United States Patent [19]

Berger et al.

[11] **3,895,634**

[45] **July 22, 1975**

[54] **TAMPON INSERTER**

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[73] Assignee: **Rapid-American Corporation**, New York, N.Y.

[22] Filed: **Oct. 18, 1973**

[21] Appl. No.: **407,711**

[52] **U.S. Cl.** **128/263**

[51] **Int. Cl.** **A61f 15/00**

[58] **Field of Search** 128/263, 270, 285, 264

[56] **References Cited**

UNITED STATES PATENTS

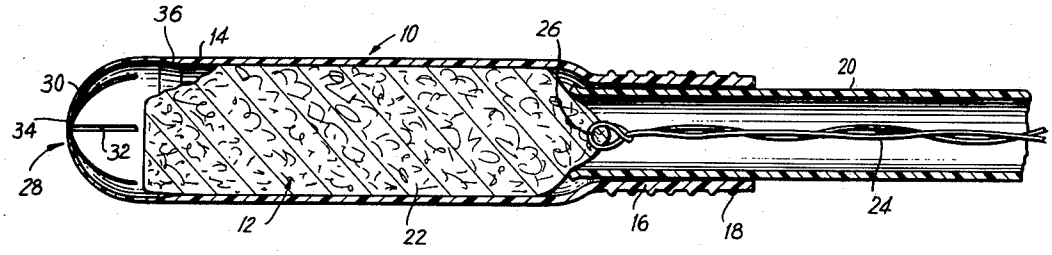
3,124,134	3/1964	Gardner	128/263
3,347,234	10/1967	Voss	128/263
3,433,225	3/1969	Voss	128/263
3,628,533	12/1971	Loyer	128/263

Primary Examiner—Richard A. Gaudet
Assistant Examiner—Henry S. Layton
Attorney, Agent, or Firm—Stewart J. Fried; Jeffrey A. Schwab

[57] **ABSTRACT**

A tampon inserter is disclosed having a tubular front barrel member including an insertion tip formed from a plurality of triangular-shaped segments which converge to a predetermined desired shape to aid insertion. The cross-sectional wall thickness of the tubular portion of the barrel member and insertion tip are tailored to provide a relatively high strength side wall and a relatively flexible and supple insertion tip such that insertion is facilitated and a tampon may be ejected at an acceptable tampon ejection pressure.

21 Claims, 8 Drawing Figures



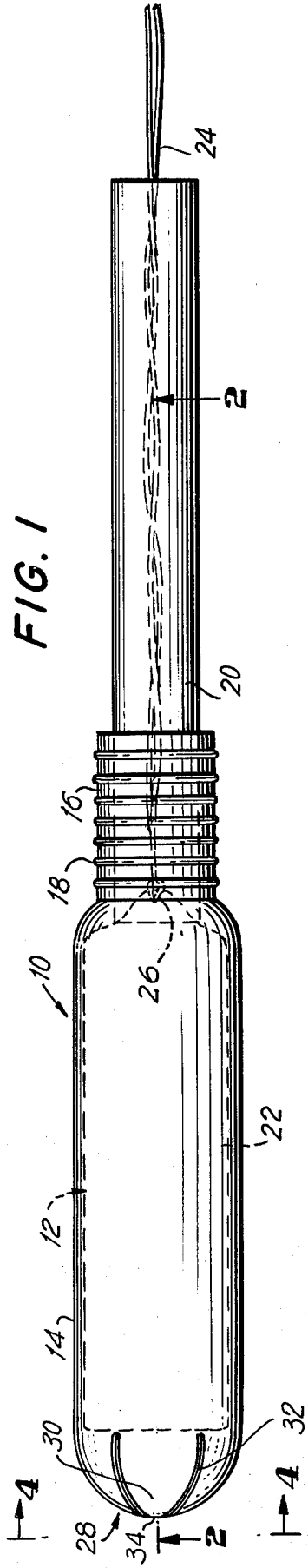


FIG. 1

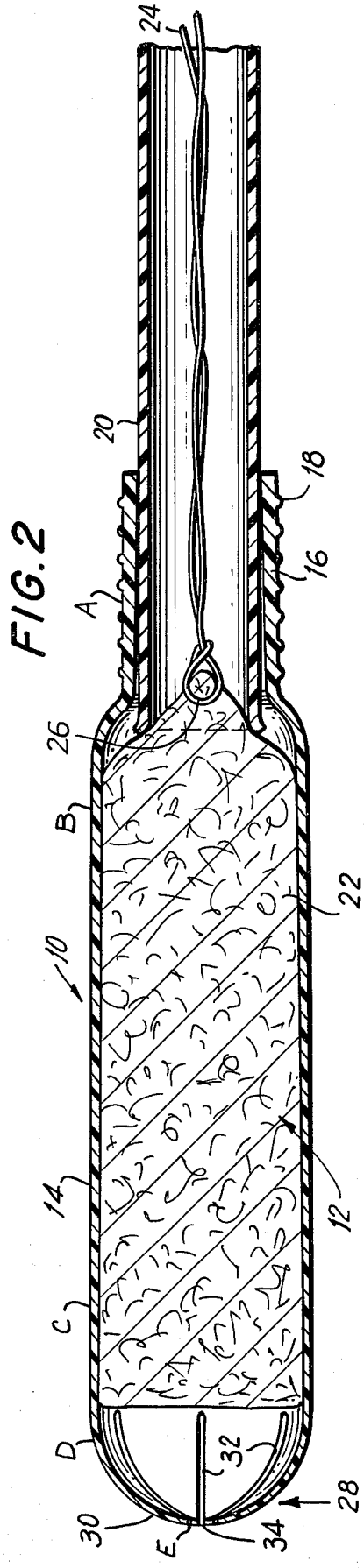


FIG. 2

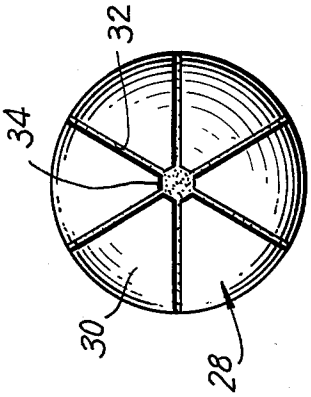


FIG. 4

FIG. 3

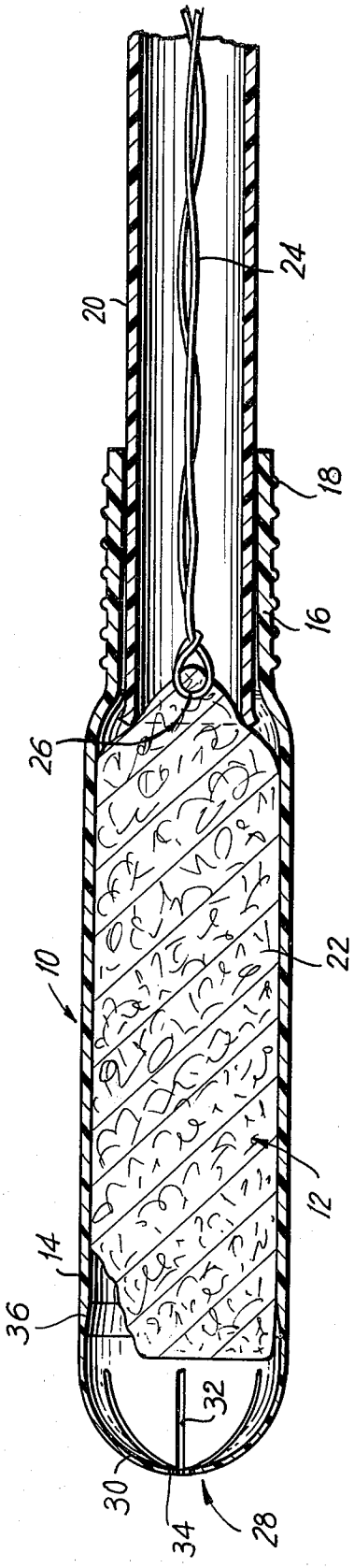
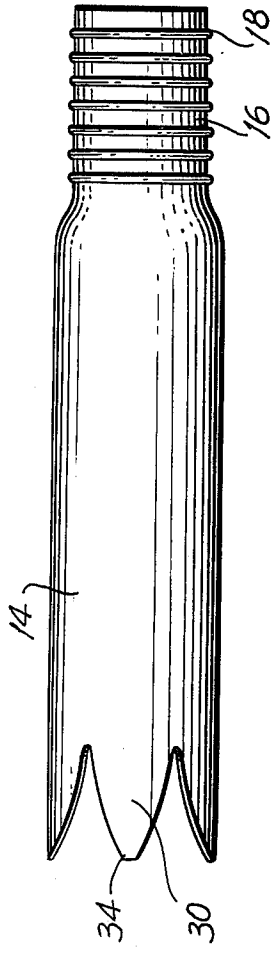


FIG. 5



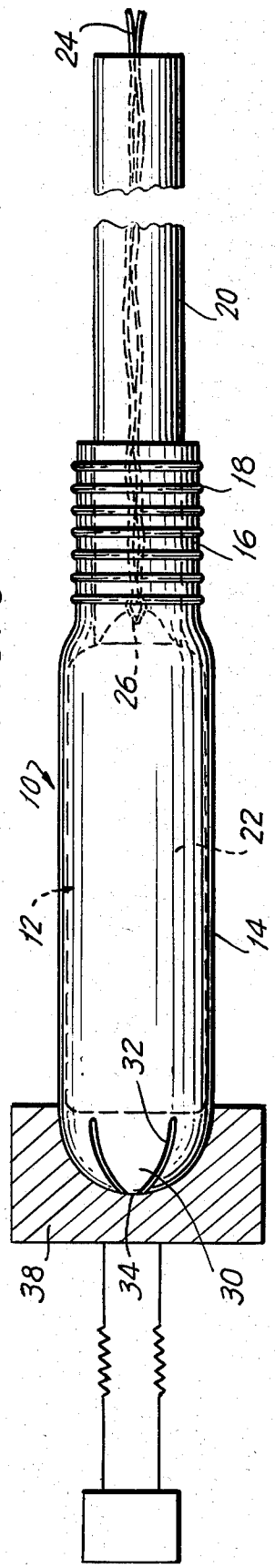


FIG. 6

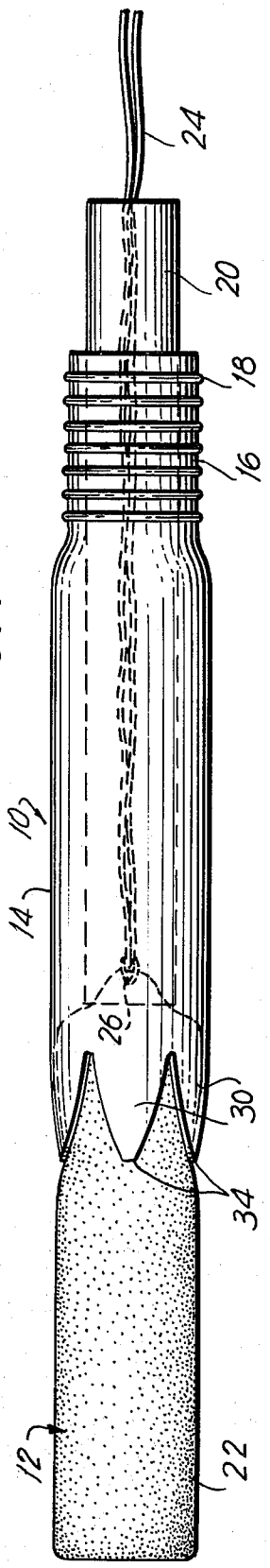


FIG. 7

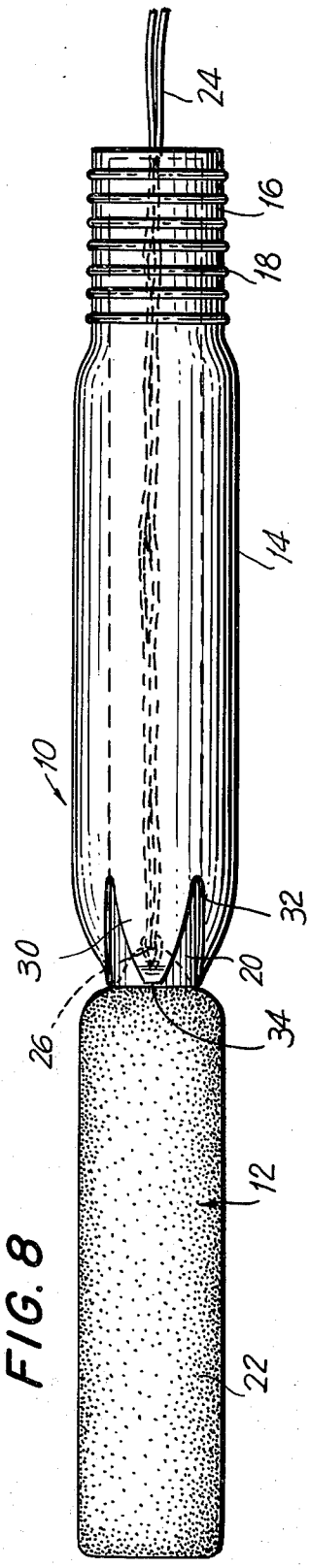


FIG. 8

TAMPON INSERTER

FIELD OF INVENTION

This invention relates generally to catamenial devices and more particularly relates to tampon inserters which are constructed in a manner which facilitates their use and imparts further advantages which will be described in detail hereinafter.

DESCRIPTION OF THE PRIOR ART

Catamenial tampons have, in recent years, increasingly been replacing sanitary napkins in preference among large numbers of women due to their ease of use and their imperceptibility during use which does not restrict the particular type of fashions which may be worn, as is sometimes the case with relatively bulkier, externally worn sanitary napkins.

Since a tampon is worn internally, it is much smaller than a sanitary napkin, and its size and shape must necessarily permit easy insertion and removal. Proper placement of the tampon within the vagina is extremely important to prevent the possible embarrassment to the wearer which may be caused by improper placement and possible resultant leakage.

Two general methods of tampon insertion are currently in widescale use. The first involves use of a tampon holder consisting of a hollow cylinder having openings at both ends and a slidable, telescoping plunger arrangement through one open end for ejecting the tampon through the opposite end after the cylinder has been placed within the vagina. The second method involves direct placement of the tampon within the vagina with one's finger or a stake removably emplaced in the rear of the tampon.

The present invention relates to the first of these methods of insertion involving use of a tampon holder, or inserter, which contains the tampon prior to insertion and which is itself inserted into the vagina before tampon ejection. Subsequent to tampon placement, the insertion device is removed and discarded.

Inserters of this general type are extensively shown in the prior art and have been in use for many years. Typically, they comprise a generally tubular body formed from cardboard or plastic and have a mating ejection means extending from an opening in their rear end. The tampon, which comprises an absorbent material formed into a cylindrical shape, is contained in the front portion of the inserter and has a removal string extending out the back of the tubular body part of the inserter adjacent to or through an opening in the ejection means.

Various configurations for container and ejection means pairs have been proposed to facilitate the manufacture, handling, placement and removal of the inserter as well as ejection of the tampon. These have included forming the components from materials having different physical properties; varying the size and shape of the inserter, ejection means or tampon; and, of particular pertinence to the present invention, modifying the front end of the inserter to ease insertion into the vagina and prevent irritation, scratching or the capture and pulling of pubic hairs.

The prior art developments most closely related to the present invention involve the reconstruction of the forward end of the inserter to form a partially, substantially, or completely closed, tapered insertion end which will open sufficient to permit passage of the tampon during ejection. Such an insertion end, which may be formed in different shapes for convenient insertion, assists in parting the vaginal walls slowly to guide the inserter into proper position and resiliently gives way upon ejection of the tampon.

An early attempt at forming such a temporary closure is shown in U.S. Pat. No. 2,178,840 to Lorenian wherein it is disclosed that the front barrel portion of a medicament inserter is cut in a sawtooth manner to yield upstanding triangular projections which are converged inwardly to form a dome-shaped insertion end. A plunger is provided at the rear of the inserter and, upon actuation, pushes the medicament contained within the inserter through the temporary closure and forces the converged triangular projections to extend substantially to their original upstanding configuration to permit passage of the medicament and deposit within the body.

Subsequent refinements on the basic teaching of the Lorenian Patent have indicated that, while the basic design proposed by Lorenian will assist in positioning a tampon inserter within the vagina, its construction has certain inherent disadvantages in use which subsequent patentees have sought to overcome.

A better understanding of the advantages and disadvantages of the various tampon inserter constructions of the prior art will be had by a brief review of the requirements for an optimized tampon inserter of the general type disclosed in the Lorenian Patent.

The front barrel portion of the tampon inserter is typically cylindrical, having a diameter and length which are predetermined to contain a tampon of sufficient capacity. Its length must be sufficient to permit insertion within the vagina and to extend within the vagina a sufficient distance to place the tampon beyond the introital region of the vagina which, due to its high sensitivity, is not suitable for contact with the tampon over an extended period of time. The barrel portion of the tampon inserter, and particularly its leading edge, must be constructed of a material which will not irritate the introital region of the vagina during insertion. At the same time it must have sufficient wall stability to prevent its distortion or collapse during handling, shipping and the manipulations which are necessary for insertion. This is particularly important during the actual thrust of insertion which is accomplished solely by a force being applied at the rear end of the barrel portion of the inserter. Not only will collapse or distortion of the insertion end present problems of discomfort, but also such distortion can, through frictional engagement with the tampon, raise the force necessary to expel the tampon into the body.

Thus, while the use of a dome-shaped tip at the ejection end of the tampon inserter has the potential to ease insertion, a major problem has existed in constructing an insertion tip that is sufficiently flexible and yieldable to permit easy ejection of the tampon. The forward movement of the tampon must spread the discrete projections which make up the shaped end to form an opening which will permit passage of the tampon without prohibitively increasing the manual force or ejection pressure required on the ejection means at the rear of the inserter.

The need for a highly stable wall over the major portion of the front barrel of the inserter and simultaneously a highly flexible forward insertion end has presented at least one obstacle which may have prevented

the commercial success of this type of arrangement. To maintain the smooth surface of the insertion member it is desirable that the barrel portion and insertion end, of the inserter be formed from the same material. In an apparent attempt to deal with this problem Lorenian employed a large number (the drawings seem to show at least twelve) of triangular projections at the forward end of the inserter to obtain the necessary flexibility of these projections to permit easy ejection of the inserter contents. Not only does the use of such a large number of projections present difficulties in fabrication, since it is necessary to conform each of these in a precise manner to obtain the closure, but also it presents many lateral side edges which, if out of registry, can present problems of irritation.

Subsequent patentees have sought to alleviate the need for a large number of projections by attempting to obtain the necessary flexibility in other ways.

Typical of these proposed solutions are U.S. Pat. No. 2,413,480 to Winter which discloses the adhesion of an insertion tip of a different material from that of the main body of the tampon inserter to the forward end of the inserter barrel. This construction permits the barrel to be formed of a material having greater wall stability and the insertion tip to be formed from a more flexible material. While accomplishing its intended purpose of tailoring the strength of the materials of construction to the particular requirements of their application, it can be seen that such a construction requires the use of an additional component, the insertion tip. This requires the separate fabricating step of adhering the tip to the inserter barrel and introduces the possibility of the tip coming loose during use and deposit of same within the vagina. The resultant product also provides an inserter with an external ledge which may create an irritation problem upon withdrawal of the inserter. U.S. Pat. No. 3,499,447 to Mattes et al. discloses a similar two-piece inserter barrel element.

Attempts at fabrication of a one-piece front barrel have usually sought to overcome the high ejection pressure problem referred to above by either only partially forming an insertion end (U.S. Pat. No. 3,717,149 to Morane and U.S. Pat. No. 2,754,822 to Emelock); by forming a "hinge" at the base of the tip to increase flexibility of the triangular segments which form the tip (U.S. Pat. No. 3,433,225 to Voss et al.); or by providing camming devices on the interior walls of the triangular members to assist in removing the apexes of the triangular members from the path of the tampon as it is ejected from the inserter (U.S. Pat. No. 3,628,533 to Loyer).

In some instances, prior workers have employed dome-shaped tampons within this general type of inserter thus, providing an assist to the ejection process.

While the attempts of the past have been many, to date there has yet to be a simple, easily and economically constructed inserter, of the general type described which has enjoyed large commerical acceptance.

OBJECTS OF THE INVENTION

It is an object of this invention to provide a tampon inserter which has sufficient strength to withstand handling and manipulation prior to and during tampon ejection and yet has a substantially closed insertion end of triangular petals which are sufficiently flexible to permit ejection of a tampon upon application of an acceptable ejection pressure to the ejection means of the inserter.

SUMMARY OF THE INVENTION

In accordance with the present invention there is provided a tampon inserter of the general type comprising a substantially cylindrical, hollow tubular member adapted to contain a tampon and having a tapered front insertion end and an opening in its rear end. An ejector, in telescoping relation with the tubular member, extends through the opening in its rear end and is adapted to eject a tampon from the front end of the tubular member. The tapered front insertion end is formed from a plurality of resilient substantially triangular segments which are integrally formed as part of the tubular member and have their bases extending circumferentially around the tubular member and their sides and apexes converging to form an end of desired shape. The mean cross-sectional wall thickness of the cylindrical portion of the tubular member is of a predetermined thickness sufficient to provide wall stability to the tubular member prior to, during, and following tampon ejection. The mean cross-sectional wall thickness of the triangular segments is of a predetermined thickness sufficient to provide flexibility to the segments during tampon ejection, the mean wall thickness of the triangular segments being substantially less than the mean wall thickness of the cylindrical portion of the tubular member. Thus, there is provided a tampon inserter having a tampon-containing tubular member of sufficient strength to withstand normal forces applied during handling, insertion, tampon ejection and inserter removal, and an integrally formed insertion end which is of substantially less thickness than the tubular member to provide a resilient closure which is sufficiently flexible and supple to permit tampon ejection at an acceptable tampon ejection pressure but is stable to deformation in handling, storage and shipping.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more particularly described with reference to the accompanying drawings in which:

FIG. 1 is an enlarged perspective view of a catamenial device in accordance with the present invention;

FIG. 2 is a cross-sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view, similar to that of FIG. 2, but showing an alternate embodiment of the invention;

FIG. 4 is a front view of a catamenial device taken along line 4—4 of FIG. 1;

FIG. 5 is a perspective view of the front barrel portion of a thermoplastic tampon inserter in accordance with the present invention shown after molding but prior to fabrication of the insertion end;

FIG. 6 is a perspective view, partially in cross-section, showing the fabrication of the insertion end on a catamenial device including the front barrel component shown in FIG. 5;

FIG. 7 is a perspective view showing tampon ejection in a catamenial device in accordance with the present invention;

FIG. 8 is a perspective view showing the catamenial device of FIG. 7 subsequent to tampon ejection.

DETAILED DESCRIPTION OF THE DRAWINGS AND PREFERRED EMBODIMENTS

The catamenial device of the present invention, as depicted in the drawings, comprises a tampon inserter, generally designated **10** which contains, and is constructed to permit insertion within the vagina of, an absorbent catamenial tampon, generally designated **12.** Tampon inserter **10** comprises an elongated, generally cylindrical, front barrel member **14** which tapers at its rear end to a cylindrical finger grip **16** of lesser diameter than the front barrel member and including a plurality of spaced external circumferential ribs **18** which provide finger grips to facilitate use of the inserter. An ejection means, such as a cylindrical plunger **20** is provided at the rear of the front barrel member **14** extending through the cylindrical finger grip **16** into the interior of the front barrel member.

The absorbent catamenial tampon **12** comprises an absorbent material, e.g. rayon, formed into a generally cylindrical shape **22,** having a withdrawal string **24** securely fastened to its rear end at fastening point **26** and having its free end extending through the cylindrical plunger **20.**

The forward end of the front barrel member **14** is fabricated into an insertion tip **28** comprising a generally hemispherical dome formed from converged triangular segments **30** which are integrally formed from the same material of construction as the front barrel member **14** and are extentions of the forward terminus of the front barrel member. The number, size and shape of these triangular segments are selected to yield an insertion tip of the desired configuration. Preferrably six triangular segments are employed and are converged (see FIG. **4**) in a manner which minimizes the space **32** between the individual segments and yet forms the desired shape without segments overlapping on their sides or at their tips **34.** Additionally, the tips **34** are preferrably rounded to further reduce the possibility of overlapping at their juncture and to prevent possible scratching of vaginal tissue during use.

As can best be seen in FIG. **2,** the embodiment of the invention there depicted has a front barrel member having a wall thickness which is at its maximum in the area of the finger grip **16,** becomes progressively thinner as it approaches the forward end of the inserter, and has its thinnest area at the tips **34** of the triangular segments **30.** Through such a construction, the wall thickness along the major tubular portion of the length of the front barrel member **14** of the inserter is of a predetermined sufficient thickness to give product stability during storage and handling and to prevent wall collapse during the manipulations and application of forces which are sustained by the barrel member during insertion, tampon ejection and subsequent removal of the inserter. The finger grip **16,** having a wall thickness which is greater than that of the major portion of the front barrel member **14,** is sufficiently stable to permit it to withstand the compressive forces which are exerted on the finger grip during insertion and additionally aids in preventing the cylindrical plunger **20** from becoming disengaged from the front barrel member of the inserter by exerting a uniform force on the plunger prior to, during and after tampon ejection. The cross-sectional wall thickness of the insertion tip **28,** on the other hand, being thinner than that of the main body portion of the front barrel member **14** is sufficiently flexible and supple to feel soft during insertion of the device into the vagina and to permit easy passage of the tampon through the opening which it creates in the insertion tip during ejection. The rate of taper of the wall thickness may be uniform for the entire length of the front barrel member, but preferably accelerates as it approaches the front end of the member. Such a construction maintains wall thickness at a high level over a maximum length of the tubular portion of the front barrel member.

A second embodiment of the invention is shown in FIG. **3** of the drawings wherein the various components are identical to those shown in FIG. **2** except that the tapering of the wall thickness of the front barrel member **14** is accomplished through an abrupt step **36** in the interior surface of the wall at a point near the insertion tip **28** but below the bases of the triangular segments **30.** This step **36** also permits continuation of the thickened portion of the tubular body of the front barrel member **14** for a major portion of the length of the tubular body thereby providing a high degree of wall stability to the front barrel member **14** over its entire length.

The method of fabricating and using the catamenial device of the present invention is shown in FIGS. **5** through **8** and is identical for either the embodiment of FIG. **2** or that of FIG. **3** of the drawings. The external appearance of the catamenial device, e.g. FIGS. **1** and **4,** will also be substantially the same for both embodiments.

The material of construction of the tampon inserter of the present invention is not critical and numerous materials such as carboard and thermoplastics, have been widely used in the past. The material for use in this invention must be capable of being formed into various thicknesses in closely adjacent areas. This can be accomplished in cardboard laminates by omitting certain of the laminate layers from specific portions of the fabricated components but is more easily accomplished through molding techniques employing thermoplastic materials. Therefore, thermoplastics, and particularly polyolefins, are preferred materials of construction of the tampon inserter of the present invention with polyethylene being particularly preferred due to its low cost, availability and ease of molding.

FIG. **5** of the drawings shows the front barrel member **14** of the tampon inserter **10** formed from polyethylene subsequent to molding but prior to assembly into the completed tampon inserter. It can be seen from this drawing that the front barrel member of the inserter is molded with its tubular main body portion, cylindrical finger grip **16,** circumferential ribs **18** and triangular segments **30** as integral components of a one-shot injection molded piece. The triangular segments **30** are molded in an "open" configuration, i.e. extending parallel to and as a continuatoin of the circumferential wall of the front barrel member **14** of the inserter. The front barrel member is also molded to its desired wall thickness including any differences in wall thickness which are required to obtain the combination of high body strength and insertion tip flexibility which are desired.

With regard to molding a component of this type, it will be obvious to those skilled in the art that the configuration of the component requires that the injection mold have a draft which will provide the component with a small degree of wall taper and possibly that the

diameter of the component will be slightly greater at the forward end than at the rear. This is necessary to permit the molded component to be removed from the mold and, in components of this general type, usually ranges from about 0.001 to about 0.003 inch in decreased wall thickness over the entire length of the cylindrical portion of the front barrel member of the inserter. The decrease in wall thickness provided in the tampon inserter of the present invention is substantially in excess of that required for mold draft. The term "substantially in excess", "substantially greater" or similar language, as used herein, is intended to mean "at least 50 per cent greater" but may well exceed 50 per cent. Typically, therefore, the cross-sectional thickness of front barrel member of inserters in accordance with this invention will be at least 0.005 inch less at the tips of the triangular segments or petals of the insertion tip than at the rear end of the cylindrical portion of the front barrel member. Preferably, the mean cross-sectional thickness of the petals will be at least 0.005 inch, and most preferably at least 0.0075 inch, less than the mean cross-sectional thickness of the cylindrical portion of the front barrel member.

A typical front barrel member for a tampon inserter of the present invention, as molded, i.e. with the forward triangular segments of the insertion tip fully extended, would measure about three inches in overall length and would have an external diameter, at its widest point, of about 0.6 inch. Typical wall thicknesses for such a front barrel member would be approximately 0.04 inch at the finger grip (Section A of FIG. **2**), 0.028 inch at the rear end of the elongated cylindrical portion of the front barrel (Section B), 0.025 inch at a point approximately two-thirds of the way forward (Section C) on the elongated cylindrical barrel member, 0.0217 inch at the base (Section D) of the triangular segments, and 0.015 inch at the tips (Section E) of the triangular segments. It can be seen, therefore, that maximum thickness is provided in the finger grip portion of the barrel member to increase the strength of this portion since it will receive the greatest handling and force exertion. The wall thickness is then decreased and is fairly constant over approximately two-thirds of the cylindrical portion of the barrel member to provide the required degree of strength but not to the extent present in the finger grip. The wall thickness then tapers sharply as it approaches the forward tips of the triangular segments to provide increased flexibility to these segments to facilitate tampon ejection.

After molding, the front barrel member is provided with an ejection means and the tampon is loaded. The ejection means may comprise a cardboard, wooden, thermoplastic or thermoset rod or tube which, as shown in the drawings, extends through the opening in the finger grip of the inserter and is of a size and configuration sufficient to check inadvertent removal from the inserter. This may be accomplished by forming the tube in a somewhat oval shape to exert a transverse pressure on the internal walls of the cylindrical finger grip and thereby increase the friction between the two components. In addition the end of the thermoplastic tube within the front barrel member of the inserter may be flared slightly to a diameter greater than the passage in the finger grip to prevent the tube from being inadvertently withdrawn from the rear end of the barrel member.

The tampon may be formed of any material and in any size and configuration which can be loaded into the inserter of the present invention and ejected from same. Typically, the tampon will be formed from an absorbent material, e.g. absorbent cotton, rayon, sponge etc., and will be formed into an elongated cylindrical shape. The relative diameters of the tampon and internal wall of the inserter should be tailored in a manner such that the tampon will not be so loosely contained within the inserter as to move about nor should it be so tight as to undesirably increase the ejection pressure required for insertion.

It is apparent from FIG. **5** of the drawings that, since the finger grip **16** is of less diameter than the main body portion of the front barrel member **14,** it is necessary that the tampon be loaded into the barrel member through its front end. The assembly of the inserter components involves the insertion of the telescoping plunger **20** through the finger grip **16** and the placement of the tampon **12** in the front barrel member **14** with the withdrawal string **24** extending through the plunger **20.**

After assembly, the insertion tip **28** of the tampon inserter may be formed as shown in FIG. **6** by forcing the front end of the inserter into a shaped heated die **38** wherein the triangular segments **30** are converged inwardly to form an insertion tip of desired shape. The die **38** is brought to a temperature sufficient to heat the thermoplastic material of the triangular segments but lower than that which would melt the thermoplastic. After the triangular segments are brought to appropriate shaping temperature, the die is cooled to set the segments in the desired configuration. This can be accomplished in an electrically heated die by merely turning off the electrical current but may be done more quickly by externally cooling the die after the current is turned off.

The manner of using the inserter of the present invention involves placing the front barrel member of the inserter within the vagina a sufficient distance such that only the finger grip **16** and plunger **20** remain exposed. While the finger grip is held, a forward movement of the plunger will force the tampon through the insertion tip causing the flexible, supple triangular segments to part and closely adhere to the tampon as it emerges. As can best be seen in FIG. **7** of the drawings, the extended triangular segments conform closely to the sides of the tampon as it is ejected thereby preventing the possibility of pinching sensitive tissues or capturing pubic hair.

When the plunger is fully depressed (FIG. **8**), the tampon is set free of the inserter and the triangular segments again converge until they contact the forward end of the plunger. They remain there, partially closed and gripping the plunger, during withdrawal of the inserter to prevent retention of the plunger within the vagina or the closing of the triangular segments while being withdrawn through the introital region of the vagina.

It will be obvious to those skilled in the art that various modifications can be made in the specifics of the above description of the preferred embodiments of the invention without departing from the novel features described and claimed herein.

For example, with regard to the materials of fabrication, it has been described that polyolefins are the preferred materials of construction with polyethylene being particularly preferred. It will be obvious to those

skilled in the art that thermoplastics other than polyolefins as well as thermosetting materials will also be useful and that these may contain various plasticizers, fillers, anti-oxidants, dyes, etc., as are commonly used in thermoplastic molding or thermosetting. The choice and mixing of such materials to obtain a formed piece of proper physical properties and appearance is well within the ordinary skill of the artisan.

The shape of the insertion tip is also not critical to the present invention and, while a substantially blunt hemisperical tip is preferred, other shapes will also be useful. For example, more pointed, steeple-shaped, frusto-conical or parabolic tips may also be used.

The number of segments or petals employed to form the tip may also be modified but here it has been found that the use of six petals is particularly preferred. To facilitate molding from a thermoplastic material it is desirable that the number of petals be even since mold fabrication is thereby simplified.

In addition, as the number of petals decreases, the length of the curve at the base of each petal increases. Conversely, as the circumference of the front barrel member decreases, the radius of curvature of the base of the individual petals also decreases. In both instances the force required to set the petals into the desired configuration and to straighten the petals during tampon ejection is substantially increased.

As the number of petals increases, ejection pressure is reduced but difficulties are encountered in forming a smooth closure and controlling the individual petals during and after tampon ejection.

The height of the individual petals is preferrably less than the diameter of the front barrel member of the inserter to minimize the possibility of a tip of one of the petals being exposed by extending beyond the circumference of the front barrel member should the petals inadvertently collapse during use. The significance of this constructional feature can be appreciated from FIG. 5 of the drawings wherein it can be seen that, if the petal length is longer than the diameter of the barrel and if the petals collapse inwardly, it would be possible for one of the petals to overlie the front end of the barrel and extend beyond its circumference on the opposite side of the barrel. A petal tip extending in this manner could cause irritation during placement or withdrawal of the inserter.

In addition, to minimize the possibility of the edges of the petals from irritating or scratching, the tips are preferably rounded and the edges are preferably feathered to further enhance the flexibility and supple texture of the petals.

As can be seen in FIG. 4, the petals are preferably arranged with their sides as close as possible, within the tolerances of mass production techniques, but do not overlap either at their side edges or their tips. Such a configuration is referred to herein as being "closed", but it is to be understood that this terminology is intended to permit a slight spacing, e.g. of the order of about 0.010 to 0.025 inch, between petals. The blunted tips of the petals will also usually be separated by a space of about 0.040 to 0.075 inch.

The finger grip of the inserter may also be modified to provide a grip which is of the same circumference as the front barrel member or is of greater circumference than this member. In this latter instance, where the finger grip extends beyond the circumference of the front barrel member, it may be provided as a collar around the base of the barrel member and may leave the rear end of the barrel open for substantially its entire diameter. This type of construction, which is well known in the art, permits loading of the tampon and ejection means from the rear of the front barrel member. Such a construction will permit the injection molding of the petals into the desired configuration at the same time the front barrel member is molded or will permit post-forming of the insertion tip with mating mold members. The embodiments of the invention shown in the drawings allow fabrication of the insertion tip with only a female die and only through a post-forming technique.

Other modifications of the present invention will be obvious to those skilled in the art from the foregoing teachings. Moreover, while the present invention has been described with reference to many particular details thereof, it is not intended that these details shall be construed as limiting the scope of the invention.

What is claimed is:

1. A tampon inserter comprising a barrel member adapted to contain a tampon and an ejection means in telescoping relation with said barrel member, said barrel member having a substantially cylindrical, hollow tubular body and a tapered front insertion end comprising a plurality of resilient substantially triangular segments having their bases integral with said tubular body and their sides and apexes converged toward each other to form said insertion end, said tubular body having a predetermined mean cross-sectional wall thickness sufficient to provide wall stability to said tubular body and said triangular segments having a predetermined mean cross-sectional wall thickness which is substantially less than that of said tubular body such that the flexibility of said segments is increased while the overall strength and stability of the major portion of said tubular body is maintained.

2. The tampon inserter of claim **1** wherein said tubular body and said triangular segments are thermoplastic and are integral members of a single injection molded thermoplastic piece.

3. The tampon inserter of claim **1** wherein said tubular body and said triangular segments are integrally formed of thermosetting plastic.

4. The tampon inserter of claim **1** wherein said tubular body and said triangular segments each comprise a plurality of layers of cardboard, said tubular body having more layers than said triangular segments.

5. The tampon inserter of claim **1** wherein the cross-sectional wall thickness of said tubular body is greatest at its rear end and less at the bases of said triangular segments.

6. The tampon inserter of claim **1** wherein the cross-sectional wall thickness of said triangular segments is greatest at the bases of the segments and tapers toward the apexes of the segments.

7. The tampon inserter of claim **1** wherein the cross-sectional wall thickness of said barrel member continually decreases from the rear of the tubular body of the member to the apexes of the triangular segments which form the insertion end.

8. The tampon inserter of claim **7** wherein the rate of decrease in wall thickness is uniform over the entire length of the barrel member.

9. The tampon inserter of claim **7** wherein the rate of decrease in wall thickness accelerates toward the insertion end of said barrel member.

10. The tampon inserter of claim 7 wherein a step is provided on the interior wall of said barrel member and extending circumferentially around the interior of said member to obtain a substantial decrease in wall thickness over a relatively short length of said barrel member.

11. The tampon inserter of claim 1 wherein said barrel member further includes a circumferential finger grip at the end of said tubular body opposite said insertion end, said finger grip having a cross-sectional wall thickness greater than that of said tubular body.

12. The tampon inserter of claim 1 wherein said barrel member and said ejection means are thermoplastic and the cross-sectional wall thickness of said barrel member continually decreases at a rate which accelerates toward the insertion end of said barrel member.

13. The tampon inserter of claim 1 wherein said barrel member is thermoplastic and includes an integrally molded finger grip at the end of said barrel member opposite said insertion end, the mean cross-sectional wall thickness of the tubular body of said barrel member being substantially greater than that of said insertion end and substantially less than that of said finger grip.

14. The tampon inserter of claim 13 wherein said finger grip is cylindrical and is of less diameter than said tubular body.

15. The tampon inserter of claim 1 wherein said insertion end is substantially hemispherical in shape and is comprised of six substantially triangular segments having their sides and apexes approaching each other and having a length, from their bases to the apexes less than the diameter of said tubular body.

16. A tampon inserter comprising a polyethylene barrel member adapted to contain a tampon and an ejection means in telescoping relation with said barrel member, said barrel member having a tubular body, an insertion tip at one end of said tubular body and a cylindrical finger grip of less diameter than said tubular body at the opposite end of said tubular body, said finger grip having a cross-sectional wall thickness sufficient to withstand the forces applied to said finger grip during use and greater than that of the major portion of said tubular body, said tubular body having a cross-sectional wall thickness over the major portion of its length substantially greater than that of said insertion tip, said insertion tip comprising a plurality of resilient upstanding projections bent inwardly into a predetermined desired tapered configuration to facilitate placement of said tampon inserter within the vagina, said upstanding projections, tubular body and finger grip being integral parts of a single molded component.

17. The tampon inserter of claim 16 wherein the cross-sectional wall thickness of said tubular body continually decreases from a point proximate said finger grip to the furthest extension of said upstanding projections.

18. The tampon inserter of claim 16 wherein said upstanding projections are substantially triangular segments having their bases extending around the circumference of said tubular body and their sides and apexes converged to a substantially closed dome-shaped insertion tip.

19. A tampon inserter comprising a thermoplastic barrel member adapted to contain a tampon and an ejection means in telescoping relation with said barrel member, said barrel member having a tubular body, an insertion tip at one end of said tubular body and a finger grip at the opposite end of said tubular body, said tubular body having a cross-sectional wall thickness over the major portion of its length substantially greater than that of said insertion tip, said insertion tip comprising a plurality of resilient upstanding projections bent inwardly into a predetermined desired tapered configuration to facilitate placement of said tampon inserter within the vagina, said upstanding projections, tubular body and finger grip being integral parts of a single molded component.

20. The tampon inserter of claim 19 wherein the cross-sectional wall thickness of said tubular body continually decreased from a point proximate said finger grip to the furthest extension of said upstanding projections.

21. The tampon inserter of claim 19 wherein the mean cross-sectional wall thickness of the upstanding projections of said insertion tip is at least 0.0075 inch less than the mean cross-sectional wall thickness of said tubular body.

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