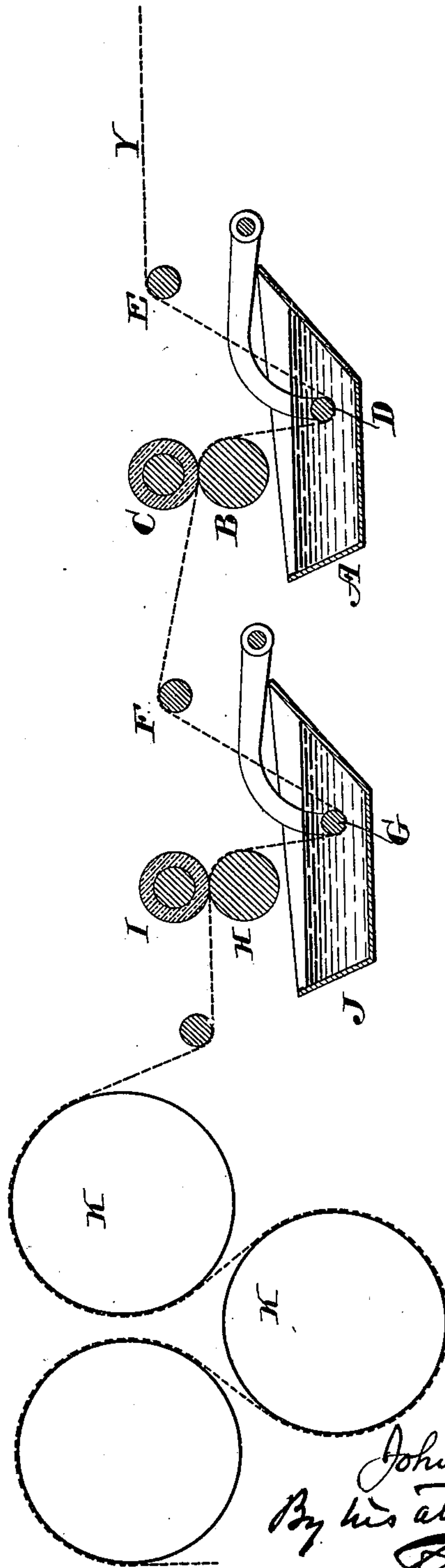


No. 659,343.

Patented Oct. 9, 1900.

J. W. FRIES.
PROCESS OF DYEING.
(Application filed Dec. 14, 1899.)

(No Model.)



Witnesses:
Being sworn
R. M. Kelly.

Inventor:
John W. Fries
By his atty
[Signature]

UNITED STATES PATENT OFFICE.

JOHN W. FRIES, OF SALEM, NORTH CAROLINA.

PROCESS OF DYEING.

SPECIFICATION forming part of Letters Patent No. 659,343, dated October 9, 1900.

Application filed December 14, 1899. Serial No. 740,300. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN W. FRIES, of Salem, Forsyth county, North Carolina, have invented an Improvement in Processes for Dyeing Textile Materials, of which the following is a specification.

My invention has reference to processes for dyeing textile materials; and it consists of certain improvements fully set out hereinafter.

The object of my invention is to color or dye textile materials in the web or yarn of vegetable, animal, or mineral origin by the employment of the "direct dyes," whereby a result shall be secured which will be both permanent and low in cost.

In carrying out my invention I prepare two fluid mixtures, one for imparting the coloring-dyes to the fabric and the other to precipitate the coloring elements upon the fiber and subject the textile material successively thereto under pressure of rolls, whereby the coloring fluid is first forced into and through the fiber and the air expelled and subsequently the precipitating fluid likewise forced into and through the fiber under pressure to secure thorough impregnation and complete precipitation. Furthermore, the excess of the dyeing and precipitating fluids is expelled from the textile material before subsequent treatments. This process results in a more uniform tint and economical result.

I have shown in the accompanying drawing a suitable apparatus to aid in carrying out my improved process.

Y is the textile material, either a web of woven or felted fabric or in form of yarn. It passes over guide-rod E, thence downward under a roller D, below the liquid-level, in a vat A, and thence upward between the pressure-rolls C B, one of which may be metal and the other rubber covered to prevent injury to the fiber. The fluid in the vat A is the dyeing or coloring mixture and is specified hereinafter. After receiving the coloring solution the textile material passes to a similar set of apparatus as that just described—namely, it passes over the guide-rod F, thence under the roller G in the vat J, and thence upward between the pressure-rolls H I. The vat J contains the precipitating fluid for acting upon the colored fabric, and which is also described

hereinafter. After the coloring-matter has been precipitated upon the textile material and the excess of the dye and precipitating fluid removed the textile material is passed to drying-cylinders K or may be treated in any other well-known and customary manner.

The dyeing fluid consists of soap in a thick fluid condition, to which is added the direct dyes, which are a class of dyes having a direct affinity for cotton, examples of which are the benzidine and diamene dyes, which are soluble in alkaline solutions or solutions of alkaline salts, such as chloride of soda, phosphate of soda, sulfate of soda, or similar compounds of potash. Such dyes go on cotton without previous treatment to a mordant, such as tannin fixed by antimony. The soap solution may be formed by adding to one hundred parts, by weight, of water five percent., by weight, of commercial concentrated soap, (hard soap.) It is also preferable that the soap be a potash soap, because it is more fluid and penetrates the fiber better, and therefore acts as a more reliable vehicle for conveying the coloring-dyes to all parts of the textile material.

The precipitating fluid consists of a solution having the qualities necessary to precipitate the stearin and olein of the soap to cause them to carry down the coloring-matters of the dyes in the form of a mixed insoluble precipitate. Acetate of lime or magnesia, calcic chlorid, magnesium chlorid, or sulfate of magnesia are excellently adapted to the purpose of precipitating the soap as a stearate and oleate. If acetate of lime be employed, the acetate of potash will be formed, and the precipitate will be a mixed one of stearate and oleate of lime, carbonate of lime, and the precipitated color of the dyes. The acetate of potash results from the use of potash soap. If the soap is a soda soap, then acetate of soda will result in the solution. In case of using the chlorid of lime in place of the acetate the resulting solution would be a chlorid of soda or potash. In cases where the precipitating solution contains a sulfate a sulfate of lime or potash will remain in the solution. The above precipitate would vary where magnesia is employed in place of the lime, as in this case the precipitate would contain the stearate and oleate of magnesia.

and some carbonate of magnesia. I greatly prefer a precipitating solution which gives a white precipitate, and hence advise the use of the lime, calcium, or magnesia salts. As the precipitate remains as an insoluble compound on the fabrics and is the means of holding the color of the dyes, it is an advantage to have it of white color, since it does not destroy the color value of the dye, but, on the other hand, heightens its color and brightness.

For light shades of color the precipitating solution should contain about five per cent., by weight, of the acetate of lime or other salt to one hundred parts of water, while for dark shades of color ten per cent. of the salt should be used.

The rolls C B and H I are located above the liquids in the vats A J, so that the excess of the dye solution and the precipitating solution may be squeezed out of the textile material and flow back into the respective vats. The pressure to which the textile material is subjected by these rolls expels all air from the fiber and positively forces the solution into and through the fiber, where they are wanted, permitting perfect coloring in passing through one set of rolls C B alone. Of course it is evident that a repetition of the coloring operations may be employed, if so desired; but this would only be necessary in special classes of textile materials having great body or for very dark shades.

When the fabric or yarn has been colored and enters the vat J, it is evident that part of the precipitating salts will be removed, and in time the solution will be less concentrated. This will cause the textile material to "bleed" or lose part of its coloring-matter by being dissolved out by the weak solution in vat J. To avoid this "bleeding" of color from the fabric or yarn, I feed the bath of vat J with concentrated solution of the acetate of lime or other salt used as the precipitating reagent. By keeping the strength of the bath up to the desired point all bleeding tendency is overcome, and the entire color is left in the fabric.

I do not confine myself to the proportions of the ingredients herein set out; nor do I limit myself to the precipitating salts specified, as other salts having equivalent action may be used, if so desired.

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

1. The herein-described method of dyeing textile material consisting in saturating said textile material with a thick solution of soap and "direct dyes" at ordinary temperatures, then subjecting the saturated textile material to mechanical pressure to expel the air and force the coloring solution into and through the fiber and remove the excess of the solution, then immediately and before drying passing the colored material in its wet condition through a bath containing a salt solution at

ordinary temperature capable of precipitating the fatty substances of the soap together with the color-matter of the dyes, and then subjecting the textile material so treated while still wet to a second action of mechanical pressure to thoroughly intermingle both solutions before either is dried and remove all excess of fluid.

2. The herein-described process of coloring or dyeing textile material consisting in applying to the textile material a solution of the "direct dyes" in a solvent at ordinary temperature, removing by mechanical pressure the air and excess of the dye solution and forcing the dye and solvent into and through the fiber of the textile material, then immediately and before drying immersing the dyed textile material in a bath of an acetate of an alkaline base at ordinary temperature capable of precipitating the solvent and the coloring-matter of the dyes, and maintaining the strength of the precipitating-bath during the process by adding thereto additional quantity of the precipitating salt to prevent bleeding of the color from the dyed textile material.

3. The herein-described method of dyeing textile material consisting in saturating said textile material with a solution of soap and "direct dyes" at ordinary temperature, then immediately and before drying passing the colored material through a bath at ordinary temperature containing a salt solution capable of precipitating the fatty substances of the soap together with the color-matter of the dyes, forcing the precipitating salt into close union with the dye and soap by mechanical pressure upon the textile material, and maintaining the precipitating-bath by adding thereto concentrated solutions of the precipitating salt during the process to prevent bleeding of the color from the dyed textile material.

4. The herein-described process of coloring or dyeing textile material consisting in applying to the textile material a solution of the "direct dyes" in a solvent at ordinary temperatures, removing by mechanical pressure the air and excess of the dye solution, then immediately and before drying immersing the dyed textile material in a bath of acetate of lime capable of precipitating the solvent and the coloring-matter of the dyes at ordinary temperatures, subjecting the textile material so treated while still wet to further mechanical pressure to expel the air and force a thorough intermingling of the two solutions before either is dried to insure full precipitation, and finally drying the textile material so dyed.

In testimony of which invention I have hereunto set my hand.

JOHN W. FRIES.

Witnesses:

A. F. PFOHL,
C. T. PFOHL,