

UNITED STATES PATENT OFFICE.

FRANK ISHERWOOD HORROCKS, OF SALE, ENGLAND.

PROCESS OF DYEING.

SPECIFICATION forming part of Letters Patent No. 630,507, dated August 8, 1899.

Application filed May 25, 1899. Serial No. 718,284. (No specimens.)

To all whom it may concern:

Be it known that I, FRANK ISHERWOOD HORROCKS, a subject of the Queen of Great Britain, residing at Liddle Lodge, Sale, in the county of Chester, England, have invented certain new and useful Improvements in the Art of Dyeing Products Made from Vegetable Fibers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has relation to the art of dyeing products made from vegetable fibers—such as threads, yarns, and fabrics—and more particularly to dyeing such products a permanent and fast drab color in all shades and to producing figures or patterns on such products, if desired.

In carrying out my invention I form a solution of a salt of copper and a salt of iron, which when reacted upon with a solution of a salt of an alkali metal will be converted into oxids and deposited upon the fibers of the product in this form.

In practice I take, for instance, an aqueous solution of sulfate of copper and of sulfate of iron in equal proportions and of a strength of about 8° Twaddell and impregnate the fibrous material therewith. I then remove the excess of solution and react upon the material with a salt of a metal of the alkalies—as, for instance, an aqueous solution of caustic soda or of common soda or of a carbonate or silicate of such—of a strength of, say, 2° to 6° Twaddell, whereby the copper and iron salts are deposited upon the fibers of the product in the form of oxids, after which the material is washed and dried.

Any desired shade of drab may be obtained in various ways—for instance, by passing the material repeatedly and alternately through the solutions of copper and iron salts and through the reacting solution, or by varying the strength of these solutions, or by varying the quantitative relation of the salts of copper and iron in solution.

In practice I immerse or steep the material in or pass it through the solution of copper and iron salts, then remove the excess of so-

lution either by treatment in a centrifugal hydro-extractor or by passing the material through squeezing-rolls and then through a solution of caustic soda or of common soda or through a solution of their carbonates or silicates of a strength of from 2° to 4° Twaddell, or through a weak solution of ammonia of from 1° to 3° Twaddell, after which the material is washed and dried.

If fabrics are to be dyed, as described, in figures or patterns, I remove the excess of solution of copper and iron salts by passing the fabric through squeezing-rollers, the upper one of which has the figures or pattern engraved therein, so that a less quantity of solution will be removed from those parts of the fabric passing under the countersunk portions of the figures or pattern than from those parts acted upon by both rolls, and when the fabric is reacted upon by the reagent those parts of the fabric holding the greater proportion of solution will be of a correspondingly greater depth of color than the other parts of the fabric being passed from the rollers immediately into or through the reagent.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. The improvement in dyeing products made of vegetable fibers, which consists in impregnating the same with a solution of a salt of copper and of iron, and precipitating the same upon the fibers of the product in the form of oxids by means of a suitable reagent, for the purposes set forth.

2. The improvement in dyeing products made of vegetable fibers, which consists in impregnating the material with a solution of sulfate of copper and of sulfate of iron, removing the excess of solution, precipitating the salts of copper and iron in the form of oxids upon the fibers of the material by means of a solution of a suitable salt of an alkali metal, and washing and drying the material, for the purpose set forth.

3. The improvement in the art of dyeing fabrics made from vegetable fibers, which consists in impregnating the fabric with a solution of a salt of copper and of a salt of iron, removing the excess of solution to a greater

extent from some portions of the fabric than
from others, precipitating the copper and iron
salts in the form of oxids upon the fibers of
the fabric by means of a suitable agent and
5 washing and drying the fabric, for the pur-
poses set forth.

In testimony that I claim the foregoing as

my invention I have signed my name in pres-
ence of two subscribing witnesses.

FRANK ISHERWOOD HORROCKS.

Witnesses:

PETER J. LIVSEY,

WILLIAM FAULKNER.