurs as an incident to normal body action against the surface of the napkin when the napkin is worn in a normal manner, and the fiber applique and gauze web being pressed together into intimate interengagement and the crossing portions of the threads in said gauze web being pressed into one another and the crossing knots flattened, whereby said gauze is smoothed and said light applique of fiber enabled to a significant degree to shield the body from chafing contact with the flattened knots.

4. A catamenial napkin having an absorbent pad and a wrapper around said pad, said wrapper comprising a gauze web and an applique of fibers approximately uniformly distributed on the outside of said gauze web and of such light weight and density that it is highly pervious to liquid, said applique and the gauze web being pressed together into intimate interengagement and the crossing portions of the threads in said gauze being pressed into one another and the crossing knots flattened, whereby said gauze web is smoothed and said light applique of fiber enabled to a significant degree to shield the body from chafing contact with the flattened knots, some of the crossing portions of the threads of said gauze being adhesively bonded to each other at the crossings with thermoplastic adhesive material so as to stabilize the mesh formation of the gauze, said adhesive also occurring discontinuously along the gauze threads extending in one direction and in greater discontinuity along the gauze threads extending in the other direc-

tion, thereby to preserve in the gauze component a high degree of the normal softness thereof notwithstanding the normal tendency of the adhesive to stiffen the portions of the threads bearing said adhesive, said applique being bonded by said thermoplastic adhesives to the threads of said gauze web in a multiplicity of relatively spaced areas which occur where fibers of said applique and adhesive bearing portions of the threads of said gauze web are in contiguous relationship to each other, said spaced areas including areas coinciding with many of the adhesively united crossings of the gauze threads, there being such a paucity of fibers in said applique in relation to the area of said gauze web over which said fiber is distributed that a large proportion of the fibers in said applique contacts and is bonded to said web as aforesaid, thereby attaining secure anchorage of said applique to said gauze web and imparting to the wrapper a characteristic of high resistance to displacement of the applique fibers from the gauze web by scuffing or rubbing which occurs as an incident to normal body action against the surface of the napkin when the napkin is worn in a normal manner.

KENNETH J. HARWOOD.
HARVEY J. LE DAIN.

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