This invention relates to the manufacture of tampons and more particularly to the method of making catamenial tampons.

The main objects of the invention are to provide a method of making a tampon embodying a highly compressed absorbent core and which tampon, notwithstanding its state of high compression, will embody a desirable softness, and also stability against a tendency to expand to the bulk in which it was initially compressed; to provide a method for making a tampon having the characteristics indicated, and which method will be simple and practical so as to be adapted to commercial use in the rapid production of large numbers of tampons; and, in general, it is the object of the invention to provide a practical method of making an improved tampon of the character indicated.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawing wherein the construction of a tampon in accordance with the invention, is illustrated.

In the drawing:

Fig. 1 is a perspective illustration of a partially formed tampon unit;

Fig. 2 is a perspective illustration of a completed tampon made from the partially formed unit illustrated in Fig. 1;

Figs. 3 and 4 are respectively horizontal and vertical sections more or less diagrammatic in character, of typical mechanism employed for compressing the unit illustrated in Fig. 1 to form the finished product shown in Fig. 2; and

Figs. 5, 6, 7 and 8 are diagrammatic illustrations showing successive steps in the formation of the tampon.

The completed tampon shown in Fig. 2 is made from a core of absorbent creped tissue paper formed by superposing a multiplicity of plies of the paper to form a substantially rectangular elongated block. The block 1 is enclosed in a suitable jacket 2 which may be of knitted, braid or other textile material disposed around the block 1 and having end portions projecting beyond the opposite ends of the block 1. The projecting end portion of the jacket is preferably tucked into the adjacent end of the absorbed block 1 at one end as indicated at 3, the other projecting portion 4 of the jacket remaining in its extending position to ultimately form a draw string. The absorbent material block 1 may also be wrapped in other pervious material disposed inside of the jacket 4 if desired. The length and transverse size of the absorbent block 1 is considerably larger than the desired length and transverse size of the finished tampon.

A unit, such as represented in Fig. 1, is compressed both longitudinally and transversely to reduce its size and to change its shape to the desired tampon size and shape substantially as shown in Fig. 2.

For this purpose, the unit represented in its entirety at 5 is placed into the zone of operation of a suitable die structure which embodies an oppositely disposed pair of dies 6 and 7, a second oppositely disposed pair of dies 8 and 9 arranged at substantially right angles to the position of the dies 6 and 7, and lengthwise compressing dies 11 and 12.

The various compression members may, of course, be suitably guided for movement toward each other and suitable actuating mechanism should, of course, be provided.

The details of the die structure and of the actuating mechanism form no part of the present invention and hence are not herein illustrated except to the extent that guide elements 13 for the die members 6, 7, 8 and 9 are shown. Also the die members 11 and 12 may be so mounted and actuated that in addition to being movable toward each other they may be movable laterally to positions out of alignment with the chamber formed by the compression ends of the dies 6, 7, 8 and 9, thereby to permit insertion and removal of the tampon units to and from the die mechanism.

A tampon unit 5 is placed within the die structure and the dies 11 and 12 and are first operated to compress the unit 5 longitudinally so as to shorten its length to the desired tampon length which, in this instance, is represented by the corresponding dimension of the dies 6 and 7 as shown in Fig. 4. Thereafter the dies 6 and 7 are moved towards each other to reduce the transverse dimension of the unit 5 in one direction as represented in Fig. 5. Then the dies 8 and 9 are moved towards each other between the closed dies 5 and 7 to compress the unit 5 in a direction which is substantially perpendicular to the direction of the first transverse compression, the tampon unit 5 then being reduced very nearly to its desired tampon size.

The units may be removed from the dies at this time and in the compressed condition in which they then are, they may be distributed as a commercially finished product. However, it has been found that there is a tendency for the slightly flattened side portions represented at 14—15 of the tampon to be rather hard and therefore
somewhat objectionable. This may be due to the fact that the said flattened surface portions may be the surface portions wherein the edges of the paper plies forming the absorbent body are more or less welded together incident to the high compression produced crosswise of said surface portions by the closely approaching side portions 15 of the arcuate ends 16 of the dies 8 and 9. Whatever the reason, the hardness or harshness mentioned has been found to occur at this stage of the method of production herein described.

To overcome the indicated harshness, the compressed unit is subjected to one or more additional compression operations. One such additional compression operation is represented in Fig. 7 wherein the dies 6 and 1 are illustrated as having again and further compressed the core member in the same direction as at first and transversely of the direction in which the dies 8 and 9 had previously compressed the core. The dies 6 and 1 are then opened sufficiently to permit the dies 8 and 9 to be again moved towards each other and to again compress the core 5 to restore it from the transversely flattened condition illustrated in Fig. 7 to a more or less oval or rounded condition represented in Fig. 8 (and Fig. 6).

The subsequent or repeated transverse compression of the tampon serves to break down the hard surface portions above referred to, so that the tampon unit will have a more or less uniform surface construction and more or less uniform softness around its entire surface. This softening action appears to be due to more or less of a kneading effect or action on the tampon body, which is produced by the successive compressions thereof in directions extending transversely to each other.

The described effect may be attained to a desirable extent by opening the dies from the position shown in Fig. 6 sufficiently to permit the tampon body to be rotated through an angle of about 90° and then again closing the dies 8 and 9 to again compress the tampon body in a direction which is transverse to the direction in which the body was first compressed by said dies 8 and 9. Such an operation has been found to be quite effective in overcoming the indicated hardness which is imparted to the tampons by the described initial transverse compressing operations.

The transverse compression effected by the dies 6, 7, 8 and 9 in their first operations is sufficient to more or less consolidate or weld together the fibers of the paper plies employed in making up the absorbent block 1. The compaction effected is sufficient to cause the absorbent body to become stable; that is, to maintain its compressed condition against a normal tendency to expand towards its initial uncompacted condition. In the arrangements illustrated, the compression operations are carried on on the jacketed absorbent body and it will be apparent that they could also be effected before the jacket is applied and the jacket subsequently applied.

The finished tampon 17 is of more or less oval shaped cross section and it has the desirable and advantageous characteristic of losing its stability against expansion when it is wetted. The wetting has the effect of releasing or permitting the breaking of the bonds produced between the fibers by their compression together. The jacket 2 should, of course, be of such construction and so applied that it will not resist the expansion of the absorbent body when it is wetted.

Variations of the described method of manufacturing catamenial tampons may be made while retaining the principles thereof as referred to in the following claims.

I claim:

1. The method of making a catamenial tampon which consists in forming an elongated, transversely over sized, absorbent core member, compressing said core member transversely in at least two directions which are at such an angle to each other that the member will be thereby compacted to approximately the desired transversely reduced tampon size, and then kneading the compressed member to soften the same while maintaining its tampon size.

2. The method of softening a compressed catamenial tampon which consists in compressing the tampon in one direction so as to reduce the dimension therein in that direction to less than the desired final dimension and then to increase the dimension of the tampon in a transverse direction to greater than the desired final dimension in said transverse direction, and then again compressing the member in the direction of the transverse increase to restore it to the desired dimension while also permitting the member to expand to the desired size in the direction of said reduced dimension.

3. The method of making a catamenial tampon which consists in compacting an absorbent body member to approximately the desired final transverse dimensions of the tampon body, again compacting the member transversely to a reduced transverse dimension which is less than said desired final transverse dimension, and then working the body so as to effect re-expansion of said reduced dimension to approximately said desired final transverse dimension.

4. The method of making a catamenial tampon which consists in forming an elongated, transversely oversized absorbent core member, compressing said core member transversely to substantially the desired size, and then subjecting said compressed core member to at least two successive transverse compression forces of such magnitude and at such an angle to each other that the member will be first compacted in one direction to less than said desired transverse size and expanded to a greater size in another transverse direction, and secondly restored to said desired size.

5. The method of making a catamenial tampon which consists of forming a longitudinally and transversely oversized absorbent core member, compressing said core member longitudinally to approximately the desired length and compressing the member transversely to substantially the desired transverse size, and then subjecting the compressed member to at least two successive transverse compression forces of such magnitude and at such an angle to each other that the member will be first compacted in one direction to less than said desired transverse size and expanded to a greater size in another transverse direction, and secondly restored to said desired size.

6. The method of making a catamenial tampon which consists of forming a longitudinally and transversely oversized absorbent core member, enclosing said member in a pervious textile material jacket, compressing said jacket and core member longitudinally to approximately the desired length and compressing the jacket and member transversely to substantially the desired transverse size, and then subjecting the compressed
jacket and member to at least two successive transverse compression forces of such magnitude and at such an angle to each other that the jacket and member will be first compacted in one direction to less than said desired transverse size and expanded to a greater size in another transverse direction, and secondly restored to said desired size.

7. The method of making a catamenial tampon having a body of absorbent material compacted to such an extent that the body remains in rigid and substantially stable compacted condition so long as it is kept dry, but readily re-expands upon being wetted, comprising the steps of compacting the body of absorbent material in one direction to less than the desired final dimension in that direction, and working the body so as to effect re-expansion of said reduced dimension to a greater dimension at which such body exhibits a desirable softness characteristic while remaining in said rigid, stable compacted condition from which it is adapted to re-expand upon being wetted.

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