

# United States Patent

[15] **3,695,260**

Endres

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- [54] **LAPAROTOMY SHEET**  
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[22] Filed: **March 30, 1970**  
[21] Appl. No.: **23,570**

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Ltd.

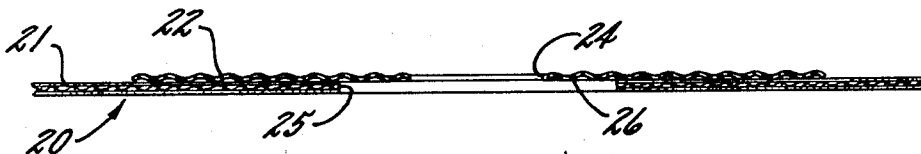
- [52] U.S. Cl. ....128/132 D  
[51] Int. Cl. ....A61f 13/00  
[58] Field of Search.....128/132 D, 171

### [57] ABSTRACT

A disposable laparotomy sheet comprises a major sheet of porous nonwoven fabric and a minor sheet of opaque, glare-resistant plastic near the center of the major sheet and including a fenestration to define the operative area.

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**5 Claims, 7 Drawing Figures**



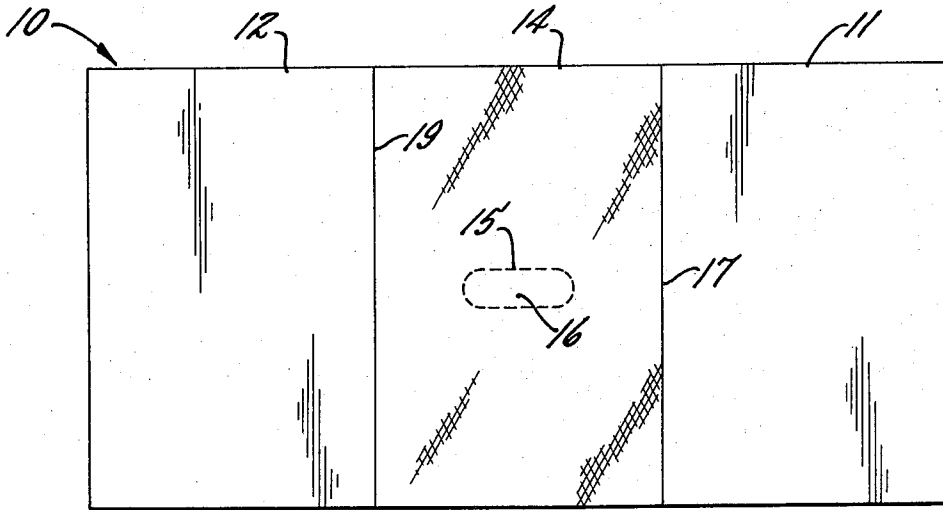


FIG. 1.

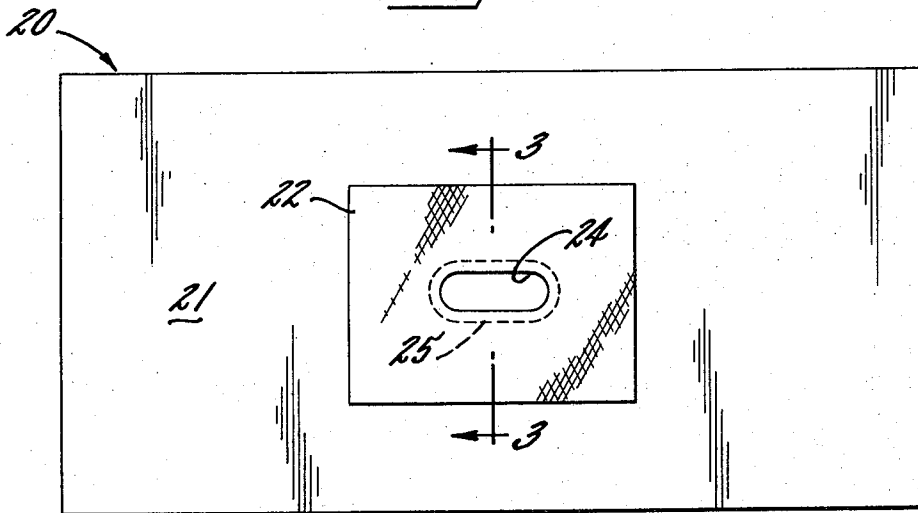


FIG. 2.

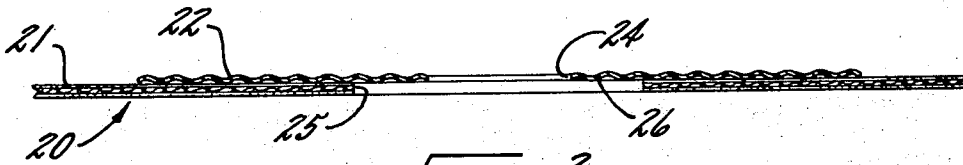


FIG. 3.

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FIG. 4.

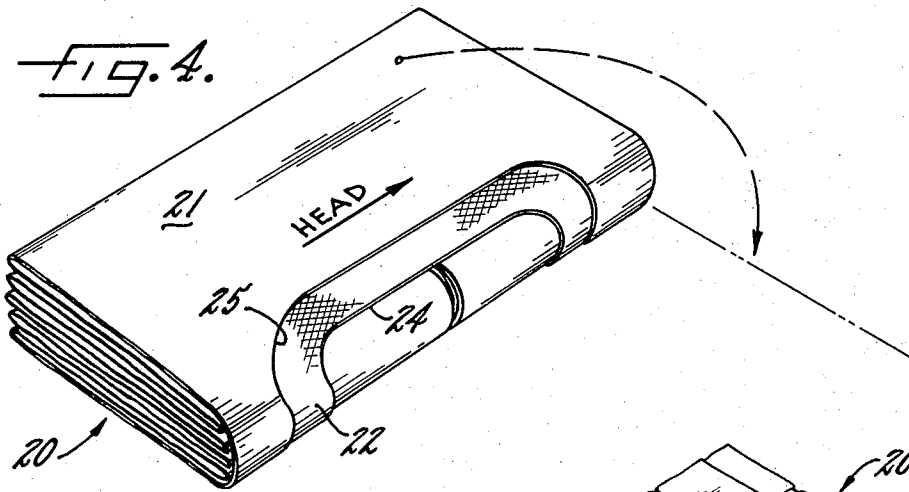


FIG. 5.

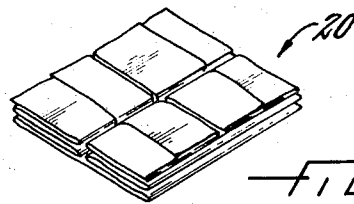


FIG. 6.

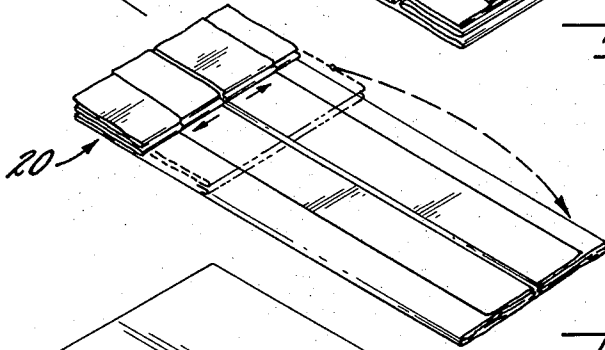
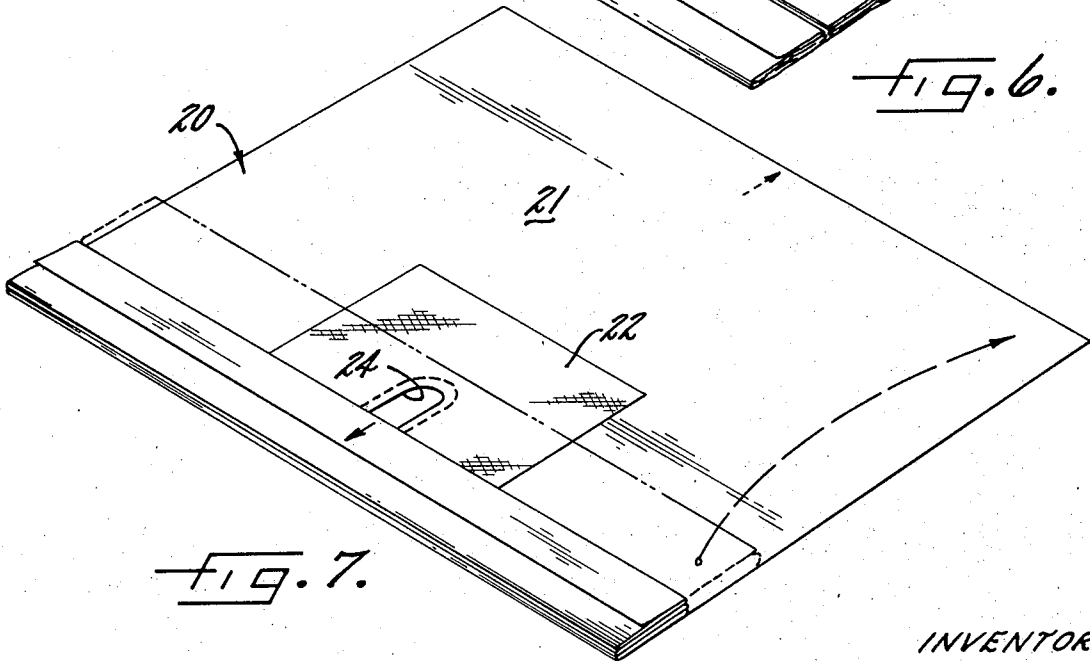


FIG. 7.



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## LAPAROTOMY SHEET

This invention relates to surgical drapes, and more particularly concerns a disposable laparotomy sheet featuring outstanding simplicity, versatility, and little cost.

For surgical operations and other hospital procedures it is conventional to drape all or a portion of the patient with a laparotomy sheet. The sheet has a generally central fenestration to expose the operative or surgical area.

Early laparotomy sheets, and indeed many such sheets in use today, were made of woven textile material. While this was satisfactory, if but in the sense of widespread use, the cost of such sheets, the cost of laundering them, and the cost of sterilizing them for re-use has led in recent years to the growing adoption of disposable laparotomy sheets. Not infrequently, the cost of a sterile disposable sheet is less than the cost of laundering and sterilizing a woven fabric sheet.

As materials for the disposable sheet the choice is usually between nonwoven paper-like fabrics on the one hand, and plastic sheeting on the other. Both have their features and disadvantages.

Nonwoven fabric disposable sheets are attractive, convenient, and not too dissimilar to woven fabrics. Opposed to this, they tend to be somewhat more slippery, and usually are thinner than woven textiles which prevents their being as effective in absorbing perspiration and blood or other body fluids. Plastic laparotomy sheets are almost invariably even more slippery and, in addition, reflect glare from the intense operating room lights. Further, whether or not justified, all-plastic sheets have a reputation for producing static electricity. Moreover, by reason of their imperviousness plastic sheets cause the patient to perspire.

Accordingly, a principal object of the invention is to provide a novel disposable laparotomy sheet that integrates the benefits of nonwoven fabric sheets and those made of plastic, while at the same time avoiding their respective limitations.

An additional object is to provide a disposable laparotomy sheet which is unusually low in cost, easy to manufacture, and convenient to use.

Other and further objects, aims, and advantages of the invention will become apparent as the description of the invention proceeds with reference to the annexed drawings wherein:

FIG. 1 is a top plan view, somewhat schematic, of one embodiment of the invention;

FIG. 2 is a top plan view of an alternative, preferred, embodiment;

FIG. 3 is an enlarged sectional view, taken along line 3-3 of FIG. 2, with the components grossly exaggerated for reasons of clarity of presentation; and

FIGS. 4 through 7 depict sequentially the manner of un-folding a pack (FIG. 4) of a folded laparotomy sheet according to FIG. 2, or conversely, of folding the sheet into a pack.

While the invention will be described in conjunction with certain preferred embodiments, it will be understood that it is not intended to limit the invention to these particular embodiments. On the contrary, it is intended to cover all alternatives, modifications, and equivalent arrangements as may be included within the spirit and scope of the invention.

Turning now to the drawings, and particularly to FIG. 1, one form of the invention is depicted somewhat schematically. The laparotomy sheet 10 in this instance comprises three sections, namely a head area 11 and a foot area 12 both made of porous nonwoven fabric material, and a central or minor area 14 composed of a plastic, as will be explained subsequently in more detail. Near the center of the sheet 10 is a fenestration 15, shown in dashed lines to indicate that, in the described embodiment, the elongated fenestration 15 is perforated until use, whereupon the portion 15 is removed entirely to expose the operative or surgical field. The head and foot areas 11, 12 constitute the major nonwoven sheet, and are spaced away from the fenestration 15 by the minor plastic area 14 which extends completely across the sheet 10.

By way of example, the laparotomy sheet 10 is 44 inches wide by 118 inches long. The fenestration 15, a generally oblong aperture about 12 inches long by 4 inches wide, is positioned with the edge nearest the head end of the sheet 10 located approximately 44 inches from the end, and the edge or periphery of the fenestration 15 located near the foot end of the sheet 10 being 62 inches from the end. Also, the fenestration 15 is located centrally of the central area 14, and this, in turn, is approximately 40 by 90 inches.

Nonwoven fabric materials constituting the head and foot area 11, 12 respectively are available commercially, and many examples of these materials have been described in the literature. See, for example, Buresh, "Nonwoven Fabrics" (Reinhold, New York, 1962), and Krema, "Nonwoven Textiles" (SNTL, Prague, 1962). In essence, nonwoven fabrics are thin mattings of natural or synthetic textile fibers bonded together by any of various bonding media. The thickness of these nonwoven fabrics may be varied widely, and more than one sheet of nonwoven fabric may be laminated together if additional thickness is required.

The central area 14 is advantageously a strong, thin, plastic material, typified by low density polyethylene, polyvinyl chloride, or the like, which is pigmented sufficiently to become opaque. Polyethylene film is presently the material of choice, and may be used at a thickness of about 1 to about 5 mils.

In accordance with one feature of the invention, glare from operating room lights is minimized or eliminated by embossing the upper surface of the sheet 14. Embossed polyethylene and other plastic sheets are likewise available commercially, and are usually prepared by calendaring a sheet between calender rolls of which one roll has a roughened or grooved surface. The other roll may similarly be grooved, or may be a resilient material such as rubber. See, for example, Billmeyer, "Textbook of Polymer Science" (Interscience, New York, 1962), at pages 493 and 497. Advantageously, the plastic sheet is embossed with a simulated leather grain, with the individual grains being approximately one thirty-second inch. Thus, not only does the embossing diffuse reflected light and thereby minimize glare, but it provides a less slippery finish for the plastic in order to reduce the tendency of the sheet 10 to slip, or of instruments to slide off.

To reduce the tendency of plastics to accumulate electrostatic charges, various anti-static agents are available for incorporation into the plastic film. These

tend to be proprietary with the film manufacturer, but examples are included, for example, in Raff and Allison, "Polyethylene" (Interscience, New York, 1956), at pages 416, 417.

As shown in FIG. 1, the nonwoven fabric head and a foot areas or portions 11, 12 are spaced away from the fenestration 15 by a substantial distance, and are secured to the plastic central area near their common edges 17, 19. These edges 17, 19 are lap joints, with a suitable adhesive used to secure the sheets at the laps.

It is apparent, therefore, that the combination of plastic in the central area 14 and nonwoven fabric in the head and foot areas 11, 12 permits the advantages of both materials to be realized. The central area 14 is fluid impervious, and therefore prevents leakage of blood or other body fluids to undesired areas of the anatomy, while the porous nonwoven portions provide some degree of ventilation for the patient.

An even more advantageous embodiment of the invention is portrayed in FIG. 2, and in an enlarged section of FIG. 2 shown in FIG. 3. In substance, in this embodiment the disposable laparotomy sheet 20 comprises a major sheet of porous nonwoven fabric 21, and a generally rectangular plastic sheet 22 which extends over a central portion of the major sheet 21 and is secured to the sheet 21 by a suitable adhesive. In this case, the fenestration 24 is defined by an elongated aperture in the plastic central sheet 22, while a larger aperture 25 has its edges spaced away from the periphery of the fenestration 24. The spacing may, illustratively, be 1 inch on each side and 2 inches at the end, although this may be varied (as, indeed, may the size of the aperture 24) to accommodate operative fields of expectedly different sizes.

By way of illustration, the embodiment of FIG. 2 has the same overall and fenestration dimensions, as well as fenestration location, as do that of the FIG. 1 embodiment. The central sheet 22 is 30 inches wide and 45 1/2 inches long; the fenestration 24 is located 12 1/2 inches from the head end of the laparotomy sheet 20 and 21 inches from the foot end.

Although not shown in FIGS. 2 and 3, the major sheet 21 may be composed of two portions. In this event, it is convenient to join them near one end of the fenestration 24, by an adhesively secured lap joint.

The central sheet 22 is, as previously indicated, adhesively attached to the major sheet 21 of nonwoven fabric material. An adhesive strip of, say, one-eighth inches wide along the outside edges of the central sheet 22, while another adhesive strip of, say, three-eighths inch width secures the central area of the central sheet 22 near the region of the aperture 25. If desired, a normally tacky and pressure sensitive adhesive may be used for at least the adhesive near the aperture 25 and applied also to the portion of the central sheet 22 between the fenestration 24 and the aperture 25. Thus, a pressure sensitive adhesive is available on the portion 26 in the event it is desired to secure the laparotomy sheet 20 to the anatomy of a patient during a surgical procedure. Should this option be desired, an adherent peel strip may be placed over the portion 26 and removed just before placement of the sheet 20 on the patient. Suitable pressure sensitive adhesives, and suitable adherents, are described, respectively, in Kirk-

Othmer, "Encyclopedia of Chemical Technology," Second Edition (Interscience, New York, 1963), particularly at page 382 and at pages 7-10 of Vol. 1.

Ordinarily, and irrespective of whether an adhesive is used on the portion 26 of the laparotomy sheet 20, the sheet is placed over a patient with the plastic central sheet 22 facing upward. This, however, is not necessary when there is no adhesive on the portion 26, and consequently the plastic side may be either above or below the main sheet 21 as the surgeon prefers.

Turning now to FIGS. 4 through 7, these drawings depict the procedure of unfolding a folded pack of the laparotomy sheet 20 shown in FIG. 2. Proceeding inversely from FIG. 7 to FIG. 4, the drawings indicate the method of folding the sheet 20, first with the head and foot portions folded accordionwise toward the center so as to cover the plastic central portion 22 (FIG. 7), then accordionwise from each side (FIGS. 6 and 5) to make a compact package (FIG. 5), and finally doubled over (FIG. 4). Unfolding follows the opposite procedure, that is, from FIG. 4 through FIG. 7 in sequence.

Thus there has been provided, in accordance with the invention, a laparotomy sheet that fully satisfies the objectives, aims, and advantages set forth earlier. The sheet of the invention is remarkably simple, and yet possesses unusual advantages with few if any disabilities.

I claim as my invention:

1. In a disposable laparotomy sheet of the type having a major sheet of porous nonwoven fabric, including head and foot areas, and a fenestration in said laparotomy sheet to expose the operative area, the improvement comprising:

an opaque pigmented, embossed, fluid impervious plastic sheet adhesively secured to said major sheet and covering the upper surface thereof in the region of said fenestration to prevent fluid strike through,

said plastic sheet having said fenestration therein; and

the combination of said plastic sheet being embossed and opaque pigmented being effective to diffuse reflected light and thereby minimize glare, said embossed sheet being effective to provide a less slippery finish and thereby reduce the tendency of surgical instruments to slide off when placed thereon.

2. Sheet of claim 1 wherein said plastic sheet extends completely across said laparotomy sheet to separate said head and said foot areas, said head and said foot areas being respectively adhesively secured to opposite edges of said plastic sheet.

3. Sheet of claim 1 wherein said plastic sheet extends over a generally central portion of said laparotomy sheet, the major sheet having an aperture therein larger than said fenestration with the edges of said aperture being spaced away from the periphery of said fenestration.

4. Sheet of claim 1 wherein said plastic comprises polyethylene.

5. The sheet of claim 1 wherein the exposed upper surface of said major sheet is spaced from said fenestration.

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