S. P. LOVELL.

COLLOID TREATED FABRIC AND METHOD OF PRODUCING THE SAME.

APPLICATION FILED JAN. 16, 1920.

1,353,599. Patented Sept. 21, 1920.

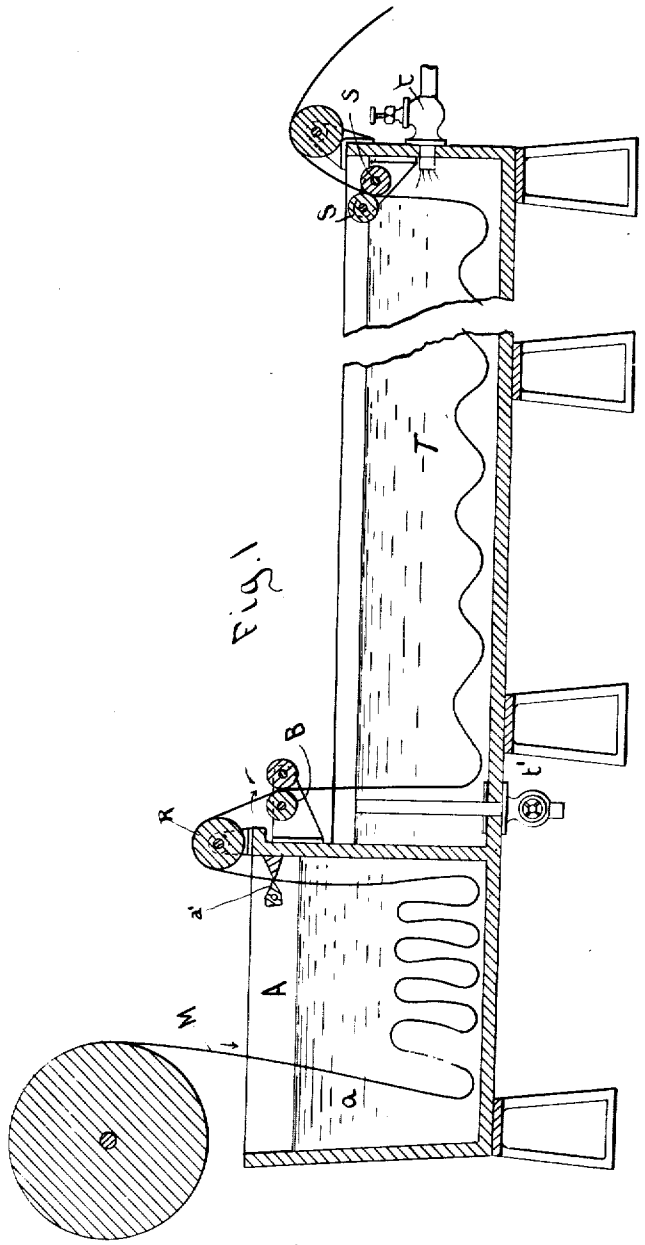

Fig. 1



Fig. 3

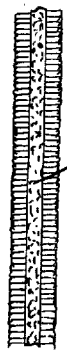

Fig. 4



Fig. 2

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COLLOID-TREATED FABRIC AND METHOD OF PRODUCING THE SAME.

1,353,599. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed January 16, 1920. Serial No. 351,913.

To all whom it may concern:

Be it known that I, STANLEY P. LOVELL, a citizen of the United States, residing at 276 West Elm street, Brockton, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Colloid-Treated Fabrics and Methods of Producing the Same, of which the following is a specification.

My invention is a new treated fabric, having a villous pile in which colloidal substances are deposited by precipitation in a porous form and retained therein by the engagement of the colloidal substance with the pile and the fabric, the fibers of the pile forming capillary spaces or passages from the outer surface of the colloidal substance to the interior thereof. This new fabric may be of woven material, such for example, as cloth, or of structureless material, such for example, as felt, the use to which it is to be put governing the selection of fabric material. The colloidal substance, is, for example, nitro-cellulose, casein, various gums such as manila, copal, kawri, sandarac, resin or rosin. My invention also includes the method of producing the new fabric.

In the drawings:

Figure 1 is a diagrammatic side elevation of an arrangement of means suitable for treating my new fabric;

Fig. 2 is a longitudinal sectional elevation of a portion of fabric, after impregnation;

Fig. 3 is a similar view after the opening of the pile; and

Fig. 4 is a similar view after final smoothing of the free ends of the fibers of the pile.

The fabric as it comes from the maker before treatment has a distinct pile, which is usually laid in parallelism along the length of the piece of material, that is to say, each fiber of which the pile is made up is laid in the direction of the surface of the fabric, parallel with neighboring fibers and with the sides of the fabric piece.

Taking a sheet of the material, M, to be treated, it is passed into a dipping tank, A, containing the colloid solution, *a*, which is to be used (for example, some of the substances mentioned above) the colloidal substance being insoluble in pure water and diffused or dissolved in a medium suitable to its nature, such for example, as alcohol, ether, ammonia solution, etc. To persons skilled in this art the suitable medium for the particular solid which is to be used will be known or readily ascertainable from published works of authority. After remaining in the dipping tank a time sufficient to thoroughly impregnate the material with the colloidal substance, the material is withdrawn from the tank, passing scrapers, *a'*, or other means suitable to remove surplus colloid solution, and over an actuated roller, R, which lifts the material from the dipping tank, A, and passes the material to an opening mechanism, preferably a roller, B, the surface of which, in contact with the material, revolves in a direction against the "lay" of the pile (see Fig. 2), lifting the fibers to an open position substantially perpendicular to the surface of the body of the fabric (see Fig. 3), and increasing the space between the fibers of the pile. As a rule, the contacting surface of the opening roller will move in the direction of motion of the sheet of material, M, but at a surface speed greater than that of the sheet of material. It is deemed unnecessary, in the diagram, to show means for actuating the roller, R, and the opening rolls, B.

After being operated upon by the opening rolls, the colloidal material does not completely fill the interstices of the fibers of the pile, and is thereupon passed to a precipitating bath in tank, T, in which the material remains until displacement of the solvent liquid is practically completed by water or other precipitating agent, suitable to the particular solid employed. To a person skilled in this art the suitable medium for the particular solid which is to be precipitated will be known or readily ascertainable from published works of authority. The colloidal substance is thus precipitated among the fibers of the pile. The time within which this result is accomplished varies with the nature of the solid employed and with the substance of the fabric and the completion of this step may be ascertained by simple manipulative tests; squeezing the material, if the displacement of solvent is not complete, will bring to the surface particles or drops of colloidal solution, easily identified by its gelatinous character. The tank, T, is provided with an inlet, *t*, for the water or other precipitant, and with an adjustable outlet, *t'*, by means of which the precipitant may be renewed or discharged, and its depth in tank, T, regulated. The material is now withdrawn from the precipitating bath and dried and the solid will

be found precipitated among the fibers of the pile and entangled and interlocked with the fibers thereof. If desired, the material, as it passes from the bath may be passed by and in contact with smoothing means, as shown, a pair of rollers, S, which will smooth down in one direction any projecting ends of the perpendicular fibers, giving a smooth finish to the surface and further inclosing and binding the porous precipitate.

This new fabric, thus treated, forms a substantially thickened composite material, which is advantageous for different uses, as for example, the making of box toe blanks, used in the manufacture of boots and shoes, and the making of scabbards, and other military equipment, and separator plates, used in the making of electric storage batteries, and for many other uses in the arts.

The new material, when it is to be molded to a particular shape, for example, in the shoe industry, as a substitute for leather, in stiffening certain parts of boots and shoes, is dipped in a suitable solvent, and notwithstanding its thickness, owing to the porosity of the precipitate and the capillary spaces formed by the villous pile, leading from the surface of the colloidal precipitate to the interior thereof, the solvent will instantly penetrate the porous material, which is thereupon resolved into a flaccid body, which may be instantly conformed and will dry in the desired shape, stiff, flexible, and resilient, as the solvent is withdrawn by evaporation.

This quickness of softening action is a distinctive feature and the effect of the villous pile in maintaining the integrity and connection of the fabric and its porous colloidal load is also of great advantage.

I claim:—

1. As a new article of manufacture, a villous pile fabric, with porous colloidal material, insoluble in water, among and between the fibers of the pile.

2. As a new article of manufacture, a villous pile fabric, with porous colloidal precipitate, insoluble in water, precipitated among and between the fibers of the pile.

3. As in claim two, the free and projecting ends of the fibers being laid along the surface of the colloidal precipitate.

4. As in claim two, the fibers forming capillary spaces leading to the interior of the colloidal precipitate.

5. The method which consists in impregnating a sheet of villous pile fabric with colloidal material, insoluble in water, in diffusion or solution, passing the fabric to a pile opening mechanism, and thence to a precipitating bath; immersing the fabric therein until the precipitant displaces the solvent, precipitating the colloidal material among and between the fibers of the pile.

6. As in claim five, then passing the fabric to a contact with a smoothing means, to lay the free ends of the fibers on the precipitate.

Signed at Boston, Massachusetts, this thirteenth day of January, 1920.

STANLEY P. LOVELL.

DISCLAIMER

1,353,599.—*Stanley P. Lovell*, Brockton, Mass. COLLOID-TREATED FABRIC AND METHOD OF PRODUCING THE SAME. Patent dated September 21, 1920. Disclaimer filed March 21, 1934, by the assignee, *Celastic Corporation*.

Hereby enters disclaimer to the subject matter of the claims of said patent 1,353,599, except where a villous pile fabric is used, with porous colloidal material among and between the fibers of the pile and in such state of subdivision and porosity that the resulting product is capable of being made flaccid substantially instantaneously by the use of an appropriate solvent, and in that condition is capable of being formed into a desired shape and become stiff, flexible, and resilient in its new form upon vaporization of the solvent.

[*Official Gazette April 10, 1934.*]