

Feb. 18, 1969

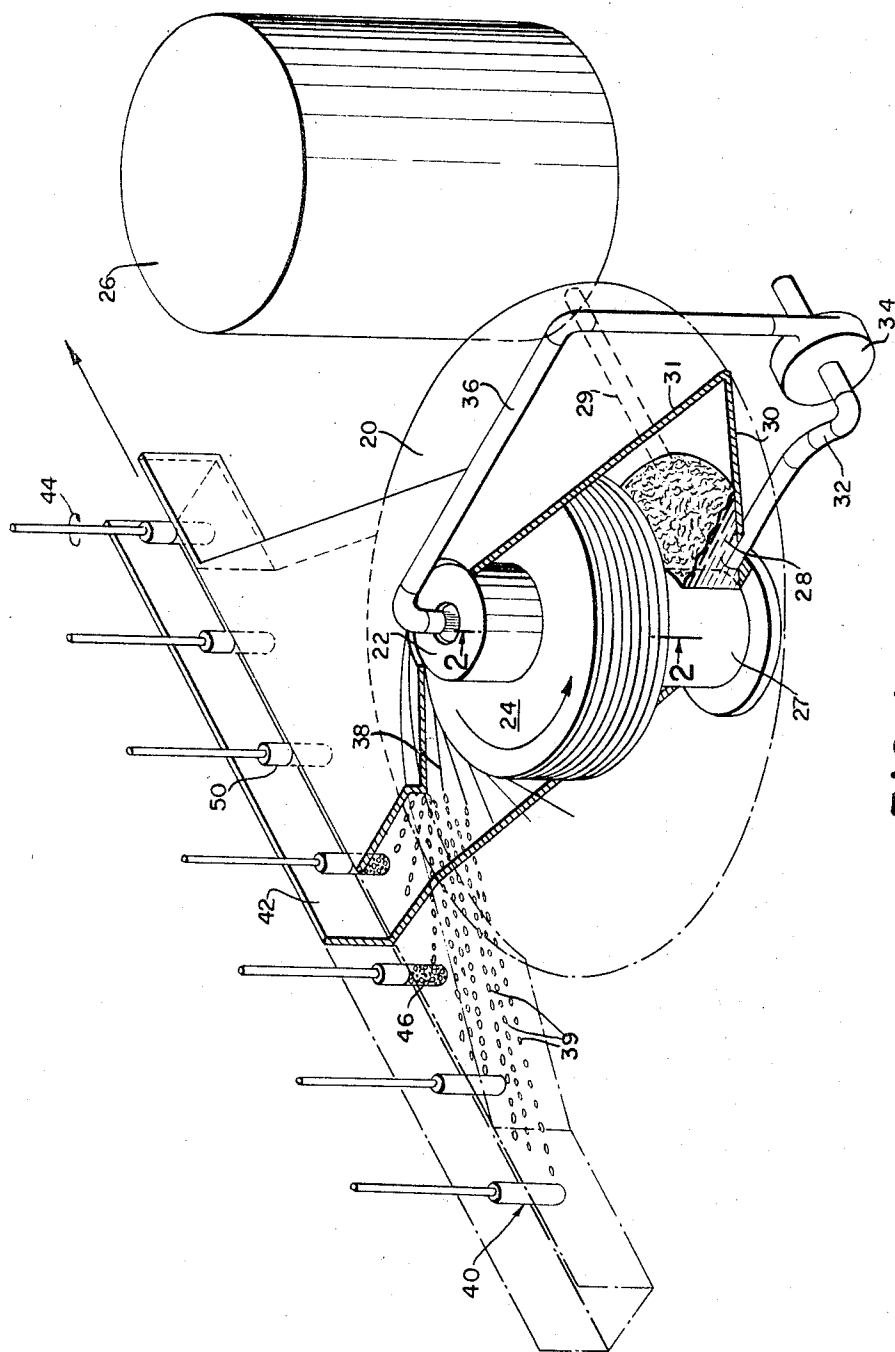
H. A. WHITEHEAD ET AL

3,428,044

COATED CATAMENIAL TAMPON

Filed Oct. 15, 1965

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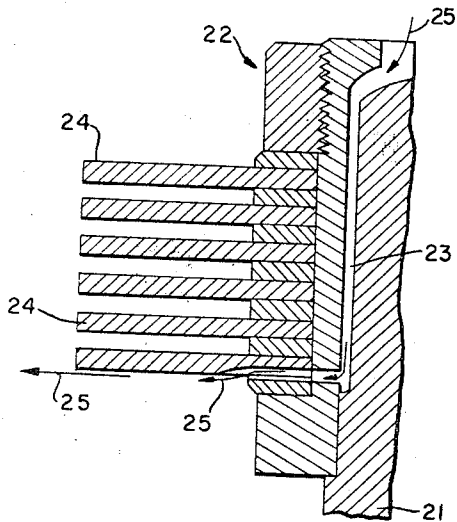


FIG. 2.

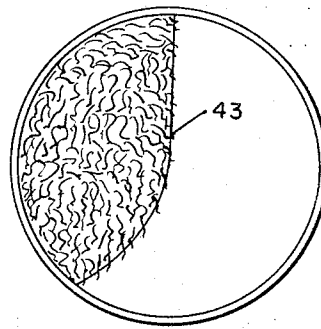


FIG. 3B.

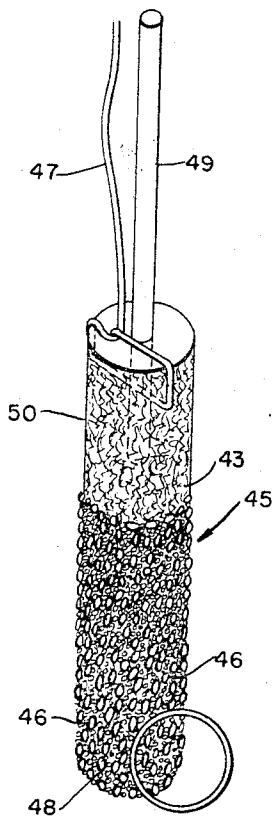


FIG. 3.

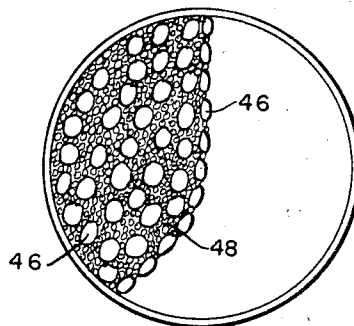


FIG. 3A.

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COATED CATAMENIAL TAMPON

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5 Claims

Int. Cl. A61f 13/20; G03g 1/20; C23d 5/08

ABSTRACT OF THE DISCLOSURE

An absorbent tampon having its forward end coated with a reticulated network of discrete globules of water-soluble lubricating material to aid insertion. Areas of the tampon surface adjacent points of contact between individual globules are substantially free of coating. A number of globules protrude farther from the surface than others. The coating is applied by reducing the material to a molten state, dividing the material into particles while in such molten state, than partially solidifying the particles and while in the latter condition applying the particles to the tampon surface.

This invention relates to improvements in tampons and to methods for providing such improvements. More particularly, the invention relates to a tampon having an improved coating thereon.

Tampons have been used for internal absorption purposes for many years, especially for catamenial purposes. The most prevalent types of tampons in use today comprise an assembly of absorbent material, such as cotton, cellulose wadding, synthetic sponge, cellulose fluff or combinations thereof, compressed to a size small enough to fit readily into the vaginal tract. The tampons in their compressed condition are preferably in a self-sustaining form which is substantially stable under normal atmospheric conditions, but which expands readily when wetted. When inserted in the vaginal tract, absorption of body fluids causes the compressed tampon to attempt to re-expand approximately to its original uncompressed size to substantially fill the vaginal cavity and to prevent leakage therefrom.

Because the material used is so highly absorbent, untreated tampons, even in their relatively small compressed form, tend to wipe the vaginal tract dry when being inserted, and in so doing often cause irritation of the delicate membranes. This absorptive action increases frictional resistance and often requires more force for insertion than is considered desirable. It is desirable therefore to provide tampons with an effective insertion aiding material to relieve the difficulties encountered during insertion, without hampering the effectiveness of the tampon to perform its absorptive function.

The need for insertion aiding material is particularly desirable for the type of tampon which is not enclosed in the rigid tube commonly employed as the insertion device. In the absence of such a device, and also when a detachable stick is employed for inserting, the absorbent surface of the tampon is normally exposed before insertion, and comes in direct contact with the body tissue during insertion. Tampons with stick type inserters, which are not enclosed in a protective tube, have advantages in that they are less costly to produce, yet provide a more positive means of placement. However, since the absorbent surface area of such tampons directly contacts the body tissues during insertion, the tampons have a tendency to absorb prematurely the moisture normally present on the surface of mucoid or epithelial tissue. This tends to dry the surface, and makes tampon insertion more difficult. For menstrual uses this drying effect is particularly evi-

denced during times of light flow, especially at the beginning and at the waning days of the menstrual period.

Many efforts have been made to overcome these latter difficulties. Such efforts include coating the tip or leading end of the tampon itself with lubricants such as vaseline, emulsified mineral oil, soaps and the like, or enclosing the tip of the tampon in a water-soluble film comprised of materials such as methyl cellulose, gelatin, dextrin, glucose, polyvinyl alcohol, sodium alginate, etc. While these prior modifications result in improvement in insertion ease, each of them tends to interfere with absorption capabilities of the tampon, especially when the tampon is first inserted. Furthermore, these insertion aiding materials are not easily applied to the tampon during manufacture. When non-film forming materials, such as those first enumerated above are employed, they usually are applied by dipping or spraying techniques. In such applications, the material must necessarily be of low viscosity, or is diluted with water. In that condition the material tends to penetrate into the interior of the pre-compressed tampon too deeply, interfering with the ability of the tampon to absorb fluids and sometimes causing undesirable and premature re-expansion. When preformed films are used as the insertion aid material, the thickness required for convenient handling during manufacture is such that after insertion a long delay occurs before body fluids dissolve the coating sufficiently to permit the absorptive mass to receive and absorb body fluids as intended. In such cases, the tampon is rendered temporarily ineffective to perform its intended absorptive function.

Accordingly, an important object of the present invention is to provide for coating absorbent tampons with an insertion aiding material, the application of which material has no effect on the self-sustaining compressed condition of the tampon, or its effectiveness after insertion.

Another object is to coat a tampon with a fluid-soluble lubricant coating in a manner which permits the tampon readily to receive and hold body fluids immediately after insertion, and before requiring the coating to be entirely dissolved.

Still another object is to provide a stick-type tampon with improved insertion properties.

A further object is to provide an improved coated tampon in which the coating is confined substantially to the exterior surface thereof with a minimum of penetration into the absorbent fibrous components.

Other objects and advantages of the invention will become apparent by reference to the following specification and accompanying drawing.

In the drawings:

FIGURE 1 is a schematic and perspective view partly in section of a suitable means for carrying out the method for coating tampons in accordance with this invention.

FIGURE 2 is a partial section taken along line 2—2 of FIGURE 1.

FIGURE 3 is an enlarged perspective view representing a finished tampon coated in accordance with the invention.

FIGURE 3A is a greatly enlarged view of a portion of the tip of the tampon shown in FIGURE 3.

FIGURE 3B is a greatly enlarged view similar to FIGURE 3A, showing a portion of the tip of a compressed tampon as it appears before coating is applied.

As shown in FIGURES 1 and 2, one type of treating apparatus suitable for use in this invention comprises an enclosed circular chamber 20 having centrally disposed therein high speed rotor 22 mounted on a shaft 21 inside housing 27 for counter-clockwise rotation. The outer circumference of rotor 22 comprises a plurality of spaced discs 24. Heated tank 26 supplies molten water-soluble material 28 to the interior of chamber 20 by supply pipe 29. The coating material 28 is of a type which is

normally solid but which melts and remains fluid when heated to a temperature above about 115° F. The solid material is water-soluble or water miscible. For purposes of maintaining the coating material fluid, both tank 26, walls 30 and 31 of the circular chamber 20, and trough 42 are suitably heated, and the molten fluid is continuously circulated, as shown. The fluid coating 28 is drawn from the bottom of chamber 20 through pipe 32 by pump 34 and supplied through the top center of rotor 22 by pipe 36. The interior of the rotor has a plurality of fluid passageways 23 leading from the top of rotor 22 to the space between each of the discs 24. The fluid coating materials travel through these passageways as shown by arrows 25. While only one such passageway is shown in the FIG. 2 sectional view, it is understood that similar passageways lead to the spaces between each of the discs, with discharge ports circumferentially spaced on the interior of the rotor. As the rotor is rapidly rotated, the fluid coating material is flung outward centrifugally between discs 24, as represented by arrows 25 in FIG. 2, along tangential paths 38 (FIG. 1) in the form of discrete droplets 39. The droplets 39 are cooled and partially congealed as they travel through the atmosphere on their way toward tampons 40. Tampons 40 are moved in spaced alignment through treating trough 42 which is in communication with the interior of chamber 20. The tampons 40 are held by rotatable chucks, not shown, as they pass through trough 42 and the tampons are continuously rotated axially as shown by arrow 44. As the rotating tampons 40 pass through trough 42, some of the congealing droplets strike the rotating forward ends of the tampons 40, as the droplets are flung outwardly from between rotating discs 24, and adhere to the tampon surface in the form of discrete particles 46. The droplets are sufficiently plastic at this stage to adhere to fibers which normally protrude from the tampon surface with substantially no penetration to the interior of the tampon. The adhered droplets form a discontinuous coating of discrete globular particles 46 with interstices therebetween which are substantially devoid of coating. Tampon surface areas 48 which lie between points where such particles adhere are exposed between these interstices, and these areas remain substantially free of coating. The distal or trailing end 50 of the tampon is shielded as it passes through the apparatus. This shielded area of the tampon thus remains substantially free of coating.

The droplets which fail to become attached to the tampons are caught by the heated rear wall of trough 42 where they are remelted and flow back to the main supply of molten fluid.

The compressed self-sustaining tampon, before being treated as herein described, even though highly compressed has a fine array of fibers extending outwardly from the surface. These fibers are not easily discernible by the unaided eye but are readily seen when viewed through a microscope. A representation of this fibrous surface structure is shown at 43 in FIG. 3B. As noted previously, the plastic droplets tend to be caught by these fibers and form on the tampon surface a reticulated network comprising minute globules 46 (FIG. 3A) of the insertion aid coating material on the surface, leaving spaces 48 between such globules where substantially no coating material is present. The coating is thickest where the globules first attach themselves to the fibers and protrude from the surface, gradually thinning down to interstitial areas free of coating.

Referring again to FIG. 2, only one channel 23 for feeding the fluid coating material to the rotating discs is shown. This channel feeds the fluid material underneath lower disc 24, from where it is discharged centrifugally. It is understood that similar channels are circumferentially spaced on the interior of rotor 22 to lead between each of the remaining discs. The channels and outlets between each disc are preferably spaced 180° apart to maintain dynamic balance in the high speed rotor. It is understood

that more than one set of such outlets may be used between discs if desired.

The finished tampon is shown in enlarged perspective in FIG. 3. The tampon comprises a compressed self-sustaining body of highly absorbent material provided with the usual withdrawal string 47. The proximal or leading end 45 of the tampon is coated with discrete globules 46 of fluid-soluble coating having a large number of coating-free interstices 48 exposing portions of the absorbent tampon surface. These interstices provide channels through which body exudate has unrestricted and immediate access to the absorbent mass in the interior of the tampon. Thus the tampon is able to accept and hold body fluids immediately, even before the coating material itself is completely dissolved. In being flung through cooling air on its flight to the tampon surface, the congealable coating material appears to take the shape of discrete globules, which form bead-like protuberances 46 on the proximal end 45 of the tampon. Because a large number of these globules attach themselves to the tiny fibers 43 which protrude from the surface of the tampon, many of the globules tend to extend somewhat outwardly from the surface of the finished tampon. During insertion the protruding globules become the first portion if the tampon to contact the moist vaginal surface, and by being thus interposed between the skin surface and the absorbent body of the tampon, temporarily insulate the moist vaginal membrane from the dry tampon. The body fluids in the vaginal tract also immediately begin to dissolve these protruding globules upon contact to provide a lubricating action. Because the area of surface to surface contact between the body and the globules is small, and because the dissolving globules provide lubrication, insertion takes place with a minimum of friction and discomfort. When the tampon is in place, body exudate is able to penetrate into the interstices between the discrete bead-like particles of undissolved coating material without hinderance, where it may be absorbed immediately by the underlying absorbent material. As a result, the improved tampon can perform its absorptive function immediately with only minimum interference from the lubricating coating. Thus, the lubricant need not dissolve completely before absorption can occur, as is necessary when the soluble films or continuous coatings of the prior art are employed. At the same time, the distal end of the tampon, which preferably completely free of coating, is enabled to expand somewhat more rapidly than the proximal end, to help provide a seal near the entrance of the vaginal channel to minimize undesirable leakage.

The improved tampon structure thus provides a lubricated frontal section for ease of insertion without inhibiting the basic absorptive function of the tampon body itself. It is also noted that the method of applying the coating enables less coating to be used than is required in prior methods.

When a tampon is highly compressed to its self-sustaining form, and the absorbent material is directly exposed before insertion without having the commonly employed rigid non-absorbent insertion tube, there are severe requirements imposed on the type of insertion aid which is suitable for use as an exterior coating, as herein taught. For practical purpose, and in order not to hinder tampon performance, a small amount of coating material is preferred. The coating material should be water soluble or water miscible to readily dissolve in body fluids so as not to impair fluid absorbency after insertion. The material should not have an aqueous phase or comprise an aqueous solution in order to avoid absorption by the tampon during application, and to prevent the tampon from expanding from its self-sustaining compressed state during the coating operation. The material preferably should be of a plastic nature, which softens or melts immediately upon first contact with moisture and at body temperatures, in order to facilitate lubricating action dur-

ing insertion. The material should also be non-toxic and relatively inert.

For use in the process described, the material preferably should not have the property of melting or being reduced to a liquid state at relatively low temperatures, i.e., in the neighborhood of 110° F. to 150° F., yet readily congeal when exposed to ambient air temperatures. The finished coating should also be smooth and relatively dry to the touch. A matte soft finish is preferred to a shiny, hard finish.

An example of material that meets the above requirements is polyethylene glycol. Polyethylene glycols above triethylene glycol, with molecular weights from 200 to 6,000 range from water-white liquids to waxy solids. They are stable, non-volatile, odorless and substantially non-toxic. The material is hygroscopic and serves as an excellent lubricant. Those having molecular weights of 1,000 or more are normally solid, varying in consistency from a petrolatum-like grease to a hard wax. Polyethylene glycols in the lower normally solid range may be used but higher molecular weights are preferred to avoid greasiness or premature melting. Mixtures of materials having different molecular weights may be employed to obtain a particular consistency. A molecular weight in the range of 2,500 to 5,000 is preferred. Polyethylene glycols in the preferred range of weights are completely water soluble and are also miscible with many waxes, gums, oils, starches and organic solvents. The latter materials may be used to modify the polyethylene glycol for use in this invention, but aqueous materials, especially where the water is unbound, are to be avoided.

While polyethylene glycols are preferred, other materials having high water-solubility which are normally solid and heat meltable may be used. Suitable, but less desirable materials include polyoxyethylated glycol glycosides, and long-chain fatty acids with polar end groups such as glyceryl monostearate.

Thixotropic materials which are normally solid, but which become fluid upon being subjected to mechanical shear, and thus in effect have a melted appearance under physical agitation, may also be used as long as the material has the property of rapidly congealing and returning to its solid state when applied as described. In such cases, the heating step used to melt the material may be dispensed with.

While the method shown for applying the coating material to the tampon comprises a centrifugal apparatus, it is understood that other methods may be used. Spraying or mechanical vibrators can also be used. An important

consideration is that the application be made so that the coating is applied as discrete globules, and that a continuous film or coating on the finished tampon be avoided. Also, while the method describe indicates the coating is accomplished by one pass of the tampon through the spraying section, it is understood that multiple passes may be used.

The process is applicable wherever a lubricated surface on an absorbent fibrous material is desired.

It is understood that the invention is not limited to the exact details of the methods and compositions shown or described, and obvious modifications will be apparent to those skilled in the art. Accordingly, the invention is to be limited only by the scope of the appended claims.

We claim:

1. An absorbent tampon having an improved insertion aid coating thereon, said tampon comprising a compressed self-sustaining body of absorbent material, a substantial portion of the proximal end of said tampon being coated with a reticulated network of discrete globules of fluid-soluble material, spaces between globules being substantially free of coating material whereby portions of the absorbent tampon body are exposed.

2. The tampon of claim 1 in which the distal end thereof includes a withdrawal string and a detachable inserter stick.

3. The tampon of claim 1 in which a number of said globules protrude from the surface of said tampon.

4. The tampon of claim 1 in which said fluid-soluble material is polyethylene glycol.

5. The tampon of claim 1 in which said fluid-soluble material is polyethylene glycol having a molecular weight of from about 2,500 to 5,000.

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CHARLES F. ROSENBAUM, *Primary Examiner.*

U.S. Cl. X.R

117—17.5, 37, 101, 105.4, 148