May 23, 1967 F. H. STEIGER 3,320,956

CATAMENIAL TAMPON AND METHOD OF MAKING

Filed Nov. 24, 1964 2 Sheets-Sheet 1

Fig. 1.

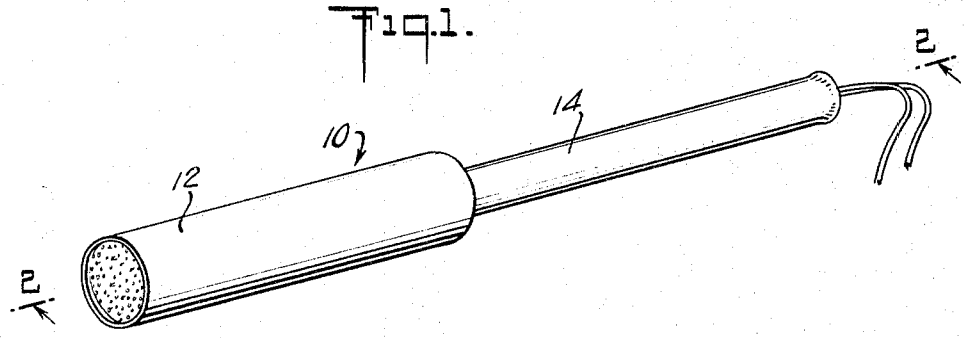


Fig. 2.

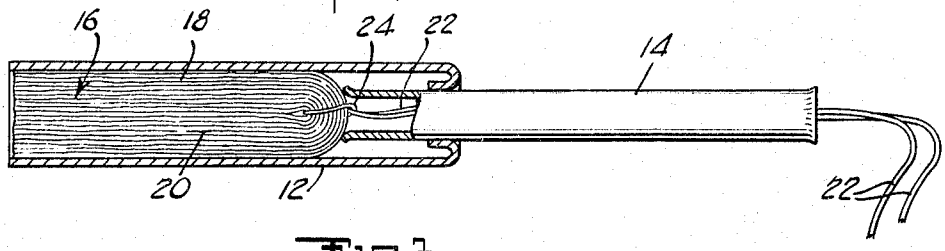


Fig. 3.

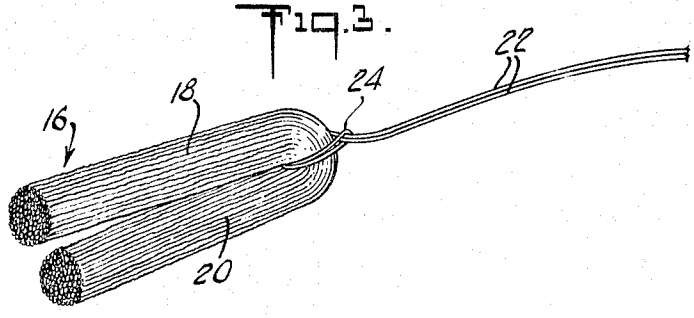
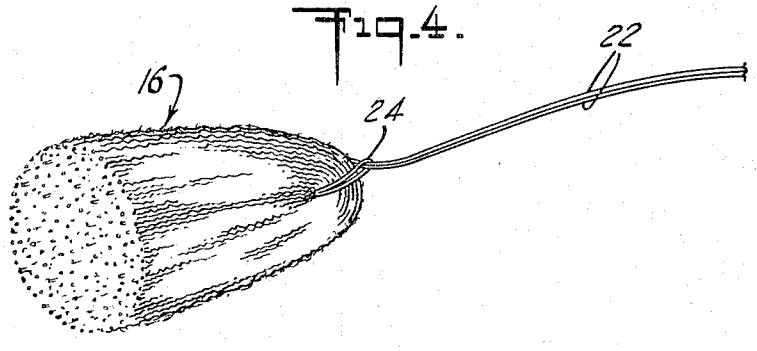


Fig. 4.



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Fig. 5.

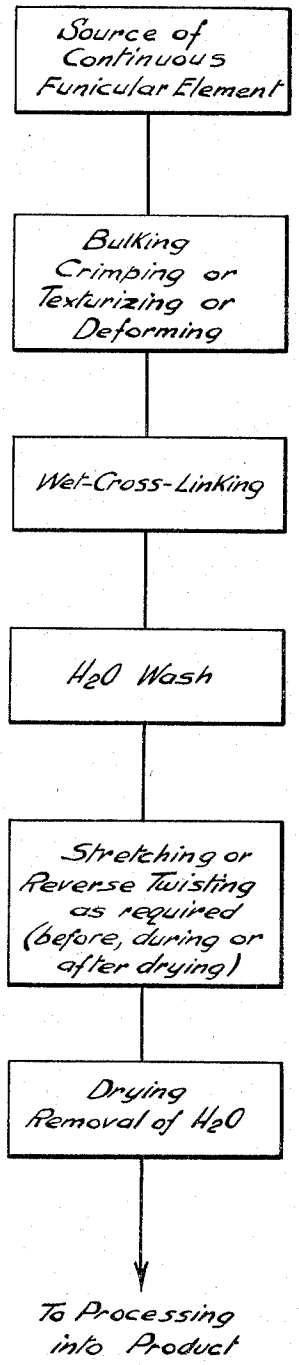


Fig. 6a.



Fig. 6b.

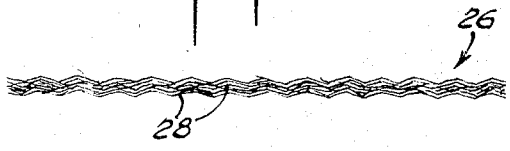


Fig. 6c.

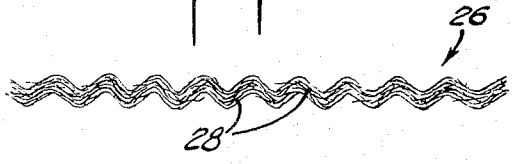


Fig. 6d.

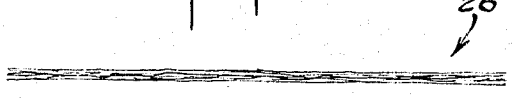
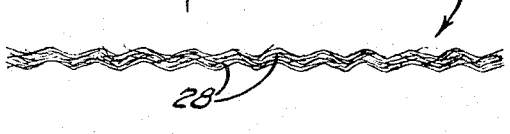


Fig. 6e.



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3,320,956

CATAMENIAL TAMPON AND METHOD OF MAKING

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Filed Nov. 24, 1964, Ser. No. 413,443
27 Claims. (Cl. 128—263)

This invention relates to absorbent products for absorbing body fluids, and more particularly, is directed to tampons adapted for insertion into body cavities for the absorption and retention of body fluids and to methods of making the same.

Many practical factors effect the desirability of the use of tampons for insertion into body cavities for the absorption of fluids therein. Particularly, is this true in the use of tampons for the insertion into the vagina for the absorption of catamenial fluids during the menses.

Foremost in importance, perhaps, is the ability of catamenial tampons to resist early failure. That is to say, catamenial tampons desirably should not fail at low-fluid capacities, such that failure and passage of fluids occur after only small amounts of menstrual fluids have been absorbed and retained within the tampon.

Not only is it desirable that catamenial tampons have a low frequency of early failure, but in addition, such tampons should have a high-fluid capacity. That is to say, desirable tampons should have a total capacity for the retention of fluids which is as high as possible.

Yet another characteristic desired to be imparted to tampons is a capabality to conform to the shape and contour of the body cavity into which they are inserted. Such conformability is desired so that tampons are not uncomfortable during use and also because a tampon which is able to conform to the shape and contour of the body cavity into which it is inserted provides more complete blockage of the body cavity to prevent leakage of fluids therefrom.

Furthermore, in order to prevent early failure and achieve high capacity it is desirable that a catamenial tampon should expand in use to occlude all routes by which body fluids might escape. Those tampons that presently do expand do so while maintaining a substantially circular cross-sectional shape which is determined primarily by their method of manufacture. Thus, they are limited in the degree to which they can adapt themselves to the changing pressures and contours of the vagina. Accordingly, it is desirable to provide a tampon capable of an extent of radial expansion which is determined by its environment during use rather than the arbitrary choices during manufacture. In addition, when conventional radially expanded tampons are removed, they maintain their more or less fixed geometrical shape while they pass through a channel of varying configuration. For the greater comfort of the user, it is desirable to have a tampon whose radially expanded form is sufficiently amorphous to mold itself to its environment during removal.

Another factor effecting the desirability of the use of tampons, and in particular, catamenial tampons is a low-expulsion value. That is to say, a minimum force should be required to expel the tampon from the container or applicator in which it is contained into the body cavity in which it is to be used.

While all of the above are desirable characteristics for tampons, it is found that efforts to provide any one of the above desirable characteristics in a tampon adversely effects one or more of the other characteristics desired. For example, ways have been sought to increase the amounts of fluid which can be absorbed by such products, i.e., fluid capacity. This may be accomplished by either increasing the amount of absorbent material in the product or by increasing the absorbing capacities of the materials used. That is to say, within limits, by increasing the amount (weight) of the absorbent fibers within a given volume, i.e., by increasing the density of the product, the absorbing capacity of the product may be increased. However, in order to increase the amount of absorbent material present while maintaining its size constant, it is necessary to compress or compact the material. This compression tends to produce effects which decrease the absorbing capacities of the products. A point can be reached where the reduction in absorbing capacity due to compression exceeds the increase of absorbing capacity obtained due to the additional weight of the fibers. Thus, even though such fibers are compressed to increase the absorbing capacity of the product, the size limitations of the products still establish the amount of absorbent fibrous material which can be incorporated therein.

Efforts to increase the conformability of tampons to the surrounding structures of the cavity into which they are inserted produce tampons suffering from an inherent lack of fluid capacity. An uncompressed tow tampon as described in U.S. Patent No. 2,934,068, issued to G. C. Graham and H. V. Barlow on Apr. 26, 1960, obtains excellent conformability characteristics and inherently low-expulsion values but, because of the loose association of the continuous filaments from which it is made, suffers from an inherent lack of fluid capacity. The capacity of such a continuous filament tow tampon can be improved somewhat by wet crosslinking treatment such as is disclosed in my co-pending application Ser. No. 219,764, filed Aug. 27, 1962, while still retaining its excellent conformability and low-expulsion value characteristics, but still the inherent nature of the loose association among the relatively straight parallelized continuous filaments prevents the total fluid capacity from being improved to commerically acceptable levels.

It is found that if the continuous filament tow tampons are not only wet crosslinked in accordance with the disclosure in the above-mentioned co-pending application but are also bulked, crimped or textured so as to provide a random inter-contacting association among the continuous filaments thereby increasing the total bulk of the tampon produced, the total capacity can be improved to generally acceptable commercial levels. However, such bulking of continuous filament tows, whether wet crosslinked or not, produces extremely high expulsion values for expelling the tampon from the applicator because of the increased bulk of the individual filaments in the dry state such that an attempt to lower the expulsion value results in a reduction in the total weight of the fibrous material that can be used in the tampon thereby also creating a considerably lower total capacity.

From the above, it is readily seen that attempts to provide a tampon having all the desirable characteristics heretofore sought to be achieved result in having only one or two of the desirable characteristics at the expense of the others.

It have found that a tampon of funicular fibrous elements which are continuous from end to end and which are substantially parallelized (ideal for tampon conformability to the shape and contour of the body cavity into which they are inserted and highly ideal for maintaining low-expulsion values for expelling the tampon from the applicator in which they are contained) can be of sufficiently high bulk in use so as to maintain a high total fluid capacity. According to my invention there is provided a tampon comprised of continuous funicular elements extending from one end to the other end of the tampon which elements are relatively straight and parallelized in a dry state but which upon interception of fluids become bulked, crimped or textured whereby the tampon expands radially increasing the size of the inter-

stitial spaces augmenting the total fluid capacity of the tampon. As used herein, the term, "funicular elements" is defined as any cord-like, fibrous structure, including without limitation, single continuous filaments, yarns of long synthetic cellulosic filaments or yarns of short staple cellulosic fibers, either natural such as cotton, and the like, or synthetic, such as rayon.

The improved tampons of the present invention are made by subjecting continuous funicular elements to a bulking, crimping, texturizing or deforming operation, subjecting the bulked, crimped, texturized or deformed elements to wet crosslinking treatment to set the crimp therein, stretching or otherwise returning to its original form the wet crosslinked bulked, crimped, texturized or deformed elements before, during or after drying to remove the crimp, parallelizing the treated elements into a bundle of indefinite length, cutting the bundle at spaced intervals equal to approximately twice the length of the desired tampon whereby substantially all of the elements are cut to the same length, tying a removal cord or string to the approximate center of the cut length of the bundle whereby substantially all the elements are bound together at their midpoints, folding the lengths of bound elements approximately in half to form a tampon, and inserting said cut, bound and folded tampons into hollow cylindrical containers or tubes with the removal cords extending outwardly therefrom whereby the individual tampons can be ejected from the container by a suitable plunger and positioned in a body cavity for use therein.

In the accompanying drawings and following specification there is illustrated and described a preferred form of tampon embodying the inventive concept but it is to be understood that the invention is not to be considered limited to the construction disclosed except as determined by the scope of the appended claims.

In the drawings:

FIGURE 1 is a perspective view of the improved tampon of the present invention contained in an applicator suitable for use;

FIGURE 2 is a cross-sectional view of the tampon shown in FIGURE 1 being taken through a diameter of the tampon and applicator in the direction of 2—2;

FIGURE 3 is a detail perspective drawing showing the absorbent portion of the tampon and its removal cord or string shown in the dry state prior to use;

FIGURE 4 is a detail drawing showing the absorbent portion of the tampon of the present invention in a wet state following its interception of fluids;

FIGURE 5 is a schematic diagram showing the process steps involved in treating funicular elements which are to be used in forming the tampon of the present invention; and

FIGURE 6, (*a*) through (*e*), shows a single funicular element, continuous filament rayon yarn, as it appears (*a*) prior to crimping; (*b*) subsequent to crimping; (*c*) subsequent to wet crosslinking; (*d*) subsequent to stretching and drying and as it is used in forming tampons of the present invention; and (*e*) upon re-wetting subsequent to being treated as in (*a*) through (*d*) above.

In the embodiment of the invention shown in the drawings, the tampon and applicator **10** of the present invention comprises a hollow cylindrical container or tube **12** and a hollow, cylindrical ejector or plunger **14** telescopically positioned within the cylindrical container and adapted to slide therein. The absorbent tampon portion **16** of the article **10** comprises funicular elements substantially all of which have a length approximately twice the length of the tampon **16** and wherein substantially all of the elements are folded at their midpoints to form two legs **18** and **20** of approximately equal lengths. A removal cord or string **22** is provided and binds the elements at their approximate midpoints by means of a knot **24**.

As shown in FIGURES 1 and 2, the absorbent tampon portion **16** is inserted in doubled up form in the container **12** with the removal string **22** extending outwardly therefrom through the ejector or plunger **14**. It will be appreciated that movement of the plunger **14** to the left as viewed in FIGURES 1 and 2 will eject the tampon **16** outwardly to be inserted and positioned in a body cavity to receive, absorb, and retain body fluids therein.

In FIGURE 3, there is shown the absorbent tampon portion **16** in an ejected position but in a dry state wherein the legs **18** and **20** have opened up and flared due to the natural resiliency and springiness of the funicular elements from which they are made. It is to be appreciated that such opening up and flaring of the legs **18** and **20** when inside a body cavity will vary and conform or adapt itself to the shape and contour thereof. That is to say, the opening up and flaring of the tampon **16** is aided to a considerable extent by the resistance offered by the walls of the vagina to the entry and positioning of the tampon, as well as by the pressures exerted by the weight of the body on the surfaces of the tampon. All of these factors mutually contribute to the reshaping of the tampon from its originally cylindrical shape to a form more closely resembling a flat fish tail when the tampon is in use.

Further, as shown in FIGURE 3, the continuous funicular elements from which the tampon **16** is made are relatively straight and parallelized and are in contact with one another along substantially their entire lengths. Such is the association of the funicular elements of the tampons of the present invention prior to their being wetted in use.

Because of being treated in the manner more fully described hereafter, the funicular elements of the tampons of the present invention obtain a latent ability to become bulked, crimped, textured or deformed upon being wetted in use. As shown in FIGURE 4, the tampon of continuous funicular elements **16** becomes bulky by increasing considerably in diameter upon the interception of body fluids. This occurs because each of the funicular elements **26** making up the tampon of the present invention has the latent ability to become bulked upon being wetted such that each funicular element crimps and assumes a configuration which it formerly maintained prior to its being made into a tampon in accordance with the present invention. As shown in FIGURE 4, and more particularly in FIGURE 6(*e*), the crimping takes the form of generally sinusoidal waves **28** such that the length of the individual funicular element **26** shortens while the space occupied by its over-all lateral dimensions increases.

As shown in the block process diagram of FIGURE 5, the funicular elements are first subjected to a bulking crimping, texturizing or deforming operation. Continuous filaments **26**, FIGURE 6(*a*), either individually or in bundles as a tow or formed into yarns, or individual short staple fibers which are formed into yarns, are fed into a stuffing box, a well-known crimping device familiar to the art. In operation, the material is fed into the box at a rate more rapid than that at which it is withdrawn such that the filaments or yarns **26** are forced to obtain a bulked, or crimped configuration, FIGURE 6(*b*) substantially in the form of sinusoidal waves.

In addition to the crimping by the stuffing box as above described, bulking, crimping, texturizing or deforming of the above funicular elements **26** can also be accomplished by a knitting operation whereby a pattern is imparted to the funicular elements conforming to the type of knit pattern employed, usually a square-wave pattern. Latent bulking, crimping, or texturizing can also be accomplished by imparting to the continuous filaments a predetermined twist, treating the twisted yarn by wet crosslinking, and then back-twisting to remove most or all of the original twist. By this operation, the funicular elements **26** assume a configuration somewhat similar to a coiled spring when they become wetted.

When it is desired to make a tampon from yarns formed of short staple fibers, such as cotton, the bulking, crimp-

ing, or texturizing operation is preferably carried out either by the stuffing box procedure or by a knitting process as described above. Attempts to set a crimp in yarns of short staple fibers by the twist method generally are difficult because of the tendency of the yarn to come apart as the degree of back-twisting approaches or exceeds the total initial twist.

In the bulked, crimped, textured or deformed state, FIGURE 6(*b*), the funicular elements **26** are then subjected to wet crosslinking treatment as described in somewhat greater detail in the examples appearing hereafter. Such wet crosslinking treatment accentuates the crimped conformation of the funicular elements, FIGURE 6(*c*), and at the same time serves to make the crimp permanent while the funicular elements are wet.

After wet crosslinking the funicular elements **26** are rinsed free of the crosslinking agents with water. The funicular elements **26** are then maintained under tension or with a reversed twist, as the need may be, either before, during or after they are permitted to air dry or are forceably dried by the application of heat. These operations serve to remove substantially all of the crimp from the dry funicular elements, FIGURE 6(*d*).

Subsequent to all of the above operations, the funicular elements **26** are ready to be processed into tampons in accordance with the present invention. The funicular elements **26**, as shown in FIGURE 6, (*a*) through (*d*), ultimately issuing from the process steps above described appear to be physically substantially identical to their appearance prior to being subjected to the above-described process steps. Accordingly, they are formed into tampons by being parallelized into bundles which are cut into lengths approximately twice the length of the tampon desired. In the case of catamenial tampons, the bundles are cut into about 5" lengths, each cut bundle weighing about 3.24 grams. The length of the bundles are tied with a string at the midpoint of their lengths and doubled upon themselves at the midpoint to form uncompressed tampons of generally parallel aligned funicular elements. These folded-over bundles are placed in conventional telescopic tampon applicators **12** with the tied segment **24** serving as the base of the tampon and the withdrawal strings **22** extends through the plunger **14**.

As described earlier, the funicular elements **26** suitable for making tampons **16** of the present invention are originally manufactured in continuous lengths either as individual filaments or as yarns of short staple fibers. The lengths are suitable for severing into shorter lengths approximately equal to twice the length of the absorbent portion of the tampon.

Suitable materials from which the funicular elements are made are generally cellulosic materials such as rayon (regenerated cellulose from the viscose or cupraammonium processes), and cotton and other cellulosic fibers which exist in staple lengths of an inch or two which in the latter instance are usable when formed into yarns.

The invention will be further illustrated in greater detail by the following specific examples. It should be understood, however, that although these examples may describe in particular detail some of the more specific features of the invention, they are given primarily for purposes of illustration and the invention in its broader aspects is not to be limited thereto.

In each of the following examples, the funicular elements treated as described are cut into five-inch lengths and tied into bundles by a withdrawal string at their midpoints and doubled upon themselves around the withdrawal string. When the treatment of any example produced funicular elements of such bulk that a bundle weighing 3.24 grams could not be placed in a conventional applicator and expelled therefrom with a total expulsion force of 12 ounces or less, the weight of the bundle was reduced to the values indicated in the respective examples.

Each of the tampons produced in the following examples was tested under identical conditions in the laboratory by being placed at the open end of a length of glass tubing which is connected through a stockcock to a reservoir of test fluid. Surrounding the tampon and glass tubing is a mounted sleeve of flexible polyethylene film. This sleeve is brought into contact with the tampon by the application of a pressure equal to about 24 inches of water. The test fluid is introduced upwardly through the glass tubing until it just covers the test tampon. Absorption is permitted to take place at the 24-inch water pressure for 5 minutes. The test fluid is then removed and the test tampon is permitted to drain for 2 minutes under the 24-inch water pressure. The dimensions of the tampon under pressure are determined by viewing the test object through the transparent plastic sleeve by means of a traveling microscope. The pressure is then removed and the wet tampon is removed and quickly weighed. The volume of fluid absorbed by the tampon is determined by subtracting the weight of the tampon before testing from its weight after testing and dividing the difference by the density of the fluid.

Example 1

(a) Tampons are made from untreated 200/44 continuous filament rayon yarns, with 2.5 turns per inch of S twist.

(b) Continuous filament rayon yarns 200/44 with 2.5 turns per inch of S twist are wet crosslinked by immersion at room temperature for 30 minutes in a bath consisting by volume of 20% Formalin (an aqueous solution containing 37% formaldehyde), 50% concentrated hydrochloric acid, and 30% water. The yarns then are removed, rinsed free of formaldehyde and hydrochloric acid, and air-dried. Tampons are made from these wet crosslinked yarns.

(c) Continuous filament rayon yarns 200/44 with 2.5 turns per inch of S twist are crimped by passage through a stuffer box. From these crimped yarns, tampons are constructed.

(d) Continuous filament rayon yarns 200/44 with 2.5 turns per inch of S twist are crimped as described in (c) above and then are wet crosslinked by treatment in a bath as described in (b). Tampons are made from these crimped, wet crosslinked yarns.

(e) Continuous filament rayon yarns 200/44 with 2.5 turns per inch of S twist are crimped and wet crosslinked as described in (d) above. Before drying, however, they are put under tension so that after drying substantially all of the crimp is removed. Tampons are made from these crimped, wet crosslinked, tension-dried yarns.

Summarized in Table I below are the results obtained from testing the tampons of Example 1, (a) through (e),

TABLE I.—TAMPONS OF CONTINUOUS FILAMENT RAYON YARNS 200/44 WITH 2.5 TURNS PER INCH OF S TWIST

Item	Yarn Treatment	Weight (gms.)	Capacity per Unit Wgt. (cc./gram)	Total Capacity (cc.)	Wet Diameter (cm.)
A	None	3.24	1.4	4.4	1.2
B	Wet Crosslinked	3.24	1.9	6.0	1.2
C	Crimped	2.14	3.6	7.6	1.6
D	Crimped and Wet Crosslinked.	1.56	4.1	6.4	1.4
E	Crimped, Wet Crosslinked and Stretched.	3.24	3.9	12.6	1.8

by the laboratory test procedure described above. Presented is a tabulation comparing the weights, the wet diameters, fluid capacities per unit weight, and the total fluid capacities of the tampons. Where the weights are less than 3.24 grams, the tampon made from the funicular elements treated as shown could not be made at that weight and obtain an expulsion force of 12 ounces or less. The lesser weights represent the weight of the tampon which could be inserted into the standard applicator and expulsed therefrom with a total force of 12 ounces.

From the above tabulation, it is seen that wet crosslinking increases the total capacity of tampons made of filament rayon yarns, but has no appreciable effect on the wet diameter of the tampon. (Larger diameters increase the probability of interception of fluid by the tampon.)

Crimping the yarn increases the capacity per unit weight to a greater degree than does wet crosslinking. Crimping, however, also increases the dry bulk of the yarns so that it is not possible to put the conventional amount of material into the tampon applicator. When the weight of the tampon has been reduced sufficiently for placement in an applicator, the total capacity is only slightly greater than that of the wet crosslinked yarn.

Crosslinking the crimped yarn further increases the dry bulk as well as the capacity per unit weight so that the total capacity of a practical tampon weight actually is less than that of a tampon made from crimped yarns that were not wet crosslinked. Thus, the marked improvements in capacity per unit weight which can be induced by crimping the yarn can not be translated to improvements in the total capacity of the tampon because of the increased bulk of the crimped yarns.

Tampons made with false-crimp yarns, that is yarns that are crimped, wet crosslinked and stretched, have capacities per unit weight which are of the same magnitude as other crimped yarns. The false-crimp yarns, however, have a dry bulk which is comparable to that of uncrimped yarns. Thus, tampons of conventional weight can be constructed with the false-crimp yarns and are significantly better in total capacity and demonstrate a greater wet diameter than that of tufted tampons made of yarns which have not been treated according to the present invention.

Example 2

Rayon filament yarn 900/100 is twisted so that the final yarn contains 22.5 turns per inch of S twist. The yarn containing 22.5 turns per inch is immersed for 20 minutes at room temperature in a bath containing by volume 20% Formalin, 50% concentrated hydrochloric acid, and 30% water. The yarns are rinsed briefly, centrifuger, immersed in a solution of 2% sodium carbonate for 5 minutes, centrifuged, throroughly rinsed in water, and dried at 240° F. The yarns then are given 24 turns per inch of Z twist, wound into a skein and held at constant length while sprayed with water and then permitted to air-dry. The yarns are cut into 5-inch lengths and are assembled into bundles weighing 2.98 grams. These bundles are converted to tufted tampons and are inserted into conventional super-size tampon applicators.

In the laboratory tests described above with respect to Example 1, these tampons hold 10.0 cc. of fluid and have a wet diameter of 1.6 cm. Tests on similar tampons made from 900/100 rayon filament yarn which is not subjected to the twisting or wet crosslinking operations have a fluid-holding capacity of 4.5 cc. and a wet diameter of 1.1 cm.

When tampons made with such twisted, wet crosslinked, back-twisted yarns are used catamenially until there is evidence of failure, it is found that the average total capacity of these tampons under such conditions of use is 11.6 cc. No failures occur at fluid contents less than 8.4 cc.

Example 3

A circular knit fabric is knit of 12/1, bleached, cotton yarn. The fabric is padded at 200% wet pick-up through a water solution containing 10% 1,3-dichloropropanol-2 and then is padded under similar conditions through a water solution containing 10% sodium hydroxide. The fabric is sealed in a polyethylene bag and maintained at room temperature for 18 hours after which the fabric is removed from the bag, washed in running water until extracts of the fibers show no signs of residual alkalinity when tested with pH paper. The fabric is dried. The yarn is unravelled from the fabric and subjected to sufficient tension to remove the crimps which are formed during the knitting operation.

Tampons made with these knit, wet crosslinked, unravelled yarns can be made at a weight of 2.59 grams and have a total capacity of 10.6 cc. while tampons of the same weight which are made of untreated cotton yarn have a capacity of 8.0 cc.

Example 4

Fifty thousand total denier, 3 denier per filament, continuous rayon filament tow is crimped by passage through a fabric compactor and then wet crosslinked by immersion in a bath containing 20% Formalin, 50% concentrated hydrochloric acid, and 30% water at 100° F. for 6 minutes. The tow is thoroughly washed, dried and stretched.

A 3.24 gram tampon made of this tow absorbs 9.9 cc. in the above-described laboratory test and measures 1.6 cm. in diameter when wet while a similar tampon made of the original untreated tow absorbs 6.1 cc. and measures 1.3 cm. in diameter.

Although the foregoing examples and specification are directed to the preferred manufacturing method of cutting the desired lengths from the bundle of funicular elements prior to tying, it is to be appreciated that the removal strings are adaptable to being tied to the bundle at spaced intervals first, prior to the severing step, or, if so desired, both steps of tying and cutting are capable of being accomplished substantially simultaneously.

Although the invention has been described primarily with doubled-up funicular elements, it is to be appreciated that the starting material could be a bundle of funicular elements cut into lengths exactly equal to the length of the tampon desired and placed directly in undoubled form in the cylindrical container. Such tampons are similarly satisfactorily used but present problems in the commercial production thereof due to the difficulty of satisfactorily securing the removal cord or string permanently to the tampon and avoiding the possibility of its slipping loose during the removal thereof from the body cavity.

It has been found in such cases that a small amount of adhesive can be used to tie together the funicular elements at the base of the tampon so that the removal string may be permanently secured to the tow of filaments whereby the possibility of its slipping loose is prevented.

It is also to be appreciated that, although the invention has been described with funicular elements which are all substantially parallelized and wherein the capillaries extend in substantially straight lines, the bundle can be given a slight twist of a fraction of a turn or more per inch which holds the bundle together better during the handling thereof but which nevertheless permits the capillaries to extend from one end of the tampon to the other, although this time possessing somewhat of a helical configuration.

While we have shown and described what we believe to be a preferred embodiment of the invention in the matter of simplicity of construction, ease of utilization, etc.,

it will be appreciated that the details of such construction may be more or less modified within the scope of the claims without departure from the principles of construction or material sacrifice of the advantages of the preferred design.

I claim:

1. An absorbent tampon for absorbing body fluids comprising an uncompressed bundle of fibrous false crimped funicular elements substantially all of which have a length substantially equal to twice the length of said tampon and which extend from one first end of the tampon to the other end thereof and back again to said first end, said elements being substantially straight throughout the length of said tampon and in contact with each other along substantially their entire lengths in a dry state but having the latent ability to become bulked upon being wetted with said body fluids.

2. An absorbent tampon in accordance with claim 1 wherein said bundle of fibrous false crimped funicular elements is a tow of continuous filament rayon.

3. An absorbent tampon in accordance with claim 1 wherein said false crimped funicular elements are rayon yarns.

4. An absorbent tampon in accordance with claim 1 wherein said false crimped funicular elements are cotton yarns.

5. An absorbent tampon in accordance with claim 1 wherein said false crimped funicular elements are substantially parallelized in the dry state.

6. An absorbent tampon in accordance with claim 1 wherein said false crimped funicular elements pursue a substantially helical path in the dry state.

7. An absorbent tampon in accordance with claim 1 wherein said false crimped funicular elements have the latent ability to assume a coiled configuration upon being wetted with said body fluids.

8. An absorbent tampon in accordance with claim 1 wherein said false crimped funicular elements have the latent ability to assume a sinusoidal wave configuration upon being wetted with said body fluids.

9. An absorbent tampon in accordance with claim 1 wherein said false crimped funicular elements have the latent ability to assume a square wave configuration upon being wetted with said body fluids.

10. A catamenial device comprising an outer tube, an inner tube slideably positioned therein, a catamenial tampon positioned within said outer tube and being ejectable therefrom by moving said inner tube towards said tampon, said tampon comprising an uncompressed bundle of fibrous, false crimped funicular elements substantially all of which have a length approximately twice the length of the tampon and which extend from one first end of the tampon to the other end thereof and back again to said first end by being folded at their approximate midpoints and being substantially straight throughout the length of said tampon and in contact with each other along substantially their entire lengths in a dry state, a withdrawal string binding substantially all of said funicular elements at their folded midpoints, said tampon being positioned in said outer tube with the folded and bound end in the interior thereof adjacent an end of said inner tube through which said withdrawal string extends, said false crimped funicular elements having the latent ability to become bulked upon being wetted with catamenial fluids.

11. A catamenial device in accordance with claim 10 wherein said bundle of fibrous false crimped funicular elements is a tow of continuous filament rayon.

12. A catamenial device in accordance with claim 10 wherein said false crimped funicular elements are rayon yarns.

13. A catamenial device in accordance with claim 10 wherein said false crimped funicular elements are cotton yarns.

14. A catamenial device in accordance with claim 10 wherein said false crimped funicular elements are substantially parallelized in the dry state.

15. A catamenial device in accordance with claim 10 wherein said false crimped funicular elements pursue a substantially helical path in the dry state.

16. A catamenial device in accordance with claim 10 wherein said false crimped funicular elements have the latent ability to assume a coiled configuration upon being wetted with said catamenial fluids.

17. A catamenial device in accordance with claim 10 wherein said false crimped funicular elements have the latent ability to assume a sinusoidal wave configuration upon being wetted with said catamenial fluids.

18. A catamenial device in accordance with claim 10 wherein said false crimped funicular elements have the latent ability to assume a square wave configuration upon being wetted with said catamenial fluids.

19. The method of imparting to a dry fibrous, continuous funicular element the latent ability to become bulked upon being wetted which comprises the steps of (1) imparting a deformed pattern in said continuous funicular element, (2) wet crosslinking said deformed funicular element, (3) removing the wet crosslinking agents from said funicular element by washing with water, and (4) removing the earlier imparted deformed pattern in said funicular element whereby said funicular element assumes a configuration in a dry state substantially the same as prior to its being subjected to said steps.

20. The method according to claim 19 wherein said funicular element is a continuous rayon filament and said deformed pattern is a crimp assuming the configuration of a sinusoidal wave imparted by feeding said rayon filament into a stuffing box and said deformed pattern is removed by stretching said deformed rayon filament.

21. The method according to claim 19 wherein said funicular element is a continuous rayon filament and said deformed pattern is a crimp assuming the configuration of a coiled spring imparted by twisting said rayon filament, and said deformed pattern is removed by imparting a reverse twist to said deformed rayon filament.

22. The method according to claim 19 wherein said funicular element is a continuous rayon filament and said deformed pattern is a crimp assuming the configuration of a square wave imparted by knitting said rayon filament and said deformed pattern is removed by unravelling and stretching said knitted rayon filament.

23. The method according to claim 19 wherein said funicular element is a yarn of continuous rayon filaments and said deformed pattern is a crimp assuming the configuration of a sinusoidal wave imparted by feeding said rayon yarn into a stuffing box and said deformed pattern is removed by stretching said deformed rayon yarn.

24. The method according to claim 19 wherein said funicular element is a yarn of continuous rayon filaments and said deformed pattern is a crimp assuming the configuration of a coiled spring imparted by twisting said rayon yarn, and said deformed pattern is removed by imparting to said deformed rayon yarn a reverse twist.

25. The method according to claim 19 wherein said funicular element is a yarn of continuous rayon filaments and said deformed pattern is a crimp assuming the configuration of a square wave imparted by knitting said rayon yarn and said deformed pattern is removed by unravelling and stretching said knitted rayon yarn.

26. The method according to claim 19 wherein said funicular element is a yarn of short staple cotton fibers and said deformed pattern is a crimp assuming the configuration of a sinusoidal wave imparted by feeding said

cotton yarn into a stuffing box and said deformed pattern is removed by stretching said deformed cotton yarn.

27. The method according to claim **19** wherein said funicular element is a yarn of short staple cotton fibers and said deformed pattern is a crimp assuming the configuration of a square wave imparted by knitting said cotton yarn and said deformed pattern is removed by unravelling and stretching said knitted cotton yarn.

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