

UNITED STATES PATENT OFFICE

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IMPROVEMENT IN DYEING AND PRINTING TEXTILE FABRICS.

Specification forming part of Letters Patent No. **170,626**, dated November 30, 1875; application filed November 27, 1875.

To all whom it may concern :

Be it known that I, JAMES HARLEY, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Printing and Dyeing Textile Fabrics; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

In Patent No. 168,991, issued to me October 19, 1875, I have described a method of fixing aniline greens upon prints in combination with madder and alizarine colors. My present invention is an improvement upon, and an enlargement of, the said invention; and consists, first, in combining and fixing upon calico and similar printed and dyed goods the aniline purples and violets with madder and alizarine mordants; second, in combining aniline purples, violets, and greens, with madder and alizarine mordants upon such printed and dyed fabrics; third, in certain modifications of the process of fixing the aniline colors named above upon fabrics with the mordants suitable for dyeing up in the various madder and alizarine styles; fourth, in the new fabrics produced by this process.

By the improvement and modification of the process I can dispense with the use of gelatine and soluble silicate in the padding or preparation of the cloth.

The printing of what are known as madder colors, either with the various preparation of madder or with the artificial dye-stuffs, such as anthracene colors, which are applied in the same manner as madder preparations, is well known in calico printing. In such goods portions are reserved as whites. It is very desirable to combine with the usual figures produced by means of mordants and madder colors and their substitutes, other colors, such as methyl violet and aniline purples, so as to apply these purples simultaneously with mordants intended for passing through the dye-bath to be dyed up in black, red, orange, chocolate, brown, drab, and all the various madder colors. Heretofore this has not been

practicable. By my invention it is accomplished. The purples are first fixed upon the cloth, so as to pass through the ordinary dunging and dye-bath, in combination with mordants intended for dyeing up the various madder and alizarine colors. By the method pursued in fixing the purples in my process it can be applied and the goods passed through the dye-bath without either affecting the other colors or being itself affected. In fact, the portions to which the purples are applied pass through the dye-bath just as the white portions do in ordinary dyeing with madder, garancine, alizarine, and the like dye-stuffs. Of course, the purples need not fill all the portions not covered by the madder-color mordants, but any part or figure may be reserved as white in the usual manner, or it may have an aniline green applied on certain parts. This part of my invention, therefore, consists in applying to textile fabrics, especially those made of cotton, particular preparations of aniline purples simultaneously with mordants intended for passing through the dye-bath to be dyed up in red, orange, pink, chocolate, brown, drab, black, or other color, tint, or shade obtained in madder styles. The invention also consists of a new style of printed goods—namely, a print having in combination, aniline purples with one or more madder colors. This combination of colors enables the calico-printer to produce very pleasing effects, especially in what are known as robe styles.

The following description will enable others to make and use my invention.

In the first place, I pass my cloth through the following solutions previous to printing: Gelatine, standing at 2° of Twaddell's hydrometer; silicate of soda, at one and a half degree of Twaddell; chlorate of potash, standing at 2° Twaddell. The cloth is then dried and is ready for the printing-machine.

I may here state that the three solutions above are mixed together and the cloth passed through them at once. To make my purple color I take four and a half (4½) gallons extract of sumac, standing 26° Twaddell; six pounds starch; boil ten minutes; and when half cold I add two and a half pounds tartaric

acid, one pound oxalic acid, and one pound aniline purple. This is printed on the cloth already passed through the above solution, in combination with regular mordants. By this means I get an insoluble tannate of gelatine. After the goods are dried and aged one night I pass them through a solution of silicate of soda at 2° Twaddell, and heated to 180° Fahrenheit, or thereabout. The goods are then well washed and dyed to suit the patterns, with different proportions of alizarine, garancine, sumac, bark, berries, and such other materials as are ordinarily employed in this style of work, as well understood by competent dyers.

I do not limit myself to the exact materials or proportions given above, as an expert dyer and chemist may readily substitute equivalent materials for many of them.

The essential feature of my process consists in fixing upon the cloth, at the same time or before being placed in the dye-bath, the purples named or their equivalents, so that they neither interfere with, nor are themselves injured by, the subsequent process of dyeing and finishing the goods. The aniline violets may be used instead of purples. This feature is also applicable to those indigo styles in which mordants are applied by the printing-machine.

The purples produced by my process pass through the bath just as the whites do ordinarily, and the dyeing and finishing take place just as if the portions containing the purple had been white.

Instead of the formula given above, which is substantially that of my former patent for preparing the cloth for fixing the aniline colors, I find that the following is simpler. It is applicable as well to aniline greens as to aniline purples and violets.

I take two hundred pounds of sumac, to which is added one hundred and fifty gallons of water, and boil the mixture an hour or so, then put upon a filter. After being filtered the sumac-liquor is boiled down to stand at 20° Twaddell's hydrometer. For my green color, I take at the rate of ten gallons of sumac-liquor standing at 20° Twaddell, two gallons acetic acid at 10° Twaddell, twelve pounds of starch. Then the whole is boiled. When it reaches about 180° Fahrenheit I add at the rate of ten ounces tartaric acid to the gallon, and when cooled down to about 120° Fahrenheit I add at the rate of two ounces of oxalic acid to the gallon, and when quite cold I add at the rate of three ounces of aniline green, chemically pure, to the gallon. The color is then ready for printing on the cloth.

To make my purple, I take seven gallons sumac-liquor standing at 20° Twaddell, and three gallons acetic acid at 10° Twaddell, and ten pounds of starch. Boil the whole, and when cooled to 140° Fahrenheit I add at the rate of eight ounces tartaric acid, and four ounces aniline purple to the gallon. This color is now ready for printing on the cloth.

I take cloth known to printers as cloth that has received a madder-bleach, and pass it through a solution of chlorate of potash standing at 2° Twaddell, dry it, and it is ready for printing. Pass it onto the printing-machine, where the mordants intended for dyeing and the aniline green, or the green and purple, are printed at once—that is, at the same time. The cloth is passed through a box, known as an "aging-box," and can then be passed through silicate of soda at 2° Twaddell, and standing at 180° Fahrenheit or thereabout. The pieces are then washed and dyed.

I do not limit myself to these proportions, as they will have to be varied to suit the pattern.

After having been passed through the silicate the green and purple are sufficiently fixed to pass through the dyeing and soaping operation.

I have named in the above formula what is known as pure aniline purple; but the same process is applicable to any of the aniline purples and violets, taking the corresponding strength of each.

To sum up and distinguish this my present invention from my former invention, and from what was known prior to my said former invention, I will state what are the special new features. In the general process of fixing an aniline dye upon a fabric, so that it can pass through a madder, garancine, alizarine, or similar dye-bath, for which mordants are required, without being injured itself or injuring the dyes to be taken from the dye-bath, I have obviated the necessity of the use of gelatine. I have succeeded in fixing upon cloth aniline purples and violets in combination with the various madder colors. I have made the further combination in the same fabric of aniline purples, violets, greens, and madder, or alizarine colors. This gives my invention very great importance to the calico-printer. The variety and richness of every design is greatly increased, and the effective contrasts of the colors immensely heightened.

It is obvious that in fixing the aniline color upon the cloth no chemical must be left in that portion of the cloth upon which the aniline color is fixed which would act as a mordant to take color from the madder or alizarine dye-bath, as such would cause the spoiling of the aniline colors, and they would not pass through the dye-bath without being affected or changed in color.

For fixing the aniline colors I have named the sumac preparation above described for the reason that I deem it the cheapest and best of its class of substances; but expert dyers and chemists will readily understand that other similar preparations may be used as equivalents and substitutes. I, therefore, do not limit myself to the exact materials or proportions, so long as the effects produced are substantially the same or equivalent.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent, is—

1. The improved process herein described for dyeing in madder and garancine styles, in combination with aniline purples and violets, consisting in first fixing the latter upon the cloth with the mordants, and then passing the cloth through the dye-bath, whereby it is then dyed up in madder and indigo styles, substantially as specified.

2. The combination of aniline greens and purples upon cloth with mordants suitable for dyeing up in madder colors, substantially as specified.

3. The new fabric herein described, having

an aniline purple, substantially such as described, in combination with one or more madder colors.

4. The combination of aniline purple upon fabrics with mordants suitable for dyeing with garancine, alizarine, and similar dye-stuffs, substantially as set forth.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

JAMES HARLEY.

Witnesses:

ALBERT M. MOORE,
JEROME B. MELVIN.