UNITED STATES PATENT OFFICE.

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DYEING.

SPECIFICATION forming part of Letters Patent No. 385,426, dated July 3, 1888.

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To all whom it may concern:

Be it known that I, JOHN C. PENNINGTON, a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Dry Dyeing; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention belongs to that class of processes commonly known as "dry dyeing," in which fibers, tissues, and materials, especially those of silk, or silk and cotton, or wool, are dyed in liquids other than water or alcohol in order to avoid loss of luster or "feel" or elasticity—a consequence of dyeing in water.

This improvement is based on the following facts: The colors commonly known as "aniline" colors are compounds or salts of certain alkaloidal bases and acids, usually acetic acid. In this condition they are soluble in water or alcohol, but not in ether or benzine or similar liquids; but the alkaloidal bases of these colors, when separated from the acids commonly associated with them, are soluble in ether, but not in benzine nor in water. These bases are sometimes colorless and sometimes yellow or brown, and regain their proper colors only when recombined with an acid.

My process therefore consists in impregnating the tissues and materials to be dyed with a solution in ether of the bases of the alkaloidal aniline colors separated from the acids ordinarily combined with them, drying them, and then submitting them to the action of steam containing the vapor of acetic or other volatile acid, thus reconstituting the colored salts upon the tissue. It will be seen that in this manner silk or other tissues may be dyed in ether without the intervention of any foreign substance whatever, and that, therefore, no subsequent washing in ether or other similar liquid is necessary; and I have found that the luster and elasticity or feel of the materials are not injured. For instance, to dye an aniline-blue on silk fabric I take a suitable quantity of aniline-blue, not sulphonated, but such as is classed in the trade under "spirit-blues," and treat it at about 200° Fahrenheit with a proper quantity of caustic soda dissolved in alcohol. I distill off the alcohol, wash the product, which is the base of the color, with water, dry it, and dissolve it in ether in quantity according to the shade desired. I then run the above-described solution into the closed vat and pass and repass the fabric by means of rollers through the described solution until it has properly absorbed the requisite amount of color base. I then run the color solution out of the vat, admit steam to volatilize the ether remaining on or in the tissue and in the vat, (which ether is condensed and saved,) and add a suitable quantity of acetic or other suitable volatile acid to furnish the color base with the necessary amount of acid to bring out its color by reconstituting the colored salt in and upon the tissue or material. When the fabric is sufficiently steamed, it will be found properly dyed, and no washing is necessary, because no fixed substance other than the pure color has been applied to the fabric.

The above method is one which will give good results; but it may be varied according to well-known methods. For instance, in dyeing aniline red or auramine (yellow) it is not necessary to dissolve the color in alcohol, but it may, instead, be dissolved in water and precipitated by caustic soda or other alkali and then dissolved in ether. Any process which will produce the alkaloidal base of the color may be used and the base then be dissolved in ether.

I am aware that patents have been granted for dyeing silk and other fabrics in liquids other than water, ("dry dyeing," so called;) but in these processes the coloring materials are rendered soluble in benzine and "essences" by combining them with fats and oils, which renders it necessary to wash the dyed fabrics in several baths of benzine or essences to take off the excess of such fats or oils, and, besides, the colors are injured by the addition of such solvents; but in this process no substance is added to the color to render it soluble, and therefore no subsequent washing is needed.

Having thus fully described my invention, what I claim is—

The process of dyeing silks, wools, and

mixed fabrics with aniline colors by impregnating them with a solution of the alkaloidal bases of such colors in ether or other equivalent liquids, and afterward submitting them to the action of steam containing suitable acid to reconstitute the color and to volatilize the residual solvent.

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

JOHN C. PENNINGTON.

Witnesses:
R. G. DYRENFORTH,
W. W. MORTIMER.