United States Patent

Kokx et al.

[15] **3,706,311**

[45] **Dec. 19, 1972**

[54] **SELF-SPREADING CATAMENIAL TAMPON**

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[52] **U.S. Cl.** **128/285**

[51] **Int. Cl.** **A61f 13/20**

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

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[57] **ABSTRACT**

A self-spreading catamenial tampon made from a bundle of uncompressed absorbent material and a mechanical spreader inside the bundle which immediately spreads the folded legs of the tampon when the tampon is ejected from an inserter. The tampon is oriented within the vagina so that its spreading will be in a lateral direction and it is inserted just above the introital region. The immediate spreading allows the tampon to immediately contact the lateral walls of the vagina thereby spanning the vaginal passageway and minimizing bypass failures.

12 Claims, 8 Drawing Figures

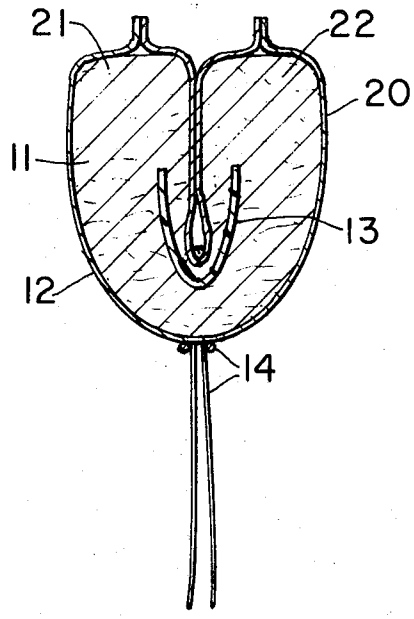

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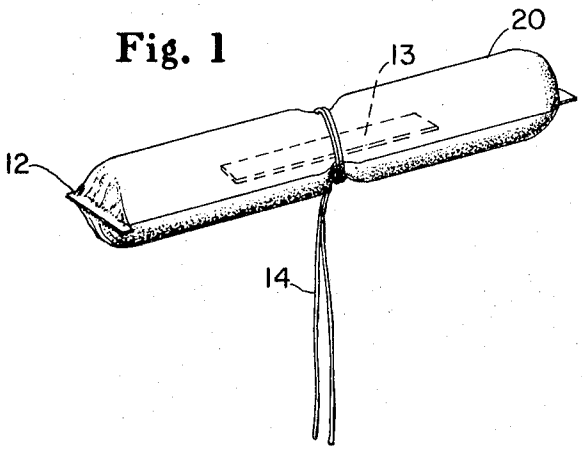
Fig. 1



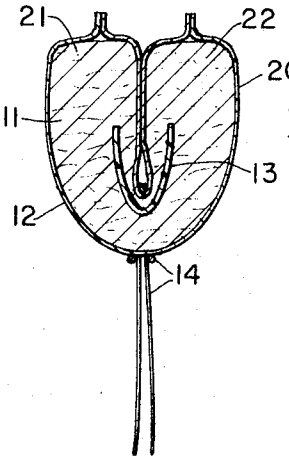


Fig. 2

Fig. 3

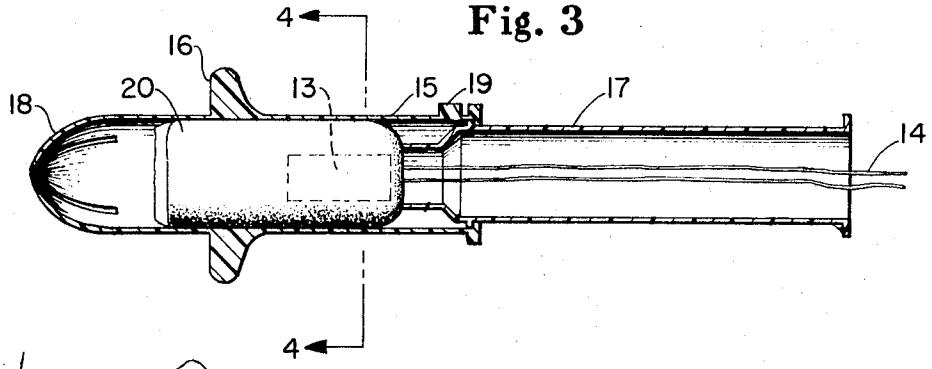


Fig. 5

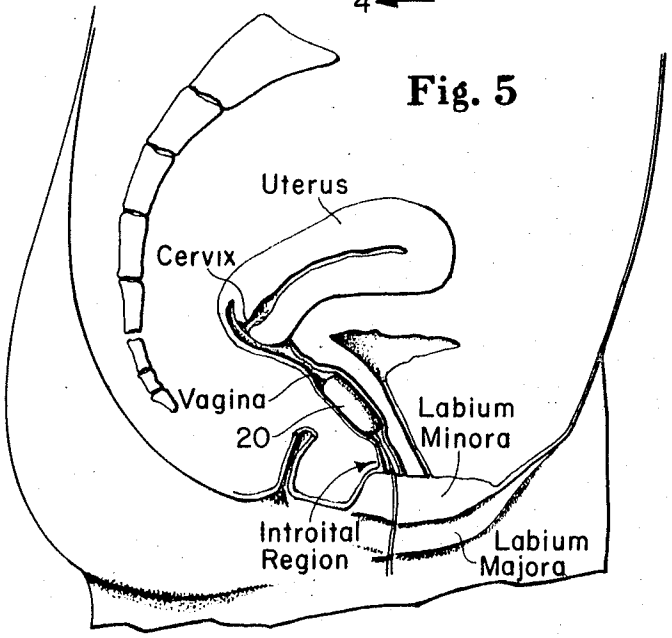


Fig. 4

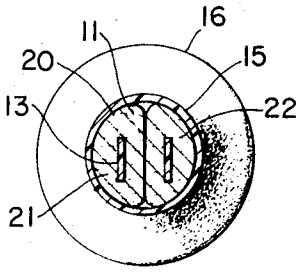


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Fig. 6

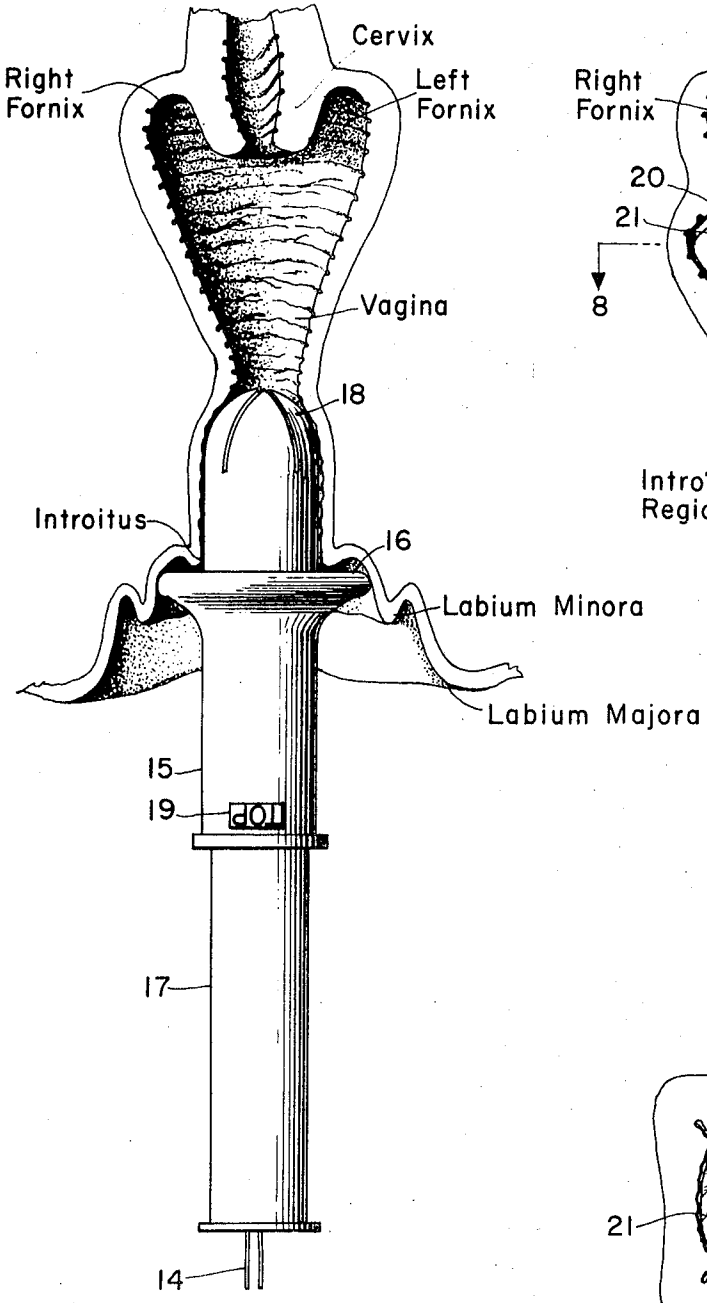


Fig. 7

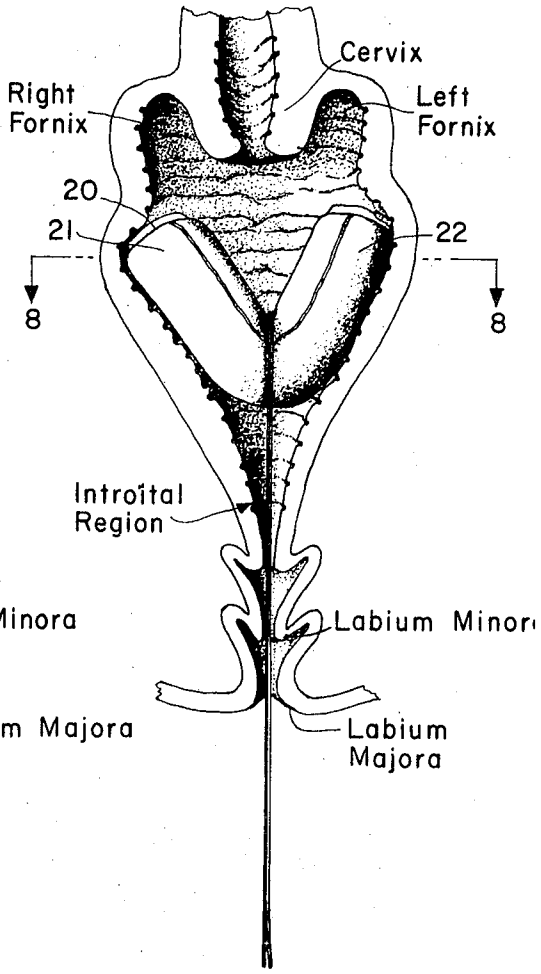
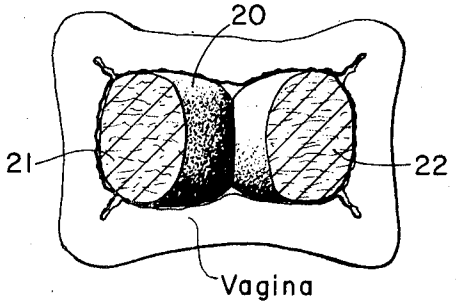


Fig. 8



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SELF-SPREADING CATAMENIAL TAMPON

FIELD OF THE INVENTION

This invention relates generally to improvements in absorbent catamenial tampons and a method of inserting them to substantially reduce menses bypass; more particularly it concerns tampons containing an interior potential energy source which acquires energy when the tampons are compacted for insertion and thus immediately spreads the tampon when the tampon is released.

DESCRIPTION OF THE PRIOR ART

Anatomy references teach that the expanded vaginal vault has a shape similar to the shape of a pear which has been slightly flattened whereby the anterior-posterior dimension is less than the lateral dimension. Menstrual fluid enters in the upper portion of the vagina through the cervical os which is located in the region where the vagina is most distensible and therefore has its maximum potential cross-sectional area. The vagina is least distensible near the introitus and therefore the potential cross-section is reduced. Also, the introital region of the vagina is more sensitive to outwardly directed pressures than the remainder of the vagina.

Methods of collecting the recurring menses which flow periodically from females during their child bearing years are many and varied and are generally well-known to those skilled in the art. All methods proposed fall into one of the following two general classifications: retentive and absorptive means. Retentive means are those which form an impervious dam across an internal canal; these are generally in the form of a rubber cap or diaphragm which prevents flow from passing them, thereby damming up the menses using an internal organ as a reservoir. Retentive means generally fall into two main classes: devices which are intended to cover or contact the cervix of the uterus and devices which are intended to lie in the vaginal canal below the level of the cervix.

Absorptive devices can also be placed into two broad categories — interior and exterior devices. Exterior devices are generally in the form of pads and probably are the most commonly used type of menstrual sanitary device, but they are unsatisfactory for a variety of reasons. Some of these reasons are physical discomfort from the bulkiness of the pad, self-consciousness that its presence may be discerned by others, emotional discomfort because the bulk of the pad constantly reminds the user that it is there, odors accompany the exposure of the menses to air, and a generally unhygienic and nonaesthetic character.

Internal absorptive devices generally in use are fibrous assemblies which are highly compressed into 1½ – 2 inches long cylinders approximately ½ inch in diameter. These products do not expand in a cross-sectional direction until contacted with body fluids. Prior art insertion techniques are designed to achieve placement of the tampon deep (2¼ inches – 2½ inches) in the vagina near the point of fluid entrance, i.e., near the cervical os, and thereby avoid placement near the introitus to avoid wearing discomfort. Deep insertion to a position where the collapsed vaginal vault contains many folds and convolutions coupled with the small cross-sectional area of the compressed tampon

frequently results in bypass failures, i.e., the menses discharged from the cervical os travels the length of the vagina without contacting the tampon and thereby escapes through the introitus without being absorbed. Bypass failures occur because the deeply inserted, compressed tampon cannot block the many folds and convolutions of the vagina in that deep region, but the menses can and does flow through these folds and convolutions and ultimately through the introitus to soil the woman's clothing and possibly cause her embarrassment.

Each of the attributes associated with the generally available tampons, i.e., cylindrical in shape, highly compressed material, deeply inserted, and expanded by the menses, contributes towards lessening the effectiveness of these tampons in that (1) the cross-section of the vagina is not circular therefore a cylinder is not the best shape to use to block the vagina, (2) the high compression and resultant high density dictates that the tampon, upon insertion, is relatively small and has literally no inherent resiliency to immediately expand it, because the hydrogen bonding which accompanies the high compression precludes elastic response, (3) deep insertion locates the tampon in a part of the vagina where the potential vaginal cross-section is the greatest, this means the tampon is in contact with a smaller percentage of the vaginal periphery whereby the probability of bypass increases, and (4) since these tampons rely on moisture to expand and block a cross-section of the vagina, if they are located so that bypass occurs, they are never wetted and consequently continue to fail.

Some devices have been attempted which try to overcome one or several of these disadvantages, but they fail in that they do not overcome all of the disadvantages or that they have their own peculiar attendant disadvantages. Some tampons have non-circular cross-sections, which is an attempt to conform the tampon to the shape of the vagina. But generally these tampons are highly compressed to facilitate insertion and thus have a high density, are inserted deep, and require moisture to break the hydrogen-bonded structure before they can expand. Thus they do not alleviate the problem of bypass.

Some tampons attempt to solve the problem of bypass by being structured so that they form an arc when they are ejected and released into the vagina. The theory is that they will arc across the vagina and thereby form a barrier from one wall to the other. But, they do not solve the problem of bypass because they are highly compressed and deeply inserted, therefore they can be inserted into one of the vaginal fornices and, figuratively, become lost. Since they do not actually span the vaginal passage, they do not solve the problem of bypass.

Another approach to solving the problem of bypass is shown in U. S. Pat. No. 3,512,538 which is an expandable catamenial tampon in the form of an elongate hollow shell of absorbent material with an inner sack which may be semipermeable or impervious. The tampon is inserted into the vaginal canal in a collapsed condition and then expanded in place so as to form a flexible seal with the vaginal wall to prevent by-pass of menses. The disadvantage of this approach is that expanding the tampon requires a secondary operation after the

tampon is inserted which comprises manipulation of a pressure creating device and a filler tube which bridges between the pressure creating device and the inner sack of the tampon. This has a serious psychological disadvantage because the user is inflating a device inside herself and this could be extremely distasteful to many potential users.

An intervaginal device, for proper function per se, must satisfy mutually contradictory criteria, as indicated by the following anatomical facts. (1) The entrance to the vagina is provided with a functional sphincter comprised of several muscles which form the main closure of the vagina. These muscles resist distention of the vaginal vestibule, hence, entry to the vagina proper. Consequently, the diameter of any intervaginal device should be small for easy, comfortable, and safe insertion. (2) Beyond this sphincter, the vagina per se is a flaccid organ, the walls of which are normally collapsed, touching one another to give a cross-section of roughly H-shape and hence capable of relatively great radial distention without appreciable resistance. Consequently — and contrary to the first requirement — an intervaginal occlusive device must be of relatively large diameter. (3) Another limitation is that contact between a tampon and the cervix is preferably to be avoided because contact with the cervix can possibly cause tissue irritation and infection.

Therefore a catamenial tampon should be (1) small enough in diameter to facilitate insertion into, and removal from, the vaginal cavity; (2) large enough in diameter to permit the tampon to substantially fill the cross-section of the vagina; (3) great enough in absorptive capacity to permit the tampon to be worn for an extended period of time during which it will accumulate the menses released and hold them without leakage; and (4) located so it is not in contact with the cervix. These contradictory requirements are difficult to reconcile.

Catamenial tampons are subject to three distinct kinds of failure: bypass, partitioning, and compression. Bypass failure occurs when the menses travels the length of the vagina without contacting the tampon, i.e., the tampon fails to intercept the flowing menses. This occurs because the tampon does not fill the cross-section of the vagina. Partitioning failure occurs when the menses flow rate past a particular area of the tampon is greater than the absorption rate of the tampon in that area. Thus, although some of the menses is absorbed, that flow which is greater than the absorption rate of the tampon proceeds past the tampon and out the introitus. Compressive failure occurs when the user inadvertently brings pressure to bear on a tampon which has absorbed menses, and this pressure is great enough to "squeeze" the menses from the tampon. Since this pressure is generally exerted downward, the menses is expelled from the tampon at its lower end and therefore the expelled menses is free to flow unobstructed from the vagina.

OBJECTS OF THE INVENTION

It is the primary object of this invention to provide a tampon which spreads immediately thereby obstructing the vagina and preventing bypass of the menses.

It is a further object of this invention to provide a tampon which contains an interior source of potential energy so that it is self-spreading upon release, therefore manipulations subsequent to the actual insertion of the tampon are not required to seat the tampon.

An additional object is to provide a tampon which is compatible with the non-circular cross-section of the vagina and the irregularities present in the vaginal walls.

It is a further object of this invention to provide a tampon which can take advantage of the general "funnel" shape of the vagina in that it can be placed in the lower portion of the vagina without discomfort or danger to the user.

Other objects and advantages will become apparent to those skilled in the art from the detailed specifications and the attached drawings.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention a tampon made of absorbent material is provided with an internal, self-acting mechanical spreader such that the absorbent material and the spreader may be folded over on themselves prior to and during insertion. When the tampon, is ejected from the inserter, the spreader automatically causes the legs of the tampon to spread within the vagina when the tampon is released. The spreader causes the absorbent material to assume a larger cross-section which more effectively fills the vagina cross-section and does so immediately without relying on external manipulations or internal fluids to expand the absorbent material. Therefore the tampon of this invention is both dry-spreading and self-spreading with the spreading being primarily along one axis of the tampon's cross-section.

In accordance with another aspect of the present invention there is provided a novel method of placement of the self-spreading catamenial tampon such that the tampon is angularly oriented whereby the spreading will be in a lateral direction, i.e., along the major axis of a vagina cross-section, such that the orientation of the tampon is predetermined in order that the tampon cross-section conforms to the shape of the vagina. In addition to being oriented during insertion, the tampon is limited in its depth of insertion so that it is placed just above the introital region of the vagina. This places the tampon towards the bottom of the funnel shaped vagina such that it blocks substantially the entire cross-section of the vagina.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features which are believed to be characteristic of this invention are set forth with particularity in appended claims. The invention itself, however, both as to its structure and its method of insertion, may best be understood by reference to the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a self-spreading catamenial tampon before the tampon has been folded to a V-shape or compressed to facilitate insertion;

FIG. 2 is a front cross-section of a self-spreading tampon which has been folded at its longitudinal center;

FIG. 3 is a fragmentary side view partially in cross-section showing a self-spreading catamenial tampon within an inserter;

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is a vertical anterior-posterior section of the pelvic area of the female body showing the application and placement of the present invention in use;

FIG. 6 is a substantially front sectional view of a portion of the pelvic area of the female body taken in a plane through the cervix and introitus and showing the position of an inserter immediately prior to ejecting a tampon into the vagina;

FIG. 7 is a view similar to FIG. 6 which shows a tampon of the invention in position immediately after placement in the vagina and the inserter removed from the introital area;

FIG. 8 is a vertical, lateral section view of the vagina taken along line 8—8 of FIG. 7 and illustrates how the tampon of this invention fills the cross-section of the vagina.

While the invention will be described in connection with a preferred embodiment, it is to be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modification, and equivalences as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

The tampon of the present invention spreads immediately upon release independent of contact by body fluids, i.e., it is dry-spreading, and provides a means of positioning the tampon in the vaginal vault near the introitus where the enlarged cross-section of the tampon more completely fills the vaginal cross-section to thereby prevent fluid bypass. Improved performance results due to a decrease in the incidence of fluid bypass, yet is accomplished without causing wearing discomfort.

Turning first to FIGS. 1 and 2, there is shown the structure of the preferred embodiment. The tampon **20** has a main body comprised of a bundle of absorbent material **11**. Inside this bundle **11** is a spreading means which preferably comprises a single leaf flat spring **13** which acts as the mechanical spreader in the tampon of this invention. The bundle **11**, with the mechanical spreader **13** inside, is overwrapped with a nonwoven overwrap **12**. A withdrawal string **14** is then secured about the longitudinal center of the tampon.

The absorbent bundle **11** of FIG. 2 is preferably a sliver of carded rayon fibers overwrapped with the nonwoven material **12**. The cylindrical assembly, which can be round, elliptical or other shapes in cross-section, weighs about 2¾ grams, is about 3⅜ inches long, about 1 inch in diameter, and has a density before being compacted of about 0.07 gm/cc. The single leaf flat spring **13** is preferably made of polyethylene and is about 1/16 × 1/4 × 2 inches, but it can also be made of other materials well-known to those skilled in the spring art, e.g., other plastics, stainless steel, spring steel, plastic-coated steel, etc. It is positioned within the assembly, i.e., between the rayon and the overwrap or within the rayon sliver.

FIG. 2 is a cross-section of the tampon of this invention and better shows the construction and relative placement of the various parts of the tampon during placement within the vagina. The single leaf flat spring **13** is folded over to a substantially V-shape so that its inherent resiliency will create an outwardly directed force which acts to spread the two legs **21** and **22** of the folded tampon when the tampon is released. Note also that the nonwoven overwrap **12** surrounds the entire tampon and is sealed at the end of each leg, thereby eliminating any possibility of the absorbent material of the bundle **11** from sloughing off into the vagina.

The absorbent bundle **11** can be constructed from any absorbent material which will expand upon ejection from an inserter due to its natural resiliency. These materials can run the ambit from rayon, cotton, or similar absorbent fibers or combinations thereof, to sponges of regenerated cellulose, polyurethane or similar expanding open celled materials or any absorbent materials well-known to those of ordinary skill in the tampon and bandage art. The amount of absorptive material, its length and cross-sectional area can be varied, depending upon the tampon capacity desired and the length and diameter of the outer tube **15** of the inserter, shown in FIG. 3, so that the outer tube **15** is completely filled but yet the tampon **20** is ejectable from the outer tube **15** without the user exerting undue force. For an outer tube **15** with an inside diameter of about 0.65 inches, a tampon weight of from about 1.5 to about 3.5 grams is satisfactory, although for average conditions a weight of about 2.75 grams is preferred.

The overwrap **12** can be made of any of those well-known to those of ordinary skill in the tampon or bandage art. Preferably it is Chicopee Masslinn number 2494 which is available from the Chicopee Manufacturing Company. It is a line-bonded, nonwoven, rayon fabric. It has a weight of 18 grams per square yard.

To facilitate insertion into the body, the tampon **20** is deformed, i.e., folded in half, so it has a substantially V-shape as shown in FIG. 2 and is compacted slightly and placed in the outer tube **15** of a plastic telescopic tube inserter such that the tube **15** acts as a restraining means for the compacted tampon as shown in FIG. 3. Folding the tampon to substantially a V-shape compels the spring **13** to also assume substantially a V-shape. Folding the spring **13** loads it with potential energy so that it biases the tampon legs toward an open position. The inserter also has an inner tube **17** which slides within outer tube **15**. The tampon **20** is compacted to a density of from about 0.2 to about 0.4 grams per cubic centimeter (gm/cc), to place it within outer tube **15**. However, because the absorbent bundle **11** has not taken a high compression set, immediately upon ejection from the outer tube **15**, it expands due to its natural resiliency and the legs **21** and **22** of the tampon spread due to the action of the spring **13** whereby the tampon **20** has a cross-sectional area at least equal to the cross-sectional area that compressed tampons achieve only after complete contact with body fluids. Being uncompressed, the tampon **20** undergoes to axial expansion (growth) after positioning in the vagina.

Placement of a tampon **20** within an outer tube **15** is shown in FIG. 3 wherein the tampon is positioned with the legs **21** and **22** towards the tip **18** of the inserter. A reverse of that orientation is also feasible, whereby the legs **21** and **22** are positioned away from the tip **18** of the outer tube **15** so that upon insertion in the vagina, the legs **21** and **22** of the tampon would be towards the introitus. The cross-section of FIG. **4** gives another view of the tampon **20** as it appears within the outer tube **15**.

The tampon **20** is placed within the vagina by using an outer tube **15** which can limit the depth of insertion of the tampon. One possible embodiment of such an inserter is shown in FIG. **3**. The tampon **20** is loaded in the outer tube **15**. The inner tube **17** functions as a pushing element to eject the tampon **20** from the outer tube **15** and is assembled in position behind tampon **20**. The tampon **20** has a low density, i.e., it is not highly compressed like the majority of the tampons presently in use, and therefore will require some compaction to load it in outer tube **15**. But since the compaction is of comparatively low order of magnitude, no bonding agent is used and a minimum of interfiber hydrogen bonding is effected, very little compressive set remains in tampon **20** after it has been ejected from outer tube **15**.

The outer tube **15** may be of any reasonable length and diameter as long as means are provided to insure shallow insertion within the vagina. This shallow insertion means **16** could also possibly be used as an index for angularly orienting the tampon within the vagina so that the spreading of the tampon legs **21** and **22** is towards the lateral walls of the vagina. The outer tube **15** can be constructed of any low friction material well-known to those of ordinary skill in the inserter art, e.g., coated cardboard, polyethylene, polypropylene, or similar plastics.

The optimum position for inserting the tampon of this invention is immediately above the introital region (see FIG. **5**). This region is directly above the entrance to the vagina, and its extent is determined as being that zone which is uncomfortably sensitive to outwardly directed pressures, i.e., the introital region is delineated from the rest of the vagina at the threshold where there is a significant decrease in sensitivity in the vagina. This high sensitivity precludes positioning a tampon in the introital region which otherwise would be a prime location because the narrowest cross-section of the vagina exists there. Therefore, the minimum depth, found by experimentation, at which a tampon can be positioned and still be comfortable is approximately one inch from the introitus. This minimum depth varies among women and thus the minimum comfortable depth is more than an inch for some women. The prior art apparently did not recognize the advantage in placing a tampon as low in the vagina as is comfortable for the user in order to increase the probability of intercepting menses due to the vagina's smaller cross-section in that region. Any user can determine what is the optimum depth for her by varying the depth of insertion to determine the shallowest placement which is comfortable for her. The tampon **20** shown in position in FIGS. **5** and **7** is placed in the optimum position to satisfy the majority of women on both mense bypass control and wearing comfort, that is, from about 1¼ to about 1⅝vaginabrinches from the introitus.

The tampon **20** is inserted shallowly in the vagina and oriented horizontally so its spreading is lateral to coincide with the vaginal cross-section, i.e., so that the increased dimension of the spread tampon is parallel with the maximum dimension of a vertical, lateral cross-section of the vagina as shown in FIG. **8**. It is desirable to insert the tampon **20** shallow because the shape of the vagina shown in FIG. **6** resembles a funnel or an inverted pear. The most effective blocking of a channel of this shape can be done at its narrowest portion, and the vagina is narrowest in the area around the introitus. Therefore, shallow insertion of the tampon **20** places it so as to increase the probability of intercepting the menses.

The outer tube **15** is designed to position the self-spreading tampon **20** about 1½ inches deep in the vagina. Normal deep insertion (approximately 2¼ inches to 2½ inches) positions the tampon near the point of maximum vaginal cross-section and therefore produces somewhat random and unpredictable positioning of the tampon relative to the cervix. The deeply inserted tampon many times is placed in a vaginal fornix and this leads to sporadic effectiveness. Shallow insertion positions the tampon in the "neck" of the vagina where its positioning is more reproducable and predictable and its cross-section can more effectively "plug" the vagina against menses bypass.

One technique for achieving shallow insertion with standard inserters is to provide guide means, i.e., a color band around the outer tube **15** or indents or raised areas on the outer tube **15**, whereby the user grips the inserter about 1¼ to 1⅝ inches from the tip **18** of the outer tube **15**, thereby insuring that the tampon **20** will be inserted only that far. The preferred technique for limiting the depth of insertion, shown in FIG. **6**, is to provide a stop **16**, which is a raised annular band on the outer periphery of outer tube **15**, at a distance from the tip **18** equal to the desired depth of insertion. The outer tube **15** is inserted in the vagina until the depth limiting stop **16** is seated against the introitus. The inner tube **17** is then moved forward to eject the tampon **20** from the outer tube **15** whereby the tampon **20** is placed in the optimum position for preventing bypass.

A stop **16** with an outside diameter approximately ½ inch greater than the outside diameter of the outer tube **15** will rest on the introitus rather than against the labia minora apparently due to the fact that the position assumed while inserting a tampon separates the labia minora and therefore the path to the introitus is unobstructed. The labia minora are spread out of the way because they are connected to the labia majora and thereby are spread apart as the thighs and labia majora are spread apart which is the natural preparation for inserting a tampon. It is advantageous to be able to use the introitus as a positioning location for the stop because the depth of insertion can be more easily controlled from this location than it can from other less exact locations which previously have been used, e.g., the mons pubis, the labia majora, and the labia minora.

The shallow insertion achieved is advantageous for several reasons. First, tampon placement is positive because the tampon spans from side wall to side wall of the vagina and internal pressures exerted on the vagina do not move a shallowly placed tampon out of its optimum position. Second, bypass failures are substantially eliminated because the tampon is in a narrow cross-section of the vagina wherein the tampon more completely fills the vaginal cross-section. Third, the tampon cannot come in contact with the cervix and therefore irritation of the cervix will not result. Fourth, the tampon is comfortable to wear because it is positioned immediately above the introital region, in the region where sensitivity is substantially reduced.

The tampon of this invention is intended to be self-spreading in a lateral direction within the vagina in order to correspond with the shape of the vagina. Lateral spreading requires that the tampon, in conjunction with the inserter, be oriented as it is inserted. The tampon can be oriented inside the vagina by using an outer tube **15** which has an angular orientation index on it such as a raised pad **19** shown in FIGS. **3** and **6** or a depression similar to that shown in U.S. Pat. No. 3,068,867 — Bletzinger et al.

The user of the tampon insures proper positioning of the tampon **20** by grasping the outer tube **15** between the thumb and the middle finger with the thumb positioned on the angular index, e.g., the raised pad **19**. The outer tube **15** is inserted through the introitus, keeping the angular index **19** positioned upward and aligned with her vertical axis, until she feels the pressure of stop **16** against the introitus. Then she slides the inner tube **17** towards the tampon **20** and continues sliding the inner tube **17** until the tampon **20** has been ejected from the outer tube. The stop **16** is held in contact with the introitus until ejection of the tampon **20** has been completed. Angular positioning is accomplished by keeping the angular index **19** "up", and depth positioning is accomplished by maintaining contact between the stop **16** and the introitus during ejection of the tampon.

Should the user inadvertently mis-orient the tampon by a moderate amount during insertion, the spreading action of the mechanical spreader **13** will tend to properly orient the tampon **20**. This self-orienting tendency occurs almost immediately so that the chance of bypass is very limited.

The tampon **20** is oriented so that its expansion is laterally, shown in FIG. **7**, because a lateral cross-section of the relaxed vagina is shaped like a capital H whereby its width is greater than its height. Given this cross-sectional shape, in order to most effectively plug the vagina a tampon must have a width to height ratio greater than one. A vestige of this H shape, even with the tampon inserted, is shown in FIG. **8**.

The tampon **20** spreads as shown in FIG. **7** as soon as it is ejected from the outer tube **15**. This spreading results from at least two phenomena, the natural resiliency of the compacted fibers between the legs **21** and **22** of the tampon, and the spreading effect of the mechanical spreader **13**. FIG. **7** shows how this mechanically self-spreading tampon **20** spans the cross-section of the vagina immediately after insertion and does so in a lower region of the vagina which is directly under the cervix, the optimum position to prevent bypass. FIG. **8** shows how an inserted tampon **20** plugs the cross-section of the vagina. It spans from side to side and also is in contact with the top and bottom walls of the vagina.

The tampon of this invention spreads by itself because it incorporates a mechanical spreader, the potential energy of which is stored until the tampon is ejected from an inserter. No secondary operation is required in order to make this tampon conform with the internal configuration of the vagina. Communication between the tampon, which is internal, and the user trying to expand the tampon after it is inserted, as is required with other known devices, e.g., that shown in U.S. Pat. No. 3,512,528 — Whitehead et al., is not required with this tampon. The tampon of this invention does not rely on moisture to expand whereas other tampons do rely on moisture to expand. Although moisture may cause some expansion of this tampon, it relies primarily on the internal mechanical spreader to spread the tampon legs and thereby prevent bypass.

Another advantage of the tampon of this invention is that it conforms to the internal shape of the vagina immediately. This conforming occurs because the self-spreader forces the tampon to contact the lateral walls of the vagina and the low compression absorbent bundle allows deformation of the absorbent bundle such that the tampon conforms to the irregularities of the vagina's internal surface. This immediate conformation occurs because this tampon is not highly compressed and therefore is resilient and compressible so it will conform with irregularities within the vagina. Also the inherent delay associated with a tampon which requires a secondary operation to spread or expand it does not exist with this self-spreading tampon. Because the tampon of this invention does have the ability to conform to vaginal wall irregularities, it contacts a high percentage of the interior periphery of a vagina cross-section, thereby effectively reducing bypass.

Another form a self-spreading tampon could take would be a device similar to an inside micrometer wherein the cross-sectional growth is directly lateral rather than a swinging motion about a hinge as is accomplished with the V-shaped tampon. It could have an absorbent bundle collapsible along its longitudinal axis and containing a telescoping spreader which is biased towards spreading. When a collapsed tampon of this embodiment is released, the spreader grows laterally and causes the absorbent bundle to also grow laterally.

Withdrawal of a used tampon is accomplished by pulling on the removal string **14**. This removal spring **14** can be attached either to the center of the tampon or to one end of the tampon. This string **14** can be constructed of any of the materials well-known to those of ordinary skill in the art such that the string **14** will resist breaking under the forces encountered in removing a tampon. If the string **14** is attached in the center of the tampon, the tampon is drawn directly down and the walls of the vagina expand to allow passage of the tampon while the legs of the V are forced together somewhat by this motion. The mechanical spreader is not so strong as to seriously resist this partial "closing up" of the tampon upon withdrawal. If the removal string is attached to one end of the tampon, the initial pulling on the string tends to rotate the tampon within the vagina so that the end to which it is attached is drawn near the introitus and the tampon is then withdrawn in the shape of a cylinder with the leg of the V proximate the string entering the introitus first. PLease note FIG. **7** in order to visualize the motion of the tampon during withdrawal.

Thus, it is apparent that there has been provided, in accordance with the invention, a self-spreading catamenial tampon that fully satisfies the objects, aims and advantages set forth above. While the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art in the light of the foregoing descrip-

tion. Accordingly, it is intended to embrace all such alternatives, modifications, and variations as fall within the spirit and broad scope of the appended claims.

What is claimed is:

1. A tampon, comprising: a bundle of absorbent material having oppositely disposed legs, said bundle deformed so that said legs approximate, a self acting spreading means associated with said bundle for biasing said legs toward a spread position, and withdrawal means for removing the bundle from the vagina, the spreading means having potential energy stored therein when said bundle is deformed, said potential energy biasing said legs toward a spread position, whereby said tampon released in the vagina immediately spreads from the deformed configuration and obstructs the vaginal passage so that fluid flowing down the vaginal walls will be intercepted by the tampon due to the plugging of the vaginal cross section by the spread tampon immediately after insertion and release of the tampon in the vagina.

2. The tampon claimed in claim 1 wherein the bundle is initially folded at its approximate longitudinal center to form a substantially V-shaped tampon having two legs, whereby said spreading means causes immediate outward spreading of the legs of the tampon as soon as the tampon is released within the vagina.

3. The tampon claimed in claim 2 wherein the bundle of absorbent material is of uniform cross-section.

4. The tampon claimed in claim 2 wherein the bundle of absorbent material is of low density, not highly compressed, and retains little compressive set after moderate compaction.

5. The tampon claimed in claim 2 wherein the spreading means comprises a mechanical spreader in the form of a single leaf flat spring folded at its approximate longitudinal center to substantially a V-shape wherein the V-fold is transverse to the major cross-sectional dimension of the strip.

6. A tampon product comprising the tampon claimed in claim 1 in combination with inserter means for placing said tampon within the vagina.

7. The tampon product claimed in claim 6 wherein said inserter means comprises an outer tube and an inner tube slideably positioned within said outer tube, said tampon positioned within said outer tube and being ejectable therefrom by moving said inner tube towards said tampon.

8. The tampon product claimed in claim 6 wherein said inserter means has at least one index for angular orientation of said tampon during insertion into the vagina.

9. The tampon product claimed in claim 8 wherein said index comprises a touch sensitive index on said inserter means.

10. The tampon product claimed in claim 6 wherein said inserter means has a depth of insertion limiting means.

11. The tampon product claimed in claim 7 wherein said outer tube of the inserter means has a depth of insertion limiting means, said depth limiting means being a stop comprising an annular band around the periphery of said outer tube, the outside diameter of said annular band being greater than the outside diameter of said outer tube.

12. The tampon product claimed in claim 6 wherein said inserter means has both at least one index for angular orientation of said tampon during insertion into the vagina and a depth of insertion limiting means, whereby the tampon is inserted through the introitus so the depth limiting means contacts the exterior of the introitus and the angular orientation index is properly positioned before the tampon is finally positioned within the vagina.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,706,311 **Dated** December 19, 1972

Inventor(s) Darrel D. Kokx and Robert S. Moore

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

Column 7, line 58, "1 5/8vaginabrinches" should read --1 5/8 inches--.

Column 10, line 58, "PLease" should read --Please--.

Signed and sealed this 29th day of May 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents