UNITED STATES PATENT OFFICE.

ALCIDE FRANCOIS POIRRIER, OF PARIS, FRANCE.

PROCESS OF MORDANTING.

SPECIFICATION forming part of Letters Patent No. 646,760, dated April 3, 1900.

Application filed May 16, 1899. Serial No. 717,038. (No specimens.)

To all whom it may concern:

Be it known that I, ALCIDE FRANCOIS POIRRIER, a citizen of the Republic of France, residing at Paris, France, have invented Improvements in Processes of Mordanting, of which the following is a specification.

This invention relates to improved methods in the application of substantive sulfur coloring-matters to dyeing purposes, whereby the disadvantages to which the existing modes of application of such dyestuffs are subject are obviated.

In particular, the present improvements effect, first, a greater resistance of the dyed materials to the action of soap or of a wash of soap and carbonate of soda; secondly, a greater strength of the fiber after dyeing, steaming, &c., and, thirdly, a greater uniformity of the tints on cotton fabrics.

I have previously recommended as fixing agent for these coloring-matters a solution containing five per cent. of sulfate of copper and five per cent. of sulfuric acid or a solution containing five per cent. of bichromate of potash and five per cent. of sulfuric acid, these percentages being calculated on the weight of the cotton to be dyed. In both cases there are obtained slightly-different tints—namely, greener in the case of sulfate of copper and bluer with bichromate of potash. In both cases the tints are very resisting to soap. When fixing by means of sulfate of copper and sulfuric acid, the tints obtained are sufficiently resistant to carbonate of soda of one per cent. or even of ten per cent. strength as also to carbonate of soda and soap, (one per cent. and five per cent;) but the fiber is considerably affected by the steaming or when the fabrics after dyeing are exposed for some time in a hot and moist atmosphere. In the case of fixing by means of bichromate and sulfuric acid the resistance to carbonate of soda is very weak and the fiber is also affected by the steaming. Thus these two processes are subject to greater or less disadvantages, which are entirely obviated by the improved methods forming the subject of the present invention, whereby the tints are rendered very resistant to soap, quite resistant to boiling carbonate of soda, whether weak (one per cent.) or strong, (ten per cent.,) as also to a wash of carbonate of soda and soap, while the fiber thus treated does not appreciably lose strength during the steaming, whether with saturated or superheated steam. This result is obtained, first, by entirely doing away with the use of free sulfuric acid in either one or the other of the above processes; secondly, in the sulfate of copper process, substituting for the sulfate any other salt of copper—such as the chlorid acetate, &c.—or any cupric combination—such, for instance, as the oxid of copper in ammoniacal solution; thirdly, in substituting in the bichromate process for the greater portion of the bichromate a salt of copper other than the sulfate.

The compositions of the fixing-baths would be, for example—

Formula No. 1: Three per cent. chlorid of copper or the corresponding quantity of a cupric combination other than sulfate of copper. The cotton is maintained during from one-half to one hour at 90° centigrade.

Formula No. 2: Two to three per cent. of chlorid of copper and one to two per cent. of bichromate of potash. The cotton is maintained at from 90° to 95° centigrade during from one-half to one hour.

The chlorid of copper can be very simply prepared by employing the corresponding quantity of commercial sulfate of copper in the presence of an excess of common salt.

The first formula is employed, by preference, for obtaining greenish tints and the second for obtaining bluish-black tints.

The diminution in the strength of the fiber, which, as already stated, is considerably less than with the previous processes, can be further prevented by using the said coloring-matters not in the crude state, but after having freed them from the greater part of the products accompanying them, such as the polysulfides, sulfides, sulfites, hyposulfites, &c. The application of the above-improved processes with these purified coloring-matters therefore satisfies all the requirements both as regards the strength of the fiber and as regards the resistance of the tints to the usual agents, (soap, carbonate of soda, or both combined.) Lastly, a perfectly-uniform tint may be obtained on piece-cotton by the improved process.

The discolorations which are sometimes ob-

served with the existing methods are caused by the extreme oxidizability of the coloring-matter and are only produced when the fabric is subject to contact with the atmosphere while the dyeing process is being carried on. Dyeing in black is a process having two phases. In one the coloring agent is fixed on the fiber in a state of undetermined reduction. In the second phase after the washing of the fiber in order to eliminate what is mechanically retained the oxidation of the coloring agent transforms it (the coloring agent) into an intense black; but if in the first phase the wet fiber is allowed to remain in contact with the air that portion of the reduced coloring agent which impregnated the tissue without being fixed upon the same oxidizes very rapidly and becomes insoluble. The coloring agent thus oxidized is not fixed upon the fiber and may be removed by frictional contact. Hence the colorings thus obtained rub off and soil greatly white tissues with which they come in contact. It suffices, therefore, in order to avoid such defects to keep the fabric completely immersed during the whole of the dyeing process. The bath being of a reducing nature, the surface thereof constitutes a screen which protects the interior against all access of air and which consequently avoids all accidental local oxidation. The process should therefore be carried on in an ordinary fulling-machine, all the rollers of which are completely immersed in the bath. The surface of the latter will become slightly oxidized; but this will cause no inconvenience.

While in the following claims chlorid of copper is designated as the "fixing" agent or as forming a part of the fixing agent, its equivalents for the purpose stated, such as any salt of copper or cupric combination other than the sulfate of copper or the oxid of copper in ammoniacal solution, may be employed with the same or analogous results.

I claim—

1. The process of fixing the colors obtained from substantive sulfur coloring-matters consisting in subjecting the dyed material to the action of a bath of chlorid of copper.

2. The process of fixing the colors obtained from substantive sulfur coloring-matters consisting in subjecting the dyed material to the action of a bath of chlorid of copper and bichromate of potash.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALCIDE FRANÇOIS POIRRIER.

Witnesses:
JULES ARMENGAUD, Jeune,
J. ALLISON BOWEN.