

# UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN THE DYEING, PRINTING, AND MANUFACTURE OF WATER-PROOF FLOCKED CLOTH.

Specification forming part of Letters Patent No. **46,200**, dated January 31, 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 Dyeing, Printing, and Manufacture of Water-Proof Cloths, where the same are covered with the flocks or dust of wool, silk, cotton, fur, or other fibrous material, having the back of cotton, wool, silk, hemp, jute, or other material, and coated with india-rubber or gutta-percha, either vulcanized or unvulcanized, or in combination with lead, litharge sulphur, or other compounds, which may be used with said gums, linseed or other oils, varnishes, &c.; and I do hereby declare that the same is clearly and fully set forth in the following specification.

In the manufacture of water-proof cloth having a woolen, silk, or fur surface, it has been found indispensably necessary, prior to my invention and discovery, to use a colored flock for the face of the goods, owing to the fact, first, that in submitting the cloth so coated with india-rubber, gutta-percha, or other gums or varnishes to a heat necessary to produce and fix the color on the face by the process of dyeing, printing, or steaming, the heat thus required has uniformly had the effect of sending to the surface of the cloth more or less of the gums before named, or emissions or exhalations from the same or from the substances used in combination therewith, which has had a tendency to deaden and destroy the color, as well as to give the face of the goods a spotted appearance; second, I have discovered, in attempting to dye or print goods composed of vulcanized or unvulcanized india-rubber or gutta-percha and coated with wool, silk, or fur, that upon subjecting the same to a heat of 212° Fahrenheit a peculiar chemical combination is produced from the ingredients used in curing—as, for instance, lead, litharge, sulphur, oils, &c., whether in combination with india-rubber or gutta-percha, when subjected to a heat of 160° to 212° Fahrenheit, produces a chemical combination of sulphate of lead or white oxide of lead or galena, which is known as a compound of lead and sulphur when combined with oxygen, but when combined with oily substances, as in water-proof goods, becomes carbonized and forms a sulphureted

nitrocarbon. This, when drawn to the face of the cloth by the heat required in dyeing or steaming, has the appearance of a gum or curd produced by the action of these agents on the oily substance used in the lead, and forms a resistance to the chemical combination of the dye intended for the wool, silk, or fur, and utterly destroys its effect. Not only is the presence of the gum fatal to the production of a brilliant color, but, aside from this, I find that the sulphate of lead evolved by the heat overpowers and destroys the effect intended to be produced by the action of the acids or other mordants mixed in the dye-vat or in the color to be used for printing—for instance, in colors which must be fixed upon wool, silk, or fur at a certain degree of heat sufficient to evolve the exhalations of sulphate of lead, or if the same be combined with a curd of linseed or other oil this would form an overpowering resistance to either muriate or sulphmuriate of tin in the proportion in which these compounds must be used to give the color sufficient spring, brilliancy, and durability upon either silk, wool, or fur. For these and other reasons which I shall hereinafter describe, no one before me has overcome these obstacles to dyeing or printing cloths composed of india-rubber, gutta-percha, or other gums or compounds covered with a face of woolen, silk, or fur flocks. I have, however, made the discovery that in order to successfully and uniformly overcome these difficulties and place the dyeing and printing of water-proof or other flock-face goods, when composed of either india-rubber, gutta-percha, or other gums, varnishes, or compounds, upon a feasible and reliable basis, the resistance produced, as before described, to the action of the drugs in either dyeing or printing can and must be overcome before the cloth is dyed or printed. To effect this I submit the cloth to a steam heat of from 220° to 290° Fahrenheit for, say, during twenty or thirty minutes. This process has the effect of evolving all the chemical action produced by the ingredients used in the rubber, gutta-percha, or other mixtures of which the cloth is composed. I afterward submit the cloth to a bath of muriate of tin standing at from 4° to 12° Twaddle. The effect of the muriatic acid is to precipitate or solidify the gum or curd evolved from the rub-



ber or gutta-percha, to neutralize the effect of the sulphate of lead, as well as to deposit a coating of tin upon and throughout the flocked surface. After removing the goods from this bath I submit them to a bath of aqua-ammonia and sal-soda of a strength sufficient to neutralize the muriatic acid or any impurities or other chemical negatives which may be upon the face of the cloth. This latter application may be used either before or after the bath of muriate of tin. I then submit the cloth to a solution of sulphuric acid and chloride of lime, in order to thoroughly oxidize the previous deposit of tin, and afterward to a solution of sulphuric acid and water to remove the lime. This combination forms a mordant for any color which may be desired in dyeing or printing, and at the same time enables me to obtain the desired color at a lower temperature of heat or steam and of a more uniform and beautiful shade than by any process heretofore known.

It is well known that hitherto all water-proof cloths with woolen, silk, or fur surfaces have been chiefly made from colored flocks, on account of the impossibility of obtaining brilliant or uniform colors by dyeing or printing the goods after being flocked; also, that all efforts heretofore made by all other parties to print such goods have been unsuccessful upon either white or colored goods, such as I have herein described, and chiefly for the reasons I have given. By my invention and discovery these cloths can be produced in the most beautiful

colors and designs, suitable for piano, table, and other furniture covers. The cloth, being impervious to water, dampness, or dust, will secure musical instruments and other valuable articles of furniture against injury from such causes, while greatly adding to their beauty; also, for robe-linings, producing a design in colors which gives elegance to the robe, while rendering it impervious to rain, yet cheaper than the ordinary woolen goods used for that purpose and not liable to shrinkage; also, for traveling-bags, shoes, and shoe-linings, saddle-cloths, hats, caps, carpets, clothing, and a vast number of other uses to which woolen, silk, or other expensive goods have hitherto been applied.

The process which I have described produces the best effect of any which I have attempted; but I do not limit my discovery to the precise formula hereinbefore set forth, for the reasons that equivalents for some of the substances named may be used and a good result produced; but

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

The process, substantially as hereinbefore described, of preparing, dyeing, and printing goods having a surface of flocks of the character hereinbefore described.

THOS. CROSSLY.

Witnesses:

WM. B. TOBEY,  
L. BOSWORTH.