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2,336,744

METHOD AND APPARATUS FOR MAKING TAMPONS

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Fig. 1

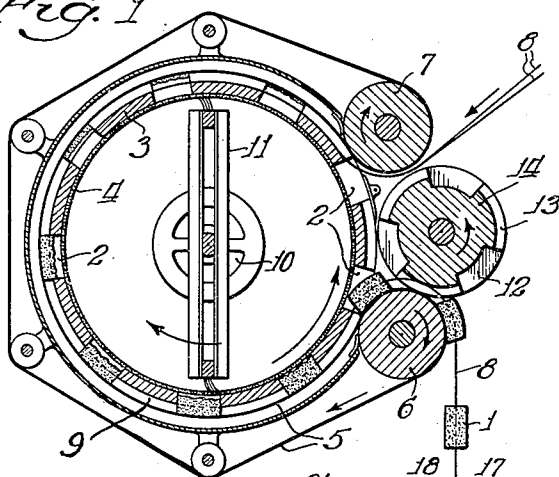


Fig. 2

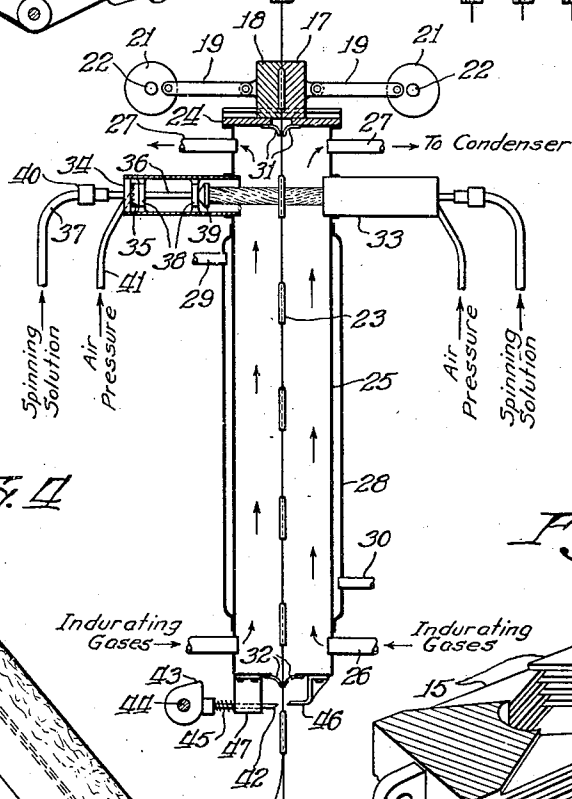
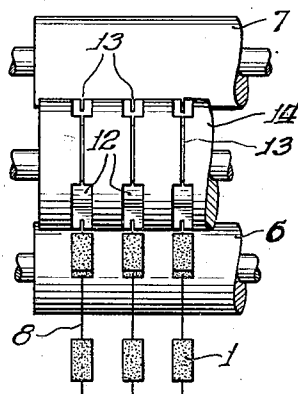


Fig. 4

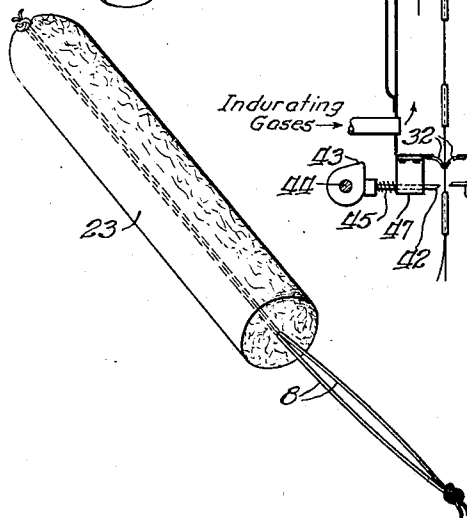
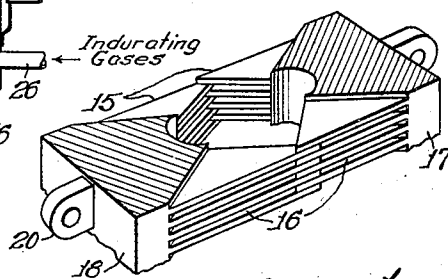


Fig. 3



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METHOD AND APPARATUS FOR MAKING
TAMPONS

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14 Claims. (Cl. 18—1)

This invention relates to absorbent articles adapted for insertion into body cavities for the absorption and retention of liquid secretions, and particularly to a vaginal tampon as a substitute for the usual external sanitary napkin. This application is a continuation-in-part of my copending application "Method and apparatus for spinning unwoven fabrics," Serial No. 414,809; filed October 13, 1941.

An object of my invention is to produce a tampon with an extensible filamentous coating spun thereover to allow for maximum expansion and prevent sluffing of the fibres and disintegration of the cartridge when in use.

Another object is to produce a tampon with a spun coating of filaments that are much finer and softer than natural fibres to facilitate insertion of the tampon by fingers, or cardboard tube applicator, into the body orifice.

Another object is to produce a tampon of minimum size, which is relatively rigid and self-retaining when dry, but will give maximum expansion and adaptation to the size and shape of the orifice when in use.

Other objects and advantages of the invention will become apparent from the following detailed description, which refers to the drawing.

In accordance with my invention an elastomeric or other extensible filamentous structure is spun over sponge, cellulosic, or other absorbent material, after the latter has been reduced by compression to a cartridge of the desired shape, size and rigidity, the compressing means being complementary compression members that may either rotate, or advance directly, to give the necessary compaction. The filamentous structure must allow for expansion of the cartridge for absorbency purposes, and the spacing of the filaments must be sufficiently close to prevent sluffing of the fibres and disintegration of the cartridge when in use. Such a filamentous structure may be spun by disrupting a continuous synthetic thread or yarn before induration takes place into filaments by a blast of elastic fluid while both are passing through an ejector, and conveying and depositing the disrupted filaments by an elastic fluid moving through a controlled path; or a viscous fluid may be spun directly into disrupted filaments by a rotating spinneret or other means, and the whirling disrupted filaments carried by an elastic fluid through a controlled path and deposited over the object to be coated. A great variety of materials may be used for spinning purposes, such as a latex elastomeric composition, cellulosic or petroleum derivative, polymeric

amide, protein-base material, copolymer of vinyl chloride and vinyl acetate, etc.; and these may be modified by other materials, such as pigments, resins, plasticizers, volatile solvents, etc., to form a viscous spinning fluid, providing such solution will produce a filamentous structure of the required characteristics as to strength, extensibility, elasticity, heat-sensitivity, coagulant point, etc.; or a mineral, mineral derivative, polymeric amide, and other inorganic and organic plastic materials, may be spun separately or together in a molten state with or without the aid of solvents, plasticizers, etc., to produce a filamentous structure. All such structures must possess the necessary extensibility but may or may not be elastomeric. Induration of the filaments and bonding of the filaments to the coated article may be accomplished by various means, such as vulcanization for latex compositions, evaporation for solutions containing a cellulosic derivative in a volatile solvent, a cooling agent for molten thermoplastics, absorption of oxygen for air-drying petroleum derivatives, hot air for heat reactive phenol-formaldehyde and glycerol-phthalic anhydride resins, etc.; and any suitable elastic fluid, such as air, steam, hydrogen, nitrogen, carbon dioxide, etc., may be used for heating, cooling, evaporation, directing the movements of the filaments, and other spinning and curing operations.

The invention is exemplified in the following description, and a preferred arrangement is illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a cross section of the depositing apparatus and spinning chamber.

Fig. 2 is a part elevation view of the driving rolls of the depositing cylinder.

Fig. 3 is a perspective view of the compression blocks.

Fig. 4 is a perspective view of the finished tampon.

Referring to the drawing more specifically by reference characters:

The fibre fluff pads 1 are formed in the pockets 2 of the wooden cylinder 3, which is positioned between the screen 4 and the foraminous endless belt 5 that is carried on the drive rolls 6 and 7, as described in my copending application, entitled, "Sanitary napkins and surgical dressings," Serial No. 392,921. Strings 8 pass around the cylinder in grooves 9, the bottom of the grooves being midway between the screen and the belt. An air current conveys the fibrous material through opening 10 and deposits it on the screen

where the air pressure and rabbling action of the rotating brush 11 cause the fibres to be distributed uniformly through the screen into the pockets positioned over the endless belt. As the pockets fill the strings become embedded within the center of the pads, which become quite firm under the combined action of air pressure and rotating brush; and the corded pads are then further compacted and discharged from the apparatus by means of compression pockets 12 and string grooves 13 in the center roll 14. As indicated in Fig. 2, a great number of parallel lines of pads on strings may be turned out of the one machine.

After the pads are corded together on strings and receive their initial compression and are discharged from the depositing apparatus, each one is dropped into an opening of substantially the same shape as the pads, made by the fingers 15 meshing into spaces 16 of the complementary compression blocks 17 and 18, respectively. The two blocks are then forced into closer relationship by means of connecting rods 19 that engage the lugs 20 of the former, and which are driven by eccentrics 21 that are fastened to rotating shafts 22. During the early part of the compression operation, the sides of the pad become slightly ridged due to the openings between the fingers, but this is removed as the blocks come together to form a continuous peripheral surface, which may be cylindrical, or oval, or of any other desired configuration, to give the completely compressed tampon 23 its ultimate size and shape.

The spinning chamber consists of: top cover plate 24, which is grooved to serve as a guideplate for the compression blocks; upright tank 25, having inlet and outlet 26 and 27, respectively, for the indurating and spinning fluids; heating jacket 28, having steam inlet and outlet 29 and 30, respectively; and top and bottom flexible strips 31 and 32, respectively, to permit ingress and egress of the tampons without escape of the indurating gases. The spinneret tube consists of: cylinder 33, cylinder end plate 34, fluid motor 35, inner and outer spinneret pipes 36 and 37, respectively, ball bearings 38, rotating spinneret 39, turning joint 40, and a feed pipe 41 for the compressed air required for rotating the motor and spinneret and conveying the disrupted filaments for coating the cartridges. After passing out of spinning chamber the strings of cartridges are cut at suitable intervals by: a cutter blade 42, which is driven by a cam 43, on the rotating shaft 44, and retracted by spring 45; a cutter bracket 46, which is fastened to the bottom of the spinning tank; and a bracket 47, which guides the cutter blade. The cut strings are knotted at either end of each tampon to prevent withdrawal therefrom, and the tampons are then run through a sterilizing temperature, and finally wrapped in tissue paper or Cellophane for marketing purposes.

It will be obvious from the foregoing description that the pads may be discharged from the depositing apparatus in a continuous, or intermittent, operation that must be synchronized with the movements of the compression blocks. However, if the movement of the pads from the depositing apparatus is continuous, the compression blocks will close upon one pad while the string from the following pad piles up thereupon, the excess being taken up the moment the compressed pad is released. Likewise, the spinning tubes may operate continuously, or they may be synchronized to spin at the moment a pad is in juxtaposition to a tube.

It will also be apparent that a strip of commercial absorbent cotton, or crepe wadding, or other fibrous material, may be continuously drawn from a source of supply and wound into a spiral roll about a string, and that a plurality of such spirally wound rolls may be corded together and fed between the compression blocks and through the spinning chamber, as above described.

I claim as my invention:

1. The method of producing a tampon comprising: compressing an absorbent material to form a relatively rigid cartridge; and spinning directly thereover an integral pervious web of filaments.
2. The method of producing a tampon comprising: compressing an absorbent material to form a relatively rigid cartridge; and spinning directly thereover an integral pervious web of intersected filaments.
3. The method of producing a tampon comprising: compressing an absorbent material to form a relatively rigid cartridge; and spinning directly thereover an integral pervious web of promiscuously intersected filaments.
4. The method of producing a tampon comprising: compressing an absorbent material to form a relatively rigid cartridge; and spinning directly thereover an integral pervious web of extensible intersected filaments.
5. The method of producing a tampon comprising: compressing an absorbent material to form a relatively rigid cartridge; and spinning directly thereover an integral pervious web of elastomeric intersected filaments.
6. The method of producing a tampon comprising: compressing an absorbent material to form a relatively rigid cartridge; and spinning directly thereover an integral pervious web of extensible non-elastomeric intersected filaments.
7. The method of producing a tampon comprising: compressing an absorbent material to form a relatively rigid cartridge; and spinning an integral web of filaments of substantial strength directly over the said cartridge whereby the cartridge is made self-retaining.
8. The method of producing tampons comprising: sifting an absorbent material at uniformly spaced intervals through a primary foraminous wall to form pads on an adjacent secondary foraminous wall; removing the said pads from between the two said walls; compressing the said pads to form relatively rigid cartridges; and spinning an integral pervious web of filaments directly over each of the said cartridges.
9. The method of producing tampons comprising: sifting an absorbent material at uniformly spaced intervals through a primary foraminous wall to form pads on an adjacent secondary foraminous wall; removing the said pads from between the two said walls; compressing the said pads to form relatively rigid cartridges; and enclosing each of the said cartridges in an integral pervious web of extensible filaments.
10. The method of producing tampons having pull cords comprising: sifting an absorbent material at uniformly spaced intervals through a primary foraminous wall to form pads on an adjacent secondary foraminous wall about a central cord; removing the corded pads from between the two said walls; compressing the corded pads to form relatively rigid cartridges about the said cord; spinning an integral pervious web

of filaments over each of the said corded cartridges; and cutting the said cord at regular intervals to separate the said cartridges.

11. In a tampon apparatus, the combination of: a primary foraminous wall; a secondary 5 foraminous wall situated adjacent to the primary wall; a central cord running between the two said walls; a compression apparatus; means for sifting an absorbent material through the primary wall at spaced intervals to form pads on 10 the secondary wall about the said cord; means for removing the corded pads from between the two said walls; and means for passing the corded pads through the said compression apparatus whereby the pads are reduced to relatively rigid 15 cartridges.

12. In a tampon apparatus, the combination of: a compression apparatus; a coating chamber; means for stringing pads of absorbent material on a cord; means for passing the corded pads 20 through the said compression apparatus whereby the pads are reduced to relatively rigid cartridges; means for passing the said cartridges through the said coating chamber whereby each of the cartridges is coated with an integral pervious web of plastic filaments; and means for 25 indurating the said web of plastic filaments.

13. In a tampon apparatus, the combination of: a compression apparatus; a spinning chamber; means for stringing pads of absorbent material on a cord; means for passing the corded pads through the said compression apparatus whereby the pads are reduced to relatively rigid cartridges; means for passing the said cartridges through the said spinning chamber; and means in the spinning chamber for coating each of the said cartridges with an integral pervious web of intersected filaments.

14. In a tampon apparatus, the combination of: a compression apparatus; a spinning chamber; means for stringing pads of absorbent material on a cord; means for passing the corded pads through the said compression apparatus whereby the pads are reduced to relatively rigid 15 cartridges; means for passing the said cartridges through the said spinning chamber; means in the spinning chamber for coating each of the said cartridges with an integral pervious web of plastic filaments; and means for passing a treating fluid through the said spinning chamber to indurate the said coating of plastic filaments.

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