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R. M. SCHMIDT

3,138,159

ABSORBENT PRODUCT

Filed Feb. 15, 1961

Fig. 1.

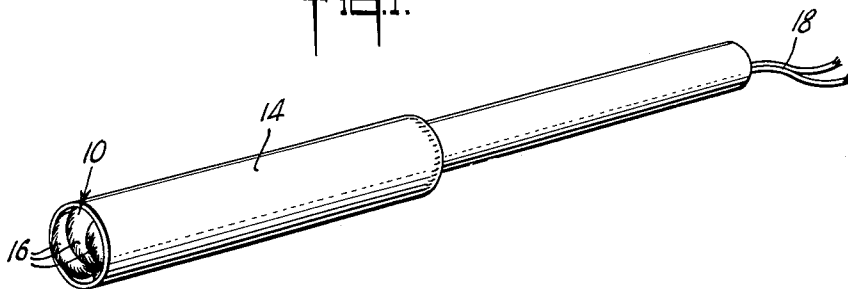


Fig. 2.

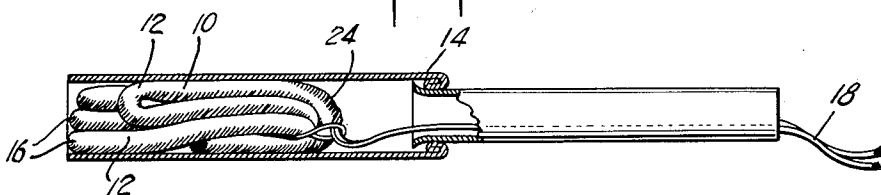


Fig. 3.

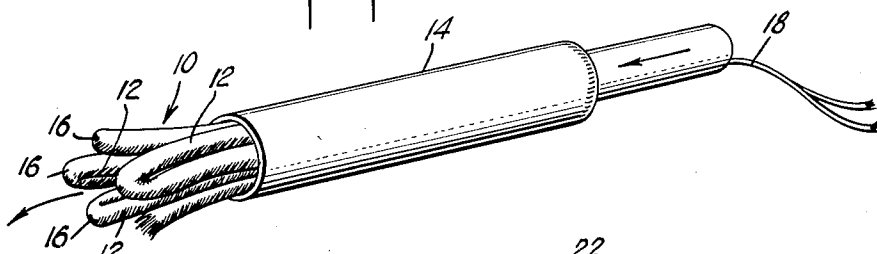


Fig. 4.

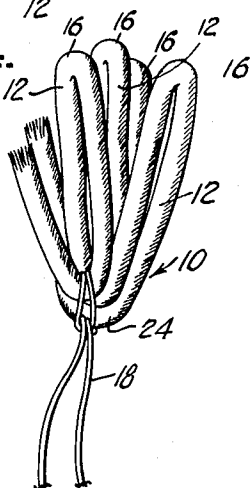
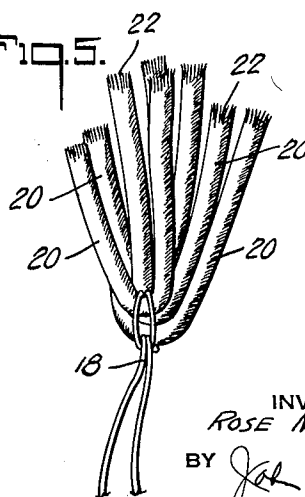


Fig. 5.



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3,138,159

ABSORBENT PRODUCT

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This invention relates to absorbent articles and more particularly to novel catamenial tampons formed from a plurality of loops or strands of absorbent, strip- or cord-like material presenting a plurality of absorbing surfaces, with the individual loops or strands being movable with respect to each other and also being individually bendable and deformable to provide a more effective absorbing medium.

Tampons in a variety of shapes, sizes and configurations have been developed heretofore. The tampon which has achieved widest acceptance is in the form of an elongated cylinder of highly compressed, absorbent, fibrous material. Due to anatomical considerations, and to provide for ease of insertion and withdrawal, such tampons are made considerably smaller than the vaginal cavity within which they are positioned in use. Consequently, they may be positioned improperly and lie to one side of the vaginal cavity. As a result, the tampons may be by-passed by menstrual fluid. Further, in view of their configuration and of their relative rigidity, such tampons do not conform readily to changes in the configuration of the vaginal cavity during body movements and in this respect may not only be uncomfortable, but may also fail to provide an effective barrier to the flow of menstrual fluid.

Catamenial tampons function by absorbing menstrual fluid from their outer surface into the interior. That is, fluid impinged upon the outer surface of the tampon is absorbed into the interior by wicking or capillarity. If the menstrual fluid to be absorbed were all liquid, the tampon could absorb the fluid relatively effectively. However, a certain amount of solids are normally present in menstrual fluid, such as that due to the exfoliating endometrium, and hence such solids are not absorbed into the interior of the tampon. Instead, they collect on the outer surface and may ultimately occlude parts of the surface, thereby reducing the ability of the tampon to absorb the fluid.

In accordance with the present invention, there is provided a tampon which is flexible and conformable, and thus more comfortable when worn. The tampon can open or blossom upon insertion intravaginally, and various parts thereof become located in different parts of the vaginal cavity. In so doing, the tampon presents a plurality of absorbing surfaces in various parts of the vaginal cavity to provide a more effective barrier to the flow of menstrual fluid, and thus better protection. The tampon has the further attribute of being both easy to insert and easy to withdraw after use.

A tampon made in accordance with the present invention and which achieves the foregoing and other objects includes a plurality of coils or loops or strands of absorbent, flexible, strip-like material of relatively substantial thickness, with the individual loops or strands being deformable and freely movable with respect to each other. When the tampon is inserted intravaginally, the loops or strands can fan out, open up, and spread apart and may be randomly bent, folded, tilted and otherwise deformed, either individually or collectively with other loops or strands. During body movements, the loops or strands tend to become adjusted and positioned in different areas of the vaginal cavity and are thus conformable to changes in vaginal configuration.

Each of the loops or strands is absorbent and thus,

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because of their number, present a greater amount of absorbing surface. The individual strands or loops, because of their widths or diameters, are more easily saturated than are tampons of conventional sizes and widths.

There is thus also provided, in accordance with this invention, a tampon having a larger absorbing surface, and which permits a more complete utilization of the absorbing capabilities of the absorbent material used in making the tampon.

Referring to the drawings where various embodiments of the invention are illustrated by way of example:

FIG. 1 is a perspective view of a conventional tampon applicator containing a tampon incorporating a preferred form of the invention, formed from a series of loops of absorbent material;

FIG. 2 is a vertical sectional view of FIG. 1;

FIG. 3 is a view illustrating ejection of the tampon from within the tampon applicator and shows the manner in which the loops open up;

FIG. 4 is a view of the tampon illustrating a form it may take upon ejection from the tampon applicator; and

FIG. 5 is a view of another embodiment of the invention in which the tampon is formed from a plurality of absorbent strands.

The tampon 10 illustrated in FIGS. 1-4 includes a plurality of contiguous loops or strands 12 of absorbent, flexible, strip-like material of relatively substantial thickness with the loops or strands illustrated as being in an oval-shaped, coiled arrangement, and generally in lengthwise alignment with each other so that they may be placed into a tampon applicator 14 of conventional form. As thus arranged, the forward ends 16 of the loops or strands, which are the ends first entering the vagina during insertion of the tampon, present gently rounded, blunted surfaces which permit the tampon to be inserted easily and comfortably. In the embodiment illustrated, the loops or strands are formed from a single strip of absorbent material and are of approximately equal size. They may be secured to each other at one point by a withdrawal cord 18 tied around all of the loops or strands and having extending ends for withdrawing the tampon after use. Since the loops or strands are tied at one point, they are, for substantially most of their lengths, unrestrained and hence are individually separable and freely movable with respect to each other so that they may spread upon insertion of the tampon into the vaginal cavity. In addition, due to their separability and movability, and because they are made from flexible material, they can bend readily in different planes and conform to the body movements. The loops or strands further tend to move around and adjust themselves in response to body movements, either individually or collectively, to become positioned in different portions of the vaginal cavity to provide an effective barrier to the flow of menstrual fluid.

The strip-like material from which the loops or strands are formed may be made of various materials. Cotton, rayon and paper, mixtures of absorbent and non-absorbent fibrous materials, such as cotton and nylon, needle-punched fabrics, and woven or non-woven fabrics, are typical of the types of materials which may be employed. If the strip comprises a core of short fibers, such as wood pulp fibers or cotton linters, or other material which tends to separate, particularly when wet, the core is preferably covered, such as with an open mesh knitted or braided fabric to minimize sloughing of the individual fibers.

The strip of fibrous absorbent material from which the loops or strands are formed may have a cross-sectional configuration which is tubular, flat or otherwise shaped. The strip has a substantial thickness and each loop or strand formed therefrom is absorbent, as distinguished from individual loops or strands of material, and may

vary from $\frac{1}{32}$ to $\frac{1}{4}$ of an inch in diameter, and preferably is about $\frac{1}{16}$ of an inch in diameter. The density of the strip of absorbent material may also be suitably varied, the density selected usually being based upon achieving the optimum absorption for a given weight of material. A density of from about 0.3 to about 0.5 gram per cc. for most absorbent materials is generally satisfactory. If desired, the density of the strip of material may be increased by compression, by crimping, or by twisting the strip prior to forming the loops or strands. Crimping also contributes to flexibility of the loops or strands.

A strip formed of two to four smaller strips of twisted absorbent material, with some of the strips being S twisted and others Z twisted, imparts softness and more flexibility to the strip. The softness and the rigidity of the strip may be varied to make them more or less bendable and distortable, as desired. Additional rigidity may be imparted to the strip by the compression, twisting, or crimping. The loops or strands, although flexible, are not limp and have sufficient rigidity to enable them to be inserted into the vagina.

The number of loops or strands may be varied. By increasing the number of loops or strands, more surface area for absorbing menstrual fluid can be obtained. At least two loops or strands are required in order to obtain a tampon which will achieve the desired function, while as many as twenty loops or strands may be used. The loops or strands may, when in the flattened, oval-shaped form they have in a tampon applicator, vary in length from about $\frac{1}{2}$ to about 3 inches. Preferably, the loops or strands are about $2\frac{1}{2}$ inches long. The weight of the strip of material used to make the tampon may vary, by way of example, from between 30 to 60 grains.

As an illustration, a tampon incorporating the invention may be made from an absorbent cotton or rayon rope or roving 24 inches long, $\frac{5}{32}$ inch in diameter and weighing about 47 grains, and contained within an open mesh, braided cover to minimize sloughing, breaking and pulling apart. The cord is then looped into 4 loops or strands measuring about 2 to $2\frac{1}{2}$ inches long when in a flattened, oval shape and the loops or strands tied together with a withdrawal cord at one point to form the tampon. The tampon so formed is then inserted into the outer tube portion of a conventional tampon applicator with the free ends of the loops or strands adjacent the forward end of the outer tube.

The loops or strands are preferably formed from a single piece of the strip material whose length may be varied according to the number and length of the loops or strands desired in the completed tampon. Suitable four-loop tampons may be made from strips of absorbent material ranging from approximately 22 to 24 inches in length. If desired, however, individual loops or strands may be formed from individual strips of absorbent material which are then secured together by the withdrawal cord.

In another form of the invention, illustrated in FIG. 5, the tampon may consist of individual strips 20 of absorbent material, doubled up and tied together at the fold with the withdrawal cord 18 so that the ends 22 of the strips may be free to move. Each of the strips is absorbent and hence is individually capable of absorbing menstrual fluid. The tampon incorporating this form of the invention may also be placed within the outer tube portion of a conventional tampon applicator with the free end 22 adjacent the forward end of the outer tube so that, when the tampon is expelled from the outer tube during insertion into the vagina, the free ends can move independently of each other and the loops or strands become positioned randomly in the vagina.

When the tampon is ejected from the applicator, the loops or strands are no longer restrained and hence can open up and separate from each other as the tampon is inserted into the vagina. In addition, a certain degree of resistance to insertion is encountered, due to the closed

configuration of the vagina, and to contact of the tampon with vaginal surfaces. Such resistance tends to cause the loops or strands to become separated from each other and become buckled, bent, tilted, bellied-out and otherwise randomly deformed in a variety of different directions and in different planes. In some instances, two or more of the loops or strands may be collectively deformed more or less as a unit. As a result of such deformation and movement, the loops or strands can become positioned in different parts of the vagina. Each loop or strand becomes a separate absorbent element, capable of absorbing menstrual fluid which contacts it. If menstrual fluid tends to flow primarily along one part of the vaginal cavity, one or more of the loops or strands located in that part of the vagina are available to exercise their absorbing capacity. If the direction of flow of the fluid is in another part of the vagina, the loops or strands located in that part are available to absorb the fluid.

The tampon presents surfaces available for absorbing menstrual fluid both on its exterior and on its interior. When the tampon is positioned in the vagina, the menstrual fluid can be absorbed radially into each of the loops or strands from their lateral surfaces. The fluid can also penetrate in between adjacent loops or strands, both from the ends and sides, to be absorbed by the interior surfaces of the loops or strands, even if one or more of the loops or strands are not appreciably deformed or moved, but instead are relatively close to each other.

In withdrawing the tampon after it has been used, the deformed loops or strands tend to draw together and again align themselves to make withdrawal easy and comfortable since they are secured together by the withdrawal cord at the end first withdrawn. Further ease of withdrawal is obtained due to the rounded configuration presented by the loops or strands at the point at which they are attached to the withdrawal cord.

The tampons as above described are illustrative embodiments of the invention and it is contemplated that variations, modifications and changes may be made therein while still remaining within the spirit of the invention.

What is claimed is:

1. An elongated catamenial tampon comprising a plurality of associated, lengthwise-extending strands of flexible, deformable, absorbent, integral, rope-like material arranged in the form of loops and having sufficient rigidity to be inserted intravaginally, said strands presenting absorbing surfaces and having capillary properties, said strands being unrestrained over most of their length and being movable with respect to each other and individually and randomly bendable while still retaining their integral rope-like characteristics.

2. A tampon in accordance with claim 1 wherein said loops are formed from a single strip of said material.

3. A tampon in accordance with claim 1 wherein said loops are in the form of a coil.

4. An elongated catamenial tampon comprising from about 2 to about 20 associated, lengthwise-extending strands of flexible, deformable, absorbent, integral, rope-like material having sufficient rigidity to be inserted intravaginally, said strands presenting absorbing surfaces and having capillary properties, said strands being unrestrained over most of their length and being movable with respect to each other and individually and randomly bendable while still retaining their integral rope-like characteristics.

5. An elongated catamenial tampon comprising a plurality of associated, lengthwise-extending strands of flexible, deformable, absorbent, integral, rope-like material having a density of from about 0.3 to about 0.5 gram/cc. and sufficient rigidity to be inserted intravaginally, said strands presenting absorbing surfaces and having capillary properties, said strands being unrestrained over most of their length and being movable with respect to

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other and individually and randomly bendable while still retaining their integral rope-like characteristics.

6. A tampon in accordance with claim 5 wherein said strands have a diameter ranging from about $\frac{1}{32}$ to about $\frac{1}{4}$ of an inch.

7. An elongated catamenial tampon weighing from about 20 to about 60 grains comprising from about 2 to 20 associated, lengthwise-extending strands of flexible, deformable, absorbent, integral, rope-like material having a density of from about 0.3 to about 0.5 gram/cc., a diameter of about $\frac{1}{32}$ to about $\frac{1}{4}$ of inch, and having sufficient rigidity to be inserted intravaginally, said strands presenting absorbing surfaces and having capillary properties, said strands being secured together at one point and being unrestrained over most of their length and movable with respect to each other and individually and randomly bendable while still retaining their integral rope-like characteristics.

8. A tampon in accordance with claim 7 wherein said strands have a length ranging from about $\frac{1}{2}$ to about 3 inches.

9. An elongated catamenial tampon comprising a plurality of associated, lengthwise-extending, flexible and deformable strands of absorbent, coherent, integral, rope-like material, said strands having structural stability and sufficient rigidity to be inserted intravaginally, said strands presenting absorbing surfaces and having capillary properties, said strands being unrestrained over most of their length and being movable with respect to each other and individually and randomly bendable while still retaining their coherent, integral, rope-like characteristics.

10. A tampon in accordance with claim 9 wherein said strands are of different lengths.

11. A tampon in accordance with claim 9 wherein said strands have an absorbent core and a liquid pervious cover.

12. A tampon in accordance with claim 9 wherein said strands range from about $\frac{1}{2}$ to about 3 inches in length.

13. An elongated catamenial tampon comprising a plurality of associated, lengthwise-extending flexible and deformable strands of absorbent, coherent, integral, rope-like material, said strands having a diameter of from about $\frac{1}{32}$ to about $\frac{1}{4}$ of an inch, said strands having structural stability and sufficient rigidity to be inserted intravaginally, said strands presenting absorbing surfaces and having capillary properties, said strands being unrestrained over most of their length and being movable with respect to each other and individually and randomly bendable while still retaining their coherent, integral, rope-like characteristics.

14. An elongated catamenial tampon comprising from about 2 to about 20 associated, lengthwise-extending, flexible and deformable loops of absorbent, coherent, integral, rope-like material, said loops having structural stability and sufficient rigidity to be inserted intravaginally, said loops presenting absorbing surfaces and having capillary properties, said loops being unrestrained over most of their length and being movable with respect to each other and individually and randomly bendable while still retaining their coherent, integral, rope-like characteristics.

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