UNITED STATES PATENT OFFICE.

ALEXANDRE SCHULTZ, OF PARIS, FRANCE.

IMPROVEMENT IN PROCESSES OF DYEING FABRICS.

Specification forming part of Letters Patent No. **170,307**, dated November 23, 1875; application filed September 10, 1875.

To all whom it may concern:

Be it known that I, ALEXANDRE SCHULTZ, of Paris, in the Republic of France, have invented improvements in operating with indigo in the printing of cotton and other fabrics produced from vegetable fibers, of which the following is a specification:

The invention relates to fixing the coloring matter, when employing indigo in printing on cotton and other fabrics produced from vegetable fibers, by a steaming process; and consists in the use of indigo-white and oxide of tin.

In carrying out the invention the indigo is reduced to indigo-white paste by any of the known processes. This indigo-white paste is then mixed with oxide of tin and a solution of gum-senegal or other suitable gum, in proportions depending upon the percentage of pure indigo contained in the indigo-white paste.

The following proportions answer well, viz: For ten parts of pure indigo contained in the paste add one part of oxide of tin and solution of gum about equal in quantity to the indigo-white paste, but varying with the shade of blue required.

These proportions may, however, be varied, and salts of tin and an alkali which produces oxide of tin in the process may be used, taking care that the color contains no free acid or alkali.

The oxide of tin used is, by preference, that obtained by precipitating tin crystals with soda, in the usual manner.

The indigo-white paste used in carrying out this invention is that obtained by precipitating a solution of deoxidized indigo in alkali by an acid and filtration; but it may be otherwise obtained.

In some cases, if desired, the indigo-white, in solution in alkali, may be precipitated by an acid solution of tin crystals.

The coloring matter thus obtained is printed alone or in combination with other steam coloring matter, and the fabric is steamed for a period which may vary from, say, half an hour to two hours, depending upon the character of the other colors with which the indigo may be associated in the printing.

After steaming, the fabric is washed and treated as may be necessary to the more complete development of other colors with which this printing with the indigo is associated.

By such means the indigo-white or reduced indigo which is printed on the tissue combines with the cotton, and, by the steaming, is fixed on the fabric.

The indigo is fixed on the fabric by steam used in like manner to that adopted in fixing alizarine and other steam-colors, so that, in thus printing with indigo, other steam-colors may be readily associated with it, and the coloring matter thus obtained may be employed in combination with other coloring matters, for producing various effects desired—as, for instance, by employing oxide of lead, oxide of zinc, or oxide of baryta in combination with the coloring matter above described, and passing the fabric to which the combination has been applied through bichromate of potash after steaming, a fast green color will be obtained, varying in character with the oxide employed, as well as by the character of the steaming and the proportions of the respective ingredients.

Having thus described my invention, I would have it understood that what I claim is—

The within-described process of dyeing vegetable fiber, which process consists, first, in treating the fabric with indigo-white and oxide of tin, in the proportions substantially as named, and then subjecting the so-treated fabric to the action of live steam.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALEX'DRE SCHULTZ.

Witnesses:

WILLIAM BROOKES,
62 *Chancery Lane, London.*

ALFRED GEORGE BROOKES,
62 *Chancery Lane, London.*