

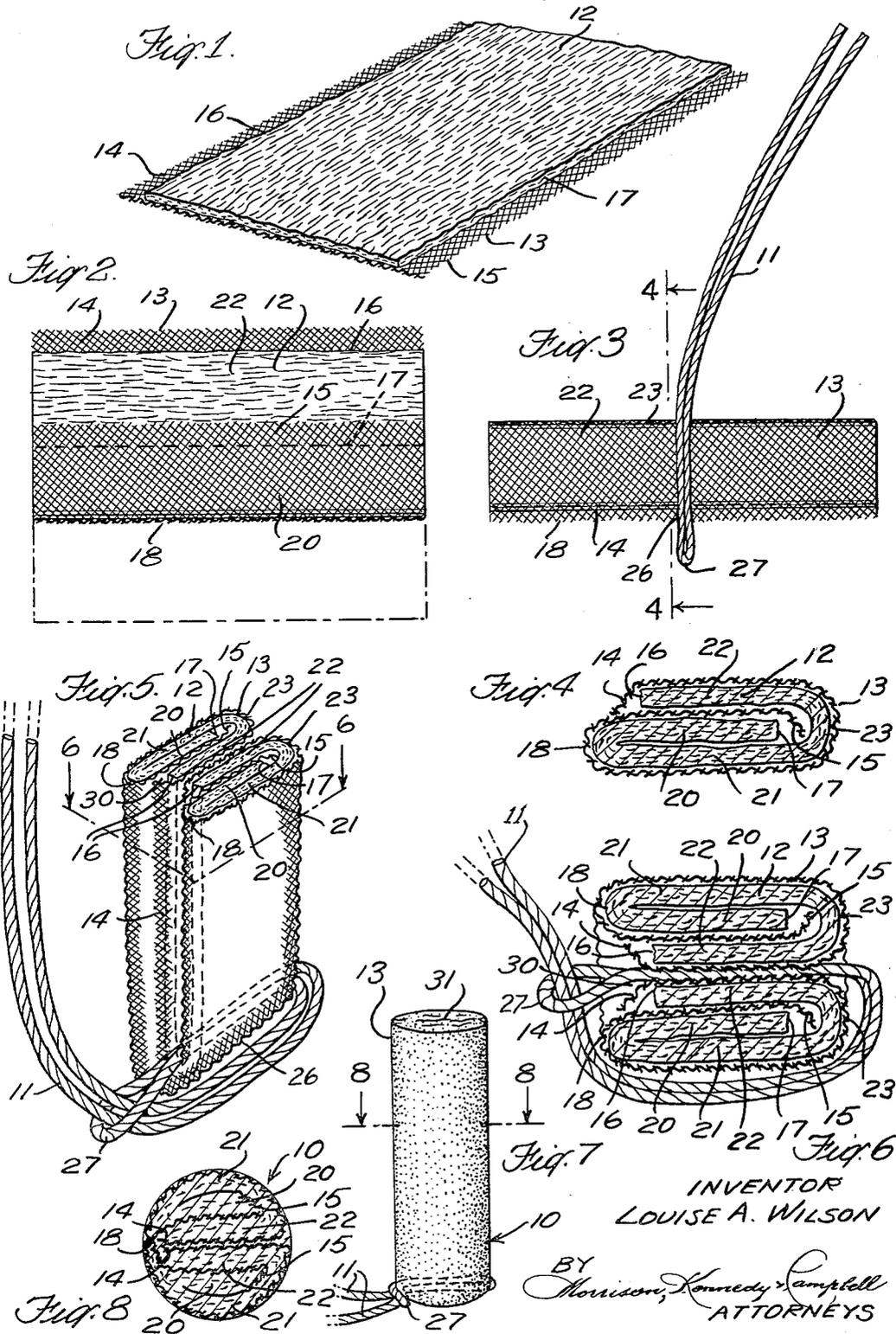
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ABSORBENT PRODUCT

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ABSORBENT PRODUCT

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The present invention relates to a catamenial tampon and to the process of making the same.

One object of the present invention is to provide a new and improved catamenial tampon, which although made essentially of highly absorbent disintegrable material is protected and reinforced against disintegration during storage, transportation, insertion, use and withdrawal without affecting its absorptiveness, which is constructed to prevent fine ravelings, fluff, lint or particles from the components of the tampon from breaking away or escaping from the tampon, which has its components interlocked into a compact plug unit, which is free to expand under the action of vaginal fluids, and which lends itself to easy and economical manufacture.

Another object of the present invention is to provide a new and improved process of making the improved tampon described.

In accordance with certain features of the present invention, the tampon in the form of a cylindrical plug is compositely made up from highly absorbent material protected by a liquid-permeable flexible cover. In producing this tampon, a blank sheet of absorbent material and a liquid-permeable sheet, such as a flexible sheet of reticulated soft non-woven fabric, forming the protective covering for the absorbent material are assembled in face to face relationship, and are so folded together as to form a composite pad made up of a number of plies or layers with the cover sheet extending over the outside of the pad and with the side margins of the cover sheet along the sides of the pad protectively overlapping the corresponding side edges of the absorbent sheet and housed within the confines of the pad. A withdrawal string is looped or tied around a transverse bend of the pad, and the pad is compressed into cylindrical shape to form the tampon with the string retained on said tampon.

The tampon formed and constructed as described will be made up of a number of layers of absorbent material, so that the maximum of absorptivity is attained. The different absorbent layers of the tampon are firmly held together by the intermeshing of these layers face to face and in one form of the invention, by the extension of these layers into the mesh openings of the interleaving layers of cover material.

Because of the nature of the absorbent material, this material might disintegrate, especially when wet. This disintegrability is a desired property of the material when the tampon has served its purpose, since it permits easy flushability in a toilet bowl, but is undesirable during the stages of vaginal insertion, use and withdrawal. The protective cover sheet serves not only as a reinforcement to hold the different layers of absorbent material firmly together, but also serves to prevent disintegration of the material during these stages. The liquid-permeable characteristics of the cover sheet permits the free entry of the body fluids into contact with the absorbent material.

The edges of the absorbent material are the parts of said material which break off most easily. The cover sheet extending over and beyond these edges serves to protect and confine these edges against disintegration. The side margins of the cover sheet overlying and projecting beyond the side edges of the absorbent sheet may themselves become a source of disturbance due to their unravelling or breakdown into lint. However, these

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projecting side margins of the cover sheet are housed and embedded within the peripheral confines of the compressed tampon, so that this condition is avoided.

Various other objects, features and advantages of the invention are apparent from the following description and from the accompanying drawings, in which:

FIG. 1 is a perspective view of a composite pad initially formed before being folded to produce the tampon embodying the present invention;

FIG. 2 is a top plan view of the composite pad but after an initial folding step;

FIG. 3 is a top plan view of the composite pad but after a second folding step to form a three-ply pad and after a withdrawal string has been set across a transverse fold line of the pad;

FIG. 4 is a transverse section of the three-ply pad of FIG. 3 taken along the lines 4—4 of FIG. 3, but shown on a larger scale;

FIG. 5 is a perspective showing the three-ply pad of FIGS. 3 and 4 but on a different scale doubly folded along a transverse fold line to form a six-ply pad with the withdrawal string looped around the bend along said fold line;

FIG. 6 is a transverse section of the six-ply pad of FIG. 5 taken along the lines 6—6 of FIG. 5 but shown on a larger scale;

FIG. 7 is a perspective of the six-ply pad of FIGS. 5 and 6 compressed into a tampon in the form of a solid cylindrical plug; and

FIG. 8 is a transverse section of the tampon taken on lines 8—8 of FIG. 7.

Referring to FIGS. 7 and 8 of the drawing, the tampon 10 of the present invention is in the form of a solid cylindrical plug adapted to be inserted into the vaginal cavity for catamenial use and may, for example, be about $1\frac{3}{4}$ inches long and about $\frac{1}{2}$ inch in diameter. The tampon 10 has a transverse bend at the rear end around which is looped and attached a withdrawal string 11. The tampon is compositely constructed as follows:

Referring to FIG. 1, the main body of the tampon comprises a rectangular shaped flexible sheet 12 of highly absorbent material. This flexible sheet 12 may consist of a single layer or of a plurality of thinner superposed layers and is centrally positioned over a liquid-permeable cover sheet 13 having substantially the same length as said absorbent sheet but having greater width, so that the ends of the two sheets register while the longitudinal side margins 14 and 15 of said cover sheet project beyond the longitudinal side edges 16 and 17 respectively of the absorbent sheet. The absorbent sheet 12 is desirably about 3 inches wide and about 6 inches long and the cover sheet 13 is desirably about the same length and about $3\frac{1}{2}$ inches wide, so that each of the projecting side margins 14 and 15 of said cover sheet is $\frac{1}{4}$ inch wide.

The absorbent sheet 12 is desirably of cellulosic material and is advantageously a bleached absorbent paper wadding highly crimped transversely to afford large absorption areas and to facilitate the interlocking of the different layers or piles of the final compressed tampon, as will be described more fully. The cover sheet 13 is desirably a non-woven meshed rayon fabric viscose-bonded to increase its tensile strength. Other covering materials, such as woven or non-woven fabrics of cotton and the like may be suitably employed. Preferably, the cover sheet is also absorbent to aid in the absorption of fluid. A reticulated cover sheet is preferred so that fluid will readily contact the absorbent sheets in the interior of the tampon. However, non-reticulated, liquid-permeable cover sheets may also be used.

The absorbent sheet 12 and the cover sheet 13 arranged in the form of a flat pad of a single composite ply as shown in FIG. 1, is then folded lengthwise along a fold

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line 18 parallel to the longitudinal side edges of the pad, as shown in FIG. 2, to bring a side section 20 of the pad over a middle section 21 of the pad, as shown in FIG. 4, and the opposite side section 22 of the pad is folded lengthwise along a fold line 23 parallel to said fold line 18 over the folded side section 20 of the pad to produce a three-ply folded laminated pad with the cover sheet 13 on the outside of the pad and also between two layers of absorbent material, as shown in FIGS. 3 and 4. The two overlapping side sections 20 and 22 of the three-ply pad are of equal width but are sufficiently narrower than the middle section 21, so that the outer projecting side margin 14 of the cover sheet 13 overlying and extending beyond the corresponding longitudinal side edge 16 of the absorbent sheet 12 does not extend beyond the adjacent fold line 18 of the pad constituting one longitudinal side edge of the folded laminated pad, but preferably extends just short of this fold line.

The other side margin 15 of the cover sheet 13 and the longitudinal side edge 17 of the absorbent sheet 12 are in the interior of the folded laminated pad in protected position. For that reason, as far as certain aspects of the invention are concerned, this side margin 15 of the cover sheet 13 need not extend beyond the side edge 17 of the absorbent sheet 12. However, during the folding operation, the extension of this side margin 15 of the cover sheet 13 beyond the side edge 17 of the absorbent sheet 12 may assist in preventing the absorbent sheet from crumbling along said side edge 17.

After the folded laminated pad of three plies has been formed as shown in FIGS. 3 and 4, the withdrawal string 11 is passed around the transverse section 26 of the pad midway between its ends and the pad is doubly folded about said section and over said string to bring the ends of said pad together and to form a six-ply pad with the folded middle section 21 of the pad on the outside defining two plies and the folded side sections 22 of the pad on the inside defining two other plies, as shown in FIGS. 5 and 6. The string 11 desirably comprises a length of cord doubly folded to form a loop 27 at one end. This doubly folded string 11 is laid across the pad along the transverse section 26 of said pad and before said pad is folded along said transverse section, as shown in FIG. 3, and the free ends of the cords are passed through the loop 27 at the other end to loop-connect the string to the bend formed along said transverse section.

The final pad doubly folded as described and as shown in FIGS. 5 and 6, will define a recess 30 on one side of the pad in which is protectively housed both spaced fold lengths of the outer side edge 16 of the absorbent sheet 12 and both fold lengths of the side margin 14 of the cover sheet 13 overlying said edge of the absorbent sheet. The two fold lengths of the other side edges 17 of the absorbent sheet 12 in the finally folded six-ply pad shown in FIGS. 5 and 6, and the two fold lengths of the side margin 15 of the cover sheet 13 overlying said side edge are confined inside the body of the pad within encircling plies of the pad, so that this side edge and side margin are well protected.

The finally folded pad, constructed as shown in FIGS. 5 and 6, is then forced by a plunger through a compression die in the usually well-known manner to compact and compress the pad into the solid tampon form shown in FIGS. 7 and 8. The compression is carried out in such a way that the approximate relative positions of the different plies or layers shown in FIGS. 5 and 6 are not disturbed. Also, during this compressive operation, the two fold lengths of the pad along the fold line 18 flanking the recess 30 are brought together to close this recess and to confine and entirely enclose the two fold lengths of the side margins 14 of the cover sheet 13 as well as the two fold lengths of the side edge 16 of the absorbent sheet 12, covered by said side margin so that these side edges and side margins are not exposed.

Due to the crimped construction of the absorbent sheet

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12, those adjoining layers of the tampon which are defined by the folding of said sheet in the manner described and which are in face to face relationship and contact without any cover sheet layer in between, are interlocked and firmly held together by the intermeshing of the crimpings in the confronting faces of these layers. The other layers of the absorbent sheet 12 in the tampon separated by interleaving layers of the cover sheet 13 are pressed into the meshed openings of said interleaving layer and are thereby interlocked and firmly held together.

The entire outside of the tampon except at its forward end face 31 will be protected by the cover sheet 13. The sections of the absorbent sheet 12 underneath the sections of the cover sheet 13 on the outside of the tampon will be pressed into the mesh openings of these cover sheet sections and in combination therewith present a smooth continuous cylindrical surface in which the presence of the cover sheet sections are not apparent to the naked eye. The outside fold sections of the cover sheet 13 protect the underlying fold sections of the absorbent sheet 12 from breaking up and disintegrating during storage, transportation, insertion, use and withdrawal, even though the absorbent sheet is made of material which will disintegrate, especially when wet. The protective action of the cover sheet 13 described is attained without interfering with the flow of body fluids to the different fold sections of the absorbent sheet 12 during use and without interfering with the free expansion of the tampon under the influence of the fluids absorbed.

The construction of the tampon is such that the fold lengths of the outer side edge 16 of the absorbent sheet 12 are covered with the fold lengths of the corresponding side margin 14 of the cover sheet 13 in the manner described. This protective relationship is particularly important, since the edges of a disintegrable sheet are more apt to disintegrate than the faces of the sheet. However, the side margins of the protective cover sheet 13 may themselves become a source of disturbance because of the possibility of lint and ravelings breaking off from said side margins. In the present invention, both the outer side edge 16 of the absorbent sheet 12 and the side margin 14 of the cover sheet 13 protecting said edges are concealed and confined in the interior of the tampon, so that the adverse conditions described cannot take place.

Although the end edges of the absorbent sheet 12 and the cover sheet 13 are fully exposed in the forward end face 31 of the tampon, this condition will not present any disintegrating difficulty at this end, since the plunger acting directly on this face during the operation of forming the tampon will compressively pack the forward end section of the tampon into a strong solid unit capable of withstanding the abrasive action normally encountered during vaginal insertion, use and withdrawal. Moreover, the parts of the tampon receiving most of the abrasive action encountered while the tampon is being inserted, during use and while it is being withdrawn are along the peripheral sides of the tampon. During these periods, the forward end of the tampon receives little or no abrasive action, so that this forward end does not require the protection required by these peripheral sides.

The tampon may be packaged in connection with an applicator (not shown) and applied thereby. The applicator forms no part of the present invention and may consist, for example, of two telescoping tubes, one of which houses the tampon, and the other of which serves to eject the tampon therefrom.

While the invention has been described with particular reference to a specific embodiment, it is to be understood that it is not to be limited thereto, but is to be construed broadly and restricted solely by the scope of the appended claims.

What is claimed is:

1. The process of making a tampon which comprises assembling a flexible rectangular absorbent sheet and a rectangular liquid-permeable cover sheet of the same

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length but wider with the cover sheet entirely covering the absorbent sheet and at least one side margin of the cover sheet overlying and extending beyond the corresponding side edge of the absorbent sheet, folding said composite pad along fold lines parallel to said side edge to bring the opposite side sections of the pad in overlapping relationship over an intermediate section of the pad to form a three-ply pad with the cover sheet on the outside and with the side section carrying said side edge of the absorbent sheet and said overlying side margin of the cover sheet on the outside, the latter side section of the three-ply pad being narrower than said intermediate section, attaching a withdrawal string about the mid-section of the three-ply pad, doubly folding the three-ply pad along said midsection to bring the ends of said three-ply pad together and to form a six-ply pad with the two lengths of said side sections in the interior of the six-ply pad in face to face contact to define a recess between the outer folds on one side of the six-ply pad protectively housing said side edge and said side margin, and compressing the six-ply pad in the form of a solid cylindrical plug without disturbing the approximate relative positions of the plies in the six-ply pad to close the walls of said recess around said side edge and said side margin and to confine said side edge and said side margin within the interior of said tampon, with said cover sheet extending over the entire periphery of the tampon.

2. An oblong cylindrical catamenial tampon comprising a core of absorbent material composed of a single sheet folded upon itself into six plies extending lengthwise of the tampon, and a cover sheet of liquid-permeable material folded upon itself into six plies also extending lengthwise of the tampon and overlapping the plies of the core forming sheet, said core forming sheet and said cover sheet being compressed into a compact solid unit with the two outermost plies of the cover sheet forming an outside smooth confining wall for the unit and with the edges

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of both sheets located within the peripheral confines of the unit, said unit being free from stitching and adhesives and maintained in its final form by the interlocking and the intermeshing of the plies of both sheets due to compression while capable of expansion to permit the absorbent core to expand when wetted.

3. An oblong cylindrical catamenial tampon according to claim 2, wherein the two innermost plies of the cover sheet are arranged in face to face contact with each other and interposed between the two innermost plies of the core-forming sheet, and wherein the intermediate plies of the cover sheet are arranged between the two innermost and the two intermediate plies of the core-forming sheet.

4. An oblong cylindrical catamenial tampon according to claim 3, wherein the six plies of the core-forming sheet are joined at the lower end of the tampon by a three-ply fold and wherein the six plies of the cover sheet are joined at the lower end of the tampon by a three-ply fold, the outermost ply of said three-ply fold of the cover sheet forming a circular flat smooth bottom confining wall for the unit.

5. An oblong cylindrical catamenial tampon according to claim 3 and including a withdrawal string looped around the folded plies of the core-forming sheet and the cover sheet.

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