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PATENTED JAN. 16, 1906.

W. R. GREEN.
ABSORBENT MATERIAL.
APPLICATION FILED JULY 25, 1904.

Fig 1.

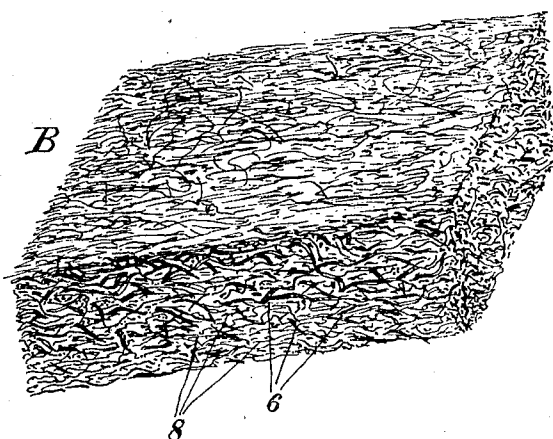


Fig.2.

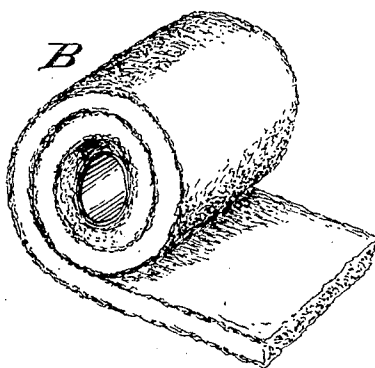
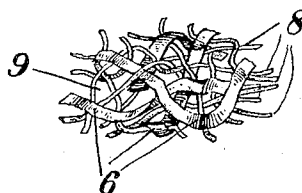


Fig3.



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ABSORBENT MATERIAL.

No. 810,136.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLARD R. GREEN, a citizen of the United States, residing in Muscatine, in the county of Muscatine and State of Iowa, have invented certain new and useful Improvements in Absorbent Materials, of which the following is a specification.

This invention relates to absorbent materials for hygienic and surgical purposes, the object being to furnish an absorbent material adapted for use in a mass which shall have an active absorptive capacity combined with relatively high distributing and retaining capacities.

In the drawings accompanying and forming a part of this specification, Figure 1 is a perspective view showing a mass of absorptive material in the form of a flat and relatively thick sheet-form mass and is illustrative in a general way of the structure and composition of the material. Fig. 2 illustrates one mode of putting up or packing the material for market by making a sheet of the material into a roll. Fig. 3 is a view of a small quantity of the material somewhat enlarged and shown in a somewhat diagrammatic way for further illustrating the material in one form thereof.

Similar characters of reference designate like parts in all the views.

One of the principal objects of my present invention is to provide a material for use as an absorbent which shall overcome objections incident to the employment of an absorbent mass composed of fiber alone, and especially those incident to the use of cotton or linen fiber in such manner.

When cotton or linen fibers are used in the form of an ordinary bat or unorganized mass of fiber, the tendency of the fibers is to instantly yield to the influence of moisture, especially when wetted to saturation, and to then settle and pack more closely together, thereby forming a compact surface portion on the mass, which surface portion becomes so impervious to the passage of further fluid that it acts as a kind of surface layer or coating operative as a dam to reduce the efficiency of the mass, so that any further absorptive action will take place so slowly as to make the material of little, if any, value for many purposes. An immediate result of these defects and conditions is that in practice an operator pulling off a bunch or small mass of absorptive cotton for use—for in-

stance, in stanching a wound—finds that the surface of the mass quickly takes up a small amount of fluid only and then becomes useless. He throws away the mass and takes another, rather than continue to use the first portion until it has properly done the work for which it was designed. In this way much the greater part of the material is, practically speaking, thrown away without having been used at all.

It is one of the objects of my present invention to largely reduce this waste of an expensive material which is used by the trade in very large quantities by furnishing a material of superior qualities and one which at the same time can be manufactured at lower cost and by the employment of different kinds of component materials.

For meeting the requirements of this special art and the conditions to which I have referred I make my improved absorbent fiber material (indicated by B, Figs. 1 and 2) of two kinds of stock, and I preferably employ stock of which one kind, as 8, is relatively fine and flexible, while the other kind, as 6, is relatively coarser and less flexible. These materials when they are incorporated and commingled together and are made of suitable compactness without being too firmly packed or matted together have a structure or composition peculiarly adapted for use as an absorbent material. The coarser and more rigid strands (referring especially to their character when wet or saturated) being interspersed throughout the mass, (as approximately represented by the darker lines in Fig. 1,) operate as a species of interior structure somewhat in the nature of a support or framework, whereby the fibers are prevented from settling together or packing so closely as to operate as a coating or dam to unduly limit the absorptive power of the mass. If the strands, each made up of a large number of fibers, organized or combined together as set forth, should be used alone, such a mass would, unless unduly compacted, have a considerable proportion of its interior space consist of spaces or channels of such size as would give them a relatively low capillary or retaining power. Besides this, the mass would be of too harsh and rough a nature for many of the purposes for which absorptive fibers are required. By distributing among the coarser and firmer strand mass a quantity of finer and more flexible

fibers the relatively large interior spaces which would otherwise exist are divided and subdivided by the finer fibers extending between the spaces between the strands, and thus such spaces are, in effect, divided into small spaces or interstices, with the result of developing a higher and more active capillary and absorptive power. Thus the relative firm and stable strands operate to keep the entire mass open and expanded, keeping the softer and more pliable fibers separated and free of undue compression, thereby preserving in a high degree the open and porous character of the absorbent mass as a whole.

The absorbent mass B when thus composed and organized consists of a mixture which is essentially non-homogeneous as compared with the ordinary absorptive material composed of cotton fiber or linen fiber. One feature of this new material is its resistance to compression when used in small masses and taken by the operator between the thumb and finger for use. With the cotton or linen fiber even a relatively slight pressure so applied unduly compresses the mass throughout the interior thereof, and thus retards and restricts the absorptive activity of the whole mass. This, with the compacting of this pliable material, as already mentioned, leads practically to the throwing away unused of much the larger part of all the material employed. By holding the finer fiber-stock open by the distribution through the same of a coarser material acting as a species of base or framework for the mass this objection is overcome and the whole mass of material is brought to a highly-efficient condition. The absorptive activity of the same is also prolonged, while the interior of the mass is maintained in a condition adapting it for taking and retaining a relatively large quantity of fluid.

By intermingling the material or woody strands with the coarser fibers of a more rigid character the fibers become entangled and intermeshed in such manner as to reduce the liability of the same to separate from loosening, and so fall out at the surface of the mass, and thus stick to or becoming lodged in a wound.

When the material is rolled for packing for market, as indicated in Fig. 2, my improved material has an advantage in its relatively firm or persistent character, whereby it is adapted for being rolled and unrolled without injury.

In the enlarged or magnified view, Fig. 3, a small portion of the absorbent material is illustrated to be composed of two kinds of material mingled together, one kind consisting of relatively large and rigid strands, as 6, and the other kind consisting of relatively fine and flexible fibers, as 8, distributed through the interior of the mass within

spaces, as 9, formed by the relatively rigid strands 6, whereby the strands keep open and expanded the finer fiber component of the mass and whereby the two kinds of material together form the capillary and fluid-retaining spaces or interstices of the mass. While different kinds of stock may be employed for the coarser component—such, for instance, as certain small plants or grasses suitably crushed or otherwise prepared—I prefer to employ for such coarser component a woody stock in the nature of small strands, these being preferably of a flat and narrow or ribbon-like form and preferably, also, of varying sizes intermingled together so as to form interiorly thereof fluid receiving and retaining spaces. This woody material may be properly described as excelsior, which may be of different grades and degrees of fineness, according to the different purposes for which it is to be used. The larger of these spaces serve as conducting-spaces, in the nature of conduits, for distributing the fluid through the interior of the mass and conducting the same to the small capillary or retaining spaces formed in the completed mass by the intermingling of the two kinds of material.

For the fiber I prefer to use a relatively flexible and yielding vegetable fiber—such, for instance, as cotton or linen. These fibers are distributed through the mass and extend between and are intermingled or intermeshed with the coarser and more rigid strands, which in a sense form a supporting member or mass component for normally holding the mass as a whole in a properly expanded form and prevent the same from undue compression. For these coarser strands I preferably employ, as stated, wood in the form of ribbon-like strands, which, as I have discovered, are, by reason of their physical form and composition, peculiarly suitable for use in this kind of material, since they are relatively rigid and of highly-stable form, even when the mass is wetted to saturation, beside being relatively non-felting, and therefore not liable to become so packed or matted together as to essentially injure the absorptive efficiency of the mass.

By the term "non-felting" as herein used in connection with strands of wood or analogous material I refer to the relatively considerable stability possessed by such material as compared with the more readily matted or felted vegetable or animal fiber or hair commonly used in the manufacture of woven and unwoven fabrics.

The employment of the two kinds of material—one a fiber combined with ribbon-like and relatively more rigid strands—has the advantage of building up a mass of material in such form and character as to normally maintain nearly its full original size and proportions, notwithstanding the absorption

thereinto of a relatively considerable amount of fluid. In practice, as is well known, the absorption of much fluid into a mass of fine vegetable fiber, especially cotton or linen, strongly tends to compact and condense the mass both on the surface and as a whole and sometimes causes the same to mat or mesh together after the manner of a felt, thereby so materially impairing and retarding the absorptive activity and capacity of the mass as to render the same of small value.

In the described composition of materials combined to form the absorbent mass the strands—especially when these are of wood or woody in character—being mingled together constitute a body mass of a comparatively fiber-like nature and of a non-felting quality. With this body mass a filling fiber component, consisting, preferably, of a non-woody character, is intermingled with the component strands or said body portion of the absorbent mass. The strands of wood naturally constitute a species of framework or open mass, within and along which the finer filaments or fibers—such, for instance, as cotton—are interspersed, and the result of this mode of building up the mass produces an absorbent mass of material having, in a sense, the character of a sponge, in that the mass has relatively large conduits or channels distributed therein, within which the fluids may pass along, as in a small stream, while scattered throughout the mass there are smaller masses intermediate and connecting the various conduits or distributing-channels and which have a relatively capillary action for taking up and then tending to hold in place the absorbed fluids supplied thereto through the distributing-conduit spaces. Among the natural materials a sponge is peculiarly distinguished by this relation of the larger and smaller spaces, which have, as between themselves, distinctly-different kinds of action, the structure of the mass also being such, in the case of a sponge particularly, as it is also in my improved absorbent material, of holding the mass up nearly to the normal full size notwithstanding a large amount of fluid may have been absorbed therein. In the case of the finer fiber—such, for instance, as cotton—(unless it is organized as by spinning and weaving) the absorbed fluids tend to mat or felt the mass, so as to make it more compact, and therefore less capable of receiving and holding a large amount of fluid, and this leads to what is called “sliming over,” particularly in the case of fluids which are slightly viscid or tend to coagulation. With my improved material, owing in part to the frame-like nature of the woody strands, the mass is not readily compacted or largely reduced in volume by the absorption of the fluid, in this important respect having a character, as al-

ready pointed out, analogous to the sponge. These features distinguish my present improvements in absorbent materials from all those combinations of materials heretofore made up of mixtures of various kinds of fiber—such, for instance, as those in which cotton and disintegrated wood-pulp are employed, the latter being held in place by and between the layers of cotton fiber, which themselves collapse on being wet. Absorbent materials thus built up are open to the objection described of felting or matting under the action of the fluid and are particularly objectionable on account of the freedom with which they slime over, and thus become ineffective in practice.

By the use of wood for the strands of the mass I avoid the necessity of subjecting the wood to disintegrating processes, and consequently save the expense of the same, besides being able to utilize the wood in a new manner in such materials, since it is in my improved material a relatively large, strong, and resistant component of the mass adapted for receiving in the interstices thereof a relatively considerable quantity of fine cotton or analogous fiber which would not otherwise have the requisite supporting qualities nor be able when used by itself to maintain the large conduit-spaces for quickly distributing relatively large quantities of fluid to the smaller capillary spaces which are distributed throughout the mass. It should be noted that one of the qualities of these capillary spaces is first to take up the fluid and then to resist the dislodgment or discharge of the fluid therefrom, whereas the larger conduit-spaces make very slight resistance to the passage of the small stream therethrough and have relatively slight, if any, power of holding the fluid therein against the action of gravity or against the power of suction.

The absorbent material herein shown and described is for hygienic and surgical purposes, in the form of bandages or otherwise, and the term “surgical purposes” in the claims is intended to cover such uses.

Having thus described my invention, I claim—

1. An absorbent material for surgical purposes comprising woody strands, and fiber intermingled therewith.

2. An absorbent material for surgical purposes comprising excelsior, and a vegetable fiber such for instance as cotton or linen fiber intermingled therewith.

3. An absorbent material for surgical purposes composed of two kinds of stock mingled together and consisting one of relatively large and rigid strands of ribbon-like formation, and the other of fiber distributed through the interior of the mass within spaces formed by the relative rigid strands, so that the strands keep open and expanded

the fiber component of the mass, the two kinds of stock together forming the capillary and fluid-retaining interstices of the mass.

5 4. An absorbent material for surgical purposes consisting of a mass of woody or analogous strands intermingled with a mass of vegetable fiber such as cotton or linen fiber, the woody strands acting as a frame to main-

tain the fiber mass distended and against collapse upon the absorption of moisture. 10

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 27th day of June, 1904.

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