Patented Apr. 5, 1932 1,852,137

UNITED STATES PATENT OFFICE

WILLIAM WHITEHEAD, OF CUMBERLAND, MARYLAND, ASSIGNOR TO CELANESE CORPORATION OF AMERICA, A CORPORATION OF DELAWARE

TINTING LIQUID AND METHOD OF APPLYING THE SAME

No Drawing. Application filed March 17, 1928. Serial No. 262,597.

This invention relates to a tinting fluid and method of using the same for temporarily marking yarns during their processing.

An object of my invention is to provide a fluid for the fugitive tinting of textile yarns for the purpose of identification of the same.

A further object of my invention is to tint yarns in a more distinctive manner than has heretofore been possible, and at the same time to produce tintings that may be scoured off more readily and rapidly.

A further object of my invention is to provide a tinting fluid for textile yarns that acts both as a fugitive dyeing agency and as a lubricant for the yarns. Further objects of my invention will appear from the following detailed description.

It is a common practice in the textile art to color yarns with an easily removable dye for the purpose for identifying them as to denier, count or size, twist, number of filaments, etc. during textile operations. After a finished product is produced, the color is removed by washing or scouring. Ordinarily aqueous solutions of acid dyes (sodium salts of sulphonic acids) are used for this purpose. The fugitive dyes are usually applied either by causing the yarn to pass across a wick or pad that dips into, or a roller that rotates in, an aqueous solution of the fugitive dye. Or else, the yarn is hanked and immersed in an aqueous bath of the dye. However, all of these methods have serious drawbacks. In the case where wicks or pads are used, these have a disadvantage of short life of but a few hours, because of the ready evaporation of the water and the depositing of the undissolved dyestuff thereon. This causes irregular application of the dye and necessitates frequent changing of the pads or wicks. Where rollers are used, it is exceedingly difficult to supply the small amounts of tinting fluid required for the finer types of yarns. The dyeing or hanking process involves the added expense of hanking and swift winding and the waste produced thereby.

By the process of my invention all of these objections are obviated. In accordance with my invention, I prepare a tinting fluid which contains as solvent for the fugitive dye, a high boiling polyhydric alcohol or a high boiling ether of such alcohol. The tinting fluid may contain some water, but such water is not absolutely necessary.

Of the high boiling polyhydric alcohols that may be used in the tinting fluid, the following may be mentioned: glycerol (boiling point 290° C.); ethylene glycol (boiling point 197.5° C.); diethylene glycol (boiling point 250° C.); propylene glycol, etc. Of the ethers of polyhydric alcohols, the monoethers such as the monoethyl ether of ethylene glycol (boiling point 135.5° C.) or the monoethyl ether of diethylene glycol (boiling point 187.5° C.), and the diethers, such as the diethyl ether of diethylene glycol, may be mentioned. Obviously instead of using only one of the above polyhydric alcohols or their ethers, a mixture of two or more of these may be used. In general a solvent whose boiling point is above 100° C. should be used.

While glycerol may be used in the fugitive tinting liquid, the glycols or their ethers are preferred, since glycerol has the objectionable property of leaving sticky deposits on the apparatus, with which the treated yarn comes in contact, such as cap-edges, fliers, travellers, etc., whereas the glycols or their ethers do not behave in this manner.

Since many of the polyhydric alcohols and their ethers are hydroscopic, I prefer to add sufficient water to the fluid to bring the aqueous concentration to at least that of the maximum amount of water these alcohols or ethers tend to absorb from the atmosphere, in order to prevent change of volume, viscosity and concentration of the tilting fluid. Thus glycerol absorbs water to the extent of 33% of its original weight from the air, ethylene glycol absorbs 3 to 4% and diethylene glycol 30% of water, and therefore when either of these liquids are used, I prefer to add water corresponding to the respective percentages set forth.

The dyestuff that is used may be any suitable dye that is used for fugitive tinting. The amount of dyestuffs used will vary with the nature of the dyestuffs and the purpose for which it is used. For example 0.5% to 1.0%

of dye in the tinting fluid is suitable for the purpose of identifying yarn in the bobbin, hank or other package when the tinting fluid is applied in amounts of 0.5 to 2.0% of the weight of the yarn being tinted. For identifying individual ends in warping, weaving and similar processes, a concentration of about 4% or over of the dye in the tinting fluid is required, when the tinting fluid is applied in amounts of 0.5 to 2.0% of the yarn being treated. Obviously these proportions are given merely by way of example and are not limitative of the scope of this invention.

The tinting fluid is applied by any of the usual methods for applying tinting fluids to yarns, but I prefer to apply the same by causing the yarn that is being wound, spun, etc. to pass across a wick or pad that is dipping in or otherwise contacting with, the tinting fluid, since this method is most economical and involves the use of a very compact tinting fluid apparatus that may be applied to all textile machines without difficulty. Because of the high boiling point of the solvents used in the tinting fluid and because of the other properties of these solvents, the wicks or pads have a very long life, running into several hundred hours, since the rate of evaporation of the solvents at normal temperature is practically nil, so that no dyestuff is thrown out of solution, and thus the wicks or pads do not become clogged with solid dyestuff.

The solvents used in the tinting fluids possess excellent lubrication properties because of their comparatively high viscosity and oiliness. Therefore, I have found that when the tinting fluids herein described are applied to yarns, further lubrication with oils, etc. is unnecessary in such cases as for example, hanking, back-winding, ring-twisting, etc. of yarns of rayon or silk. In this connection it is pointed out that the lubricating value of ethylene glycol and diethylene glycol is greater than that of glycerol.

In using the above described solvents in the tinting fluid, it is found that for a given amount of dyestuff on the yarn more distinct color effects are obtained. Thus when acid blue (Schultz No. 543*c*) is applied in aqueous solution, the color imparted to the yarn is decidedly grayish, whereas when the same dye is applied in solution in the solvents herein described, the color imparted to the yarn is distinctly blue. Moreover, I have found that the color is more readily and quickly removed by scouring the yarns that have been tinted by a tinting fluid made in accordance with my invention, than from those which have been tinted by aqueous tinting fluids.

An important application of my invention is the fugitive tinting of artificial yarns or filaments during the process of their manufacture and prior to their being wound. For instance, in the manufacture of cellulose acetate yarn by the dry spinning process, a solution of cellulose acetate in appropriate volatile solvents such as acetone, is passed through the orifices of a spinneret in a métier or dry spinning machine into a heated atmosphere, and the filaments thus formed are drawn and wound and/or twisted onto an appropriate bobbin or cap spinning machine.

When my invention is used in connection with a dry spinning process, the tinting solution is applied to the filaments or yarns on the métier or spinning machine. In one application of my invention, the tinting liquid is applied by means of a wick, which is dipping in a trough containing the tinting fluid, to the filaments just after their exit from the métier casing, both the wick and the trough being mounted on the métier or dry spinning machine.

Because of the elevated temperature prevailing within the métier, the use of the high boiling solvents mentioned above in the tinting fluid is particularly advantageous in reducing the amount of clogging of the wicks. Since glycerol tends to leave sticky deposits, the glycols or their ethers which do not behave in this manner are preferred. Thus by the use of a tinting fluid containing diethylene glycol, I have found it possible to tint cellulose acetate yarns just after their formation and prior ot their being wound and/or twisted, at the métier for 100 hours, without having to remove the wicks.

The yarns that may be tinted in accordance with my invention may be of any nature. While this invention presents great advantages in the fugitive tinting of yarns containing organic derivatives of cellulose, such as cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, ethyl cellulose, methyl cellulose or benzyl cellulose, it may be applied to yarns of other fibres such as silk, wool, cotton, reconstituted cellulose (rayon) lax or composite yarns containing mixtures of these.

It is to be understood that the foregoing details are given merely by way of illustration and that many variations may be made therein without departing from the spirit of this invention.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. A tinting fluid for the identification of yarns comprising a solvent medium having a boiling point about 100° C. comprising a compound of the glycol class and a dyestuff dissolved therein.

2. A tinting fluid for the identification of yarns comprising a solvent medium having a boiling point above 100° C. comprising a glycol and a dyestuff dissolved therein.

3. A tinting fluid for the identification of yarns comprising a glycol and a dyestuff dissolved therein.

4. A tinting fluid for the identification of

yarns comprising diethylene glycol and a dyestuff dissolved therein.

5. A tinting fluid comprising a polyhydric alcohol, water in amount at least equal to that which said polyhydric alcohol tends to absorb from the atmosphere and a dyestuff.

6. A tinting fluid comprising a glycol, water in amount at least equal to that which said glycol tends to absorb from the atmosphere and a dyestuff.

7. A tinting fluid comprising a compound of the glycol class and a dyestuff dissolved therein.

8. A tinting fluid comprising a glycol and from 0.5% to 5.0% of a dyestuff dissolved therein.

9. Method of tinting yarns comprising applying thereto a fluid containing a dyestuff dissolved in a solvent medium having a boiling point above 100° C. and containing a compound of the glycol class.

10. Method of tinting yarns comprising applying thereto a fluid containing a dyestuff dissolved in a solvent medium having a boiling point above 100° C. and containing a glycol.

11. Method of tinting yarns comprising applying thereto a fluid containing a glycol and a dyestuff.

12. Method of tinting yarns comprising applying thereto a fluid containing a diethylene glycol and a dyestuff.

13. Method of temporarily marking yarns comprising adding thereto a fluid containing a polyhydric alcohol, water in amount substantially equal to that which said polyhydric alcohol tends to absorb from the atmosphere and a fugitive dyestuff, whereas the yarns are simultaneously tinted and lubricated.

14. Method in accordance with claim 13 wherein the polyhydric alcohol is a glycol.

15. In the dry spinning of filaments or yarns containing organic derivatives of cellulose in a métier, the step of applying a tinting fluid to the filaments or yarns at the métier, said tinting fluid containing a fugitive dyestuff dissolved in a solvent medium having a boiling point above 100° C. and containing a compound of the polyhydric alcohol class.

16. In the dry spinning of filaments or yarns containing organic derivatives of cellulose in a métier, the step of applying a tinting fluid to the filaments or yarns at the métier casing, said tinting fluid containing a fugitive dyestuff dissolved in a solvent medium having a boiling point above 100° C. and containing a polyhydric alcohol.

17. In the dry spinning of filaments or yarns containing organic derivatives of cellulose in a métier, the step of applying a tinting fluid to the filaments or yarns at the métier casing, said tinting fluid containing a fugitive dyestuff and a glycol.

18. In the dry spinning of filaments or yarns containing organic derivatives of cellulose in a métier, the step of applying a tinting fluid to the filaments or yarns at the métier casing, said tinting fluid containing a fugitive dyestuff and diethylene glycol.

In testimony whereof, I have hereunto subscribed my name.

WILLIAM WHITEHEAD.