

Feb. 6, 1940.

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2,188,923

TAMPON

Filed Oct. 20, 1937

2 Sheets-Sheet 1

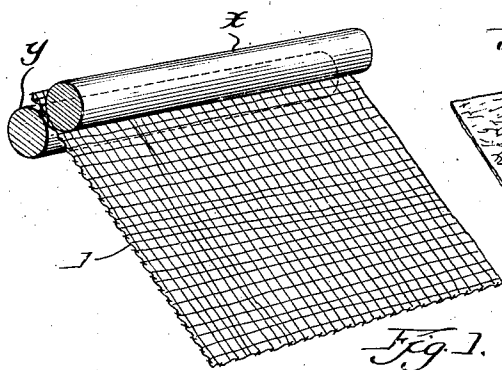


Fig. 1.

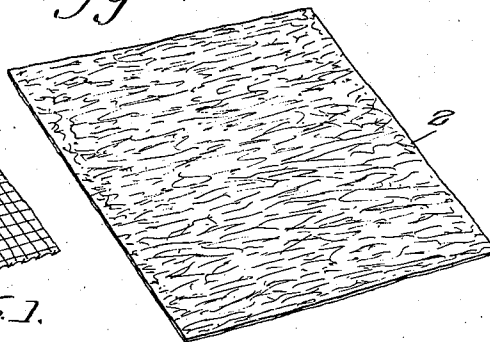


Fig. 2.

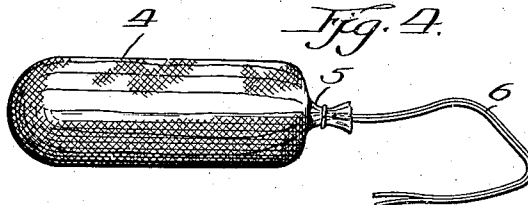
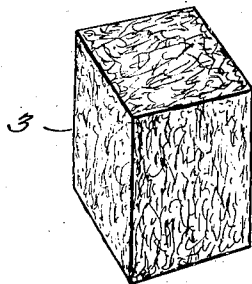


Fig. 4.

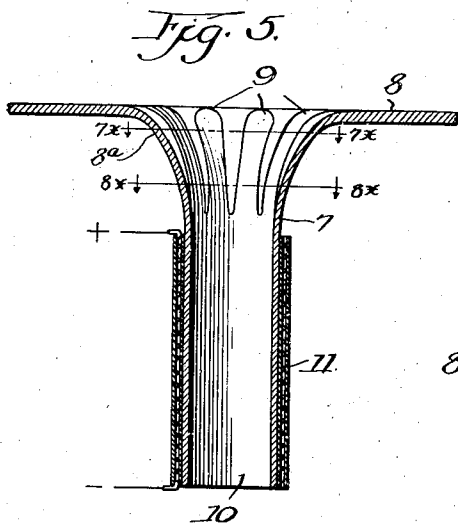


Fig. 5.

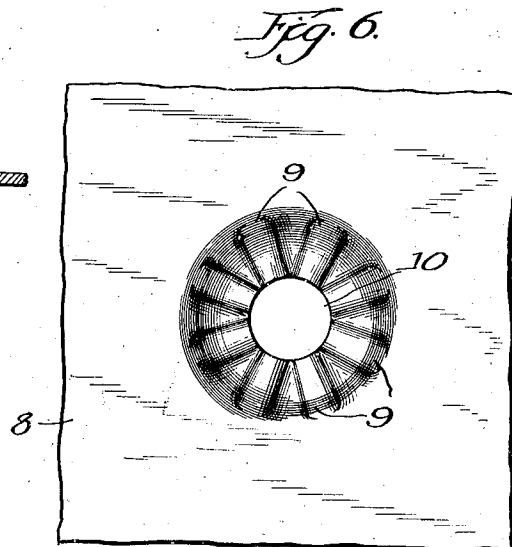


Fig. 6.

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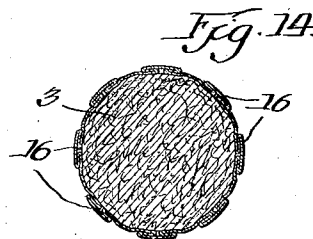
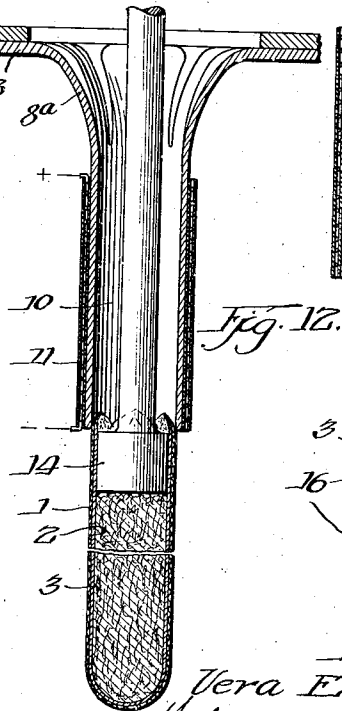
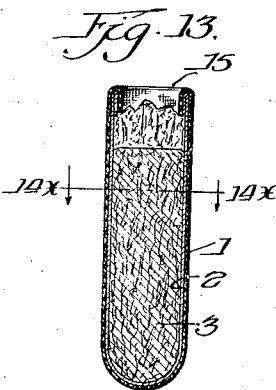
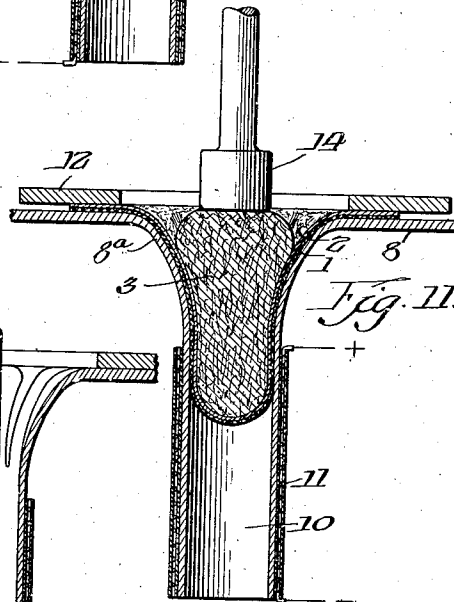
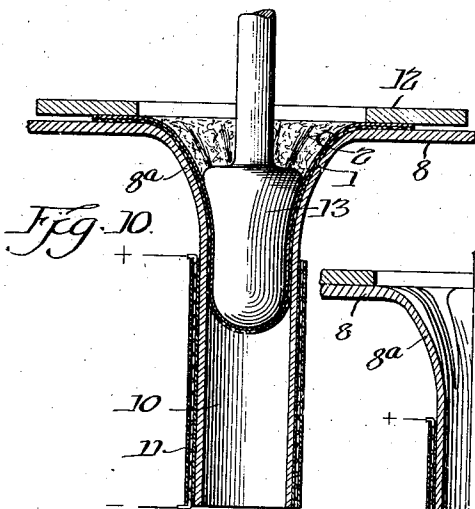
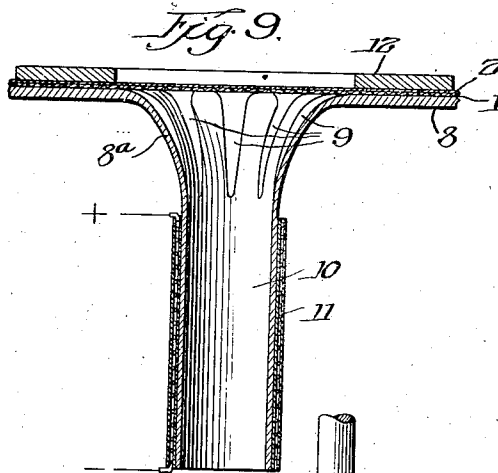
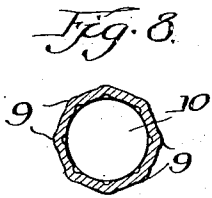
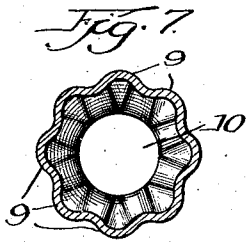
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TAMPON

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,188,923

TAMPON

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Application October 20, 1937, Serial No. 169,949

4 Claims. (Cl. 128—285)

This invention relates to tampons of the type that function by absorbing fluids that are to be controlled, and the invention proceeds upon the principle of producing and distributing the article under condensed dimensions from which it, when put into use, is released and left free to expand in exercising its absorptive function, so that its absorptive capacity is greatly enlarged.

One object of the invention is to greatly increase the expansive and absorptive capacity of the tampon, as well as the promptness with which it performs its functions in use; and to this end, the invention, while employing cellulosic fibers, avoids felting, rolling or other fabrication of these fibers that would reduce their expansibility and absorptive qualities and, instead, insures mass integrity in the body of fibers by the use of a jacket which surrounds them without in any way detracting from their absorptive qualities.

Another object of the invention is to provide a jacket for a body of loose cellulosic fibers which will serve to confine the body of fibers in its condensed form of reduced dimensions until the article is put into use, and will then be automatically released to permit the body to expand to full dimensions and saturation and still retain the mass integrity of the body; and perform these functions without delaying the absorptive function of the article. To these ends, the invention further consists in applying to a body of suitable fibers a jacket of sheet form, gathered around the body in a manner to leave ample fullness for expansion and saturation of said body, having its surface portions which intersect or contact in the process of gathering, adhered together so that the jacket remains under tension in contracted form to hold the body of fibers in their condensed state, but having the adhesive employed for this purpose releasable under body conditions so that the fullness will be freed in time to avoid resistance to expansion and saturation.

Another object is to provide a jacket for a body of suitable fibers which, while functioning in a manner to tensionally resist expansion during the condensation stage of the tampon and yielding its fullness during the expansion and saturation stages, will nevertheless be hermetic to the escape of individual fibers of the body and tensionally strong without detracting from the absorptive capacity of the body; and to this end, the invention further consists in providing a duofold jacket composed of absorptive paper surrounded by a fabricated gauze; the constituent

threads of the gauze being the members which, in their lapping or intersection, are adhered together to provide a tensionally resistant jacket of minor dimensions for the compression stage of the tampon and an equally strong or tensionally resistant jacket of large dimensions that will be effective during the saturation stage; the adhesive being restricted to saturation of or surface application to the constituent threads of the gauze, so that the mesh of the gauze is left free of obstruction and the paper lining of the fabric jacket, which can be approximately as highly absorbent as the body of fibers themselves, will be at all times ready to instantly enter upon the function of absorption.

In the accompanying drawings, which show the tampon, as well as the method of its production embodying the several features of the invention, by way of illustration—

Figure 1 is a perspective view of the fabric reinforcing member of the jacket in its relation to a pair of rolls employed for applying adhesive to it.

Figure 2 is a perspective view of a sheet of paper which constitutes the inner foil or lamina of the jacket.

Figure 3 suggests a body or charge of fiber employed as the filling body.

Figure 4 is a view of a complete tampon constructed in accordance with the invention.

Figure 5 represents a mold employed for assembling the filler and its jacket and which is provided with an electric heating element for affecting the adhesive in the course of assembly.

Figure 6 is a plan view of Figure 5.

Figure 7 is a section on the line 7x—7x of Figure 5.

Figure 8 is a section on the line 8x—8x of Figure 5.

Figure 9 shows the device of Figure 5 with the duplex jacket material extending across the top thereof and with the tensioning ring resting upon the jacket material.

Figure 10 suggests the first step in forming the jacket in the mold.

Figure 11 illustrates the step of charging the filling body into the partially formed jacket.

Figure 12 shows the extrusion of the jacket with its filler by means of the finishing plunger.

Figure 13 shows the assembly of the filler with the gathered jacket and with the upper ends of the jacket turned in previous to closure of the jacket; and

Figure 14 is an enlarged sectional view on the line 14x—14x of Figure 13.

1 represents a sheet of open gauze fabric which, by passing it between rolls X Y bearing an appropriate adhesive, will have its threads coated upon their surfaces or impregnated, as may be desired, with an adhesive suitable for causing overlapped or intersecting parts of said threads of the said gauze to adhere together when they are brought into contact or intersection by plaiting, fluting, or otherwise gathering the fullness of the sheet. This adhesive may be of a kind that is rendered fluid by moisture and hardens by giving up moisture, such, for instance, as numerous gums well known to serve this purpose, or it may have the quality of hardening at atmospheric temperatures and becoming adhesive under the application of heat or body temperature. 2 represents a sheet of highly absorbent paper, the principal qualification of which is its capacity to confine fibers. 3 is indicative of a body of cellulosic fibers which may be of any desired form but is preferably in the form of a plinth, cylinder or the like. 4 represents a completed tampon which is made by introducing the body of fibers 3 into a jacket formed of the gauze 1 and paper 2, as by placing the body of fibers centrally upon the assembled sheets 1, 2, gathering the sheets around the body of fiber by tensioning the sheets from one end to the other of the body gathering the fullness of the gauze and sheet and thereby reducing the circumferential dimension of the jacket, and then securing the gathered end beyond the body, as shown at 5 in Figure 4, and applying a string 6 for convenient manipulation.

The tampon 4 has the inherent qualities of offering substantially no obstruction to absorption through the gauze 1 and paper 2 and into the fibrous body 3, when the finished article is brought into contact with moisture. When the tampon 4 is first made, its gauze constituent will be so supplied with adhesive that gathering the composite jacket around the body of fiber-body, while holding the fibers and causing the laterally contacting or overlapping threads of the gauze to adhere together to condensed dimensions and permitting the adhesive to become set, will produce an article of reduced size convenient for manipulation which affords instant access of liquid through the gauze 1 to the paper 2 and through the highly absorbent paper to the fiber filler, so that the process of absorption and saturation will immediately ensue; and this moisture, or its temperature over and above atmosphere according to the nature of adhesive used, will promptly release the adhesion between the lapped or otherwise intersecting fibers so that resistance to expansion will be removed and the tampon may freely enlarge and promote absorption to the highest capacity.

While the present invention in its broader aspect, is not limited to any particular method of making the tampon 4 or any method of applying the jacket with sufficient fullness to avoid restricting the expansion of the fibers, and while it is preferred that the assembly of the constituent elements 1, 2 and 3 into the article 4 be accomplished by applying the filler centrally upon the jacket material and then gathering the surrounding portions of the jacket in drawing them from one end toward the other as described, I have provided convenient means for assembling these parts as illustrated in Figures 5 to 12, inclusive. Thus—

8 represents a table or flange from which depends a throat 9 fluted or otherwise provided

with members that assist in gathering the jacket material when the said material is thrust into the barrel 10, so that the fullness of the jacket material will be uniformly gathered throughout a cylindrical form of lesser diameter and where, by means of an electric heater 11, adhesive applied at some proper stage to the gauze 1 will either be dried into holding condition or melted so as to develop adhesive condition from which it can harden when the article is extruded from the portion 10.

As shown in Figure 9, an annular tensioning weight 12 is preferably employed to hold the jacket materials 1 and 2 upon the table 8, and while these materials are so held, a molding plunger 13 (Figure 10) is thrust into the center of the jacket until the latter is depressed as shown in Figure 10 and properly gathered into form desired, whereupon the forming plunger 13 is removed, the block of material 3 is pressed into the space of said plunger and an extruding plunger 14 is employed to thrust the work downward into tube 10, with the result that the gathering of the jacket is completed, the filling body 3 is condensed, and the assembled article is extruded, as shown in Figure 12; whereupon its upper open end may be drawn into closed relation and secured in the condition shown in Figure 4, the jacketing material, however, being first preferably turned inward as shown at 15 in Figure 13.

In passing through the gathering and forming tube 9, 10, the fullness of the two-ply jacketing material will be folded or pleated as shown generally at 16 in Figure 14 and ironed down into substantially smooth form without influencing the body of the filler materially otherwise than condensing it, and the plaits or folds 16, or such other folds as might be formed and flattened in the circumference of the article, lend themselves with special advantage to retention by adhesive so that a jacket without material resistance to absorption is produced upon the article in automatically releasable, circumferentially tensioned form that will retain dimensions of condensation until the article is put into use, and, without other attention, the article will enter upon its functions of release from condensation, expansion, absorption and saturation with a capacity greatly exceeding that obtainable with previously known tampons, and with much more promptly assumed expansion and saturation than is obtainable with tampons of the type which are enclosed in a soluble capsule; or which, for the sake of maintaining mass integrity, are required to convert the felted, laid or otherwise fabricated surface of a cotton or other filling fiber into tension-resisting form; or which require the fiber body to be rolled from a felted mass and rely upon creasing and an external jacket of Cellophane to maintain condensed form that must be released by picking to pieces the Cellophane preliminary to putting into use.

From the foregoing, it will be seen that the present invention contemplates a filling of cellulosic fibers, collected into a body without rolling or fabrication in volume and condition which normally assumes, especially under saturation, dimensions materially greater than those in which the article is to be distributed; an enveloping jacket in the form of a paper-like septum capable of confining the fibers of this filler without materially obstructing transmission of liquid by the process of absorption, and applied to said body with a fullness that leaves the filler free to expand under saturation; and a reinforcing jack-

et surrounding the septum and in the form of an open-mesh fabric also having a fullness that leaves the filler free to expand; the septum and reinforce being in sheet form and assembled with the filler body by placing the filler body upon them, preferably as a two-ply jacketing sheet, and drawing the sheet and gathering the fullness thereof along the sides of the body to the other end thereof, where the jacket is drawn together and closed by a string or a suitable tying means; and this assembly is suitably condensed through the filler and the composite jacket to a form having dimensions that render the article convenient for carrying and manipulation, and secured in this condensed form temporarily and releasably by adhering together plaited, overlapping, or otherwise contacting portions of the jacket, and more especially the reinforcing ply thereof, through means of an adhesive that leaves the reinforcing ply under tension at the reduced dimensions of the article but which, by reaction of body conditions, temperature or moisture or both, will automatically release the tension and permit expansion in response to saturation when the article is put into use.

From the foregoing specification it will be seen that the present invention relates to that type of sanitary tampon comprising a body of unfabricated absorbent fibers confined by a porous fabric jacket separate from and independent of said body; which said body automatically changes from one to the other of two different degrees of density, to wit, an initial density incident to compression from an external source by which the body is initially held at a sub-normal dimension convenient for carrying and manipulation; and a second density to which the body expands when the initial compression is automatically released by conditions encountered in use.

It will further be seen that the invention contemplates envelopment of the fibers and holding them in the form of a body, at both stages of their density, through means of one and the same gauze jacket that is separate from and independent of the body of fibers; as distinguished from the use of a soluble shell or the like, for retaining the initial density or sub-normal dimension of the body and a gauze fabric for holding the body at its major dimension or lesser density assumed by the body after the shell is dissolved. In the present invention, in the initial stage of density of the fibers, or sub-normal dimension of the body, there is a fullness of the jacket but this fullness is taken up by pleats or folds to make the jacket correspond in circumferential dimension to the sub-normal circumferential dimension of the body, which said pleats or folds have their overlapping surfaces so adhered together that the jacket, then constitutes an external source of compression that maintains the said sub-normal dimension; and the adhesive is such, that it will dissolve and release the pleats by conditions encountered in use, and thereby permit expansion of the body to its second stage of density, when the same jacket in distended form will continue to maintain integrity of the body.

It will further be seen that the invention contemplates having the jacket which serves initially as the external source of compression and subsequently envelopes the body in expanded form, produced from a single piece of porous seamless sheet material engaged at its intermediate portion with one end of the body of fibers; extending thence in pleats longitudinally of the said body to the other end thereof and having its free

edges at said other end secured by a gathering means; the structural conditions being such as to leave the sides of the body and its pleated enveloping jacket unconnected by the gathering means and free to open out when its folds are released, which circumstance not only leaves the jacket free to function as intended, but peculiarly adapts it for production by presenting the body of fiber endwise to the intermediate portion of the single flat sheet of gauze fabric; then forcing the two elements, so assembled, endwise of the fiber body through an appropriate funnel, thereby condensing the body to its sub-normal dimensions and gathering the fullness of the gauze sheet in the form of pleats around the sides thereof and finally causing the overlapping folds of the pleats to be adhered together by an adhesive applied to the gauze previous to assembly and thus adapting the pleated and adhered gauze to constitute an external source of compression that retains the body at its sub-normal dimension until the pleats are automatically released in use.

I claim:

1. A sanitary tampon comprising a body of fibers; said body having the capacity to expand under absorption of fluid but being initially under transverse condensation that leaves it with a materially reduced circumferential dimension; a tubular jacket consisting of highly porous fabric separate from and independent of the body; said jacket surrounding said body and confining the fibers thereof and having a normal circumferential dimension substantially equal to that of the body when expanded as aforesaid, but gathered circumferentially into folds that are independent of the body and overlie the external circumferential surface thereof and leave the tubular jacket with a reduced circumferential dimension; and an adhesive soluble under conditions encountered by the tampon in use adhering together the lapped portions of the folds and holding the tubular wall at its reduced circumferential dimension under tension and in expansion-resisting embrace upon the condensed body until released.

2. A composite tampon comprising a highly absorbent body of loose fibers having a substantial capacity for reduction in bulk under compression and re-expansion in bulk when released; and a bulk controlling jacket comprising a separate piece of mesh fabric surrounding said body, gathered into folds thereon and by said folds reduced in circumferential dimension to substantially that of the body when compressed; the said folds having their lapped faces releasably adhered together and holding the jacket under tension with a circumferential dimension corresponding to that of the body under compression, and holding the body under such compression until the folds are released by conditions encountered by the tampon in use, said confining jacket includes in its construction not only the independent mesh fabric, but an insoluble sheet of highly absorbent fiber confining paper between the mesh fabric and the body of fibers, which said paper is gathered with the mesh fabric but leaves the surfaces of the mesh fabric outermost and in contact with each other for adherence together in holding the jacket at its reduced circumferential dimension.

3. A tampon as described in claim 1 in which the porous fabric of the tubular jacket is engaged at its intermediate portion with one end of the body; has its folds drawn longitudinally of said body from said intermediate portion; has the margin of said fabric near the other end of the

body; and has a gathering means that secures said margin at said other end.

5 4. A sanitary tampon as described in claim 2, in which intermediate portions of the mesh fabric and the fiber-confining paper are superposed one upon the other and engaged with one end of the body; the folds of the mesh fabric and the paper gathered therewith extend along the sides of the

body and present the margin of the jacket near the other end of the body; and the jacket has a gathering means securing its said margin at said other end of the body; the portions of the folds between the ends of the body being left unsecured 5 by said gathering means and free to unfold when released from their adherence.

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