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PRINT ROLL COMPOSITION

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13 Claims. (Cl. 106—5.5)

This invention relates to improved print roll compositions and more particularly to such compositions containing a softener comprising a mixture of sorbitol and diethylene glycol.

The principal object of this invention is to provide a print roll composition having, under average conditions, a life several times that of known print roll compositions.

Another object of this invention is to provide a print roll composition which displays greater resistance to change in atmospheric conditions, particularly in humidity, than the known print roll compositions.

A further object of this invention is to provide a print roll composition which retains its original surface without blemish when used with the usual type of printing inks and when washed with the usual types of organic solvents.

Another object of this invention is to provide a print roll composition containing a softener comprising a mixture of sorbitol and diethylene glycol.

Still another object of this invention is to provide a print roll composition accomplishing the above-mentioned objects while at the same time overcoming the objectionably high viscosity of print roll compositions softened with a mixture of sorbitol and glycerine without necessitating the use of inordinately high percentages of water.

Heretofore, ordinary print roll compositions have comprised a binder of gelatin or glue, a softener and water. The softener almost exclusively used in the past has been glycerine. Print rollers made up from a composition comprising a softener consisting of glycerine have proved objectionable since they display undue changes in properties upon variation in atmospheric humidity. Such rollers absorb an excessive amount of moisture under conditions of high humidity and give up an undue amount of moisture under conditions of low humidity. The consequence is that their physical characteristics such as length, diameter, hardness, tack, etc., vary to an objectionable extent with changes in humidity. These changes in physical characteristics are so great that rollers made from glycerine-softened compositions must be designed for use in a certain season and cannot be used outside of this season. However, this does not always cure the defect since atmospheric humidity changes considerably even during the same season with the result that such rollers are not always usable in the season for which they were designed.

Another outstanding disadvantage of the prior print roll compositions softened with glycerine is that rollers made therefrom have an objectionably short life. Still another disadvantage of such print roll compositions is that they vary in physical properties with variations in temperature. The result is that rolls made for low temperature operation are unduly soft if used under conditions of high temperature. On the other hand rolls made for high temperature operation are unduly hard and lack the proper resilience under conditions of low temperature.

It has been proposed to use as the softener for the glue or gelatin of a print roll composition a mixture of sorbitol and glycerine containing not over 75% of sorbitol. Such use results in a composition having a much longer life than use of a softener consisting of glycerine. However the compositions have been extremely viscous at pouring temperature. In order to reduce the viscosity the percentage of water in the composition may be increased but this results in excessive shrinkage after casting which shrinkage is difficult to predict and otherwise involves difficulties.

I have found that the use in print roll compositions comprising a binder of glue or gelatin, a softener, and water, of a softener consisting of 65 to 85% sorbitol, the balance being of diethylene glycol, produces excellent print rolls and overcomes the disadvantages of the prior print roll compositions mentioned above.

Instead of using pure sorbitol in the print roll composition of the present invention, I may use a technical sorbitol syrup such as may be obtained by the reduction of monosaccharides such as glucose and treatment of the reduction liquor so as to recover therefrom a viscous aqueous syrup containing sorbitol and small amounts of impurities such as unreduced sugar, ash, and organic impurities some of which may be more or less closely related to sorbitol.

The composition of the softener used in the present invention may vary from 65% sorbitol and 35% diethylene glycol to 85% sorbitol and 15% diethylene glycol. The use of less than 65% of sorbitol produces a composition which lacks firmness of body to such an extent that it is unsuitable for use as a print roll. The use of more than 85% of sorbitol produces a composition which case hardens and is too hard surfaced to be useful. The highly preferred proportion is 75% of sorbitol and 25% of diethylene glycol. These percentages are by weight and are on a water-free basis.

The ratio of the softener to glue may vary with the composition of the softener (proportions of sorbitol and diethylene glycol) and with the quality of the glue. It may also vary to some extent with changes in water content. Using a good grade of hide glue and a softener containing between 65 and 85% of sorbitol the ratio of softener to glue may vary from 3 to 1 to 1 to 1. When using a softener containing 75% of sorbitol and 25% of diethylene glycol, a ratio of softener to glue of about 1.75 to 1 produces excellent results, making a roll which is suitable for a range of temperatures and which is better for variable weather conditions. To render the composition more resistant to softening to heat, especially where extremely high temperatures are to be encountered, this ratio may be 1 to 1 or even as low as .5 to 1. For greater softness and resiliency or where extremely low temperatures are to be encountered it may be as high as 3.0 to 1.

The moisture content of the ultimate print roll composition is susceptible to considerable variation but is preferably maintained at not over 30% in order to avoid excessive shrinkage particularly in dry atmospheres and at not under 10% in order to produce a composition which can be readily handled and worked. The preferred range of moisture content is from 15 to 22%. Within this preferred range a moisture content of 20% has been found to be extremely suitable. The moisture content of the finished roll will vary to some extent with changes in humidity, increasing during periods of high humidity and decreasing during periods of low humidity, although not nearly to the same extent as a glycerine softened roll.

In order to produce a composition containing this preferred content of moisture, I take into consideration the fact that in the preparation of the composition the use of the required heat causes considerable of the initially added water to be evaporated. Consequently such an excess of water over the calculated amount is added at the beginning of the operation that the ultimate compositions will have the desired moisture content. As an alternative to this method of compensating for loss of water by evaporation, I may add water during the preparation in an amount equal to that evaporated so as to maintain constant weight and so as to prepare a finished composition having the required moisture content.

Non-limiting examples of print roll compositions comprehended by the present invention are given below. While these examples involve specific proportions these are given for purposes of illustration only and it is to be understood that other and equivalent proportions may be used. Thus the water content and the ratio of softener to glue may be varied within the limits discussed above.

Example 1

	Percent
Glue (dry basis)	29.0
Softener (dry basis) (75% sorbitol—25% diethylene glycol)	51.0
Water	20.0

Example 2

Glue (dry basis)	29.0
Softener (dry basis) (70% sorbitol—30% diethylene glycol)	51.0
Water	20.0

Example 3

	Percent
Glue (dry basis)	29.0
Softener (dry basis) (66⅔% sorbitol—33⅓% diethylene glycol)	51.0
Water	20.0

Example 4

Glue (dry basis)	29.0
Softener (dry basis) (85% sorbitol—15% diethylene glycol)	51.0
Water	20.0

Example 5

Glue (dry basis)	32.0
Softener (dry basis) (75% sorbitol—25% diethylene glycol)	50.0
Water	18.0

The compositions of the foregoing examples were prepared by weighing the diethylene glycol, sorbitol, and water into a hot-water jacketed or steam jacketed kettle and heating to a temperature of 70° C., replacing any evaporated water, adding the glue with stirring and cooking with occasional stirring at 70° to 80° C. for two hours or until free from glue grains. Evaporated water was again replaced and thoroughly stirred into the mixture. The composition was then poured into the mold.

Other and equivalent procedures may be used, however, and the foregoing procedure is not to be considered as limiting. The ingredients may be commingled in different order into a homogeneous mixture, and the amount of water added at the beginning of the procedure may be sufficient so as to make unnecessary the replacement of evaporated water as the formulation proceeds. The amount of water remaining at the end of the operation should be sufficient to permit handling and molding of the composition and preferably should fall within the ranges above set forth.

An advantage of compositions formulated in accordance with the present invention is that with the same water content they are less viscous than compositions softened with a mixture of less than 75% sorbitol and the balance of glycerine. The composition of Example 1 is illustrative in that it had a viscosity of 7200 centipoises at 75° C. as compared with a viscosity of 7900 centipoises at 75° C. for a composition containing 29% glue, 51% softener composed of 55% sorbitol and 45% glycerine, and 20% water, and therefore was much more readily manipulated. This enables one to maintain the water content at such an amount that excessive shrinkage due to larger water content is avoided, while the composition is as readily manipulable as compositions softened with a mixture of sorbitol and glycerine, with larger water content and being therefore more susceptible to shrinkage. At the same time, the composition of the invention has sorbitol present in sufficient amount to give the composition increased resistance to the abrasive action of type and to attack by organic washing solvents, and reduced susceptibility to change during extreme variations in atmospheric conditions. Further, the compositions of the present invention may be prepared with a lower ratio of softener to glue without the necessity of using an excessive quantity of water.

It will be seen from the foregoing that I have devised a new print roll composition having

marked advantages over prior print roll compositions.

Having described my invention, what I claim is:

1. A print roll composition containing a binder, a softener and water, said softener comprising sorbitol and diethylene glycol, the sorbitol being present in an amount not less than 65% and not more than 85% of the total softener content.

2. A print roll composition as recited in claim 1 and wherein the water is present in an amount not exceeding 30% by weight of the composition.

3. A print roll composition as recited in claim 1 and wherein the water is present in an amount in the neighborhood of from 15 to 22% by weight of the composition.

4. A print roll composition containing a binder, a softener and water, said softener comprising sorbitol and diethylene glycol, the sorbitol being present in an amount equal to 75% of the total softener content.

5. A print roll composition as recited in claim 4 and wherein the water is present in an amount not exceeding 30% by weight of the composition.

6. A print roll composition as recited in claim 4 and wherein the water is present in an amount of from 15 to 22% by weight of the composition.

7. A print roll composition containing a binder, a softener and water, the binder and softener being present in said composition in a ratio of one part binder to from 1 to 3 parts softener, said softener comprising sorbitol and diethylene glycol, the sorbitol being present in an amount not less than 65% and not more than 85% of the total softener content.

8. A print roll composition as recited in claim 7 and wherein the water is present in an amount not exceeding 30% by weight of the composition.

9. A print roll composition as recited in claim 7 and wherein the water is present in an amount in the neighborhood of from 15 to 22% by weight of the composition.

10. A print roll composition containing a binder, a softener and water, the binder and softener being present in a ratio of one part binder from 1 to 3 parts softener, said softener comprising sorbitol and diethylene glycol, the sorbitol being present in an amount equal to 75% of the total softener content.

11. A print roll composition as recited in claim 10 and wherein the water is present in an amount not exceeding 30% by weight of the composition.

12. A print roll composition as recited in claim 10 and wherein the water is present in an amount in the neighborhood of from 15 to 22% by weight of the composition.

13. A print roll composition comprising a homogeneous mixture of 29.0% glue, 51% of a softener and 20.0% of water, said softener consisting of 75% of sorbitol and 25% of diethylene glycol.

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CERTIFICATE OF CORRECTION.

Patent No. 2,121,126. June 21, 1938.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 16, claim 10, after the word "binder" insert to; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of August, A. D. 1938.

Leslie Frazer

(Seal) Acting Commissioner of Patents.