

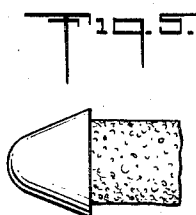
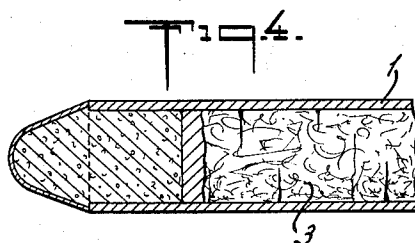
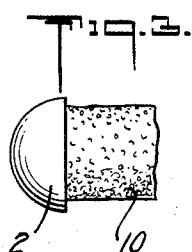
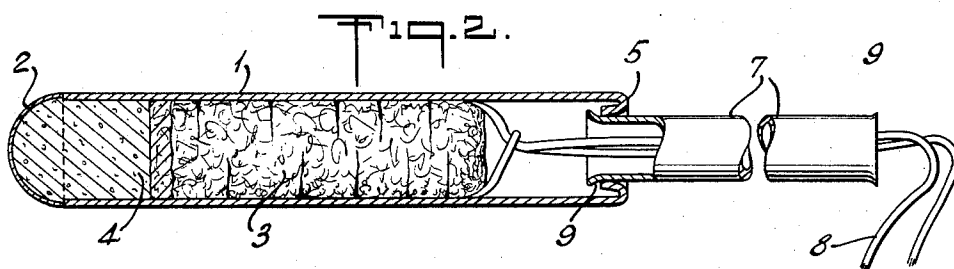
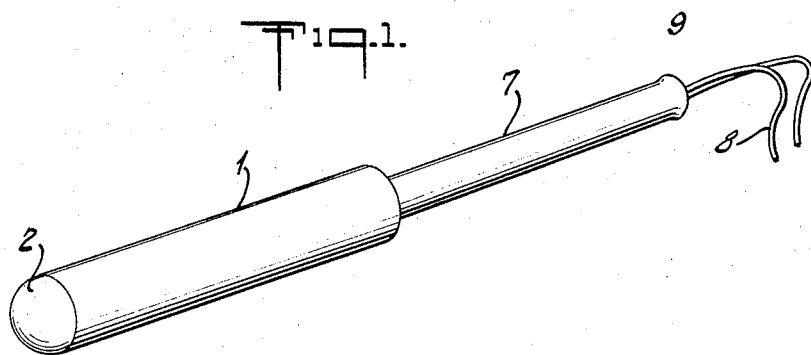
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APPLICATOR

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1

2,854,978

APPLICATOR

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This invention relates to improvements in tampons and applicators therefor, particularly with reference to catamenial tampons which are supplied to the user in an applicator. An applicator such as herein contemplated comprises a paper tube in which the tampon is seated, and a second tube which is telescoped into the tampon-holding tube, this second tube constituting an ejector for aiding expulsion of the tampon from the applicator tube.

Tampons have been in use for many years for absorbing discharges and secretions from body cavities. Although preferable in many respects to surface applications for this purpose, the use of tampons has been limited by certain disadvantageous features. The prior art tampons have been difficult to insert, especially when they had to be large enough to absorb a heavy flow of body fluid. This objectionable characteristic was particularly noticeable in catamenial tampons where delicate membranes can be chafed and abraded by their use.

Attempts have been made to avoid these handicaps in the use of catamenial tampons by coating the tampon. However, the prior art coated tampons were not adapted for the absorption of as large an amount of menstrual fluid as the mass of absorbent material which they held seemed to indicate.

In United States Patent No. 2,123,750 for example, Schulz described a catamenial tampon which comprised a cylindrical body of tightly wrapped cotton having a filament of methyl cellulose coated upon the surface thereof. This coating was adapted to prevent the expansion of the absorbent material even after its insertion in the vagina so that it was impossible to utilize the absorbent property of the cotton to its full extent. Methyl cellulose alone disperses very slowly at best, and very little dispersion of Schulz's coating filament was effected upon contact with menstrual fluids of high viscosity and high surface tension.

Another method employed for facilitating the insertion was to provide a tube or other applicator through which the tampons could be inserted. The tube itself, however, was difficult to insert, especially when it had to be large enough to contain a tampon capable of absorbing a heavy flow of body fluids.

Thus, although many attempts have been made to solve these outstanding problems of the prior art, none of these attempts, so far as we are aware, proved to be entirely satisfactory. We now have found that these prior art handicaps can be easily and successfully overcome.

It is an object of the present invention to provide a tampon assembly fitted with a smooth tip at the entrant end for easy insertion into the body cavity.

It is another object of this invention to provide a catamenial tampon assembly in which the applicator is provided with a tip at the entrant end of slightly larger diameter than the applicator tube and having a smooth surface adapted for easy insertion into the female vagina, whereby the applicator can be introduced therein without danger of abrading delicate vaginal tissues.

2

A further object is to provide a tampon assembly, provided on its entrant end with a covering tip of a water-dispersible solid, containing a surface-active agent capable of lowering the surface tension and viscosity of menstrual fluids, which tip is non-aqueous at any stage prior to dispersion and use.

Other objects will become apparent to those skilled in the art from the following description taken in conjunction with the accompanying drawing, in which

Fig. 1 is a perspective view of a tampon assembly according to our invention.

Fig. 2 is a longitudinal view, partly in section, of a tampon applicator showing the tampon and insert in place.

Fig. 3 is a longitudinal view of an applicator tip with a rounded entrant end according to the present invention.

Fig. 4 is a sectional view of an applicator tube showing the relative position of the tip illustrated in Fig. 5 with respect to the tampon.

Fig. 5 is a plan view of an applicator tip illustrating an alternate form.

Referring now to Fig. 2 of the drawing, the applicator of this invention is composed of a tube or container 1, which is formed of a relatively stiff cardboard or other suitable material as is common in this field. Cardboard is preferred and is particularly suitable because it is sufficiently rigid, safe, and non-injurious in use, as distinguished from metal, glass, or similar substances, and is particularly suitable for single-use applicators by being inexpensive. The tube is cylindrical in cross section, of proper diameter to snugly receive and frictionally hold a tampon 3, and is approximately twice the length of the tampon or of suitable length to permit ready manipulation of the applicator without the user's fingers contacting the body and without the tampon being engaged and becoming unsterile.

The discharge end of the tube 1, is fitted with a cylindrical insert 4, the end of which is spherical in shape, whereas the other end of the tube is crimped as at 5, to form a restricted opening of proper diameter to slidably receive and guide a tubular plunger 7, for axial movement relative to the tube 1. Plunger 7 is of considerably less diameter than tube 1, but of sufficient diameter to provide necessary rigidity to the plunger and to receive the withdrawal cord 8 of the tampon, which cord also serves to guide the inner end of the plunger. The plunger 7 is also preferably formed of paper and is of approximately the same length as tube 1, i. e., sufficiently long to expel the tampon from the tube.

Both ends of the plunger 7 are rolled to provide a flange 9 of somewhat greater diameter than that of the restricted opening in the one end of the tube. The flange 9 on the inner end of the plunger, acting in co-operation with the restricted opening formed at 5, interlocks the plunger to the tube, whereby withdrawal of one of the two members from the vagina or other body cavity also will cause removal of the other member. Flange 9 also insures that the two elements will not become disengaged during packing and shipping and thus eliminate the necessity of any sterilization prior to its actual use.

The tube and plunger are assembled in the first instance by forcing the plunger into the restricted end 5 from the restricted end. The formation of the crimped end 5 and the character of the material permits this being done by permitting the end wall to be forced inwardly slightly toward the distant end of the tube as shown in the drawings, with the result that the restricted opening, through the end wall of the flange, lies slightly inwardly from its end of the outer tube. This construction also prevents subsequent separation of the two elements unless separation is deliberately forced.

The crimped end 5, because of the smaller diameter

3

of the plunger 7, also provides a guide for the plunger, which guide permits angular or ready movement of the plunger relative to the tube 1, as well as axial movement as described previously, thus preventing binding or locking of the two tubes if the plunger is not removed by the user in a direction exactly in a co-axial alignment with the tube.

Flange 9 also serves another function in that the inner flange provides greater contact area of the plunger against the tampon and therefore reduces the tendency to mutilate the tampon when being expelled.

The tips illustrated by Figs. 3 and 5 are made by a special process of a foamed material to fit the open end of an applicator tube. These foams have a smooth exterior skin which provides a slippery surface to the vaginal walls for easier application. Therefore, while the body of the tip is a foam the exterior surface is actually a slippery film. It will be noted from Fig. 3 that the exposed portion of the tip 2 is spherical in shape, while the portion 10 is smaller in cross section and cylindrical in shape to fit the applicator tube.

The foams are made of methyl cellulose and a surface-active agent such as tertiary-dibutylphenoxypolyethoxyethanol; an alkylated aryl polyether alcohol; a sodium alkylaryl polyether sulfate; or nonylphenoxypolyethoxyethanol. A suitable grade of methyl cellulose is that manufactured by the Dow Chemical Company and identified as "Methocel H. G. 4000 cps." A small amount of a humectant or hygroscopic agent, such as urea, may also be present in the composition.

A preferred method of making a foamed tip for our use is illustrated by the following example:

EXAMPLE I

To 200 parts of water is added 6 parts of 4000 cps. methyl cellulose, and the mixture is agitated rapidly to induce air bubbles and cause foaming. A Waring Blender may be conveniently used to foam small quantities of the methyl cellulose solution. During mixing, two parts of tertiary-dibutylphenoxypolyethoxyethanol is added. The total mixing time is approximately 2 to 3 minutes, and the final concentration of solids in solution is 3% by weight of methyl cellulose and 1% by weight of tertiary-dibutylphenoxypolyethoxyethanol. To improve the solubility of the dried foam as much as 0.3 part of urea may be added to the methyl cellulose solution.

The above solution is poured into a suitable mold such as Pyrex test tubes to a depth of approximately 1 inch and immediately placed in an oven that has not been preheated. The oven thermostat is set at 80° C. and the evaporation time is approximately 5 to 6 hours. It is important that the oven not be preheated as the methyl cellulose must be provided an opportunity to settle slightly before heating and evaporation occur in order that a smooth film may form at the mold contact surface.

The foam, after evaporation of the mixture, is removed from the mold and the end slightly compressed and fitted into the open end of the applicator. The tip will not readily be discharged, but may be sealed with a drop of water between the applicator tube and the foam. Upon expulsion of the tampon into the vaginal tract, the foam tip is also propelled into the tract where it disintegrates.

Aqueous compositions which have been found to produce highly satisfactory foams for our purpose are listed

4

in Table I. All of these compositions readily disintegrate in the vaginal and menstrual fluids.

Table I
AQUEOUS SOLUTIONS

Foam No.	Conc. Methocel., percent	Surface Active Agent	Conc. Surface Active Agent, percent
1-----	1.0	tertiary - dibutylphenoxypoly - ethoxyethanol.	2.5
2-----	2.0	do-----	1.0
3-----	3.0	do-----	5.0
4-----	4.0	do-----	1.0
5-----	5.0	do-----	5.0
6-----	3.0	alkylated aryl polyether alcohol.	2.5
7-----	3.0	nonylphenoxypolyethoxyethanol.	2.5
8-----	3.0	sodium alkaryl polyether sulfate.	2.5

It will be understood that neither the exact proportions of surface-active agent and methyl cellulose nor the viscosity of the methyl cellulose is critical. We prefer to use from about 1.0% to about 5.0% of methyl cellulose and from about 1.0% to about 5.0% of a surface-active agent in preparing our aqueous solutions.

What is claimed is:

1. A single-use tampon applicator comprising a thin-walled tube adapted to receive and hold a tampon in one end thereof, and a foamed tip containing a surface-active agent fitted into said tube at the tampon end.

2. A combined container and applicator for an internal catamenial device of the type consisting of a compressed core of absorbent material; an elongated paper tube of a diameter to releasably hold said core therein; a foamed tip containing a surface-active agent fitted into one end of said tube, and another paper tube partially within said first named tube.

3. A single-use tampon applicator comprising a paper tube of sufficient internal diameter to receive and releasably hold a tampon in one end thereof and a foamed tip containing a surface-active agent fitted into said tube at the tampon end; said tube being flanged inwardly at its other end to provide an integral yielding end wall, said end wall having a restricted opening therethrough positioned inwardly from said latter end of the tube, and a plunger of substantially less diameter than said tube projecting into said tube through said restricted opening, said plunger being guided by the said restricted opening for sliding and angular movement within said tube and being of sufficient length to engage a tampon positioned in said tube and expel the foamed tip and the tampon from the tube by movement of said plunger into said tube.

4. A combined container and applicator according to claim 2 in which the foamed tip is composed of methyl cellulose.

5. A combined container and applicator according to claim 2 in which the foamed tip is composed of methyl cellulose combined with a surface-active agent and has a smooth exterior surface.

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