

[72] Inventors Virginia A. Corrigan
Appleton;
Bruce A. Townsend, Oshkosh, both of, Wis.
[21] Appl. No. 807,490
[22] Filed Mar. 17, 1969
[45] Patented July 27, 1971
[73] Assignee Kimberly-Clark Corporation
Neenah, Wis.

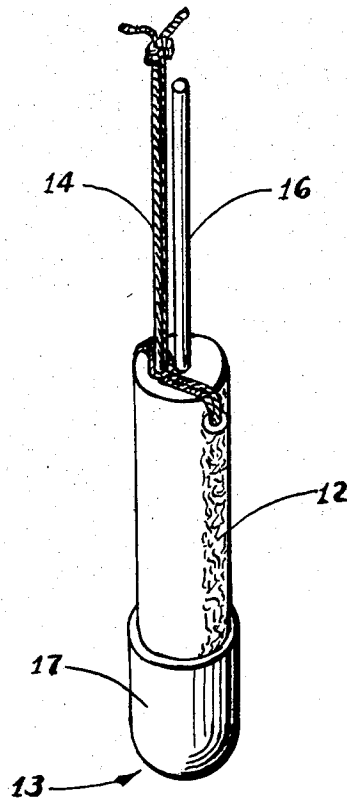
[56] References Cited
UNITED STATES PATENTS
2,301,868 11/1942 Gurley, Jr. et al. 128/285
2,440,141 4/1948 Donovan 128/285
2,491,017 12/1949 Robinson 128/285
2,849,000 8/1958 Lewing 128/285
3,406,688 10/1968 Cubitt 128/290 X
3,428,044 2/1969 Whitehead et al. 128/285

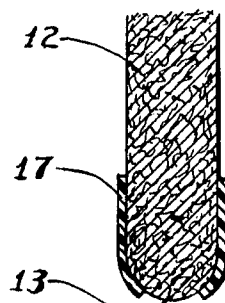
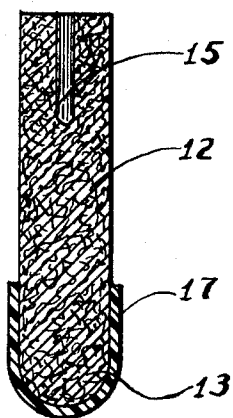
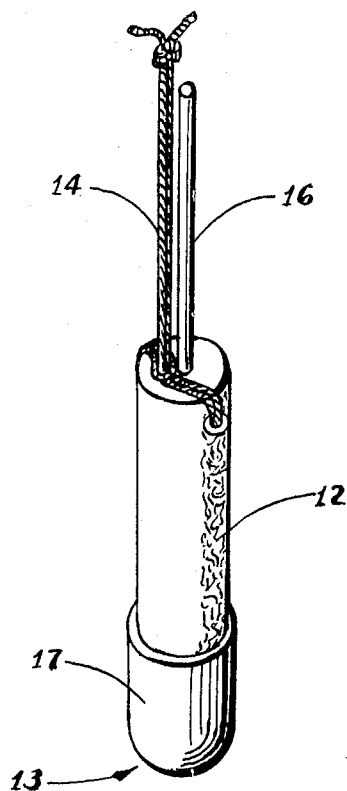
Primary Examiner—Charles F. Rosenbaum
Attorneys—Daniel J. Hanlon, Jr. and Raymond J. Miller

[54] COATING TO AID TAMPON INSERTION AND
TAMPONS COATED THEREWITH
10 Claims, 3 Drawing Figs.

[52] U.S. Cl. 128/285
[51] Int. Cl. A61f 13/20
[50] Field of Search 128/270,
285, 290, 246

ABSTRACT: An improved coating material for application to the forward portion of absorbent tampons as an insertion aid. The coating comprises a physical mixture of polyethylene glycol and starch. The coating can be applied to the tampon without penetrating to the interior of the absorbent body and remains stable under a wide range of handling conditions. Coated tampons are also described.





COATING TO AID TAMPON INSERTION AND TAMPONS COATED THEREWITH

BACKGROUND OF THE INVENTION

Tampons for internal absorption of body fluids have been used for years, primarily for catamenial purposes. They usually comprise absorbent material, such as cotton, rayon, cellulose wadding, synthetic sponge, cellulose fluff, synthetic fibers, or combinations thereof, compressed to a size small enough to fit into the vaginal tract. Normally, the tampons are compressed sufficiently to remain stable and compressed under normal atmospheric conditions, but expand readily when wetted. For example, after a tampon is inserted in the vaginal tract and contacted by body fluids the compressed tampon attempts to reexpand approximately to its original uncompressed size until it substantially fills the vaginal cavity, absorbs the fluids, and prevents leakage.

Because the material used must be highly absorbent to be effective, an untreated tampon, even in relatively small compressed form, tends to wipe the vaginal tract dry when being inserted, and in so doing may cause irritation of the membranes. This absorptive action increases frictional resistance to insertion so much, that more force is required than is considered desirable. Accordingly, there is a need for a tampon which is designed to decrease frictional resistance during insertion without hampering the effectiveness of the tampon to perform its absorptive function.

The need for insertion-aiding material is particularly apparent for that type of tampon which does not employ a telescoping tube as the insertion device. In the absence of such a device, such as is the case for a digital insertion tampon, or for a tampon which uses a detachable stick for insertion, the absorbent surface of the tampon is normally exposed before insertion, and comes into direct contact with the body tissue during insertion. Digital tampons and stick inserter tampons have advantages in that they are less costly to produce than tube-enclosed tampons. In addition, the stick tampon provides a more positive means of placement. However, since the absorbent surface area of such tampons contacts the body tissues directly during insertion, the tampon tends to absorb prematurely the moisture normally present on the surface of mucoid or epithelial tissue. As noted previously this dries the surface, and makes tampon insertion more difficult. For catamenial uses this drying effect is particularly evidenced during times of light flow, especially at the beginning and at the waning days of the menstrual period.

Many efforts have been made to facilitate insertion. 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 preformed film comprised of materials such as methyl cellulose, gelatin, dextrin, glucose, polyvinyl alcohol, sodium alginate, etc. While these prior modifications result in improved ease of insertion, each tends to interfere with absorptive capabilities of the tampon, especially at the time when the tampon is first inserted. Furthermore, these insertion-aiding materials are not easily applied to the tampon during manufacture.

When nonfilm 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, and/or is diluted with water. In such condition the material tends to penetrate into the interior of the precompressed tampon body too deeply, interfering with the ability of the tampon to absorb fluids and sometimes causing undesirable and premature reexpansion. When preformed films are used as the insertion aid material, the thickness required for convenient handling of the film during manufacture is such that after a tampon with a film-coated tip is inserted in the body, a long delay occurs before body fluids dissolve the coating sufficiently to permit the absorptive mass to receive and absorb the fluids as intended.

In such cases, the tampon is rendered temporarily ineffective in performing its intended absorptive function.

Various attempts to solve the above-described problems may be found in the prior art.

For example in U.S. Pat. No. 2,734,505, which issued Feb. 14, 1956, the problem of reexpansion caused by the penetration into the tampon of a lubricant coat is solved by first coating the tampon tip with a primary coat so that the absorbent body of the tampon will not absorb the fluid used to form the lubricant coat.

In U.S. Pat. No. 3,428,044 which issued Feb. 8, 1969 to applicants' assignee, the problem of reexpansion and penetration is solved by reducing the lubricant material to a molten state, spraying it in the air to divide the material into minute globules, partially solidifying these globules and while in that state depositing them on the tampon tip.

The present invention solves the problem in a more direct and simpler fashion by admixing with a particular lubricant coating material a penetration-decreasing filler substance which permits direct coating of a single layer onto the tampon by dipping, printing, spraying, wiping or the like, without causing the coating to penetrate the absorbent body of the tampon or cause it to reexpand.

Accordingly, an important object of the present invention is to provide an improved coating material for application to the forward portion of compressed absorbent tampons as an insertion aid.

Another object is to provide a tampon coating material which can be applied to a compressed tampon without penetration therein, thus avoiding undesirable reexpansion of the tampon body.

Still another object is to provide a tampon coating which remains stable under a wide range of handling conditions.

A further object is to provide tampons coated with an improved lubricant coating as defined herein.

SUMMARY OF THE INVENTION

The improved tampon coating material of this invention comprises polyethylene glycol having powdered starch in physical admixture therewith. Polyethylene glycol of two different molecular weights are used in the formulation. One has a molecular weight of 400 and one has a molecular weight of 4,000. Generally, the polyethylene glycol with the 4,000 molecular weight comprises the main portion of the mixture, while the starch and the polyethylene glycol with the 400 molecular weight are present in about equal quantities. The preferred mixture melts at between about 117° F. and 133° F. and may be applied to the tampon tip in molten form by dipping, printing, spraying, or wiping methods. The coating will not penetrate into the body of the tampon during coating and when cooled and set offers a dry, nontacky surface which will not rub off onto protective wrappers even under extreme handling and shipping conditions. Tampons thus coated require less insertion force, the force required being in the range of 35 to 50 percent less than the force required to insert untreated absorbent tampons of the same size. The coating also has a creamy velvety appearance which enhances its aesthetic appeal and gives the visual impression of lubricity to the user.

It should be noted here that tampons having starch coating per se are described in assignee's U.S. Pat. No. 2,099,931 of Nov. 23, 1937 where an aqueous dispersion of starch is used as an adhesive to secure a cotton wrapper to a braid-covered tampon. However, the use of starch in admixture with a lubricant for the purposes herein described is not suggested. Powdered starch is mentioned as a surface dusting coat over a gelatine-glycerine coating for tampons in U.S. Pat. No. 2,301,868, but here the starch is used primarily to prevent tackiness of the gelatine-glycerine coating, which coating would otherwise be impractical. Again, this patent does not suggest physically admixing starch with a lubricating coating to prevent penetration during the coating step.

The above-described advantages, objects and features attendant the invention will become apparent by reference to the following specification and accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an enlarged perspective view representing a finished stick inserter tampon having a coated tip.

FIG. 2 is a longitudinal section taken through the tampon portion of FIG. 1.

FIG. 3 is another sectional view showing the forward portion of a tampon in which the extreme frontal end is not covered by the coating.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As noted in the above summary of the invention, the coating material of this invention comprises a physical mixture of polyethylene glycol of two different molecular weights with powdered starch. For convenience in describing the preferred embodiments, the polyethylene glycol with a molecular weight of 400 will hereinafter be designated PEG 400 and the polyethylene glycol with a molecular weight of 4,000 will hereinafter be designated PEG 4,000.

The mixture is prepared by first melting a specified quantity of PEG 4,000 to a fluid condition by subjecting it to a temperature of between about 1200—140° F. The desired amounts of PEG 400 and dry powdered starch are then added and the entire mass is homogenized by a suitable mechanical blender. A small amount, i.e. less than 1 percent of a chemical preservative for cosmetics, such as calcium propionate dissolved in warm water is then preferably added. The mixture is now ready for coating on the forward end of the tampon. As indicated previously, the mixture is kept in its melted condition for the coating operation by maintaining it at an elevated temperature. In such condition it may be applied to the tampon by dipping, printing, spraying, wiping or the like without penetrating into the tampon body.

The drawing illustrates tampons to which such a coating has been applied.

As shown therein, the tampon comprises a cylindrical body 12 of absorbent material compressed to a self-sustaining form with a hemispheric frontal portion 13 and having a withdrawal string 14 attached to the rear portion. When the tampon is of the stick insertion type, it has a socket 15 centrally disposed in the rear portion in which a removable insertion stick 16 is seated. When the tampon is of the digital insertion type, no stick is used and the socket may be dispensed with.

For either type tampon the hemispheric frontal portion is provided with a coating 17 of the PEG-starch mixture. In FIGS. 1 and 2 coating 17 is shown as extending completely over the extreme forward tip. However, the coating may also be applied so as to cover the front sides and only the shoulders of the tip, leaving the extreme forward tip uncoated as shown in FIG. 3. In this arrangement, body fluids are able to reach the forward end of the absorbent material in the tampon immediately without first having to dissolve the coating.

In a specific example of the invention, a gallon of the coating was prepared by placing 2,310 grams of PEG 4,000 in a stainless steel pail and melting it down at a temperature of about 140° F. To this was added 1,890 grams of PEG 400 and 1,890 grams of finely powdered dry corn starch. The mixture was then homogenized by a mechanical mixer. 10.5 grams of calcium propionate was dispersed in 45 cc. of water and heated until dissolved. The latter was then added to the PEG-starch mixture and thoroughly mixed.

The mixture was maintained at a temperature above 130° F to keep it molten, and in this condition the mixture was applied to the end of the tampon by dipping the tampon therein to the depth of about five-eighths inch. The coating was then allowed to harden by cooling.

Upon cooling the coating was found to have a smooth velvety appearance and was not tacky or sticky to the touch. The coating was applied in the amount of about 0.4 grams per tampon. It adhered well to the tampon surface and when cross

sections were cut from the coated portion of the tampon no penetration of the coating or reexpansion of the tampon as a result of the coating operation was observed. A number of the coated tampons were wrapped in pouch-type wrappers comprised of glassine paper and subjected to accelerated aging tests at 150° F. Even under these severe test conditions, there was no transfer of the coating to the paper, nor loss of the lubricating facility.

In actual test uses, it was found that these coated tampons required 35 percent to 50 percent less force for insertion than did tampons of the same construction but without the coating applied. In comparing the performance of coated and uncoated tampons with respect to hours worn and absorbent capacity for body fluids, no significant differences were noted.

In addition to the preferred coating formula described above other mixtures containing varying amounts of PEG and starch were tried. It was found that the quantities set forth for each ingredient in the above-defined specific example performed best, but that variations therefrom could be made while retaining most of the important advantages of the invention.

Broadly stated it was found that the PEG 400 could comprise from 15 to 30 parts by weight, the PEG 4,000 from 40 to 70 parts by weight and the powdered starch from 15 to 30 parts by weight and still perform satisfactorily. In the preferred range the PEG 400 comprises 20 to 25 parts by weight, the PEG 4,000 50 to 60 parts by weight and the starch 20 to 25 parts by weight. In each instance it has been found that the best performance for a particular mixture is obtained when the PEG 4,000 comprises the major portion of the mixture and the PEG 400 and cornstarch are used in approximately equal amounts. The optimum mixture as defined earlier calculates out to 22.2 percent PEG 400; 54.3 percent PEG 4,000; cornstarch 22.2 percent; calcium propionate 0.25 percent; and water 1.05 percent. For this preferred mixture the melting point ranged between 117°—133° F; the density was 1.124g./cc. and the Brookfield viscosity was 390 cps. at 125° F. (No. 1 spindle at 10 r.p.m.). The reason for the wide range in the melting point apparently is due to the heterogeneity of the mixture.

While a mixture of PEG 400 and PEG 4,000 is specified as being preferred, and has been found especially useful, it is contemplated that mixtures of at least two polyethylene glycols of other molecular weights may also be found suitable.

In the examples set forth above, finely powdered cornstarch is preferred. However, other types of starch may be used with satisfactory results. In addition the starch need not be finely powdered. However the finer the powder, the smoother and better appearing is the coating.

While calcium propionate is mentioned as the preferred preservative, other compatible and well-known cosmetic preservatives such as methyl paraben, propyl paraben, quarternary ammonium compounds, triacetin, and the like, may be used.

After the coating has been applied it may be reheated with hot air to glaze and smooth the coating. Cool air may also be used to assist in setting the coating after application, or the tampon body itself may be precooled. Physically applied polishing steps may also be used.

While the coating is particularly adapted to use with stick-type and digital tampons, it may also be used as an insertion aid for tube-type inserters by applying the coating to the leading edges of the outer tube.

Further, while the front end of the tampon as illustrated in the drawing is shown as having a hemispheric tip, it will readily be seen the tip may also be conical, tapered or otherwise shaped.

We claim:

1. An absorbent tampon having an improved insertion-aid material coated on at least a portion of the frontal end thereof, said tampon comprising a compressed self-sustaining body of absorbent material and said coating comprising a physical mixture of polyethylene glycol and starch, said polyethylene

5

mixture of polyethylene glycol and starch, said polyethylene glycol comprising a mixture of polyethylene glycol having a molecular weight of 400 and polyethylene glycol having a molecular weight of 4,000.

2. The tampon of claim 1 in which the polyethylene glycol with a molecular weight of 4,000 is present in the amount of from 40 to 70 parts by weight, the polyethylene glycol with the molecular weight of 400 is present in the amount of from 15 to 30 parts by weight, and the starch is present in the amount of 15 to 30 parts by weight.

3. The tampon of claim 1 in which the polyethylene glycol with a molecular weight of 4,000 is present in the amount of from 50 to 60 parts by weight, the polyethylene glycol with the molecular weight of 400 is present in the amount of from 20 to 25 parts by weight, and the starch is present in the amount of 20 to 25 parts by weight.

4. The tampon of claim 2 in which the polyethylene glycol

6

with the molecular weight of 400 and the starch are present in substantially equal amounts.

5. The tampon of claim 3 in which the polyethylene glycol with the molecular weight of 400 and the starch are present in substantially equal amounts.

6. The tampon of claim 1 in which said starch is powdered corn starch.

7. The tampon of claim 1 in which said coating also contains a chemical preservative in an amount of less than 1 percent.

8. The tampon of claim 7 in which said preservative is calcium propionate.

9. The tampon of claim 1 in which said coating covers the entire frontal portion of said tampon.

10. The tampon of claim 1 in which the sides and shoulders of the frontal portion of said tampon are coated while a central area in advance of the shoulders is free of coating.

20

25

30

35

40

45

50

55

60

65

70

75

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,595,236 Dated July 27, 1971

Inventor(s) Virginia A. Corrigan and Bruce A. Townsend

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In Column 2, line 45 and Column 2, line 47, "polethylene" should read -- polyethylene --.

In Column 2, line 63, "coating" should read -- coatings --.

In Column 3, line 25 "1200" should read -- 120° --.

In Column 4, line 6 "sever" should read -- severe --.

In Claim 1, delete line 6.

Signed and sealed this 25th day of January 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents