UNITED STATES PATENT OFFICE.

FRANZ ERBAN, OF HÖCHST-ON-THE-MAIN, GERMANY, AND LEOPOLD SPECHT, OF MARIENTHAL, AUSTRIA-HUNGARY.

PROCESS OF DYEING.

SPECIFICATION forming part of Letters Patent No. 633,438, dated September 19, 1899.

Application filed December 30, 1893. Serial No. 495,270. (No specimens.)

To all whom it may concern:

Be it known that we, FRANZ ERBAN, residing at Höchst-on-the-Main, in the Empire of Germany, and LEOPOLD SPECHT, residing at Marienthal, in the Empire of Austria-Hungary, citizens of the Empire of Austria-Hungary, have invented certain new and useful Improvements in Processes of Dyeing Textile Fibers with Alizarin and other Mordant Dyestuffs, (for which Letters Patent were granted to us in Germany, No. 54,057, dated February 4, 1890, and in Austria-Hungary, dated August 16, 1890, Tom. XL, Fol. 2,210, and Tom. XXIV, Fol. 2,105,) of which the following is a specification.

The dyeing mechanically of textile materials loose or in other states of manufacturing has hitherto been only possible with coloring-matters soluble in water, the insoluble mordant dyes, such as alizarin, &c., not being capable of use in this way but in a few cases—that is to say, for yarn in hanks, cloth, &c.—and this in a very complicated manner.

We have now succeeded in finding a process permitting the dyeing of fiber loose and in any other state of manufacturing, and especially those which are to be dyed mechanically with these dyes by using them in the form of alkaline solutions. Of the coloring-matters at present known and industrially used the following are adapted for this purpose: Alizarin, purpurin, anthra- and flavo-purpurin, alizarin-brown, rufigallol; nitro-alizarin, (alizarin-orange;) amido-alizarin, (alizarin maroon, claret;) alizarin-bordeaux, alizarin cardinal; alizarin-cyanins, anthracene-blues; alizarin cyanin black; alizarin black (M. L. & B.) naphtazarin; alizarin green, alizarin yellow, (ellagic acid, gallacetphenon, benzophenon, and similar products, azo-colors from nitranilin and salicylic acid;) galloflavin, anthracene yellow, flavazol, anthracene red, diamant yellow, diamant-flavin, diamant orange, cloth orange, and cloth-brown, as well as some direct-dyeing coloring-matters which contain salicylic acid—such as oriol, cotton yellow, chrysamin, cresotin yellow, diamin yellow, Hessian yellow, carbazol yellow; azarin, azo green, Persian red; solid green, dioxin, gambins; roselin, gallein, cerulein; gallocyanin, gallamin blue, gallanilid blue, blue java, delphin blue, azurin in paste, gallanil blue, gallanil violet, celestin blue, chrome blue, chrome-violet, chrome-green, chrome-yellow, chrome-orange, chrome-bordeaux, chrome-prune, chrome-red, chrome-rubine, chrome-brown, chrome-black, cachou laval.

The process is effected as follows: The goods are impregnated in an apparatus suitable for the purpose with a solution of the coloring-matter to be used mixed with an alkaline medium, such as ammonia, hydroxids and carbonates of alkalies, carbonate of ammonia, alkaline reagent salts, such as phosphate of soda, borax, silicate of potash, aluminate of sodium, alkaline reagent soaps, Turkey red oil and organic bases, (for instance, amins.) The volatile mediums employed have the advantage over the fixed alkalies and those containing salts that in the drying they evaporate and leave the coloring-matter insoluble on the fiber in such a manner as to thoroughly impregnate the fiber, whereas when fixed alkalies are employed it remains soluble. Besides the solution of coloring-matter there may be added to the dye-bath substances which do not precipitate the coloring-matter in an alkaline solution—as, for example, aluminate or stannate of sodium, solution of oxid of zinc and of lead in soda-lye, solutions of ammonia, of chrome and copper oxid, cobalt, nickel or manganese oxydul, red and yellow prussiate of soda, chromic salts, solution of soap, Turkey red oil, glycerin, &c., thickenings, (gums, &c.) After impregnating the fiber the excess of liquid is removed by centrifugal machine or otherwise. In some cases it is advantageous and in other cases (for cops, spools, &c.) it is necessary to dry the material for fixing purposes. A short steaming will have the same effect. The material is then impregnated with the mordant in a bath containing the necessary mordants, (alumina, chrome, lime, iron, &c.,) best in the shape of weak or easily-volatile acids, such as acetic acid. The excess of mordant is removed and after or without drying the formation of the color-lake can then be effected and completed by steaming. Washing, soaping, and clear-

ing serve in many cases to increase the brightness of the dye.

What we claim as our invention is—

The herein-described process of dyeing with alizarin, which consists in first treating the fiber to be dyed with a soluble modification of alizarin, then fixing the alizarin color on the fiber by drying, next treating the fiber with a mordant, and finally steaming the fiber, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

FRANZ ERBAN.
LEOPOLD SPECHT.

Witnesses as to signature of Franz Erban:
JOSEF REVIER,
HEINRICH HAHN.

Witnesses as to signature of Leopold Specht:
GUIDO KÖPKE,
THEODOR MASCHINDA.