Aug. 5, 1969 V. C. EGLER 3,459,618

METHOD OF MAKING ABSORBENT DRESSINGS

Original Filed Dec. 6, 1963

Fig. 1

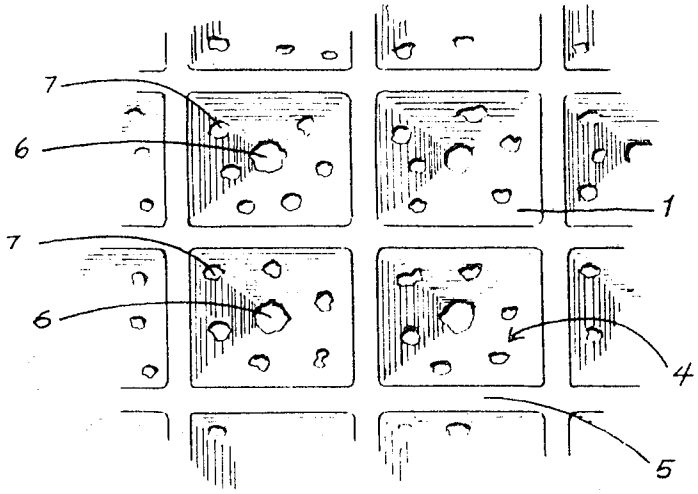


Fig. 2

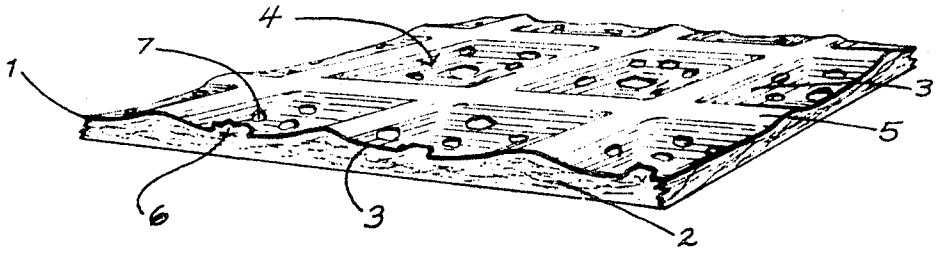
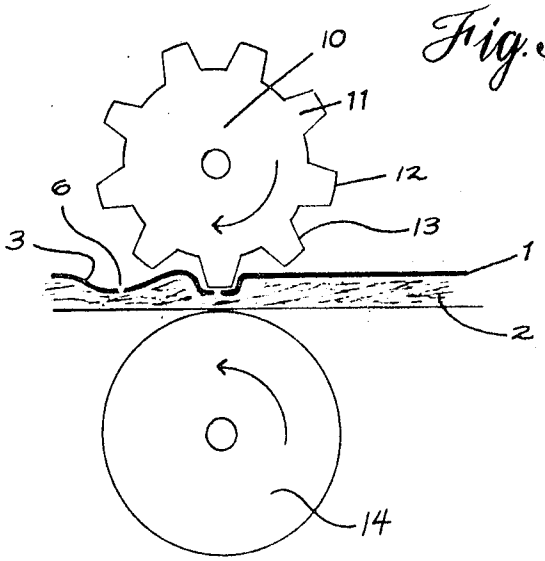


Fig. 3



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United States Patent Office 3,459,618
Patented Aug. 5, 1969

3,459,618

METHOD OF MAKING ABSORBENT DRESSINGS

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Original application Dec. 6, 1963, Ser. No. 328,553, now Patent No. 3,292,619, dated Dec. 20, 1966. Divided and this application Feb. 7, 1966, Ser. No. 525,645
Int. Cl. C09j 5/06; B32b 27/04, 27/12
U.S. Cl. 156—219 2 Claims

ABSTRACT OF THE DISCLOSURE

A method for making absorbent dressings, in particular nonadherent absorbent wound dressings, whereby a flexible thermoplastic film is heat-roller compressed onto a pad of absorbent material in such a way as to form multiple depressions in the film covered surface of the pad, to cause the film to conform to the contour of said pad surface, and to create small openings in those areas of the film which line the depressions on the pad.

This invention relates to absorbent dressings, particularly to nonadherent wound dressings, and to a method of making same.

This application is a division of applicant's copending application Ser. No. 328,553, filed Dec. 6, 1963, now U.S. Patent No. 3,292,619, issued Dec. 20, 1966.

Undoubtedly the most meritorious advance in wound dressings in recent years is the invention in nonadherent dressings by W. B. Dockstader and L. A. Thoennes as disclosed and claimed in U.S. Patent 2,923,298. The growing widespread acceptance by the medical profession and the general public of these dressings testifies to the utility and effectiveness as nonaherent dressings that minimize or eliminate scar formation in a variety of types of body wounds such as cuts, skin punctures, abrasions and burns. As to be expected, the introduction of the dressings on the market was followed with a flurry of activity by others directed to nonadherent dressing structures. These included special openings such as curvilinear slits and arrangement thereof in the film covering of the dressing; embossed pads covered with a flat monoplanar perforated film; and spacers of apertured fabrics between the main body of absorbent material and the perforated film arranged with the apertures thereof in register with the perforations in the film. Examples of these modifications may be found in U.S. Patents 2,877,765, 2,896,618 and 3,077,882.

This invention is directed to a nonadherent dressing in which only portions of the surface on the body side thereof are in contact with the body when applied to cover a wound therein. In accordance with this invention the surface of sites of fluid intake in the dressing is spaced from the surface of the body. Preferably, only a minor portion of the total surface area of the body-side of the dressing is in contact with the body. The body-side of a dressing is, of course, the side thereof placed toward the body over the wound. The major sites of fluid intake into the absorbent pad in accordance with this invention are located in depressions in the surface of the body-side of the dressing. The walls of the depressions slope inwardly into the body of the dressing and are lined with a thin film which covers the surface of the pad at the body-side of the dressing. The film lining the walls of the depressions is perforated, each depressed film portion containing a plurality of openings through which fluid exudate of the wound passes for absorption into the absorbent material located at the openings. The size of the openings and the number thereof in the film on the body-side of

the dressing required for ready passage of wound exudate therethrough and into the absorbent material are well known and suitable sizes and numbers of openings in the dressings of this invention may be chosen in accordance therewith. Preferably, the size of each opening is such that the open area thereof is equivalent to circular openings having a diameter of from about 0.008 to 0.2 inch. The total open area of the film at least in the portion thereof directly overlying the wound site should be from about 0.25 to 25% of the film area. Moreover, in accordance with this invention a predominantly major portion, if not all, of the open area of the film is located in the film portions lining the walls of the depressions.

FIGS. 1 and 2 are top and cross-sectional, partly perspective, views, respectively, of an absorbent dressing of this invention in which the numeral **1** designates the film covering a pad **2** of absorbent material. The film **1** lines the walls **3** of the generally concave depressions **4** and extends over the raised portions **5** bordering the depressions. In the case of the dressing as shown, each of the depressions **4** are bordered on all sides thereof by continuous, but may be intermittent; for example, channels may traverse portions **5** to interconnect the depressions. The walls **3** of the depressions **4** slope inwardly from the top surface of the raised portions **5** into the body of the pad **2**. The portion of the wall **3** furthermost recessed from the top surface of the dressing (surface of portion **5**) is located substantially centrally in the depression **4**. This bottom portion of the film is perforated with an opening **6** through which is exposed absorbent material of the pad **2** located directly thereunder. The film lining the sloping portions of the wall **3** is perforated with a plurality of openings **7** usually smaller in size than the bottom opening **6**. The openings **7** need not be arranged in any particular pattern in the wall **3** but generally should be distributed throughout the wall surface. The number of holes **7** in each depression may vary from about 3 to 10 or more, depending upon hole size, for rapid take-up of fluid and efficient distribution of the fluid into the pad **2**. The film **1** is adhered to the pad **2** at least at the peripheral edges of the openings **6** and **7**. Adherence at these edges keeps the portions of the pad **2** at these openings at the plane of the openings readily available for absorbing fluid entering the depressions. Thus, the absorbent material in and at the openings helps to overcome any resistance a fluid may have in passing into the openings **6** and **7**. Adherence at these edges between the pad and film also helps to maintain the walls **3** depressed, recessed from a plane common to the top surface of portions **5** of the film. Positive and maximum retention of the depressions is possible in accordance with this invention by lamination of the film to the pad substantially throughout the interface between the film and pad.

A one-stage process for the manufacture of dressings in which the film covering is laminated to the pad while forming the depressions in the covered surface of the pad and also forming openings in the film portions lining the depressions is schematically illustrated in FIG. 3. Briefly, a flexible imperforate film **1** is placed upon a pad **2** of absorbent material and the composite thereof is passed through a nip between the surfaces **12** of the bosses **11** on the pattern roll **10** and the smooth surface of roll **14**. The rolls **10** and **14** are urged together (by means not shown) with sufficient force to compress the portion of film **1** and underlying portion of pad **2** at the aforedescribed nip to form the depressions **4** in the film covered surface of the pad. The bosses **11** are heated, for example by an electric heater coil in the body of pattern roll **10**, to a temperature sufficient to soften the depressed portions of the plastic film **1** and conform to and line the walls of the depressions simultaneously made in the pad **2**. The

smooth roll **14** is also heated, preferably to a temperature less than that of the pattern roll **10**. When the boss **11** initially contacts the film and begins to depress it there is sufficient heat transfer through the film to the body of the absorbent material to prevent melting of the film. As the boss **11** travels downwardly, as viewed in FIG. 3, a point is reached at which the film at the base of the depression melts and forms an opening **6**. The molten portion at the peripheral edge of the opening **6** become attached to the absorbent material of the pad **2** directly underlying the edge of the opening. Smaller openings are formed in the sloping wall portions of the film, such as shown at **7** in the walls **3** in FIGS. 1 and 2. These openings also are laminated to the absorbent material along their peripheral edges as in the case of the larger openings **6**.

The temperature of the two rolls and the temperature differential necessary to produce the dressings of this invention are dependent on a number of factors, including, of course, the softening and melting points of the thermoplastic film, the nature of the absorbent material the pressure exerted at the nip of the two rolls and the rate at which the dressing is passed through the nip. This is illustrated in the following example.

A dressing was prepared having approximately 375 depressions per square inch of film-covered surface of the dressing. The apparatus employed to make the dressing was a pattern roll containing four-sided bosses approximately 0.017 inch high, the top surface (**12**, in the drawings) having roughly a parallelogram configuration measuring about 0.025 inch by 0.015 inch. The bosses were arranged in rows across the width of the roll, the bosses in each row being offset from the bosses in the next adjacent rows to present a staggered boss pattern. The rolls were independently heated, the pattern roll to a temperature of about 250° F. to 260° F. and the smooth roll to a temperature of about 150° F. to 175° F.

A low density polyethylene film about 0.001 inch thick was placed upon a strip of nonwoven cotton fabric approximately 0.07 inch in thickness. The composite of the film and nonwoven fabric was passed through the nip between the pattern roll and smooth roll with the film toward the pattern roll, as shown in FIG. 3. The pressure between the two rolls was about 48 pounds per inch of roll length. The pad and film were passed through the nip at a speed of three yards per minute.

Dressings of appropriate size were cut from the processed strip and tested as such on animals. The dressings functioned well as nonadherent wound dressings. Surprisingly, fluid taken into the pad over a restricted area spread rapidly and widely to portions of the absorbent pad well removed from the area of intake on the pad. For example, a droplet of colored water about ¼ inch in diameter placed upon the body-side of the dressing produced as described above was absorbed into the pad through the openings in about two to three adjacent depressions. The colored water rapidly spreads radially from the intake site to an area approximately one inch in diameter.

Films suitable for use in the dressings of this invention are thermoplastic films such as polyethylene films, vinyl chloride-vinyl acetate films, vinyl chloride-vinylidene chloride films, and polyester films to name a few. The films must be water insoluble, thin and flexible. The pad may be any absorbent material suitable for use as a wound dressing. Particularly useful are cellulosic materials such as cotton fibers, fluff and the like.

The invention claimed is:

1. A method of making absorbent dressing comprising: placing a flexible film of thermoplastic material on a surface of a pad of absorbent material; subjecting the composite of said pad and film to heat and pressure in discrete areas of said surface to soften the thermoplastic film in said discrete areas, to compress the absorbent material to form a depression therein at each of said discrete areas and to project the softened portions of said thermoplastic sheet into each of said depressions to line the surfaces of the depression with said film; and continuing the application of heat and pressure to melt discrete portions of the film lining the depressions to form a multiplicity of openings therein.

2. A method of making absorbent dressing comprising: placing a flexible film of thermoplastic material on a surface of a pad of absorbent material; subjecting the composite of said pad and film to heat and pressure in discrete areas of said surface to soften the thermoplastic film in said discrete areas, to compress the absorbent material to form a depression therein at each of said discrete areas and to project the softened portions of said thermoplastic sheet into each of said depressions to line the surfaces of the depressions with said film; and continuing the application of heat and pressure to melt discrete portions of the film lining the depressions to form a multiplicity of openings therein and to laminate said film to the surface of said pad at least at the peripheral edges of the openings in the film.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,459,618 August 5, 1969

Vernon C. Egler

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 22, before "but" insert -- raised portions 5. The raised portions 5 need not be continuous, --. Column 4, line 3, "spreads" should read -- spread --.

Signed and sealed this 21st day of April 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents