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ABSORBENT MATERIAL

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This invention relates to absorbent material such as surgical dressings, fabrics, tissues and the like made of or containing at least partially saponified organic esters of cellulose.

5 An object of my invention is to provide absorbent materials that have a high capacity for absorbing liquids such as water, blood, pus, etc. Other objects of my invention will appear from the following detailed description.

10 Surgical bandages and dressings, towels, etc., that are intended for use to absorb liquids are generally made of cotton or other cellulose fibres. I have found that when articles are made of or contain at least partially saponified filaments
15 or fibres of organic esters of cellulose, they have greater absorbent power than when made of cotton or other cellulosic fibres. While filaments or fibres of unsaponified organic esters of cellulose such as cellulose acetate have low power of ab-
20 sorption of water or other aqueous liquids, when such fibres or filaments are saponified, their power of absorption is greatly increased. Furthermore by saponifying filaments of organic esters of cellulose such as cellulose acetate, it is possible
25 to produce filaments of very fine size, as low as one denier or less, the size being reduced in some instances to 60% or less of the original, thereby increasing the surface per unit mass so that greater amounts of aqueous or other liquids may
30 be retained by mechanical absorption in the interstices and by capillary condensation, apart from the great increase of the amount of aqueous liquid actually absorbed in the filaments themselves.

35 According to my invention, then, I prepare absorbent articles by the use of wholly or partially saponified filaments, fibres or yarns of organic esters of cellulose. These articles need not consist wholly of such at least partially saponified
40 organic esters of cellulose but may also contain cotton or other cellulose fibres or other absorbent material as a part thereof.

The saponified organic ester of cellulose material may be present in the absorbent material
45 in any suitable form. Thus it may be present as continuous filaments which may or may not be twisted together to form yarns, or such continuous filaments may be in fluffed or teased condition. Again the saponified organic ester of
50 cellulose material may be present in the form of staple fibres, say of 1 to 12" or more in length, which may be associated together in the form of spun yarns, or the staple fibres may be in fluffed state, or in the form of a fleece or web of carded
55 material.

The organic ester of cellulose filaments or fibres may be saponified either before or after they are made into the articles. For instance, yarns or continuous filaments of the organic ester of cellulose may be saponified and then
5 either formed into a fabric or may be cut into staple lengths. Again the staple lengths of the organic ester of cellulose material may be saponified. Alternatively, fabric formed of or containing organic ester of cellulose yarns or filaments
10 or fibres may be saponified.

Any suitable method may be employed for saponification, such as immersing the same in a bath containing an alkaline material such as sodium hydroxide, potassium hydroxide or sodium
15 carbonate. Alternatively, saponification may be effected by subjecting the material to the action of solutions or vapors of ammonia, amines such as mono-, di- or tri-alkylamines, e. g., methylamine, dimethylamine or triethylamine, diamines such as ethylene diamine and cyclic non-
20 aromatic bases such as pyridine, piperidine, etc.

As stated the organic ester of cellulose material may be either completely or only partially
25 saponified, the amount of saponifying agent and time of treatment being governed to effect the desired degree of saponification.

By way of example, saponification may be effected by treating yarns of cellulose acetate filaments for a period of 12 hours in an aqueous
30 solution of ammonia of about 12% concentration. As an example of a vapor treatment, the hanks of cellulose acetate yarns may, while damp with water, be allowed to stand 60 hours in a closed vessel over a concentrated solution of ammonia.
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As stated, this invention is applicable for the preparation of any articles where absorbent properties are required. For instance, it may be employed in the making of towels, cleansing
40 tissues, etc. An important application of this invention is in the preparation of surgical dressings.

In one form of my invention, the surgical dressing may comprise gauze or other woven or knitted
45 fabric containing yarns or filaments of at least partially saponified organic esters of cellulose, which may be applied directly to the wound or other opening of the body that is bleeding or secreting or excreting fluids.

In another form of my invention, the surgical
50 dressing or receptor may be made with a filling of fluffed filaments, staple fibres or yarns made of saponified organic esters of cellulose, enclosed in a fabric that may be an ordinary one or that
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may contain organic esters of cellulose either saponified or unsaponified.

In another form of my invention, the surgical dressing may be prepared in a composite manner. Such dressing may be built up when applied to the patient, by first applying a layer of gauze or other woven or knitted fabric containing yarns or filaments of saponified organic esters of cellulose and then superposing one or more layers of material which may either comprise fluffed or fleece saponified organic esters of cellulose filaments or staple fibres, or other absorbent substances such as cotton, raw cotton, etc. Or else the dressing or receptor may be made separately by wrapping the fluffed saponified filaments or fibres of organic esters of cellulose, cotton, etc., with a woven or knitted fabric containing yarns of saponified organic esters of cellulose. Obviously other methods may be used for preparing the surgical dressing or receptor, since the foregoing description is given merely by way of example.

An important application of my invention is in the preparation of surgical dressings known as catamenial packs or pads which may be made of any of the methods above described. Such catamenial pads are included in the term "surgical dressing."

Of the organic esters of cellulose that may be used for the preparation of the filaments, yarns or fabrics above described, I prefer cellu-

lose acetate. However other organic esters of cellulose such as cellulose formate, cellulose propionate, cellulose butyrate, mixed cellulose nitrate acetate, mixed cellulose acetate stearate, etc., may be used for the purpose.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. A surgical dressing comprising yarns, filaments or fibres of at least partially saponified stable organic esters of cellulose.

2. A surgical dressing comprising yarns, filaments or fibres of substantially completely saponified cellulose acetate.

3. A catamenial pad comprising yarns, filaments or fibres of substantially completely saponified stable organic esters of cellulose.

4. A catamenial pad comprising yarns, filaments or fibres of at least partially saponified cellulose acetate.

5. A towel comprising yarns, filaments or fibres of at least partially saponified stable organic esters of cellulose.

6. A towel comprising yarns, filaments or fibres of substantially completely saponified cellulose acetate.

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