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# UNITED STATES PATENT OFFICE.

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## DYEING SULPHUR COLORS ON SILK.

No Drawing.

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*To all whom it may concern:*

Be it known that I, FRANK L. REMLEIN, a citizen of the United States, and a resident of Penns Grove, in the county of Salem and State of New Jersey, have invented certain new and useful Dyeing Sulphur Colors on Silk, of which the following is a specification.

This invention relates to dyeing sulphur colors on silk, and comprises a procedure whereby the dyeing of silk by sulphur colors may be satisfactorily accomplished, the color going on to the silk evenly and yet damage to the fibre being avoided. With the present process, which is applicable to all sulphur colors, there is no premature oxidation during the dyeing, particularly level and vivid shades are produced, there is no loss in tensile strength or brilliance of the silk, the characteristic soft feel of the silk is not injured, and the fibres will not rise on the yarn in dyeing and will not show the fluffiness which, in the silk industry, is known as "whiskers." It is the object of the invention to provide a process of the character indicated.

Heretofore, the procedure has been to neutralize the excess alkali produced by dissolving the dyestuff in sodium sulphide, with sodium bisulphite until the dye bath was only feebly alkaline, as tested by phenolphthalein paper which, when the bath had the right alkalinity, showed a rose and not a cherry red. The difficulty has been, however, that if the alkalinity was sufficiently reduced to save the fibre, the color went on very unevenly and in some cases hardly at all; while, on the other hand, if the bath were sufficiently alkaline to properly keep the color in solution, it was too alkaline for the fibre and damaged it. I have devised a process by which the difficulties indicated are avoided.

According to the present invention, sodium hydrosulphite is used with the sodium bisulphite, instead of using bisulphite only, to reduce the alkalinity, and also, further departing from previous practice in dyeing sulphur colors on silk, there is added to the bath a protective colloid, as, for example, the product obtained by treating gum silk with marseilles soap and variously called bast soap, gum soap, and boiled-off liquor, another example being cellulose sulphite

pitch, that is, the pitch from the waste liquor of sulphite wood pulp manufacture. The ratio of hydrosulphite to bisulphite may be substantially from 15:85 to 1:1, preferably 1:3. The ratio of gum or bast soap to the bath may be substantially from 3:400 to 1:20 preferably 1:50, and, indeed, a greater proportion of soap than 1:20 can be used, but without particular advantage.

The hydrosulphite serves satisfactorily as a reducing agent in a substantially neutral bath, thus providing for proper dyeing action even though the bath be substantially neutral, as necessary for preservation of the fibres. The protective colloid acts as a preservative of the bath, preventing coagulation of the dyestuff. Its function is therefore to be clearly distinguished from such action as soap might have, if used in dyeing with acid or basic dyes, to act upon the fibres to facilitate the saturation thereof; for in the present case the colloid functions with respect to the bath and is used for its effects thereon.

To illustrate practice in accordance with the invention, but not in restriction of the same, I give the following, it being understood, of course, that the various details, as to temperatures, mechanical operations, and the like, may be varied to suit particular circumstances and are given primarily to give fullness to the example, rather than as indicating that the primary features of the invention are restricted to the specific directions given.

For dyeing 100 lbs. of silk, make a solution of ten (10) lbs. immediat yellow D (Schultz #710), a sulphur dyestuff, in the usual manner, with ten (10) lbs. of sodium sulphide concentrated, that is, chip sulphide. To the liquor thus produced add a mixture of 75 pts., by weight, sodium bisulphite; 25 pts., by weight, sodium hydrosulphite, preferably in solution, in a small quantity of cold water, until the bath becomes but slightly alkaline, giving only a pink and not a red when tested with phenolphthalein paper. This will require about twelve (12) lbs. of the mixture of bisulphite and hydrosulphite. Add eight (8) gals. of gum or bast soap and make up the bath to 400 gals., or about forty times the weight of the silk. Raise the temperature of the dye bath to 110° F. and at that temperature enter the

- silk. Bring the temperature very slowly and regularly to 160° F. within one-half hour; hold at this temperature for twenty minutes, then add fifty (50) lbs. Glauber's salt and dye for one-half hour longer. Pass the goods through a squeeze roller into cold water, then into hot water. Soap at 150° F. for fifteen minutes and finally scroop, as usual, with an acid.
- 10 In using cellulose sulphite pitch no changes in the procedure just stated are called for, except, instead of gum soap is used an amount of pitch substantially between .5 oz. to 5 oz., preferably 1 oz. per gallon of the liquor, though, as in the case of the soap, the given maximum may be exceeded. It is to be noted that the protective colloid is advantageous even though the alkalinity of the bath be reduced without the use of hydrosulphite.
- 20 I claim:
1. In dyeing a sulphur color on silk, the steps of reducing the alkalinity of the dye bath with sodium hydrosulphite and sodium bisulphite, and adding a protective colloid.
  2. In dyeing a sulphur color on silk, the steps of reducing the alkalinity of the dye bath with sodium hydrosulphite and sodium bisulphite in a ratio substantially between 15:85 to 1:1, and adding a protective colloid.
  3. In dyeing a sulphur color on silk, the steps of reducing the alkalinity of the dye bath with sodium hydrosulphite and sodium bisulphite in substantially the ratio 1:3, and adding a protective colloid.
  4. In dyeing a sulphur color on silk, the steps of reducing the alkalinity of the dye bath with sodium hydrosulphite and sodium bisulphite, and adding gum soap in an amount, relative to the bath, substantially between the ratios 3:400 and 1:20.
  5. In dyeing a sulphur color on silk, the steps of reducing the alkalinity of the dye bath with sodium hydrosulphite and sodium bisulphite, and adding gum soap in an amount, relative to the bath, substantially in the ratio 1:50.
  6. In dyeing a sulphur color on silk, the steps of reducing the alkalinity of the dye bath with sodium hydrosulphite and sodium bisulphite in substantially the proportions of 10 parts of a mixture of substantially 25 parts of hydrosulphite and 75 of bisulphite, to 10 of color, and adding gum soap in substantially the proportion of 8 parts of soap to 400 of bath, and making up the bath to substantially 400 gallons per 10 pounds of color.
  7. In dyeing a sulphur color on silk, the steps of reducing the alkalinity of the dye bath, and adding a protective colloid.
- In testimony whereof I affix my signature.
- FRANK L. REMLEIN.