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(19)

(54) TAMPONS

(71) We, UNILEVER LIMITED, a company organised under the laws of Great Britain, of Unilever House, Blackfriars, London EC4, England, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to tampons for the absorption of body fluids, particularly catamenial tampons.

Highly absorbent gel materials such as modified celluloses and starches and polyacrylonitrile materials have been proposed for use in tampons, however it is difficult to ensure that during manufacture the materials are located and maintained in the correct position within the tampon, and also it is difficult to arrange for the best utilisation of these materials during conditions of use.

Suitable gel materials of this type have been disclosed in British Patent No. 1,563,697 and in US Patents 3,589,364, 3,661,815, 3,669,103 and 3,670,831.

It has been found in practice that tampons formed in a hollow conical shape are particularly effective when incorporating such highly absorbent gel materials; and the present invention provides such an arrangement where the gel can be handled conveniently during manufacture and is maintained in an effective location within the tampon itself both prior to, and also during use.

Accordingly the present invention provides a tampon comprising a sleeve shaped absorbent inner material enclosed within a sleeve shaped bag of fluid pervious material having inner and outer walls which enclose the sleeve of absorbent material, said absorbent inner material being in the form of a sandwich comprising a quantity of absorbent gel material held between two carrier layers at least one of which is fluid pervious.

The tampon can be manufactured by firstly forming the sandwich of carrier layers with the gel held therebetween. This can be effected, in one particular method, by bringing two layers of carrier material together between a pair of rollers and applying the gel at the zone of the nip of the two rollers so as to form a gel coating between said layers. Moisture and heat, for example from steam, may be used to bond the gel coating within the layers.

The gel may be a continuous layer coating or may be in the form of stripes if directional spread/absorption is required. The gel material may be on its own as a surface coating bonded to at least one of said carrier layers or may be held within a separate inner layer, which inner layer comprises a mixture of the gel material and a wicking filler material such as textile or wood pulp fibres, or polyurethane foam which as well as promoting wicking (flow and spread by capillarity) may increase gel binding, resiliency and product performance.

Conveniently the forming of the sleeve tampon with the absorbent sandwich may be effected on an elongate mandrel which is at least partly hollow.

One or more layers of the absorbent sandwich may be formed into a first tubular sleeve (preferably on the mandrel), a layer of pervious material for the outer bag may then be formed as a second tubular sleeve over the first tubular sleeve in such a manner as to have a longitudinal length about twice (usually slightly greater than twice) the length of the ultimate tampon and with half of said length overlapping at one end of the first tubular sleeve. The overlapping length may then be introverted along the inside of the first tubular sleeve (this can be done by an air pressure jet or by vacuum or by a mechanical probe) to form a sleeve shaped bag enclosing the first tubular sleeve. The two ends of the bag material then come together and may be tied to a withdrawal cord in conventional manner.

As an alternative to forming the bag material over the first tubular sleeve (of sandwich layer material), the bag material may start as the underneath layer and be folded back externally over the overlaying tubular sleeve of sandwich layer materials.

The resultant tampon may then be compressed and inserted in a cardboard tubular inserter in a manner known per se.

A particular advantage of this manufacturing method is that the gel material, which may include small particles is handled in a manner which ensures that an even layer or an even striped coating, is located where it is wanted without gel powder or particles flaking off, i.e. there is control of the handling of the material by virtue of the outer covering layers of the sandwich.

In use there are further and more important advantages.

An important advantage of the tampon construction in its broadest sense is that in use the layer of gel material is protected against any risk of particle fall out by having at least two layers of material (i.e. a layer of carrier material and a layer of the outer bag material) between it and the exterior. Thus there is at least a double layer protection to ensure that loose particles of gel material will remain within the tampon and be removed with the tampon after use.

Moreover, the arrangement holds the whole structure together better in use, i.e. the gel and carrier has greater structural integrity during that use.

Gel materials of the kind previously mentioned have the property of absorbing large quantities of liquid. However they take up this liquid comparatively slowly. By sandwiching the gel material between two carrier layers at least one of which has capillarity the capillary layer or layers can serve both as a conductor of the liquid from outside to the gel absorbent material, and also as an intermediate reservoir to carry the liquid until it has been absorbed by the gel.

The arrangement where layers having capillarity are used is particularly advantageous when using a cross-linked carboxyalkylated starch based material of the kind disclosed in British Patent No. 1,563,697.

An embodiment of the invention will now be described by way of example with reference to the diagrammatic drawings accompanying the provisional specification in which:

Figure 1 is a schematic diagram of an equipment for making a sandwich of tissues incorporating absorbent gel;

Figure 2 is a perspective view showing how the sandwich and an outer layer are formed on a mandrel;

Figure 3 is a view of the end of the mandrel showing formation of the tampon;

Figure 4 is a similar view to Figure 3 at a different operational stage; and

Figure 5 is a diagrammatic representation of the tampon so formed.

Referring to Figure 1 a hopper 1 contains a suitable highly absorbent milled particulate cross-linked carboxyalkylated starch starch derivative gel. The manufacture of such gels is described in German Patent Application P 26 36 899.0 which disclosure is deemed to be incorporated in this Specification. A vibratory feeder 2 is arranged to feed this gel material into the nip of a pair of rollers 3, 4 of which the upper roller 3 is of steel and the lower roller 4 of rubber so as to accommodate variations in the size or evenness of the particle layer.

Also feeding into the nip of the rollers 3, 4 are two continuous webs of tissue paper, to form carrier layers 5, 6 supplied from supply rolls 7, 8 via intermediate feed rollers 9. In each case a water spray device 10 is provided which wets the tissue carrier webs 5 and 6 before they reach the nip of rollers 3 and 4.

The wetted carrier layers 5, 6 then receive the layer of particulate gel at the nip of the two rollers 3 and 4 and thereafter feed forward as a composite sandwich ply through a heating chamber 11 which removes moisture from the tissue carriers and gel, round a cooling roller 12 and thence to a storage reel 13.

The heating chamber 11 is an enclosure consisting essentially of an open feedthrough system of rollers 14, radiant heaters 15, and forced extraction exhaust duct 16.

The material on the storage reel 13 is slit on a conventional slitting machine into a width to suit the tampon dimensions and the required number of layers of sandwich stock material.

Referring now to Figure 2, this shows the first part of the system for the production of tampons from the gel sandwich stock material formed on the equipment described with reference to, and as shown in Figure 1.

In Figure 2 this sandwich stock material 18 may be used in one, two, three or four layers which may be formed using cutting, folding, and directional re-orientation systems as required. These methods are well known to those skilled in the paper handling art and for clarity only the single layer sandwich 17, and the cutting knife 20 are shown in Figure 2.

The discrete pieces 21 of sandwich material thus formed are fed by the conveyor 19 to the next stage.

At the next stage a web 22 of a non-woven fluid pervious outer cover material is fed from a supply reel 23 in the longitudinal feeding direction followed by the sandwich stock material 17.

The feed speed of the non-woven web 22 is just over twice the speed of feed of the stock material 17. Thus, the discrete pieces 21 are picked up by the web 22 with a spacing between successive pieces which is slightly greater than the length of each piece.

A polished shaped guide piece (not shown) then forces the web into a sleeve shape on a mandrel 25 with the two edges of the web 22 overlapping. These webs are heat sealed or glued by a roller 24 as the web feeds onto the mandrel 25.

Referring now to Figure 3, the mandrel which is a low surface friction bar having a hollow 26 at its further end, carries a series of spaced pieces of sandwich stock 21 surrounded by an overlying sleeve shaped layer of non-woven material 22. The material is carried along the mandrel by a pair of endless belt conveyors 27 which each carry spaced rubber grippers 28 located to grip the web at the points where the pieces of sandwich stock 21 locate.

The material is fed off the end of the mandrel to a position where a pair of cutter rollers 29 bring knife edges together to cut the end of the web 22. An air blast jet 30 is then actuated, and this forces the free end of the web back into the hollow 26 at the end of the mandrel (see Figure 4). The grippers 28 are continuously feeding the material on, so that the folded material passes the cutter rollers. Then, when the position shown in Figure 3 is again reached, the so-formed tampon (at the extreme right hand position of Figure 3) is severed.

The so-formed tampon is then fed to further machinery where the tampon is compressed to a tight cylindrical form, a string is tied to the end, and is inserted in a telescopic cardboard applicator. These can all be standard operations, well known in the art and in consequence have not been described.

Reference is now made to Figure 5 which diagrammatically shows a tampon in accordance with the invention, having a withdrawal cord 31. In the tampon shown, the sandwich is folded into two layers, and it will be seen that the absorbent gel material 32 is well protected, by virtue of two layers of material, one of tissue 5 or 6 and one of the non-woven outer 22. Moreover these two layers of material act as both a capillary path to the gel, and a temporary reservoir until the gel has absorbed the extant liquid. In this described example the gel is shown as a continuous coating between, and in practice bonded to, the internal surfaces of the two carrier layers. Two alternatives have also been found particularly satisfactory.

The first is where the gel coating is in the form of stripes as described in British Patent No. 1,563,697; and the second is where the gel is disposed within a discrete inner layer as a mixture with a wicking filler material in particuluar cellulose or other fibres such as textile of wood pulp fibres, or polyurethane or other suitable plastics foam. The cellulose fibres and gel material can be formed into the inner layer by being mixed dry and fed from the hopper 1 as with the gel coating, or can be formed from a wet slurry by a paper making method on the lines of the well-known Fourdrinier process.

WHAT WE CLAIM IS:—

1. A tampon for the absorption of body fluids comprising a sleeve shaped absorbent inner material enclosed within a sleeve shaped bag of fluid pervious material having inner and outer walls which enclose the sleeve of absorbent material, said absorbent inner material being in the form if a sandwich comprising a quantity of absorbent gel material held between two carrier layers at least one of which layers is fluid pervious.

2. A tampon according to Claim 1 in which the gel material is a surface coating on at least one of said carrier layers.

3. A tampon according to Claim 1 in which the gel material is incorporated in an inner layer which inner layer comprises a mixture of the gel material and a wicking filler material.

4. A tampon according to Claim 1, 2 or 3 in which at least one of said carrier layers is of a fibrous material having capillarity and serving as a temporary reservoir to carry the fluid until it has been absorbed by the gel material.

5. A tampon according to Claim 4 in which the gel material is present in the form of a pre-determined discontinuous pattern which promotes directional spread and absorption.

6. A tampon according to Claim 5 in which the pre-determined pattern is a series of stripes allowing directional capillary flow of fluid along zones between stripes.

7. A tampon according to any one of the preceding claims in which the absorbent gel material is a cross-linked carboxyalkylated starch based material.

8. A tampon substantially as herein described with reference to the accompanying diagrammatic drawings.

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3 SHEETS

PROVISIONAL SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale

Sheet 1

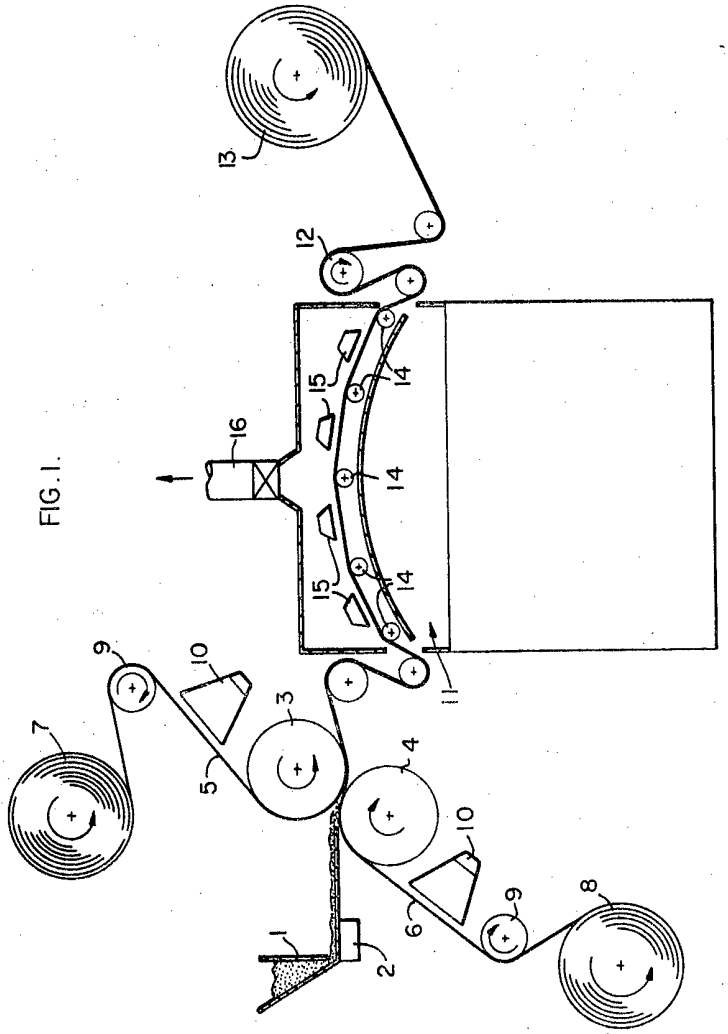

FIG. 1.

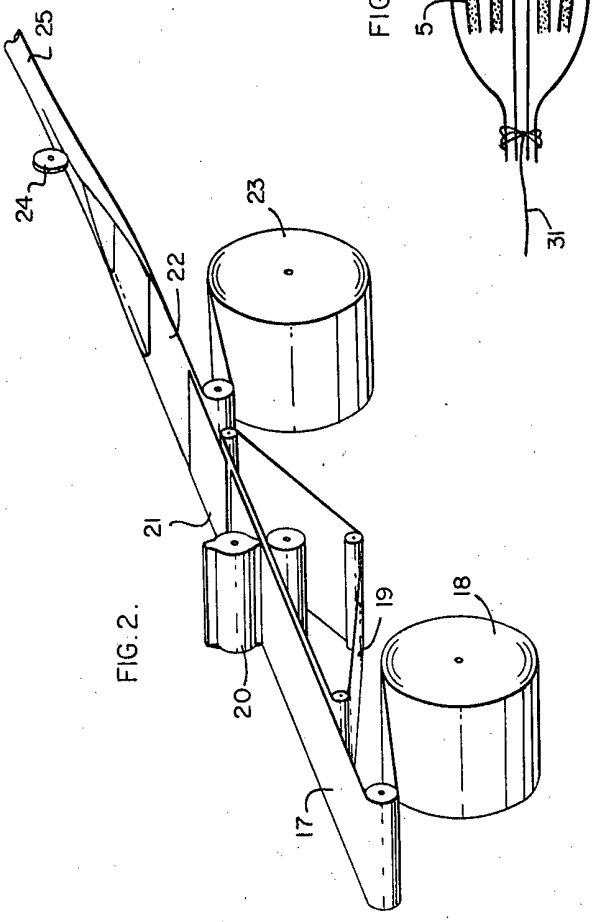

FIG. 2.

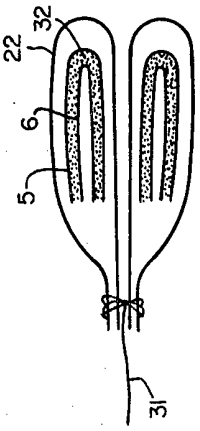

FIG. 5.

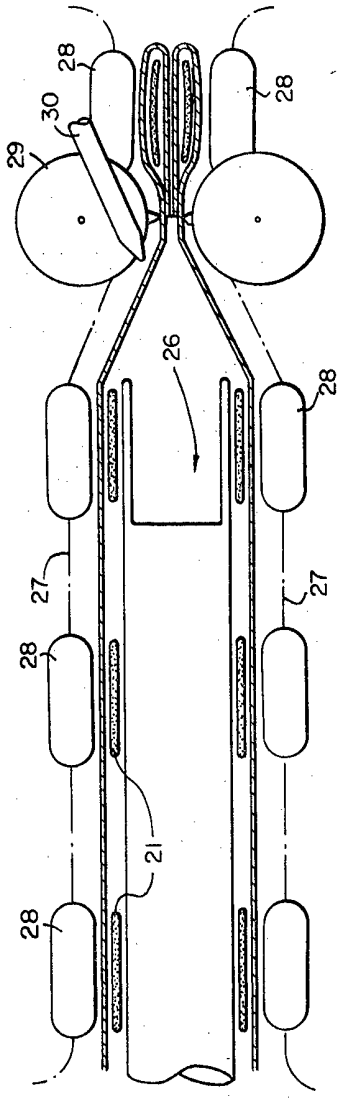

FIG. 3.

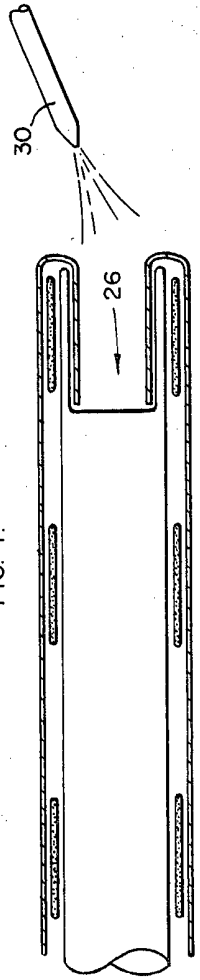

FIG. 4.