

# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN THE MANUFACTURE AND APPLICATION OF COLORS FOR PRINTING AND DYEING.

*Specification forming part of Letters Patent No. 109,341, dated November 15, 1870.*

*To all whom it may concern:*

Be it known that I, ALFRED PARAF, of France, now residing in the city, county, and State of New York, have made an invention of new and useful Improvements in the Manufacture and Application of Colors for Printing and Dyeing Fibrous and Textile Articles; and that the following is a full, clear, and exact description and specification of my said invention.

Previous to this invention vegetable colors have generally been applied to fabrics with the coloring-matter in a practically insoluble condition. In printing, for example, madder colors upon cloths, the extract of madder employed has been mixed with water, acetic acid, the acetates of alumina, soda, or lime, oil, and gum or starch, and the mixture has been printed upon the cloth. Subsequently, the printed cloth has been steamed, for the purpose of fixing the color, and then washed. As the coloring-matter was used in a practically insoluble state, a large portion of it was vaporized by the steaming, while another large portion, being held only mechanically to the cloth by the starch or gum, was washed off in the subsequent washing operation, so that, practically, but a small portion of the coloring-matter employed remained permanently combined with the cloth, and, consequently, the process as heretofore practiced resulted in a great loss of valuable coloring-matter.

The object of the invention, which constitutes the subject-matter of this patent, is to avoid the loss of coloring-matter which is attendant upon the old process, and the invention is based upon the discovery that many vegetable coloring-matters are soluble in a solution of soap, and can be precipitated in the fabric from that solution.

In order that the invention may be fully understood, I will proceed to describe the mode in which madder colors may be prepared and applied to fibrous and textile articles according to the invention.

Any extract of madder that is soluble in an alkaline solution may be used for the purposes

of this invention, the extracts preferred being tinctorine, oleizarine, and the factitious or artificial extract of madder.

The following mode of practicing the invention has produced satisfactory results when a deep-red color is to be produced:

Prepare the printing-color as follows: Dissolve one-third of one pound of common soap in one gallon of boiling water; add to the solution one pound of extract of madder in paste, as, for example, oleizarine; heat the mixture until the extract is dissolved, and then thicken it suitably for printing by means of starch, one-fourth pound of starch being generally sufficient for each quart of solution.

The cloths for printing should be prepared for the purpose as follows: Pad the cloth with a mixture of three parts of a solution of acetate of alumina at 4° Baumé, and one part of a solution of acetate of lime at 4° Baumé. Dry the cloth and age it until all, or nearly all, the acetic acid has passed off.

Print the prepared cloth, in the usual manner, with the printing-color above described, and then steam the cloth for forty-five minutes, after which it should be washed and soaped in the usual manner practiced with cloths that have been printed with madder colors.

Brighter red or rose colors may be obtained by using the above printing-color reduced by means of starch paste until the desired shade is obtained.

Purple colors may be obtained by preparing the cloth for printing as follows: Mix together three parts of the solution of the acetate of iron at 2° Baumé, and one part of the solution of acetate of lime at 2° Baumé. Dry and age the cloth as in the ordinary way. Print it with the red printing-color above described; then steam the cloth, wash it, and soap it in the same manner as for reds. If reds and purples are to be printed upon the same piece of cloth, the cloth is prepared as above described for printing red, and the red colors are printed with the printing-color above described. The purples are printed with a printing-color prepared by adding to each gallon of red print-

ing-color made as above described two ounces of dry-ground ferrocyanide of potassium. Chocolate color may be produced by adding to the red printing-color above described a sufficient quantity of the solution of chromate of soda to produce the desired shade of color. In all these cases the cloth should be prepared for printing by padding it with the solution of acetate of lime, drying it, and aging it; but this preliminary preparation of the cloth is not essential. The cloth is printed with the color, and is then steamed, washed, and soaped in the ordinary way.

If the cloths are to be dyed with the colors, this may be done by padding them with the solution of the acetates of alumina and of lime for the reds, the solution of the acetates of iron and lime for the purples, and the solution of the acetates of chrome and of lime for the chocolate color. The cloths are then dried and aged, after which they are padded in the hot soap solution of color without the addition of starch.

Another mode of practicing the invention is to pad the cloth to be printed or to be dyed with a solution of soap, in the proportions of one-half of one pound to the gallon of water, to dry the cloth, and to print it, or to dye it (by padding it) with color prepared with the extract of madder and the mordants in the ordinary way. The steaming subsequent to printing causes the solution of the printed coloring-matter by the soap, and its precipitation in the cloth; and the operation of dyeing causes a like solution of the coloring-matter by the soap, and its precipitation in the cloth. In such case, the madder colors, instead of being manufactured by means of soap before their application to the fabric, are manufactured in the fabric by means of the soap.

Another mode of practicing the invention is to prepare the soap compound directly from the crude madder material, such as flowers of madder or garancine, instead of from an extract previously obtained for the purpose. The invention may then be practiced as follows: Boil together garancine, water, and soap, in the following proportions: garancine, one pound; water, one pound; soap, half a pound. Boil for fifteen minutes. Filter the compound, and press the residuum. Boil the residuum with additional quantities of water and soap in the above proportions, and filter and press as at first until the garancine is exhausted of coloring-matter. Afterward the filtered soap solutions may be mixed together. The soap compound of the color thus produced may be sold to printers or dyers, or it may be applied directly to the cloths. A convenient mode of applying the soap solution of the color to the cloths is to introduce it into a padding-machine, and keep it hot, by preference at the boiling point, by means of a steam-pipe passing through the reservoir or vat of the pad-

ding-machine. Prepare the cloth by printing it with the usual mordants for madder colors, and dry it; then pass it through the soap solution of the color in the padding-machine, permitting the cloth to remain in the solution a sufficient time to produce the required intensity of color, from one to five minutes' time being generally sufficient for this purpose. The cloth is then washed with boiling water containing bran, in the usual manner practiced in cleansing cloths in print-works, until the unprinted portions of the cloth have attained the requisite whiteness.

In place of separating the soap solution of the color from the residuum before the cloth is passed through, the boiling mixture of the garancine and soap solution may be introduced directly into the padding-machine, and the printed cloth be subjected to it, as before described. As fast as the soap solution of the color is absorbed by the cloth, additional quantities of a hot solution of soap, containing half a pound of soap for each gallon of water, should be added to the mass in the padding-machine, and the whole should be kept at the boiling point by means of a pipe or coil of pipe, through which steam is passed. The addition of the solution of soap may be continued in this manner until the coloring-matter of the garancine is exhausted.

The object of keeping the soap solution of color hot during the treatment of the cloth with it is to keep it in a thin liquid condition, and thereby facilitate the operation.

In the preceding description, common soap has been named as the agent used for rendering the coloring-matter soluble, and the common white and yellow soaps manufactured for domestic purposes are well suited to the purpose, but it is not necessary that soap should be specially obtained for the purpose, as any saponaceous compound of an alkali and an oil or fat in which the coloring-matter is soluble may be used.

The invention is applicable not only to madder colors, but to others which are soluble in alkaline solutions, as, for example, to the coloring-matters of wood, sandal-wood, curcuma, anatto, quercitron, and Persian berry. In operating with these articles the same mordants that are used with the same dye materials in the ordinary methods in use may be used in practicing the present invention. These mordants should be applied to the cloth, and the latter should be dried, after which it may be printed or padded with the compound of the coloring-matter and the soap.

In all cases the cloth should be subjected to the soap compound before the acetic acid is dissipated from the cloth.

Having thus described my invention, and the modes of practicing it which I deem best, I claim as my invention, and desire to secure by Letters Patent—

1. The manufacture of colors for printing and dyeing fibrous and textile articles of the coloring-matter and soap, substantially as before set forth.

2. The process of applying colors to fibrous and textile articles by means of the coloring-matter and soap, substantially as before set forth.

Witness my hand this 8th day of June, A.D. 1870.

ALFRED PARAF.

Witnesses:

JULIUS GERSON,  
FRANÇOIS LUEFFEE.