UNITED STATES PATENT OFFICE.

THOMAS CROSSLY, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE AMERICAN WATER-PROOF CLOTH COMPANY, OF BROOKLYN, N. Y.

IMPROVEMENT IN THE MANUFACTURE OF WATER-PROOF FABRICS.

Specification forming part of Letters Patent No. **48,762**, dated July 11, 1865.

To all whom it may concern:

Be it known that I, THOMAS CROSSLY, of Bridgeport, county of Fairfield, and State of Connecticut, have invented a new and useful Improvement in the Manufacture of Fabrics Prepared with India-Rubber and with other Gums; and I do hereby declare that the same is fully set forth in the following specification.

In the manufacture of fabrics known as "Brussels," "Wilton," "tapestry," "velvet," "moquette," "chenille," and similar goods used for carpets and upholstery purposes, the face or pattern is obtained by raising to the surface a tuft or loop of silk, worsted, or woolen yarns, which tufts or loops are held either in or upon the back of the fabric by weft-threads of linen or jute yarns woven into a warp of similar material known as a "binding-chain," the latter, as in Brussels or other loop fabrics woven by the Jacquard loom, being used solely for the purpose of holding a face upon the back, while that portion of the worsted not required for the pattern upon the face of the goods (usually one-half the entire quantity) is used to fill in between the warp-threads of the binding-chain for the purpose of forming the back. In tapestries and velvets the worsted face or loop has printed upon it the pattern or design previous to weaving. It being therefore unnecesary to use the Jacquard loom to produce the pattern, and there being no surplus worsted, as in the Brussels, a linen or jute warp is substituted to fill the back of the fabric, which is held in position between the threads of the binding-chain by the weft-threads passing above it through the binding-chain to hold the loops of worsted upon the back and below it to hold the back together. The use of the binding chain or warp is indispensable in the manufacture of tufted or pile fabrics before described, as the pattern in all cases must be obtained upon the warp of silk, worsted, or woolen yarns, as in no case can the weft-threads be allowed to show upon the surface of the fabric. The strength or durability of these fabrics depends therefore entirely upon the strength or tenacity of the threads of the binding warp and weft, while the filling or dead chain, whether of linen, jute, or worsted, adds no strength whatever to the fabric, but is simply used to fill up the back. Thus whenever the threads of weft or binding-chain are broken or become loosened from wear or other exposure the whole fabric, and especially the loops or face, being no longer held together, becomes a shapeless mass of face and back mixed together, having no pattern or design and no longer fit for use, or at least the loops become loosened to such a degree that they are readily swept off by the broom or removed by the foot when walking upon it.

To overcome these objections and to produce a fabric having a surface of silk, worsted, wool, fur, or other material, either looped or tufted, which shall be held firmly and immovably upon the back without the use of a binding-chain or warp, I have discovered that a looped or pile or tufted fabric may be made in the following manner:

First. I weave a back, of the proper strength and firmness, of linen, jute, or other material, upon which I spread a coating of india-rubber or other gum. (I prefer india-rubber for reasons I will hereinafter give.) I then prepare a warp of silk, worsted, or woolen yarns, or other material, the end of which I fasten upon the end of the fabric to be used for the back, having spread upon it the india-rubber or gum, as described. I then insert a wire or rod or thread, of any desired size, between the back and the warp of yarn, which is raised above the back, and with a thin blade of iron or steel press the warp down on the back so covered with the rubber or gum close to the rod or wire. While the blade is thus pressed down on the warp I insert another rod or wire forward of the blade, and again press down the warp firmly upon the back, forward of the wire, and thus repeat the operation until the work is completed to any desired length, removing the wire from the loop thus formed as often as is desired or practicable while the process of tufting or looping is going on, or afterward, if necessary. Should it be desirable to produce a velvet pile instead of a loop I attach a knife to the extreme end of the wire, as in the ordinary manner, which in withdrawing from the fabric will cut the loops open at the top and thus produce a velvet pile. This work may be done by hand or machinery adapted for the purpose, whereby the warp-threads may be pressed down by a cylinder having blades or a corru-

gated surface, or by an endless chain geared upon cog-wheels having blades or their equivalents at intervals, or by any other suitable device; also, the wires or rods may be applied to the cloth by any of the above-named or other suitable machinery.

Second. I then submit the fabric so prepared to the process of vulcanization as in the ordinary manner. This cloth, when vulcanized, possesses merits which no other tufted or pile fabric whatever can claim. The warp or face having been previously firmly inserted into the india-rubber in its raw or unvulcanized state is now thoroughly incorporated with and firmly held by the vulcanized rubber, and cannot by any possibility be removed. It will therefore hold the surface or tuft until it is entirely worn out, not being dependent upon binding-warps or weft-threads to give it firmness and durability.

This improved fabric possesses other great merits, especially when used for carpets. The firmness of the fabric does not depend upon the quantity of glue, starch, gum substitute, or British gum used for that purpose, as in Brussels or tapestry carpets, the coating of vulcanized rubber or gutta-percha used in the manufacture being much more firm and indestructible than either, making the use of batting or lining under them entirely unnecessary, as no dust or dampness can possibly pass through the fabric. The coating of rubber also renders the carpet elastic to the tread of the foot and deadens the sound, which can only be accomplished to a limited extent in other kinds of carpets by adding greatly to the amount of expensive stock used. Neither can any bugs, moths, or other vermin find lodgment in these improved fabrics, it being a well-known fact that vermin of all kinds have an aversion to india-rubber as compounded for vulcanization. For the above reasons chiefly I prefer india-rubber to other gums, and especially for the reason that when vulcanized the fabric can be dyed, colored, or printed at any required degree of heat without injuring it in the least.

Third. The fabric after being vulcanized is scoured, prepared, and dyed and printed, or dyed or printed as in the ordinary manner employed by me, and described in some of my previous patents, or in any other manner.

I am also enabled by this process to produce a carpet or a fabric suitable for upholstery purposes, traveling-bags, and many other uses much more elegant and durable than by any other process heretofore known, at a less price than any other article similar in style and appearance, rendering it an article of great public utility; and in addition to the foregoing I submit that my improved fabric, after being worn as a carpet until the wool face is nearly or wholly worn off, may be applied to other uses to the greatest advantage, as in linings to be used under clapboards for wooden houses, or in covering roofs, rendering them impervious to water, or for camp uses, as for tents, blankets, &c., or for covering decks of vessels, the portion of wool held in the vulcanized rubber preventing the rubber or cloth from rot or decay.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A fabric composed of a back of linen, jute, or other material, having a coat of rubber or other gum, upon which is fastened a face of yarn of silk, worsted, woolen, fur, or other material, the same being looped or tufted, as described.

2. A fabric made as described, and colored, dyed, or printed, or colored and dyed and printed, either before or after the face is applied, in the manner and for the purposes herein set forth, as a new article of manufacture.

Dated at Bridgeport this 13th day of May, A. D. 1865.

THOMAS CROSSLY.

In presence of—
WM. B. TOBEY,
S. B. TOBEY, Jr.