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NON-ADHERENT SURGICAL DRESSING

Filed Feb. 15, 1967

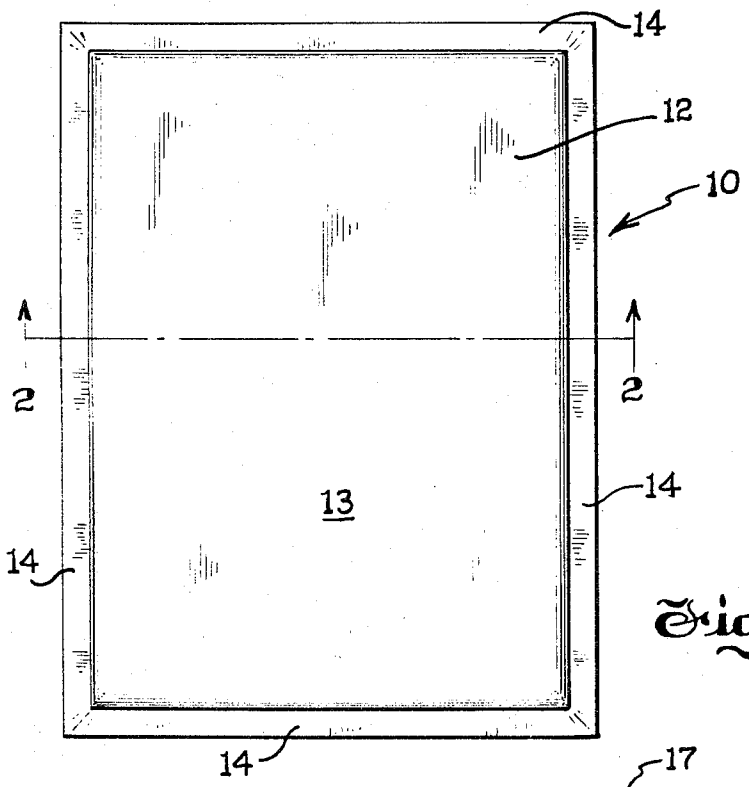


Fig. 1

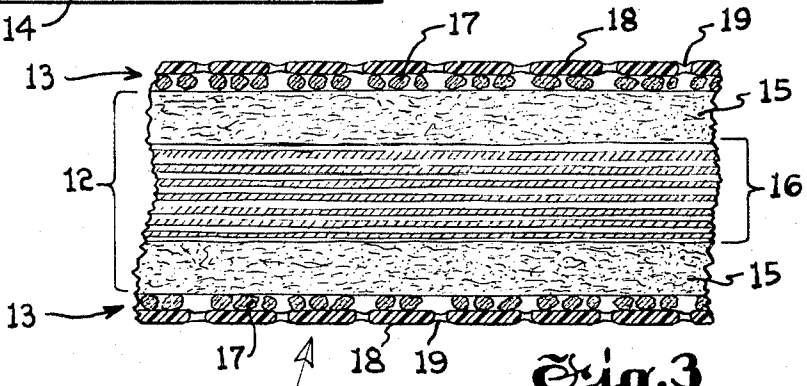


Fig. 3

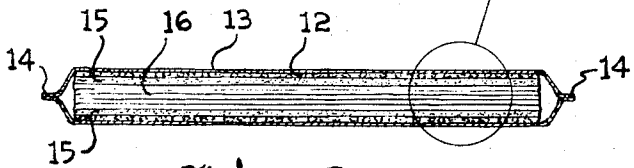


Fig. 2

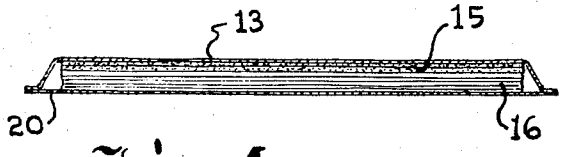


Fig. 4

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NON-ADHERENT SURGICAL DRESSING

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U.S. Cl. 128—156 12 Claims

ABSTRACT OF THE DISCLOSURE

A non-adherent surgical dressing having a laminated fluid permeable outer cover consisting of a non-woven fibrous web with a non-absorbent discontinuous film facing, and an inner absorbent core of multilayered construction. The outer layer of the absorbent core adjacent the cover is a low density fibrous mat and the inner layer adjacent the fibrous mat is a higher density element such as multiple plies of cellulose wadding or compressed wood fluff.

Background of the invention

This invention relates to an improvement in absorbent bandages or surgical dressings, and more specifically relates to dressings of the non-adherent type.

It is common practice to protect body wounds, whether accidentally or surgically produced, by covering them with sterile absorbent material which accepts and retains the fluid exudate which drains from the wound during the normal heeling process. While most absorbent materials used for dressings are capable of absorbing such fluids when applied to a wound, there is a natural tendency for the material to become bonded to the protective eschar or scab as it forms over the wound. When such bonding occurs, removal of the dressing is not only a painful procedure, but disrupts the partially healed tissue to delay healing and often cause unsightly scarring. An effective non-adherent dressing therefor, is highly desirable, not only for minor wounds but for covering burns, skin graft sites and major surgical incisions.

Several dressings are available which are relatively non-adherent and reduce or eliminate bonding when applied to wounds. One such dressing is taught in Dockstader et al. U.S. Patent 2,923,928, wherein the surface of the dressing is provided with a mechanically perforated organic film. Another is Davies U.S. Patent 3,006,338 wherein the surface of the dressing is a non-woven fabric which has been impregnated with minute particles or globules of polythene and then passed through a hot calender to provide a smooth surface covered with film-like patches of polythene and free of projecting fibers. Still another is Eldredge et al. U.S. Patent 3,285,245 wherein the surface of the dressing comprises a highly porous, self-sustaining, discontinuous film of fused and coalesced non-woven, inert, thermoplastic, synthetic polypropylene fibers.

Each of these prior art dressings are relatively non-adherent when applied to a wound. However, improvement in fluid absorption properties and capacity is desirable. This invention is directed in part to improving absorbent capacity and control of fluid flow within the dressing as well as providing a non-adherent surface having a more cosmetic feel and appearance.

A surgical dressing with a non-adherent cover and an absorbent core comprising only cotton fibers, wood fluff fibers, multiple plies of surgical gauze, or multiple plies of cellulose wadding will function to a degree. However, in such construction when the flow of exudate from a wound is heavy, the absorbed fluid will not be drawn

away and spread in the interior of the absorbent core, but will tend to puddle under the cover; or when cellulose wadding is used the absorbed fluid will spread directly under the surface. In each case, the desired dry surface of the dressing is negated by back-flow of exudate, or by the inability of the absorbent component to carry the fluid away from its source.

Summary of invention

The present invention provides an improved non-adherent cover as well as an improved arrangement of the absorbent materials in the absorbent core component. The non-adherent cover comprises a porous fibrous non-woven web having the top surface area of the individual fibers covered with a thin transparent coating of flexible plastic film. The film is discontinuous between many of the fibers and is substantially invisible to the eye so that the cover has the appearance and feel of an uncoated non-woven fabric. The discontinuous film coats completely the top area of the individual fibers in the non-woven substrate, and occasionally bridges some of the open area between fibers. However, a substantial portion of the open area or spaces between fibers of the non-woven web remain open and free of film just as they did before the film was applied. The surface film coating adds substantially no mechanical strength to the non-woven web and is not self-sustaining in itself.

The absorbent core is multilayered and the first layer comprises a low density mat of absorbent fibers such as carded cotton, airlaid cotton, or wood pulp fluff disposed directly under the cover. A second layer is located adjacent the fiber mat and comprises a higher density element, preferably multiple plies of absorbent cellulose wadding. The low density cotton or fluff layer has a very high capacity for fluid absorption, especially in the area proximal to where the fluid first strikes the layer, but has little tendency to spread the absorbed fluid laterally through the layer. The multiple plies of creped cellulose wadding which comprise the inner layer in the preferred embodiment, in addition to having the ability to quickly absorb fluid in a localized area has the additional ability to quickly spread the absorbed fluid laterally especially along the capillary tubes formed by the creping. Compressed wood pulp fluff of higher density than the fluff in the top layer, also has some ability to spread fluids laterally, but use of such an element is less desirable than a multiple creped wadding element.

In general, the lower density cotton or fluff layer has an average density in the range of about 1.5 pounds or less per cubic foot, while the higher density layer has an average density of about 2.5 pounds or more per cubic foot. An important consideration is that there be a measurable difference in average density between the uppr and adjacent layers.

When a dressing of the above-described construction is applied to a wound, the non-absorbent surface prevents sticking, the fluid quickly penetrates the top absorbent fiber mat in a localized area and wicks through to the cellulose wadding. The cellulose wadding accepts the fluid readily and spreads it laterally while continually drawing fluid from the localized source in the fibrous batt above. As a result the exudate is quickly removed from the surface of the dressing where it contacts the wound, and the wound stays substantially dry. The quick dispersion of fluid in the interior of the dressing enables the dressing to serve for longer periods than dressings of the same size but having a non-laminar construction.

Accordingly, it is the principal object of this invention to provide a non-adherent surgical dressing or bandage with improved absorbent capacity.

Another object is to provide a non-adherent dressing with improved fluid wicking ability.

Still another object is to provide a non-adherent dressing which maintains a drier surface when in use.

A further object is to provide a non-adherent dressing in which the non-adherent surface has the soft appearance of an untreated non-woven fabric.

Other objects and advantages of the invention will become apparent by reference to the following specification and accompanying drawing wherein there is described and illustrated a non-adherent bandage embodying a selected form of the invention.

Brief description of the drawings

FIGURE 1 is a top view of a pillow-shaped non-adherent surgical dressing in accordance with the invention.

FIGURE 2 is a sectional view taken along line 2—2 of FIG. 1.

FIGURE 3 is a greatly enlarged fragmentary view of the FIG. 2 section.

FIGURE 4 is a sectional view of a one-sided dressing.

Description of the preferred embodiments

FIGURE 1 is a top view of one form which the improved non-adherent surgical dressing might take. The generally rectangular dressing **10** comprises a central absorbent pad area **12** covered on both sides by an outer non-adherent fluid permeable cover **13** sealed around the entire perimeter as at **14**.

The FIGURE 2 sectional view shows the general construction of one embodiment of the dressing in more detail. A fluid permeable cover material **13** is disposed above and below a central absorbent pad **12** and is sealed together around the entire perimeter **14**, as by heat-sealing, to provide a closed envelope. Top and bottom component layers **15** of the central absorbent pad **12** comprise an absorbent carded combed cotton web. Component layer **16** comprises multiple plies of creped cellulose wadding tissue.

FIGURE 3 is a greatly enlarged fragmentary view of the FIG. 2 section to more clearly show the construction of the non-adherent cover.

In the embodiment shown, the fluid permeable cover comprises a non-woven fibrous web in which the top surfaces of fibers **17** individually, or in clusters, are coated with a thin film of thermoplastic material **18** which in the preferred embodiment is polypropylene. The thin film completely covers the top surface of each of the fibers and occasionally spans some of the open area or spaces between fibers. However, in most caess, when there is a space between fibers, and in non-woven webs there are a great multiplicity of such spaces, the film is fissured and split so that no film is present above the open area between fibers, and the film surfaced cover material is thus provided with a multiplicity of microporous apertures **19**.

Film **18** is very thin, and preferably of such thickness and transparency that it is substantially invisible to the eye without magnification. The surface of the dressing has the appearance and feel of a non-woven fabric, rather than a fabric coated with shiny plastic film. The dressing thus feels and looks much the same as an ordinary uncoated absorbent dressing with a conventional non-woven cover avoiding the shiny appearance and cold feel of plastic.

FIGURE 4 is similar to FIG. 2 except that it represents a one-sided dressing. This embodiment has the top fluid permeable cover **13**, a layer **15** underlying the cover and comprising a batt of heterogeneously arranged absorbent fibers, and a second layer **16** comprising multiple sheets of absorbent cellulose wadding. The entire structure is underlaid by a moistureproof layer **20** which may be treated paper or plastic, whose purpose is to prevent strikethrough.

In a specific example, the preferred cover material was fabricated by laminating a .4 mil thick film of polypropylene to a non-woven fabric of parallelly-aligned and bonded fibers and running the laminate through the hot nip of a calender. The heat of the calender was sufficient (350°–370° F.) to soften the polypropylene, bond it to the non-woven web, and then cause the film to shrink due to elastic memory. Since the film was bonded to the fibers prior to shrinking, it was unable to shrink uniformly. The shrinking forces were sufficient however to cause the film to draw away from the open areas or spaces between fibers with the result that small micropores were caused to open in the film in these areas.

This procedure produced a non-woven fabric having a high degree of porosity and at the same time provided the fabric with a non-absorbent coating on one surface. It was also found that the porosity of the fabric could be controlled by temperature adjustment and by the number of passes made through the heated calender nip. Higher temperature and repeated passes increased porosity. In this way, a porosity approaching that of the original untreated non-woven fabric could be produced.

In this preferred embodiment, the base non-woven fabric was manufactured by passing multiple slivers of rayon fibers in juxtaposed arrangement through a draw frame. The rotating rolls of the draw frame stretched out the individual fibers to substantially their full length so that from about 80 to 95% of the fibers were parallelly-aligned and in fully extended, substantially straight condition. While the fibers were held in this fully extended and straight condition they were bonded by applying a spaced pattern of flexible thermoplastic adhesive to the fibers without disturbing their aligned arrangement. The flexible adhesive made the web self-sustaining so that it could be further processed and also provided the bonded web with heat-sealing properties.

When cross direction strength is required such webs may also be crosslaid before applying the plastic film as above-described to form the non-adherent microporous cover.

The fibers in the above-describd embodiment comprised 2.5 inch long fibers of 1.5 denier viscose rayon and the finished web was bonded with a polyvinyl chloride resin applied in a discontinuous spaced pattern. The weight of the web before lamination to the plastic film was about 13 grams per square yard. Other suitable length and denier fibers and web weights may be used.

While the non-woven web of aligned fibers described above is the preferred embodiment, other substrates may be used for lamination to plastic to form the non-absorbent film layer. The principal requirement is that the substrate be of a porous nature and sufficiently fluid permeable for the indicated purpose before lamination. While not as suitable as the preferred substrate of aligned fibers, others which could be used include single ply cellulose wadding, carded fiber webs, and non-woven bonded thread webs with small interstitial spaces between threads. Both natural and synthetic fibers may be used in the construction.

The surface film should be thermoplastic and preferably is polypropylene since the latter may be sterilized at high temperature as in steam sterilizers, without destroying its structure. However, polyethylene and other heat shrinkable non-absorbent films may be used.

The physical arrangement of the outer cover around the absorbent core of the dressing may vary from that shown. For example, the cover may comprise a single sheet wrapped around the core and sealed on one side and both ends. Another arrangement could have a single sheet enwrapping the core with overlapping edges centered on one side and having the overlap and both ends suitably sealed.

While the above describes the preferred embodiments varous changes in the described construction may be made without departing from the spirit of the invention,

the scope of which may be determined by reference to the following claims.

What I claim is:

1. A non-adherent surgical dressing of improved absorbent capacity comprising a fluid permeable outer cover sheet and a multi-layered inner absorbent core, said cover sheet comprising a porous fibrous structure in which the upper surface of the fibers is overlaid with a non-absorbent thin coating of flexible transparent plastic film, said coating being substantially indiscernible to the eye, said core comprising a layer adjacent said cover sheet consisting of a low density mat of absorbent fibers and a layer disposed on the side of said mat opposite from said cover comprising a higher density element of absorbent materials.

2. The surgical dressing of claim 1 in which said low density mat of absorbent fibers comprises cotton fibers.

3. The surgical dressing of claim 1 in which said low density mat of absorbent fibers comprises wood pulp fluff.

4. The surgical dressing of claim 1 in which said higher density element comprises multiple plies of cellulose wadding.

5. The surgical dressing of claim 1 in which said higher density element comprises compressed wood pulp fluff.

6. The surgical dressing of claim 1 in which the fluid permeable cover sheet comprises a thin, porous nonwoven fiber web and a discontinuous, extremely thin thermoplastic film intimately bonded to and covering the top surface of the fibers in said web, said film occasionally bridging some of the open area between fibers while leaving a substantial portion of the open area between fibers free of said film.

7. The surgical dressing of claim 6 in which said film is polypropylene and said dressing is steam sterilizable.

8. The surgical dressing of claim 6 in which said film is polyethylene.

9. The surgical dressing of claim 6 in which said nonwoven fiber web is a carded cotton web.

10. The surgical dressing of claim 6 in which said nonwoven fiber web is a pervious tissue sheet.

11. The surgical dressing of claim 6 in which said nonwoven fiber web is a web of parallelly-aligned synthetic fibers in which 80 to 95% of the fibers are parallelly aligned and in fully extended and substantially straight condition.

12. The surgical dressing of claim 6 in which said nonwoven fiber web comprises a laminate, said laminate comprising two layers of parallelly-aligned synthetic fibers with said layers angularly disposed to one another and 80 to 95% of the fibers in each layer being parallelly aligned and in fully extended and substantially straight condition.

References Cited

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ADELE M. EAGER, *Primary Examiner.*

U.S. Cl. X.R.

128—157; 117—98; 161—109