

UNITED STATES PATENT OFFICE.

FREDERICK A. GATTY, OF ACCRINGTON, ENGLAND.

IMPROVEMENT IN DYEING MADDER COLORS.

Specification forming part of Letters Patent No. **139,056**, dated May 20, 1873; application filed April 14, 1873.

To all whom it may concern:

Be it known that I, FREDERICK ALBERT GATTY, of Accrington, in the county of Lancaster, England, manufacturing chemist, have invented certain new and useful Improvements in the Production of Certain Colors on Cotton Fabrics and Yarn; and I hereby declare the following specification to be a full, clear, and exact description thereof.

My improvements apply to cotton fabrics and yarns printed, padded, or otherwise prepared with aluminous mordants for dyeing red colors with madder, garancine, extracts of madder, artificial alizarine, or other substitutes of madder. In place of using cow-dung, or any known dung substitute, for the operation commonly called dunging or cleansing, I use solutions of soap, or solutions of fatty acids or resins, combined with soda, potash, or ammonia, or their respective carbonates, or emulsions of oils, or the waste soap-liquors of calico-printers and Turkey-red dyers.

The object of using the ingredients named above in lieu of cow-dung or dung substitutes is to combine a certain quantity of fatty resinous matter with the mordant in order to obtain brighter colors. It has hitherto been the practice to combine fatty acids with cotton fabrics and yarn in various ways before applying the mordant; but by my invention the cloth or yarn is first printed or otherwise prepared with the mordant, and the fatty acid is combined therewith afterward. By these means I obtain red colors similar to Turkey red without going through the tedious and expensive process of oiling. And in order that my invention may be fully understood and carried into effect, I will proceed to describe how I perform the same.

The cotton fabrics are printed or padded in the usual way with an aluminous mordant. I prefer to use the acetate of alumina, commonly called red-liquor. For printing it is thickened as is generally done, and for padding it is used in the liquid state; the strength of the mordant depends upon the depth of color required. I find that a mordant of 10° of Twaddell's hydrometer gives a good medium red. Two or three days after printing or padding, the cotton fabrics are passed through a solution of a neutral soap or an emulsion con-

tained in two cisterns, as will be described hereafter. The first cistern is fitted up with rollers and the second with a wince, similar to those used by calico-printers for the operation commonly called dunging or cleansing. Into the first cistern, containing from three hundred to four hundred gallons of water, at 150° to 160° of Fahrenheit's thermometer, I put for every one hundred gallons of water six gallons of neutral soap, prepared by dissolving fifty pounds of soap in ten gallons of water, to which I add an acid to neutralize part of the alkali of the soap, which, if left in the solution, would act very injuriously upon the mordant; the quantity of acid required depends upon the quality of soap. I add acid to the soap until a small quantity of it put into distilled water gives a milky solution. I find that one pound of muriatic acid of commerce, or its equivalent of sulphuric acid, is about the quantity required for ten pounds of good oil-soap. In place of neutralizing the soap with muriatic or sulphuric acid, a fatty acid may be used, or a mixture of fatty acids, such as is obtained when oils or other fats are saponified. In this case I add for every pound of fatty acid three pounds of water to the solution of soap. Oils, fats, or resin, in their natural state, will, to a certain extent, answer the purpose; but I prefer to use saponified oils or fats. I give preference to oils or fats saponified with an alkali, or with superheated or high-pressure steam, to those saponified with mineral acids or oxidizing agents. In place of the neutral soap I sometimes use an emulsion made with fatty acids, or saponified oils or fats, and an alkali or alkaline carbonate, such as soda, potash, ammonia, or their carbonates. I find the most suitable proportions to be as follows: I mix ten pounds of a fatty acid, or of a saponified oil or fat, with two pounds of carbonate of soda and three gallons of water. The emulsion, containing the same quantity of fatty acids as the neutral soap described above, may be used in the same proportions. In place of carbonate of soda, its equivalent of potash, ammonia, or their carbonates, may be used. Into the second cistern I put the same proportion of neutral soap or emulsion as in the first; but this is only necessary for the beginning, for when

the operation is going on the liquor carried by the fabrics from the first cistern into the second is sufficient to keep up the necessary strength. The cotton fabrics are pulled over the rollers through the first cistern, and from there they go into the second, where they are kept running over the wince for about fifteen minutes. The temperature of the solution in the second cistern is from 140° to 150° Fahrenheit. The first cistern is kept full by a constant supply of neutral soap solution running into it while the fabrics are going through it. After the fabrics have come out of the soap or emulsion they are well washed in cold water, and are then ready for dyeing with madder, garancine, artificial alizarine, or other substitutes of madder, in the usual way, well understood by printers and dyers. After the dyeing the cotton fabrics are cleared and brightened with soap, or soap and a salt of tin, according to the color required, as is well understood by dyers and calico-printers. If the red is not required to be very bright, the fabrics, after coming out of the dyeing, may simply be washed and passed through a weak solution of chloride of lime to restore the white in the printed fabrics. When I use the waste soap-liquors of calico-printers and dyers they sometimes contain less soap than is necessary for my purpose; in that case I add a certain quantity of the neutral soap or emulsion above described, to bring the solution up to the necessary strength, as stated above. There is generally no excess of alkali in the waste soap-liquors; but should there be, I add an acid, as in the case of preparing the neutral soap, described above. I may here mention that an excess or large quantity of neutral soap or emulsion, when carefully prepared, does not injure the mordant; but I use weak solutions on account of economy.

In applying my invention to cotton yarns,

I use the same mordant at 10° of Twaddell's hydrometer for a medium red, and the same neutral soap or emulsion, as described above, for cotton fabrics; the process only differs in the manipulation or mechanical part. The yarns may be printed with a thickened mordant or steeped into it in the liquid state, and the excess squeezed or wrung out. In both cases the yarns are dried, and two or three days after I steep them in a solution of neutral soap or emulsion of the same strength and temperature as that described for cotton fabrics. In this solution the yarns are handled or mechanically moved about for about fifteen or twenty minutes; they are then taken out and well washed in cold water, when they are ready for dyeing with the same dye materials as the fabrics, in the usual way yarns are generally dyed. After washing they are cleared and brightened with soap, or soap and a salt of tin, in the usual way, well understood by dyers.

Having now described the nature of my invention, and how I perform the same, I would have it understood that I do not confine myself to the particulars above described, as they may be varied, and that what I claim herein as new, and desire to secure by Letters Patent of the United States, is—

The improvement in the art of coloring cotton fabrics and yarns by treating with neutral soap or emulsions of fatty acids, or of oils or fats, either saponified or in their natural state, or the two combined, in the manner and for the purpose described.

In testimony whereof I have hereunto set my hand before two subscribing witnesses.

F. A. GATTY.

Witnesses:

H. B. BARLOW, Sr.,

H. B. BARLOW, Jr.