UNITED STATES PATENT OFFICE.

ALEXANDER N. DUBOIS, OF PHILADELPHIA, PENNSYLVANIA.

PROCESS OF GIVING LISLE-THREAD FINISH TO VEGETABLE FABRICS.

SPECIFICATION forming part of Letters Patent No. 723,147, dated March 17, 1903.

Application filed June 27, 1899. Serial No. 722,016. (Specimens.)

To all whom it may concern:

Be it known that I, ALEXANDER N. DUBOIS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Giving Lisle-Thread Finish to Vegetable Fabrics, of which the following is a specification.

My invention relates to a method of removing from goods made from vegetable fiber, particularly cotton goods, the filamental fuzz which is apt to occur and giving to such goods the smooth luster and finish of what is known as "lisle thread."

It has long been known that certain chemicals have the property under certain conditions of changing the character of vegetable fiber and bringing it to a physical condition in which its fibrous coherence is destroyed or impaired and the fiber rendered more brittle than in its natural condition. For the most part the practical utilization of this knowledge has been in eliminating cotton from mixed goods containing wool or wool and silk, with a view of recovering the animal fiber for further use, while the well-known mercerizing process may be instanced as another instance in which the action of such chemical on vegetable fiber has been made of use in the arts. My invention depends upon my discovery that under certain conditions the treatment of vegetable-fiber fabrics with these chemicals having the property of disorganizing cellulose fiber may be made use of to act upon and facilitate the removal of the filamental fibers projecting from the face of the goods without injuriously affecting the body of the goods and, on the contrary, with the effect of imparting to it a superior luster and finish and bringing it to a condition which facilitates the operation of and the effect of dyeing.

Generally speaking, my method consists in saturating the goods to be treated with a chemical or mixture of chemicals having the property of changing the physical condition of cellulose fiber, then removing the fluid by mechanical means, such as a hydro-extractor, and then subjecting the goods to a drying action until the chemical impregnating them acts upon and changes the character of the fuzz, subjecting them at the same time to an energetic attrition, which breaks off the brittle fiber and imparts the lisle-thread luster and finish to the goods. The active chemicals must then be neutralized or removed from the goods to prevent them from further acting on the body of the fabric.

My process of treatment may take place as a part of the dyeing operation or preparatory to dyeing or preparatory to bleaching. There are certain advantages in both the treatments to produce the gloss and finish during dyeing and before dyeing, and while claiming my invention broadly in my present case and also as a treatment preparatory to dyeing I have specifically claimed the treatment during dyeing in another application filed with this application, Serial No. 722,017.

In actual practice I have applied my process as follows with great success: I take four hundred pounds of cold water and add to it either four pounds of sulfuric acid of 66° Baumé or twelve pounds of hydrochloric acid at 22° Baumé or seven pounds of nitric acid of 36° Baumé or a mixture of these acids. Sometimes I use or add some of the organic acids. In this solution I immerse the cotton stockings or other fabrics preferably in what is called in the dyeing art the "tomtom," in which the goods are macerated for about thirty minutes. I then remove the goods and extract the solution from them in a hydro-extractor, and then I put them in what is called in dyeing an "oxidizing-machine," in which the goods are thoroughly mixed up and tumbled about while exposed to a regulated heat. In this machine I first dry the goods at a temperature of not over 92° Fahrenheit, and with the ventilator of the drying-room open in full, and after the goods are sensibly dry, to from 90° to 120° Fahrenheit and maintain the tumbling and consequent attrition of the goods until the filamental fuzz is rendered brittle and broken off and the surface of the goods shows the desired lisle-thread finish. I then remove the goods from the oxidizer and allow them to cool off, after which I give them a cold alkaline bath of carbonate of sodium, carbonate of potassium, ammonia liquor, or the like in the proportion of about five pounds of the alkali to the hundred pounds of goods. This neutralizes the acid in the goods, and I then

wash out the alkali and soluble salts, dry the goods in an hydro-extractor, and then proceed to dye the goods in any usual way, the goods preserving their gloss and finish and taking the dye more freely and with brighter effects than untreated goods, or instead of dyeing the goods I may bleach them after my treatment, the bleached goods preserving the finish incident to my treatment.

I have also used in my treatment solutions of various metallic salts. For instance, I have mixed in four hundred pounds of water ten pounds of sulfate of copper, or five pounds of acetate of copper, or five pounds of nitrate of copper, or ten pounds of sulfate of iron crystals, or ten pounds of nitrate of iron liquid at 48° Baumé, or twelve pounds of ammonium-chlorid salt, or thirty pounds sulfate of sodium, or twenty pounds of sulfate of aluminium, adding in each case two pounds sulfuric acid of 66° Baumé, or four pounds hydrochloric acid at 22° Baumé, or two pounds nitric acid at 36° Baumé. I have also used ten pounds of acetate of lead mixed with four pounds acetic acid at 8° Baumé, or one pound sulfuric acid, or one and a half pounds hydrochloric acid. In all cases the treatment is the same, as above described.

Where I bleach instead of dyeing the goods after my treatment, I first boil the goods, before removing the filament, &c., with an alkali to free the goods from oil or dirt, and then proceed as above described, preferably with free acid, to remove filament and give the desired finish. After this treatment I have obtained the best bleaching with either the chlorid-of-calcium process, peroxid-of-sodium process, or with the permanganate-of-potassium and sulfurous-acid process. In all cases I get a much quicker bleach after my treatment than is possible with the untreated goods.

In producing the lisle-thread effect during dyeing I include in the dyeing solution some of the chemicals having the desired effect on cellulose fiber. Indeed, many dyes contain such chemicals in substantially the proper proportions. This is true, especially, of all the anilin-oxidized fast-black-dye liquors, an example being as follows: In a barrel holding about four hundred and fifty pounds put three hundred and sixty-six pounds hot water, add five pounds sulfate of copper, one pound acetate of copper, one pound nitrate of copper, two pounds nitrate-of-iron liquid at 48° Baumé, five pounds ammonium-chlorid salt, and ten pounds chlorate of sodium or potassium. Stir up well, let the solution cool to about 90° Fahrenheit, and then add forty pounds anilin salt and dissolve, then add slowly two pounds tartaric acid dissolved in eight pounds hot water. In this dye solution the goods are saturated and then treated in the oxidizing-machine, as usual, until the desired green color is secured, after which, instead of removing the goods, I continue the treatment in the oxidizer until the chemicals render the filaments brittle and the attrition breaks them off and polishes the face of the goods. When this lisle-thread effect is produced, I remove the goods and allow them to cool off, subsequently treating them, as usual, in the dyeing process to bring out the fast-black color, which after my treatment, however, is much richer than in goods treated in the usual manner.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of treating fabrics made of vegetable fiber to remove filamental fuzz therefrom, which consists in subjecting the same to the action of a chemical adapted to carbonize the fuzz, then subjecting the fabric to oxidation and attrition, and continuing the attrition until the fuzz is removed and the surface finished.

2. The method of treating fabrics made of vegetable fiber to remove filamental fuzz therefrom, which consists in subjecting the same to the action of a chemical having an acid radical, then subjecting the fabric to oxidation and attrition, and continuing the attrition until the fuzz is removed and the surface finished.

3. The process of removing filamental fuzz from fabrics made of vegetable fiber which consists in subjecting the same to the action of a chemical having an acid radical, and then acting on the fabric simultaneously by oxidation and attrition and continuing the attention until the fuzz is removed and a lisle-thread finish imparted to the goods.

4. The process of removing filamental fuzz from fabrics made of vegetable fiber which consists of saturating or impregnating the fabric with a chemical solution having an acid radical, then removing the fluid solution, then acting on the fabric simultaneously by heat and attrition until the filamental fuzz is rubbed off and a smooth lisle-thread finish is imparted to the goods, and then neutralizing the chemicals remaining in the fabric.

5. The process of removing filamental fuzz from fabrics made from vegetable fiber, which consists in saturating or impregnating the fabric with a chemical solution adapted to carbonize the fuzz when exposed to heat, then in mechanically removing the chemical solution, exposing the fabric to the simultaneous action of heat and attrition until the filamental fuzz only is carbonized and rubbed off and a lisle-thread finish imparted to the fabric, and then neutralizing the chemicals remaining in the fabric.

In testimony whereof I affix my signature in the presence of two witnesses.

ALEXANDER N. DUBOIS.

Witnesses:
JOHN I. GILBERT,
A. G. SHILLICH.