May 15, 1951 F. P. PARISH 2,553,000

WITHDRAWAL STRING CONNECTION FOR TAMPONS

Filed July 26, 1949

FIG. 1

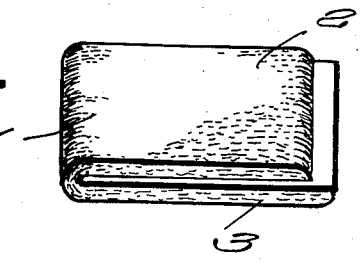


FIG. 2

FIG. 3

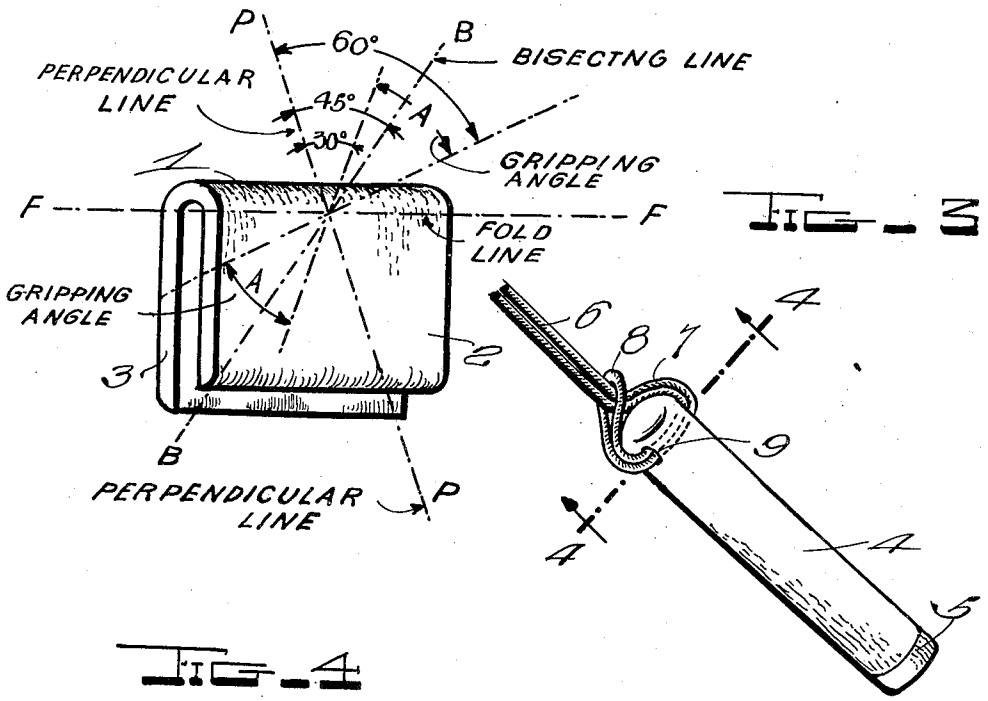


FIG. 4

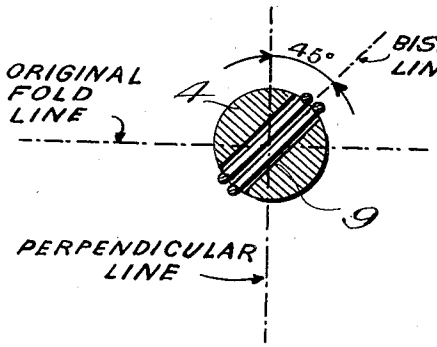
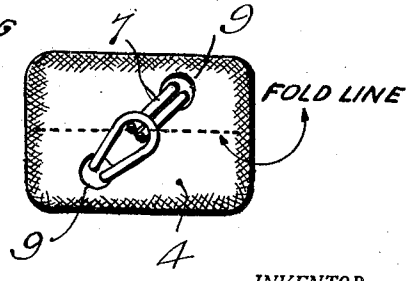


FIG. 5



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WITHDRAWAL STRING CONNECTION FOR TAMPONS

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3 Claims. (Cl. 128—285)

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The present invention relates to new and useful improvements in tampons, and, more particularly, to an improved catamenial tampon with a withdrawal element so connected therewith that the possibility of pulling away from the tampon upon withdrawal when the tampon is expanded and saturated by contact with the body fluids is eliminated and at the same time undue restriction of the free expansion of the tampon is prevented.

It is well known that in order to readily withdraw tampons after they have been used in body cavities, a withdrawal string is attached to the rear end of the tampon. In certain types of tampons usually formed of wound absorbent material, the withdrawal string is doubled and a loop formed in the bight surrounds the circumference of the tampon with the free ends carried through the tampon and rearwardly either alongside or through the end. This forms a reasonably safe attachment but the surrounding loop has a tendency to restrict the free expansion of the absorbent material

The present improvement relates to a type of tampon compressed to self-sustaining cylindrical form and has for its object a positive securing means for the withdrawal string of sufficient strength so that it will not pull loose from the rear end of the tampon upon withdrawal from the body cavity and will not restrict the free expansion of the absorbent material.

Another object of the invention is to provide a novel tampon formed of folded absorbent material side edge compressed laterally into a self-sustaining cylinder for insertion into a body cavity and an end looped string withdrawal element passing through the tampon near the original fold line and at a critical angle thereto so as to encompass a sufficient quantity of the folded and compressed material to ensure a positive and safe grip for withdrawal when the tampon is expanded by contact with the body fluids.

These and other objects of the present invention will appear as the following description thereof proceeds, and in order to more clearly understand the invention, reference may be had to the accompanying drawing, in which an embodiment of the invention is shown.

In the drawing:

Figure 1 illustrates a perspective view of the folded, flat strip of fibrous absorbent material, from which the tampon is formed;

Figure 2 is a fragmentary view of Fig. 1, showing the original fold line of said folded strip, a perpendicular line thereto, and the critical gripping angle involved in the present invention;

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Figure 3 depicts a perspective view of the tampon edge compressed to cylindrical form with the withdrawal string applied in accordance with the principles of the present invention;

Figure 4 is a section on the line 4—4 of Figure 3; and

Figure 5 illustrates an end view of the tampon in a somewhat expanded state upon contact with and absorption of body fluids.

Generically this invention relates to an improved withdrawal means for tampons formed of folded absorbent material compressed to self-sustaining form. In the embodiment illustrated, there is shown in Figure 1 the flat strip of folded absorbent material from which the tampon is formed. The flat strip is usually of cotton or cellulose fibers which inherently have little resistance to a direct linear pull in an expanded state, particularly as the fibers are arranged parallel to the length of the strip. Initially the strip is flat and is folded on a cross or transverse fold line 1, near its medial point to form fold portions 2 and 3 of unequal length. It is then compressed to a cylindrical form 4 as shown in Figure 3 by laterally side edge compression and heat treatment to render the tampon self-sustaining. The insertion end or tip is provided with a coating 5 which is a soluble substance to facilitate entrance into body cavities. It is preferred to use a substance of the character described in U. S. Patents Nos. 2,340,311 and 2,440,141.

The withdrawal means employed are connected to the rear end of the tampon 4 opposite the coated tip 5 and comprise a looped string 6 of a character well known in the art. The loop 7 of the string is formed by doubling a single piece of string and after insertion through the cylindrical tampon, passing the free ends through a bight 8. The string 6 is preferably applied to the self-sustaining tampon by a sewing machine in which an awl first punches a hole 9, preferably in a diametrical direction, through the tampon below the original fold line 1 and then a needle carries the string through, a loop forming mechanism forms the loop and upon the return of the needle the free ends of the string are passed through the bight to form a loop 7 over the rear end of the tampon.

As shown particularly in Figures 2 and 3, the portions of the string 6 of the loop 7 that pass through the tampon 4 are at a critical gripping angle to a line perpendicular to the original fold line 1 of the tampon strip. Due to the fact that the strip is side edge compressed laterally to cylindrical form, the fold line and side edge line between the folded portions 2 and 3 are main-

tained in some degree although not apparent to the eye when the tampon is compressed to a self-sustaining form. However, when the tampon is expanded due to absorption of body fluids these defining lines exist. It has been found that the critical gripping angle may vary from about 30° to about 60°, but is preferably about 45° where loop 7 of string 6 bisects the angle between the original fold line and a line perpendicular thereto (see Figs. 2 and 4). The fragmentary view illustrated in Fig. 2 shows diagrammatically the upper portion of the tampon. The fold line F—F is horizontal and is parallel to the top of the folded strip. At right angles to the fold line is the perpendicular line P—P. Between these two lines is a bisecting line B—B which indicates the preferred gripping angle of 45°. At such angle, the withdrawal string obtains a positive and safe grip while at the same time not restricting the free and unrestricted expansion of the tampon when in use. The same thing is true throughout the gripping angle A, which extends from an angle of about 30° to one of about 60° from the perpendicular line.

The positioning of the loop 7 of the withdrawal string 6 diametrically through the body of the tampon 4 below the original fold line 1 and at a critical gripping angle thereto is an important feature of the invention. The present improvement will be appreciated when it is realized that the tampon 4 expands upon contact with body fluids and the inherent nature of the fibrous material under such conditions substantially weakens the resistance of gripped material under a linear pull, such as upon withdrawal of the saturated tampon by the string 6. The smaller the mass of folded fibers gripped by the loop 7, the greater the possibility of the loop 7 pulling away from the expanded tampon. However the greater the mass of fibers gripped, the more restriction there is to expansion upon saturation. By inclining the end loop 7 at an angle to a line perpendicular to the original fold line of the tampon, a sufficient mass of fibrous material is gripped in the loop while at the same time the resistance to free and unrestricted expansion of the tampon to such an extent as to prevent the quick and ready absorption of body fluids when inserted into a body cavity is not materially reduced. In other words, the looped string passes through the tampon near the original fold line at a critical angle so as to encompass a sufficient quantity of folded and compressed material to ensure a positive and safe grip for the withdrawal of the tampon when in an expanded state after contact with and absorption of the body fluids while at the same time not gripping substantially more of the folded and compressed material than is necessary. Furthermore, the possibility of the withdrawal string pulling loose is eliminated. In Figure 5, the position of the loop 7 is illustrated when the tampon 4 is in a somewhat expanded state upon absorption of body fluids. This clearly illustrates the reduced mass of folded fibers gripped by the inclined loop with respect to the line perpendicular to the original fold line.

The present invention has been found not only to eliminate the possibility of the withdrawal string becoming detached from the expanded and saturated tampon in use, but also to provide a satisfactory end loop connection for the withdrawal string without the loop extending around the entire body of the tampon and through and parallel to the fold line which has a tendency to restrict expansion of the tampon when used in a body cavity.

Although the improved withdrawal string connection for tampons has been illustrated and described herein to a detailed extent, it will be understood that the invention is not to be regarded as limited thereto but includes all modifications and variations coming within the terms of the appended claims.

I claim:

1. A tampon formed of a flat strip of folded absorbent material edge compressed laterally to self-sustaining cylindrical form, and a looped slip knot withdrawal string at one end thereof with a portion of the loop passing through the tampon at an angle ranging between 30° and 60° with respect to a line perpendicular to the original fold adapted to encompass when tightened sufficient absorbent material at such angle to a line perpendicular to the original fold line to ensure a positive and safe grip when the absorbent material is expanded upon contact with body fluids without unduly restricting expansion.

2. A tampon formed of a flat strip of absorbent material folded lengthwise upon a transverse fold line and edge compressed laterally to self-sustaining cylindrical form, and a looped slip knot withdrawal string at one end thereof with a portion of the loop bisecting the tampon at an angle ranging between 30° and 60° with respect to a line perpendicular to the original transverse fold line and below the same adapted to encompass when tightened sufficient absorbent material at such angle to a line perpendicular to the original fold line to ensure a positive and safe grip when the absorbent material is expanded upon contact with body fluids without unduly restricting expansion.

3. A tampon formed of a flat strip of absorbent material folded lengthwise upon a transverse fold line and edge compressed laterally to self-sustaining cylindrical form, and a looped slip knot withdrawal string at one end thereof with a portion of the loop bisecting the tampon at an angle of 45° with respect to a line perpendicular to the original transverse fold line and below the same adapted to encompass when tightened sufficient absorbent material at such angle to a line perpendicular to the original fold line to ensure a positive and safe grip when the absorbent material is expanded upon contact with body fluids without unduly restricting expansion.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Country	Date
515,041	Great Britain	Nov. 24, 1939