June 17, 1952 C. I. RICKARD ET AL 2,600,576

SANITARY NAPKIN

Filed Aug. 4, 1950 2 SHEETS—SHEET 1

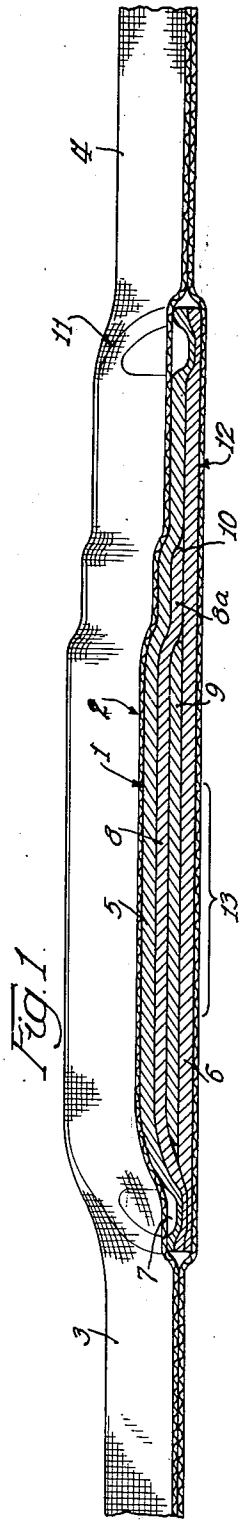


Fig. 1

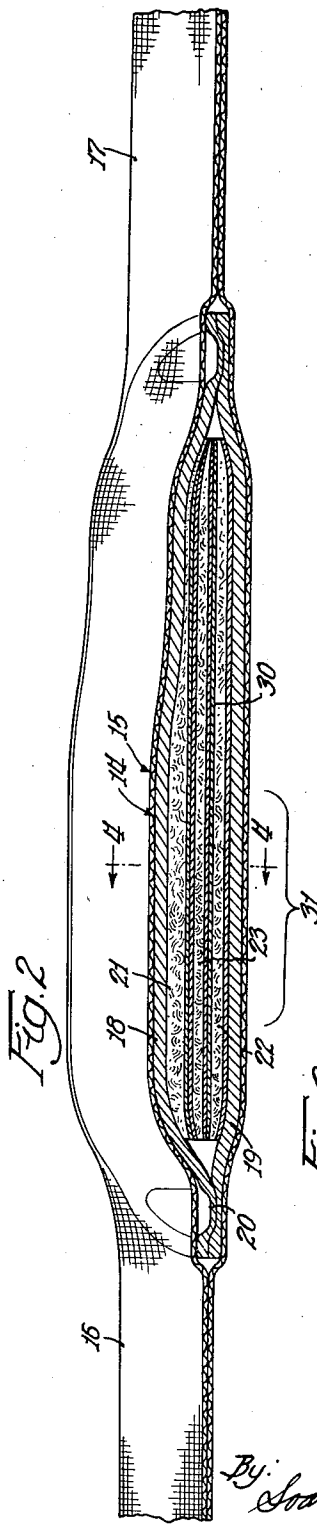


Fig. 2

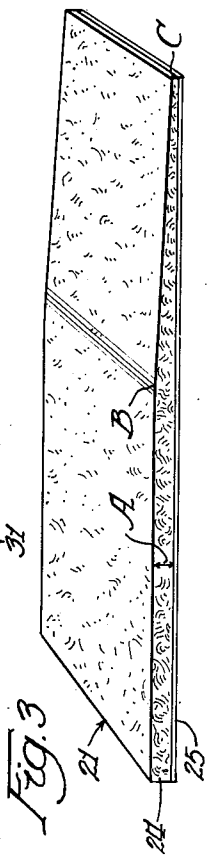


Fig. 3

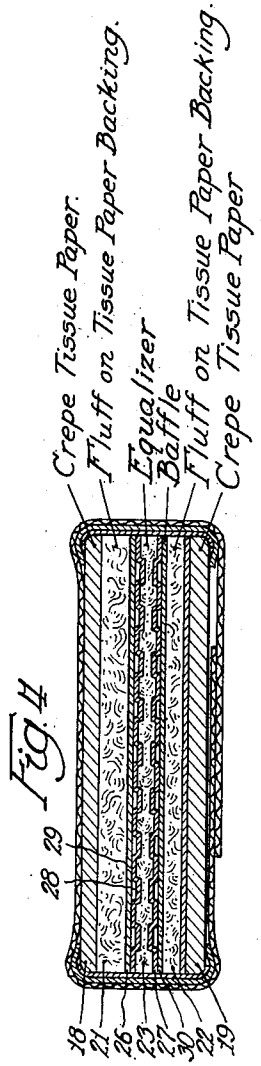


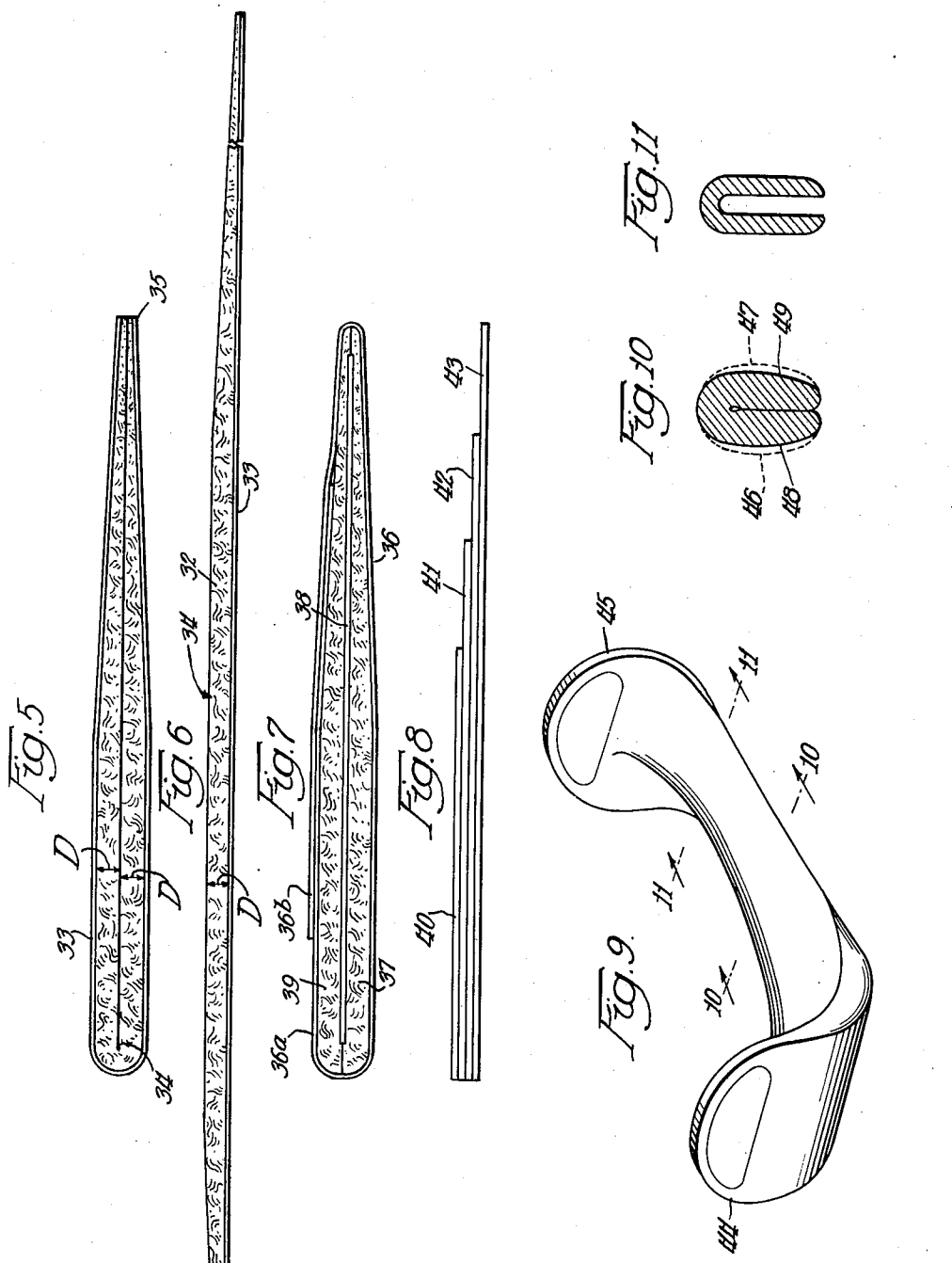
Fig. 4

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SANITARY NAPKIN

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UNITED STATES PATENT OFFICE

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SANITARY NAPKIN

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10 Claims. (Cl. 128—290)

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This invention relates to improvements in sanitary catamenial napkins and the principal object of the invention may be said to be that of providing a sanitary napkin of greater efficiency than those heretofore available.

Efficiency of a sanitary napkin as herein referred to, takes into account many factors and characteristics of the napkin, for example, (*a*) the absorption capacity of the napkin, (*b*) the absorption spreading characteristics thereof, (*c*) the tendency of the napkin to move from its proper place due to body movement and muscular action, (*d*) the weight and bulk of the napkin and its reaction to the pressures to which it is subjected when worn, and (*e*) comfort characteristics of the sanitary napkin when worn. Other characteristics and qualities may also have a bearing on this matter of efficiency but those just referred to are probably the most important and the present invention is concerned with improvements which relate mainly to the aforesaid characteristics.

In connection with the details of construction of a sanitary napkin to attain high efficiency, it is of course important to consider the practicability of the structure from a manufacturing viewpoint. Commercial considerations require that a construction be such that it may be mass-produced at high speed by automatic machinery at very low cost.

The present invention aims to provide a sanitary napkin which embodies a more efficient construction and which improved construction may be mass-produced at high speed by automatic machinery and at low cost as aforesaid.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings wherein the invention is illustrated in several embodiments.

In the drawings, Figure 1 is a fragmentary perspective which embodies a longitudinal section through one form of a sanitary napkin embodying the invention;

Figure 2 is a view similar to Figure 1 but showing another form of construction;

Figure 3 is a perspective illustration of one component of the pad structure shown in Figure 2;

Figure 4 is a section on the line 4—4 of Figure 2;

Figures 5, 6, 7 and 8 are side elevations of other forms of construction of a component of a sanitary napkin according to the present invention;

Figure 9 is a perspective illustrating approxi-

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mately the condition to which the absorbent pad portion of the napkin is folded when worn; and

Figures 10 and 11 are sections, respectively, on the lines 10—10 and 11—11 of Figure 9.

The sanitary napkin construction shown in Figure 1 comprises an absorbent pad body or unit 1 enclosed in a wrapper of gauze 2 or other suitable material. Arrangement of the wrapper about the absorbent pad may be in accordance with conventional practice and is not illustrated in detail. In accordance with such conventional practice the wrapper has end extensions 3 and 4 at the front and rear ends respectively of the absorbent pad body, these extensions being usually employed for attaching the napkin to a supporting belt or to otherwise support the napkin when worn.

The pad body 1 comprises top and bottom or outer face layers 5 and 6 of absorbent crepe tissue paper, these layers being of substantially like length and having their end portions pressure-bonded together as indicated at 7 substantially in accordance with the teaching of United States Patent No. Re. 21,706 Glomstead, May 9, 1939 (original No. 1,857,854, May 10, 1932). Inside layers 8 and 9, also of suitable absorbent material, are provided intermediate the layers 5 and 6.

The material employed in the layers 5, 6, 8 and 9 may be crepe tissue paper, preferably arranged with the creping extending lengthwise of the layers. The layers 5 and 6 may advantageously consist of about ten plies of crepe tissue paper, the layer 8 of about ten plies and the layer 9 of about eight plies, the layer 9 being treated as taught in United States Patent No. 1,863,333 to Heitmeyer June 14, 1932, to form this layer into a so-called equalizer, i. e., a device having a capacity of accelerating the spread of fluid absorption lengthwise within the pad. Other suitable absorbent materials may be employed in the construction of any or all of these layers as will presently appear.

The layer 8 is of less length than the outer layers 5 and 6, being here shown as of about three-fourths the length of said outer layers. Said layer 8 has one end bonded to the front ends of the layers 5 and 6 by being extended between the end portions of the layer where they are compressed as indicated at 7. The other end of said layer 8 terminates as indicated at 10 at a considerable distance from the rear end 11 of the pad. The layer 9 which, as above indicated, is preferably compressed along longitudinal zones to form a so-called equalizer is shorter than the layer 8 and

is disposed about midway between the ends of the layer 8 as shown. In one practical construction, the outer layers 5 and 6 may be about eight and seven-eighths inches long, the layer 8 six and one-half inches long, and the layer 9 five inches long. These proportions result in an absorbent pad having a short front end portion tapered to a thickness which is substantially less than the normal thickness of the pad through all of its layers 5, 6, 8 and 9 and this reduced thickness end portion is adapted to remain in a flat body hugging condition when the napkin is worn. Similarly the rear end portion of the napkin is reduced in thickness to the combined thickness of only the outer layers 5 and 6 as indicated at 12. The reduced rear end thickness indicated at 12 is more or less gradually increased to the full thickness of the main pad body through the agency of the short rear end portion 8a of the intermediate layer 8.

The described arrangement of pad layers results in a pad having its maximum thickness and absorption capacity in that quarter (indicated at 13 in Figure 1) of the length of the napkin immediately in front of the middle of the pad part of the napkin between its front and rear ends.

Another construction is shown in Figure 2 wherein the napkin embodies a pad 14 enclosed in a suitable gauze wrapper 15 having front and rear attachment tab extensions 16 and 17, respectively.

The absorbent pad body 14 comprises upper and lower or outer face layers 18 and 19 respectively, each of which may consist of around ten plies of crepe tissue paper. Said outer plies are of like length and have their ends pressure-bonded together as indicated at 20.

Between the multi-ply tissue layers 18 and 19 there is an absorbent filler structure which, in this instance, comprises upper and lower layers 21 and 22, respectively, and an intermediate layer 23.

The upper layer 21 may consist of a layer 24 (see also Figure 3) of finely divided cellulose fiber or so-called fluff on a supporting or backing sheet 25 of crepe tissue paper. The said fluff layer 24 has a thickness A for about one-half of its width and then tapers from about a mid-point of its with at B to a very thin or feather edge at C. The layer 22 may be similar to the layer 21 or it may be of substantially uniform thickness from end to end as shown in Figure 2, being, however, constructed of a layer of said fluff material on a supporting or carrier sheet of crepe tissue or similar material. The intermediate layer 23 may be formed of a layer of said fluff material between upper and lower confining sheets 26 and 27, respectively, of crepe tissue paper or other similar material and this intermediate layer 23 may be made into a so-called equalizer element by pressure treatment according to the teaching of the above mentioned Heitmeyer patent. As shown in Figure 4 the intermediate layer 23 is provided with longitudinally extending alternately arranged relatively compressed zones 28 and incompressed zones 29 as a result of said pressure treatment.

A baffle sheet 30 may be positioned in the absorbent filler unit intermediate the equalizer 23 and the upper or lower layer 21 and 22, preferably the lower layer as shown. Such baffle sheet may consist of one or two (or more) plies of crepe tissue paper suitably treated to impart the desired degree of moisture-proofness thereto. It is preferable that such moisture-proofness be adequate to enable the baffle sheet to withstand fluid penetration until a substantial volume of fluid has been received in the pad above the baffle sheet and until the fluid pressure is built up to a point where it can force the fluid through the baffle sheet. The fluff material employed in the layers 21, 22 and 23 and the tissue carrying or supporting plies associated with said layers are preferably of a highly absorbent character so that they will readily absorb fluid delivered thereto.

In the construction in Figures 2 to 4 inclusive, the layer 21 with its tapering thickness portion imparts to the pad 14 tapering thickness characteristics similar to those of the pad 1 shown in Figure 1. In the Figure 2 arrangement the quarter portion 31 of the over-all pad length immediately in front of the center of the pad embodies the maximum thickness of the pad body portion and provides the maximum absorption capacity portion of said pad.

Tapered thickness absorbent pads may be made by employing an absorbent section such as represented in Figure 5 which is made from a web of the character represented in Figure 6. In Figure 6 a layer 32 of fluff is deposited on a crepe tissue or similar carrying sheet 33. The layer 32 has a centrally located portion of uniform thickness D and end portions which taper from the thickness D to feather or near feather edges as shown. Such a web is folded on itself at about its mid-point indicated at 34, the carrying sheet 33 being on the outside, thereby to form the folded structure shown in Figure 5. The folded, tapered pad element shown in Figure 5 has a main portion having two thicknesses D in relatively superposed relation to each other and two tapered end portions in relatively superposed relation to thereby provide a pad having about one-half its length of uniform thickness corresponding to two times D and the other half of its thickness tapering from said main thickness to a thin edge 35.

An absorbent insert such as shown in Figures 5 and 6 may be substituted for the multiple layer insert between the outer layers 18 and 19 in the Figure 2 construction, or if desired, the entire absorbent pad may be represented by the structure shown in Figure 5 which, in that case would be made of appropriate length to correspond to the full desired pad length, and covered with a suitable wrapper such as the wrappers 2 and 15 of Figures 1 and 2 respectively.

The form of pad component shown in Figure 7 comprises a wrapper 36 of crepe tissue paper or other suitable material which is initially spread out in flat web form and on which is deposited a layer 37 of fluff, the layer being deposited so as to have a uniform thickness over about one-half the width of the layer and a tapering thickness as shown over the remaining portion of the width of the layer. A web of equalizer material 38 (or a baffle element) is next deposited on top of the fluff layer 37 if such equalizer or baffle are desired, and another fluff layer 39 similar to the fluff layer 37 is deposited on the equalizer. The marginal portions 36a and 36b of the wrapper sheet 36 are then folded over the fluff layer 39 and into mutually lapping relationship as shown to confine said fluff material.

Another tapered form of pad construction can be attained as shown in Figure 8 where a series of layers 40, 41, 42 and 43 of progressively increasing length are assembled together to form a more or less step-tapered pad. The layers may be made of superposed plies of crepe tissue paper or of fluff material with or without backing

sheets, and either equalizer or baffle strips or both, may be incorporated at any desired location in such a step-tapered structure.

The pad body structures represented in Figures 7 and 8 may be used in the same manner set forth above in respect of the structure shown in Figure 5.

Pad body material having the cross-sectional shape shown in Figures 5, 7 and 8 may be made in long lengths and rolled up into supply rolls for subsequent delivery to pad forming machines which are equipped with instrumentalities to cut off successive end portions of the required width to form the desired pad units. A typical machine of this character is represented in United States Patent No. 2,262,275 Fourness and Greiner, November 11, 1941.

The various elements or layers of the pad body are of substantially constant thickness from side to side of the pad in each elementary unit of length thereof as shown in Fig. 3, said thickness varying however, from end to end, in some of the layers as already explained. Pad elements of such uniform side to side thickness are obtained when these elements are cut one by one from the end of a long supply strip of the material as above explained, the said supply strip being formed with transverse cross section corresponding to the desired longitudinal sectional form of the element.

Absorbent sanitary napkin pads have been made in various laminated arrangements in which certain layers terminate short of the ends of the pad body so as to provide end portions of reduced thickness. Pads so made have been symmetrical in form and the absorbent capacity thereof has been substantially uniform throughout a major portion of the length of the pads, such portion being centered between the ends of the pads.

Conventional sanitary napkins of this general character have been evolved over a period of about the last thirty-five years, beginning with an all-crepe tissue paper pad of rectangular pad and uniform thickness from end to end. During these years of development, one of the persistent complaints has been that the absorbent pads have a tendency to wet or strike through from the body side to the outside. Absorbed fluid usually penetrates the entire pad thickness in a zone intermediate the pad ends and usually nearer to one end of the pad than to the other. This absorption tends to spread lengthwise of the pad from the zone of application. Of course the spread of absorption depends to a considerable extent upon the amount of fluid delivered to the napkin and the length of time that the napkin is worn. Due to the discomfort experienced when a napkin becomes very wet the tendency is to dispose of the napkin long before a major portion of its absorptive capacity has been used up. This obviously reflects considerable inefficiency in the conventional pad structures.

When a sanitary napkin is applied it is normally folded lengthwise approximately as represented in Figure 9 where the front end of the pad is represented at **44** and the rear end at **45**; intermediate the front and rear ends, the pad is folded longitudinally upon itself approximately as illustrated and this longitudinally folded portion is subjected to considerable compressive force between the legs of the wearer, whereby the normal thickness of the folded structure is reduced from something about as represented by the dotted line showing at **46** (Figure 10) to the full line showing at **48**. With the conventional uniform thickness pads this compression tends to increase the capillary flow of fluid toward the rear end of the pad and when the wearer has occasion to sit down, there is necessarily a tendency to further compress the pad material and to express some of the absorbed fluid to the outside of the pad. The resulting adverse effects on the comfort characteristics of the napkin are self-evident.

This uniform cross-section of conventional pads also readily permits the displacement of the pad in a longitudinal direction unless the attachment tabs have been pulled up so tight as to thereby create their own discomfort.

The described improved construction with a tapered thickness rear portion provides maximum absorption capacity in the area of the pad body which normally receives the major portion of fluid, and when the pad is folded for application to the body, it is given a rearwardly tapering width which has the effect of eliminating bulk in the rearward portion of the pad as indicated by comparison of Figures 10 and 11 which are drawn to subtantially the same scale. This reduction in bulk in the rearward portion of the pad serves to prevent the application of a significant portion of the capillary producing compression on said rearward portion and also to prevent the application of fluid expressing pressure thereon as often occurs with conventional uniform thickness pads as above explained. The forward thicker portion, being subjected to the usual capillary increasing compression will, however, effectively take up and hold the fluid reaching the same. By employing an equalizer strip such as the strip **23** in Figures 2 and 4 in the pad body rearward absorption may be promoted interiorly of the pad and permits extended wear of the pad if desired until even its rear portions are quite moist. If preferred, the equalizer strip may be terminated somewhat short of the rear end of the intermediate plies to accordingly control the rearward spread of fluid absorption.

The absorption capacity of the described tapered thickness pad structure is substantially equal in a practical sense to the absorption capacity of a conventional uniform thickness pad having a bulk of absorption material which is greater than that of the tapered thickness pad by an amount approximately equal to that which has been eliminated from the rear portions of the described tapered structures to form the taper. Hence, efficiency of the described tapered structure is in fact substantially higher than the absorbing efficiency of the conventional uniform thickness pad.

Because of the reduced thickness of the rear portion of the pad, the pad is somewhat more flexible lengthwise and therefore may be more easily centered on the body and caused to conform to the anatomy, thereby improving the comfort characteristic of the napkin.

The longitudinally tapering or wedge shape of the napkin when folded for application to the body, provides a front portion which is transversely enlarged, as from side **48** to side **49** in Figure 10, as compared with the dimension in a corresponding direction of a rearward portion as represented in Fig. 11. This transverse front enlargement tends to anchor the pad against rearward displacement incident to body and muscular activity so that the improved pad has a pronounced tendency to remain in place, this being an important improvement over the prior

structures and adding materially to the comfort of the napkin and the sense of security experienced by the wearer.

The described taper formations are representative of commercially practicable ways to produce the structure described. Others may also be available and the principle of the invention described may be embodied in other forms within the scope of the following claims.

We claim:

1. A sanitary napkin comprising an elongated absorbent pad having relatively superposed layers of material, one of said layers extending from end to end of the pad, the other layer being of shorter length and having its thickness tapered lengthwise of the pad, said layers cooperating to provide a pad having absorbent capacity which is greater in an area adjacent to the front end of the pad when worn than in a corresponding area adjacent the rear end of the pad, and a pervious wrapper enclosing said pad.

2. A sanitary napkin comprising an elongated absorbent pad having relatively superposed layers of material, one of said layers extending from end to end of the pad and another layer being of shorter length and having its thickness tapered rearwardly of the pad, said layers cooperating to provide a pad having absorbent capacity which is greater in an area adjacent to the front end of the pad than in a corresponding area adjacent the rear end of the pad, said pad layers being of like width throughout the length of said shorter layer, and a pervious wrapper enclosing said pad.

3. A sanitary napkin comprising an elongated absorbent pad having a pair of outer layers and a filler intermediate said outer layers, said outer layers and said filler being of substantially like widths and said filler being shorter than said outer layers, the latter having end portions disposed in face to face relation beyond the ends of said filler, and said filler having a thickness which tapers toward one end thereof so as to impart a tapering thickness to a portion of said pad, and a pervious wrapper around said pad.

4. A sanitary napkin comprising an elongated absorbent pad having a pair of outer layers and a filler intermediate said outer layers, said outer layers and said filler being of substantially like widths and said filler being shorter than and disposed approximately centrally of the length of said outer layers, the latter having end portions disposed in face to face relation beyond the ends of said filler, and said filler having a thickness which tapers toward one end thereof so as to impart a tapering thickness to a portion of said pad, and a pervious wrapper around said pad.

5. A sanitary napkin comprising an elongated absorbent pad having a pair of outer layers and a filler intermediate said outer layers, said outer layers and said filler being of substantially like widths and said filler being shorter than said outer layers, and comprising a plurality of superposed absorbent material layers, at least one of which layers has a thickness which is tapered toward the rear end of the pad, said outer layers of the pad having end portions disposed in face to face relation beyond the ends of said filler.

6. A sanitary napkin comprising an elongated absorbent pad having a pair of outer layers and a filler intermediate said filler comprising a layer of absorbent material of the same width as said outer layers but of less length than the latter and disposed in said pad nearer to the front end than to the rear end thereof so as to impart to said pad, in effect, a thickness which tapers toward the rear end of the pad.

7. A sanitary napkin comprising an elongated absorbent pad having a pair of outer layers and a filler intermediate said filler comprising a plurality of layers of absorbent material of the same width as said outer layers but of less length than the latter and disposed in said pad nearer to the front end than to the rear end thereof, one of the layers of said filler extending between the front end portions of said outer layers and another of said filler layers being shorter than the aforesaid filler layer and arranged in the filler with its opposite ends spaced from the respectively corresponding ends of the aforesaid filler layer.

8. A sanitary napkin comprising an elongated absorbent pad having a pair of outer layers and a filler intermediate said outer layers, said outer layers and said filler being of substantially like widths and said filler being shorter than said outer layers, the latter having end portions disposed in face to face relation beyond the ends of said filler and said filler embodying a tapered thickness layer of loose fluff material on a carrier web of tissue paper, said fluff layer having a thickness which tapers toward one end thereof so as to impart a tapering thickness to a portion of said pad, and a pervious wrapper around said pad.

9. An elongated sanitary napkin pad of absorbent material, said pad having distinguishable forward and rearward portions, the thickness of said pad being substantially constant from side to side of the pad in each elementary unit of length thereof and varying lengthwise of the pad, the average thickness of the pad in the forward one-half of the length thereof being greater than in the rearward one-half of said length so that the volume of material in said forward portion of the pad is greater than the volume contained in said rearward portion.

10. A sanitary napkin comprising an elongated absorbent pad having front and rear end portions and an intermediate portion, the thickness of the pad being substantially constant from side to side of the pad in each elementary unit of length thereof, said intermediate portions having forward and rearward portions of which the former is of greater average thickness than the latter, and of which, the latter has its thickness graduated downwardly to a thickness which approaches that of said rear end portion, whereby a greater volume of the absorbent pad material is located in the front one-half of the pad than in the rear one-half thereof.

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