The present invention relates to the treatment of fabrics containing cellulosic yarns or filaments for the purposes, among others, of improving their dimensional stability and producing durable stiffened finishes.

It has been proposed heretofore to treat fabrics containing cellulosic yarns with starch solutions to provide a fabric having a relatively stiffened finish. Starched fabrics, however, lose their stiffness after a single laundering and also tend to dust out. Moreover, starch does not improve the dimensional stability of the fabric.

It has also been proposed heretofore to treat cellulosic fabrics with urea-formaldehyde condensation products or melamine-formaldehyde condensation products for the purpose of improving the crease or crush resistance and the dimensional stability of the fabrics. Such treatments, however, provide a fabric which has a rather soft and full hand, which property is objectionable or undesirable for certain fabric uses. Moreover, such treatments often cause a marked loss in tensile strength of the fabric.

In accordance with the present invention it is possible to treat fabrics containing cellulosic yarns or filaments with relatively small amounts of a potentially resinous substance which can be insolubilized at relatively low temperatures to provide fabrics having improved dimensional stability and a crisp, permanently stiffened finish, without appreciable loss in tensile strength. It is also possible in accordance with this invention to fix on fabrics dyestuffs which normally bleed in hot water.

It is accordingly one object of this invention to provide improved methods of finishing textile fabrics containing cellulosic yarns or filaments.

A further object of this invention is to treat fabrics containing cellulosic yarns with relatively small amounts of a potentially resinous substance, which is capable of being insolubilized at relatively low temperatures, for the purpose of providing a fabric having a crisp, permanently stiffened finish and improved dimensional stability, and better tensile strength.

Still further objects and advantages of this invention will appear in the following description and in the appended claims.

The processes of this invention are carried out, in general, by first treating a fabric containing cellulosic yarns such as cotton yarns or regenerated cellulose yarns with an acidic aqueous colloidal solution of a partially polymerized methylated melamine-formaldehyde or methyl ether of methylol melamine condensation product having a mol ratio of combined formaldehyde to melamine of at least 2.8 to 1, the amount of the solution supplied and the concentration thereof being so adjusted as to deposit from about 1 to 12% by weight of the condensation product, based on the weight of fabric. It is preferred, however, to deposit from 2 to 9% by weight of the condensation product, based on the weight of the fabric.

After the condensation product has been applied to the fabric, the fabric is dried and then heated to insolubilize the condensation product or the fabric is heated to dry the fabric and insolubilize the condensation product in one operation. In some instances and particularly when the condensation product is exhausted onto the fabric, as will be described in greater detail hereinafter, it is not necessary to heat the fabric to insolubilize the condensation product and in such cases drying of the fabric is sufficient. Satisfactory insolubilization of the condensation product is obtained by heating the fabric at temperatures of 225 to 300°F. However, in some instances, lower temperatures, for example, 300°F may be used if the fabric is heated for sufficiently long periods of time, or higher temperatures, for example, 350°F may be used when shorter heating periods are desirable. In general, at the above-described temperatures the condensation product is insolubilized within a period of 3 to 20 minutes, the shorter heating period corresponding to the higher temperatures.

A particularly suitable procedure for treating the fabric comprises the steps of first wetting out the fabric in an acidic aqueous colloidal solution containing from 1 to 12% by weight of the partially polymerized condensation product. This is done by way of example, by immersing or dipping the fabrics in the solution or by spraying the solution on the fabric until the fabric is thoroughly wetted out or saturated with the solution. The fabric is then extracted, that is, excess solution is squeezed out of the fabric as, for example, by wringing or centrifuging the fabric, or by passing the fabric between squeeze rolls, the degree of extraction being so adjusted as to deposit from 1 to 12%, preferably from 2 to 9%, by weight of the condensation product, based on the initial fabric weight.

A preferred procedure consists in passing the fabric through the acidic aqueous colloidal solution of the partially polymerized condensation product in such a manner that the fabric is immersed below the surface of the solution and is...
thus wetted out, after which the fabric is passed between squeeze rolls to remove excess solution. This procedure is preferred because it gives the best results and insures economical wetting out of the fabric. This procedure also provides a crisp, durable or permanent finish after the condensation product is insolubilized. After the condensation product is applied to the fabric, the fabric is then dried and the condensation product is insolubilized thereon as described above. Since the solution applied to the fabric is acid and the condenser or wash cellulosic materials, it is essential to wash the fabric, after the condensation product has been insolubilized, to remove the acid left in the fabric. The fabric is then dried.

The treatment described herein is carried out on dyed fabrics or on undyed fabrics. It is preferable to treat a dyed fabric since it is thus possible to obtain good dye fixation in addition to shrinkage control or dimensional stability, and a durable stiffened finish. The fabrics employed in this invention preferably consist of yarns of natural cellulose such as cotton, linen, etc. or yarns of regenerated cellulose, for example, viscose and cuprammonium rayon, or mixtures thereof. However, it is possible to treat fabrics containing other types of yarns and at least 70% of yarns of natural or regenerated cellulose or mixtures thereof. The term “yarns” is intended to cover yarns prepared from fibers of natural cellulose or staple fibers of regenerated cellulose and is also intended to cover continuous regenerated cellulose filaments. The term “cellulose” is intended to cover normal or regenerated cellulose materials to the exclusion of other forms of cellulose. Particularly suitable fabrics for treatment according to this invention are cotton or viscose rayon marquisettes and other cellulosic fabrics which, when treated with the colloidal solutions, provide a lawn-type finish.

The colloidal solutions employed herein may be prepared in a variety of ways. One suitable method of preparation consists of first forming an aqueous solution of a water-soluble infinitely dilutable methyl ether of methylol melanine condensation product having a pH between 5 and 11 and containing at least 2.4 mols of combined formaldehyde and preferably at least 2 mols of combined methanol for each mol of melanine in the condensation product. The term “infinitely dilutable” is intended to cover condensation products having a degree of polymerisation such that 1 part of a 30% by weight solution of the condensation product can be diluted with 100 parts of water without precipitating the condensation product. The solution of the condensation product is mixed with a water-soluble organic acid selected from the group consisting of acetic acid, hydroxy acetic acid and formic acid, and water, if required, to form a solution containing from 6 to 12% by weight of the condensation product. The amount of acid required to form the colloidal solution is primarily dependent on the concentration of condensation product in the solution and the particular species of acid used. Satisfactory colloidal solutions are formed, for example, by using from 6 to 8.5% by weight of acetic acid calculated on the basis of a 10% by weight solution of the condensation product, or by using the same amounts of hydroxyacetic (glycolic) acid instead of acetic acid, or by using from 1.2 to 3% by weight of formic acid calculated on the basis of a 10% by weight solution of the condensation product. Mixtures of such acids may also be used. The proportions of acid used thus fall within the range of about 1.2 to 8.5% by weight of the acid calculated on the basis of a 10% by weight solution of the condensation product, the particular amount of acid used being dependent on the particular species of acid employed.

Acetic acid is the cheapest of the useful organic acids and the most suitable for preparing the colloidal solutions and for application to cellulosic fabrics. It is the acidic and the particular amount of acid used is preferred for use in preparing the colloidal solutions of the condensation product. When acetic acid is employed for this purpose, it is preferred to use from 6.5 to 8% by weight of acetic acid calculated on the basis of a 10% by weight solution of the condensation product. When hydroxyacetic acid is employed, it is preferred to use from 7 to 8.5% by weight of such acid calculated on the basis of a 10% by weight solution of the condensation product. When formic acid is employed it is preferred to use from 1.4 to 2% by weight of such acid calculated on the basis of a 10% solution of the condensation product.

After the acid has been added to the 6 to 12% by weight aqueous solution of the condensation product, the resulting solution is aged at least until the particles of condensation product contained therein polymerize sufficiently to attain colloidal size. The formation of the colloidal solution is evidenced in part by a change in the appearance of the original solution. The original solution is water clear but after standing at a temperature, for example, of 70 to 90° F. for about 4 hours it develops a bluish opalescence or haze and gives the characteristic Tyndall effect of colloidal solutions. At these temperatures a 6 hour aging period is generally suitable for developing colloidal sized particles under mild conditions.

The formation of the colloidal solution of the condensation product is further evidenced by the fact that the condensation product therein becomes substantive to cotton fibers, that is to say, the colloidal particles of the condensation product migrate from the solution to cotton fibers and in low concentration will be almost completely adsorbed by the cotton fibers. This is in contrast to the original neutral or alkaline solution of the condensation product or the same solution which has been acidified but not aged since the condensation product in either of these solutions is not substantive to cotton fibers. The substantive- tivity of the colloidal particles to cotton fibers is also strong evidence that such particles are positively charged since it is generally believed that cotton fibers have a negative charge in the presence of water and thus attract positively charged particles.

The solutions of the condensation product may be applied to the fabric as soon as the particles therein attain colloidal size, which usually requires an aging period of about 3 to 6 hours at temperatures of 70 to 90° F. depending on the particular acid used, the amount of acid employed and the concentration of the condensation product in the solution. In general, the colloidal solutions are still suitable for use after aging for 72 to 168 hours at such temperatures. The viscosity of the solution is one criterion for determining its suitability after prolonged periods of aging. For example, a 10% by weight colloidal solution of the condensation product, after 4 to 6 hours of aging, has a viscosity of about 3 to 5 centipoises. The viscosity does not change to any appreciable ex-
tent during aging until a relatively short period of time prior to the conversion of the colloidal solution to a thick jelly or gel. Then the viscosity rises rapidly and gelation generally takes place within a period of 1 to 5 hours. Generally the colloidal solution is useable until its viscosity rises above 15 centipoises. After that the colloidal solution may become unfit for use during the treatment of the material.

The aging temperature and exposure of the solution to air have a marked influence on the rate of formation of the colloidal solution and the rate at which solution finally converts to a gel. At temperatures below 70° F., that is, between about 40° F. and 70° F., the colloidal solution forms at a relatively slow rate and the original solution may require more than 6 hours aging period before it is converted to a colloidal solution. At temperatures above 90° F., that is, temperatures of about 100° to 200° F., the colloidal solution forms at a relatively rapid rate and the original solution may be satisfactorily converted to a colloidal solution within a 3 hour aging period. Exposure of the colloidal solution to air decreases the time period within which the colloidal solution will be stable to gelation. In general, an aging period of 3 to 72 hours is suitable for the preparation of the colloidal solution using the aging temperature described above. It is preferred, however, to use an aging period of 6 to 30 hours.

The condensation product in the colloidal solution is characterized by the fact that it contains at least 2.8 mols of combined formaldehyde for each mol of melamine therein. The ratio of combined formaldehyde to melamine is higher than 2.3 to 1 in those instances where the original methyl ether of melinyl melamine condensation product contains from 3.8 to 6 mols of combined formaldehyde and more than 2.5 mols of combined methanol for each mol of melamine. Methyl ethers containing 6 mols of combined formaldehyde and from 5 to 6 mols of combined methanol may also be used to prepare the colloidal solutions employed therein. However, such products are quite expensive to prepare. Moreover, they do not show any advantages and are not as stable in colloidal form, in most instances, as the lower methyl ethers described above. Best results are obtained by using colloidal solutions which are prepared from melinyl melamine condensation products which contain originally from 3.4 to 8.5 mols of combined formaldehyde and from 2 to 3 mols of combined methanol for each mol of melamine and these products are accordingly, preferred.

The methyl ethers of melinyl melamines employed in this invention are commercially available products and may be prepared in various ways. A suitable method for their preparation consists in first reacting melamine and formaldehyde, as formalin, in mol ratios of about 1.35 to about 1.5 in an alkaline reacting solution at a temperature between about 60 and 90° C. until the melamine is substantially dissolved. The mixture is made alkaline reacting, for example, by the addition of fixed alcalies such as sodium hydroxide, soda ash, or the like. Methanol is then added to this solution to form the methyl ether. In general, from about 10 to 30 mols or more of methanol are employed for each mol of melamine used. The solution is then acidified to a pH between about 2 and 5 with a strong mineral acid such as phosphoric acid, hydrochloric acid and the like. This mixture is heated to a temperature between about 60 and 90° C. until a homogeneous solution is obtained and the condensation product contains at least 3.4 mols of combined formaldehyde and preferably at least 2 mols of combined methanol for each mol of melamine used. The reaction is discontinued, however, while the degree of polymerization is such that the solution of the condensation product is still dilutable with large volumes of water, without precipitation of the condensation product. The solution of the condensation product, while it is still dilutable with water, is then neutralized with a fixed alkali such as KOH, NaOH, NaCO₃ and the like and then cooled. Precipitated salts formed by the neutralization of the excess mineral acid with the fixed alkali may be removed, if desired, by filtering, centrifuging or the like. The solution is now ready for use in the preparation of the colloidal solution of the condensation product.

A further understanding of this invention will be obtained from the following specific examples which are intended to further illustrate the invention, but not to limit the scope thereof, parts and percentages being by weight unless otherwise specified.

**Example I**

A. Preparation of a water solution of a water-soluble methyl ether of melinyl melamine.—One hundred and twenty seven parts (about 1 mol) of melamine were mixed with 365 parts of a 37% aqueous solution of formaldehyde (4.5 mols HCHO). The resulting mixture was adjusted to a pH of 8.6 (glass electrode) with NaOH and then heated at a temperature of 70° C., until the melamine was substantially dissolved. After a further reaction of about 5 minutes, 610 parts (20 mols) of methanol were added to the solution and the pH was adjusted to 4.0 (glass electrode) with phosphoric acid. The reaction was then continued for an additional 15 minutes at a temperature of approximately 40° C. The pH of the solution was then adjusted to 10.5 (glass electrode) with NaOH. The resulting solution was then concentrated by subjection it to a vacuum of 10 millimeters of mercury at a temperature of 60° C. until it contained 60% of the condensation product. The solution was then cooled rapidly to 20° C. The resulting solution was infinitely dilutable with water. The condensation product in the solution was analyzed and was found to contain 3.5 mols of combined formaldehyde and 2.3 mols of combined methanol for each mol of melamine used.

B. Preparation of an acidic aqueous colloidal solution of methyl ether of melinyl melamine.—Two hundred and eighty parts of the 60% solution, as prepared above, were stirred together with 118 parts of water and 218 parts of 56% acetic acid. The resulting solution contained about 16% of the methyl ether of melinyl melamine condensation product and about 7.3% of acetic acid and had a pH of 3.9. The solution was allowed to age for 6 hours at 85° F. During this aging period the solution developed a bluish haziness and the colloidal particles of partially polymerized condensation product therein were found to be substantive to cotton fibers. This colloidal solution had a pH of 3.7. The condensation product was analyzed and contains 2.9 mols of combined formaldehyde for each mol of melamine.

C. Treatment of all cotton fabric.—One hundred and eighty parts of the colloidal solution prepared as described in paragraph B above, were
diluted with 120 parts of water. The resulting colloidal solution contained 6% condensation product. A piece of cotton marquisette was wetted out in this solution and then extracted by passing it between pad rolls adjusted to give a pick-up of 136% of solution on the weight of the fabric. About 8.3% of the condensation product based on the fabric weight was thus applied to the fabric. The fabric was dried at 180°F, and then heated for an additional 10 minutes at 250°F, to insolubilize the condensation product. The fabric was next rinsed for 5 minutes in water at a temperature of 110°F, scoured for 10 minutes in a 0.1% water solution of dodecyl benzene sodium sulfonate at a temperature of 110°F, and finally rinsed in water at 110°F and dried.

The resulting fabric had excellent dimensional stability, that is, resistance to shrinkage and it also had a crisp, stiffened finish, both of which properties were retained to a substantial degree after a number of standard AATCC (American Association of Textile Colourists and Chemists) cotton washes. Moreover, the treated fabric had substantially the same tensile strength as the untreated fabric from which it was prepared.

Pieces of viscose rayon marquisette, cotton sheetsing and viscose rayon fabric were treated in the same manner as the cotton marquisette, as described in paragraph C above, with substantially the same results, that is, the treated fabrics exhibited excellent dimensional stability and a crisp, stiffened finish, both of which properties were not materially affected by a number of launderings, and without any appreciable loss in tensile strength.

Example II

A. Preparation of acidic aqueous colloidal solution of methyl ether of methylol melamine.—Two hundred and eighty parts of the 60% solution prepared in accordance with paragraph A of Example I were stirred together with 129 parts of hydroxyacetic acid and 129 parts of water. The resulting solution contained about 10% of the methyl ether of methylol melamine condensation product and about 7.2% of hydroxyacetic acid. The solution was allowed to age for 30 hours at a temperature of 80°F. At the end of the aging period the solution had a bluish opalescent appearance and the particles of partially polymerized condensation product were substantive to cotton fibers. The solution was analyzed and it was found that the condensation product therein comprised 2.9 mols of combined formaldehyde per mol of melamine.

B. Treatment of all cotton fabric.—The colloidal solution as prepared immediately above was diluted with water until it contained 6% of the partially polymerized condensation product. A cotton marquisette was then treated with this solution, dried, heated to insolubilize the condensation product and washed, using the identical procedure described in paragraph C of Example I.

The resulting fabric had excellent dimensional stability and it also possessed a crisp, stiffened finish. It also had substantially the same tensile strength as the untreated fabrics. The treated fabric had excellent resistance to shrinkage and retained its crisp, stiffened finish after a number of standard AATCC cotton washes.

Example III

A. Preparation of acidic aqueous colloidal solution of methyl ether of methylol melamine.—Two hundred and eighty parts of the 60% solution prepared in accordance with paragraph A of Example I were stirred together with 1376 parts of water and 28 parts of 100% formic acid. The resulting solution contained about 10% of the methyl ether of methylol melamine condensation product and 1.6% formic acid and had a pH of 5.5. This solution was allowed to age for 6 hours at 85°F. The aged solution had been converted to a colloidal solution having a bluish hazy appearance and a viscosity of 4 centipoises. The colloidal particles of partially polymerized condensation product were substantive to cotton fibers. This colloidal solution had a pH of 5.3. Analysis showed that the condensation product therein contained 2.95 mols of combined formaldehyde for each mol of melamine.

B. Treatment of all cotton fabric.—The colloidal solution as prepared immediately above was diluted with water until it contained 6% of the partially polymerized condensation product. A cotton marquisette was then treated with this solution, dried, heated to insolubilize the condensation product and washed, using the identical procedure described in paragraph C of Example I.

The resulting fabric had excellent dimensional stability and it also possessed a crisp, stiffened finish. It also had substantially the same tensile strength as the untreated fabric. The treated fabric had excellent resistance to shrinkage and retained its crisp, stiffened finish after a number of standard AATCC cotton washes.

Example IV

A. Preparation of acidic aqueous colloidal solution of methyl ether of methylol melamine.—One hundred and forty parts of the 60% solution, prepared in accordance with paragraph A of Example I, were stirred together with 109 parts of 56% acetic acid, 28 parts of an acrid-stable aqueous dispersion of polyvinyl acetate (containing 55% polyvinyl acetate solids) and 555 parts of water. The resulting solution contained about 10% of the methyl ether of methylol melamine condensation product, about 1.8% of polyvinyl acetate solids and about 7.2% of acetic acid. This solution was allowed to age for 6 hours at 85°F. After this aging period the solution had been converted to a colloidal solution having a bluish opalescent appearance and the particles of condensation product thereof are substantive to cotton fibers. This solution was analyzed and it was found that the condensation product therein comprised 2.9 mols of combined formaldehyde per mol of melamine.

B. Treatment of all cotton fabric.—Three hundred and sixty parts of the colloidal solution as prepared immediately above were diluted with 240 parts of water. The resulting solution contained 6% condensation product and about 1.1% of polyvinyl acetate. A piece of cotton marquisette was wetted out in this colloidal solution and then extracted by passing it between pad rolls adjusted to give a pick-up of 136% of the solution on the weight of the marquisette. About 8.2% of the condensation product and 1.5% of the polyvinyl acetate were thereby deposited on the fabric. The fabric was dried at 150°F, and then heated for an additional 10 minutes at 250°F, to insolubilize the condensation product. The fabric was next rinsed for 5 minutes in water at 110°F, scoured for 10 minutes in a 0.1% water solution of dodecyl benzene sodium sulfonate at a temperature of 110°F, and finally rinsed in water at 110°F.
The resulting fabric exhibited excellent resistance to shrinkage on laundering and also possessed a stiffened finish which was retained after a number of cotton washes. The finish was not as crisp as the finish obtained by the procedure described in Example I, but the fabric was stiffer and the fabric possessed a fuller hand.

Instead of acid-stable dispersions of polyvinyl acetate other acid-stable solutions or dispersions of thermoplastic resins may be used in the colloidal solutions of the methyl ether of methylo melamine to provide a finish of increased stiffness and fullness of hand. An example of suitable thermoplastic resins may be mentioned water-soluble copolymers of vinyl acetate and maleic acid or maleic anhydride, polymethacrylic acid, polyacrylic acid or polyvinyl alcohol, or water dispersions of polysytrene or the like. The amount of thermoplastic resin added is preferably from about 10% to 30% on the weight of the condensation product, but amounts as low as 1% on the weight of the condensation product, and, in some instances, as high as 40% on the weight of the condensation product may be used.

Example V

A. Preparation of methyl ether of methylol melamine.—One hundred and twenty-seven parts (about 1 mol) of melamine were mixed with 488 parts of a 37% aqueous solution of formaldehyde (6 mols HCHO). The resulting mixture was adjusted to a pH of 5.5 (glass electrode) with NaOH and then heated at a temperature of 70° C. until the melamine was substantially dissolved. After a further reaction of about 5 minutes, 640 parts (20 mols) of methanol were added to the solution and the pH was adjusted to 4.0 (glass electrode) with hydrochloric acid. The reaction was then continued for an additional 25 minutes at a temperature of approximately 40° C. The pH of the solution was then adjusted to 10.5 (glass electrode) with NaOH. The resulting solution was then concentrated by subjecting it to a vacuum of 5 millimeters of mercury at a temperature of 60° C. until it contained 50% condensation product. The solution was then cooled rapidly to 25° C. It was infinitely dilutable with water. The condensation product in the solution was analyzed and was found to contain 5.3 mols of combined formaldehyde and 2.9 mols of combined methanol for each mol of melamine used.

B. Preparation of acidic aqueous colloidal solution of methyl ether of methylol melamine.—One hundred and sixty-eight parts of the 50% solution as prepared immediately above, was stirred with 565 parts of water and 109 parts of acetic acid (5%). The resulting solution contained about 10% of the methyl ether of methylol melamine condensation product and about 7.3% of acetic acid. The solution was allowed to age for 8 hours at 85° F. during which time it developed a bluish opalescent appearance and the particles of partially polymerized condensation product became substantive to cotton fibers. The condensation product in this colloidal solution was analyzed and was found to comprise 3.1 mols of combined formaldehyde per mol of melamine.

C. Treatment of all cotton fabric.—The colloidal solution as obtained above was diluted with water until it contained 6% of the partially polymerized condensation product. A cotton marquisette was then treated with this solution, dried, heated to insolubilize the condensation product and washed, using the identical procedure described in paragraph C of Example I. The resulting fabric had substantially the same dimensional stability and crisp, stiffened finish as the fabric produced according to the procedure of Example I.

In Example I with the procedures herebefore set forth in the description and examples, it is possible to fix on the fabric dyestuffs which normally bleed when the dyed fabric is immersed in hot water, and also obtain excellent shrinkage control and a crisp, permanently stiffened finish. The above procedures can be modified as set forth below in order to take advantage of the substantivity of the colloidal, partially polymerized condensation product for cellulose materials, such as cotton and regenerated cellulose, particularly when dye fixation is of primary importance. In carrying out this feature of the invention the fabric containing cellulose yarns is first dyed in the usual dyeing apparatus and is then treated, preferably after the dyed fabric has been rinsed and while it is still wet, with from 5 to 70 times its own dry weight of the acidic aqueous colloidal solution of the partially polymerized condensation product, the condensation product being present in the solution in amounts of from 1 to 12% on the weight of the fabric. In most instances, it is preferred to treat the dyed fabric with from 10 to 50%, based on its own dry weight, of the solution.

The fabric is allowed to remain in the solution or is alternately immersed in the solution and then removed therefrom until from 1 to 10% of the condensation product is deposited thereon. During this step the condensation product because of its substantivity for cellulose materials migrates from the solution to the fabric. The amount of condensation product deposited on the fabric is readily ascertained by testing samples of the fabric. It is not necessary to obtain complete exhaustion of the condensation product, for the desired add on can be obtained by adjusting the concentration of the solution used as required. The temperature of the colloidal solution has some influence on the rate of exhaustion. Satisfactory results are obtained if the solution is maintained at temperatures between about 20 and 70° C. during the treatment. Temperatures of about 35 to 70° C. are preferred. The treatment generally requires about 5 to 60 minutes depending on the temperature and concentration of the solution and the amount of condensation product which it is desired to exhaust on the fabric. The treatment may be carried out for longer periods of time, if desired, although there is no particular advantage in doing so in most instances.

After the desired amount of condensation product has been exhausted on the fabric, the fabric is rinsed with water and dried. The fabric may be air dried or dried at relatively low temperatures, for example, 130 to 240° F. Insolubilization of the condensation product is not necessary or essential following exhaustion, because the condensation product on the fabric is resistant to washing or laundering without complete insolubilization.

The foregoing modification of this invention is illustrated by the following example.

Example VI

An acidic aqueous colloidal solution was first prepared as described in paragraph B of Example I. This solution was diluted with water until it contained 0.37% by weight of the condensation product.
tion product. Twenty parts by weight of this solution were then used to treat 1 part of dyed cotton fabric according to the following procedure.

The cotton fabric was first dyed with Chlorantine Fast Red (Color Index No. 273) in a dye beek in the normal manner. The fabric was then rinsed with water and while still wet was treated with the colloidal solution of 0.27% concentration using 20 parts by weight of the solution to 1 part by weight of the fabric on an air-dry basis. The colloidal solution was heated to a temperature of 160° F. prior to the treatment of the fabric and maintained at that temperature during the treatment. The fabric was saturated while in contact with the solution and was maintained in contact with the solution for a period of 15 minutes. The fabric was then removed from the solution, rinsed with cold water and allowed to dry at room temperature (about 75° F.). The fabric contained approximately 5% of the condensation product on the weight of the fabric.

The resulting fabric possessed a stiffened finish and good resistance to dye bleeding. A piece of the same fabric dyed in the same manner but not after-treated with a colloidal solution of the condensation product exhibited considerable bleeding when a 1 gram sample of the fabric was immersed in 75 cc. of cold water and then brought to the boil.

Various modifications and changes may be made in the processes of this invention as will be apparent to those skilled in the art to which the invention appertains without departing from the spirit and intent of the present invention. Accordingly, it is intended that this invention be limited only by the scope of the appended claims.

What is claimed is:

1. A process of finishing a textile fabric containing at least 70% of cellulose yarns which comprises wetting out said fabric in an acidic aqueous colloidal solution of from 1 to 12% by weight of a positively charged, partially polymerized methyl ether of methyl melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 8 mols of combined methanol per mol of melamine, said solution containing from 1.2 to 8.5% by weight, calculated on the basis of a 10% by weight solution of the condensation product, of a water-soluble organic acid selected from the group consisting of acetic acid, hydroxy-acetic acid and formic acid and being free of polyhydric alcohols; extracting the fabric to deposit from 1 to 12% by weight, based on the weight of the fabric, of the condensation product, heating said fabric to a temperature between about 200 and 350° F. to dry the fabric and insolubilize the condensation product, washing the fabric to remove the acid therefrom and then drying said fabric.

2. The process of claim 1, wherein the organic acid is acetic acid and the solution contains from 6 to 8.5% by weight of said acid calculated on the basis of a 10% by weight solution of the condensation product.

3. The process of claim 1, wherein the organic acid is hydroxy-acetic acid and the solution contains from 6 to 8.5% by weight of said acid calculated on the basis of a 10% by weight solution of the condensation product.

4. The process of claim 1, wherein the organic acid is formic acid and the solution contains from 1.2 to 3% by weight of said acid calculated on the basis of a 10% by weight solution of the condensation product.

5. A process of finishing a dyed textile fabric containing at least 70% cellulose yarns which comprises immersing said fabric while it is still wet from the dyeing operation in from 5 to 70 times its own dry weight of an acidic aqueous colloidal solution of from 1 to 12% by weight, based on the dry fabric weight, of a positively charged, partially polymerized methyl ether of methyl melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 6 mols of combined methanol per mol of melamine, and from 1.2 to 8.5% by weight, calculated on the basis of a 10% by weight solution of the condensation product, of a water-soluble organic acid selected from the group consisting of acetic acid, hydroxy-acetic acid and formic acid, said solution being free of polyhydric alcohols, continuing the immersion treatment until from 1 to 12% by weight of said condensation product, based on the fabric, has exhausted on the fabric, whereby said condensation product on the fabric is rendered wash resistant, rinsing the fabric to remove acid therefrom and then drying said fabric.

6. The process of claim 5, wherein said organic acid is acetic acid and the solution contains from 6 to 8.5% by weight of said acid, calculated on the basis of a 10% solution of the condensation product.

7. The process of claim 5, wherein said organic acid is hydroxy-acetic acid and the solution contains from 6 to 8.5% by weight of said acid, calculated on the basis of a 10% solution of the condensation product.

8. The process of claim 5, wherein said organic acid is formic acid and the solution contains from 1.2 to 3% by weight of said acid, calculated on the basis of a 10% solution of the condensation product.

9. A process of finishing a fabric consisting of cellulose yarns which comprises wetting out said fabric in an acidic aqueous colloidal solution of from 1 to 13% by weight of a positively charged, partially polymerized methyl ether of methyl melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 8 mols of combined methanol per mol of melamine, said solution containing from 6 to 8% by weight of acidic acid calculated on the basis of a 10% by weight solution of the condensation product and being free of polyhydric alcohols, extracting said fabric to deposit from 2 to 9% by weight of the condensation product, based on the fabric, heating the fabric at temperatures of 225 to 300° F. to insolubilize said condensation product and then washing the fabric to remove acid therefrom.

10. A process of finishing a fabric consisting of cellulose yarns which comprises wetting out said fabric in an acid aqueous colloidal solution of from 1 to 12% by weight of a positively charged, partially polymerized methyl ether of methyl melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 6 mols of combined methanol per mol of melamine, said solution containing from 7 to 8.5% by weight of hydroxy-acetic acid calculated on the basis of a 10% by weight solution of the condensation product and being free of polyhydric alcohols, extracting said fabric to deposit from 2 to 9% by weight of said condensation product, based on the fabric, heating the fabric at temperatures of 225 to 300° F. to insolubilize
said condensation product, and thereafter washing the fabric to remove acid therefrom.

11. A process of finishing a fabric consisting of cellulose yarns which comprises wetting out said fabric in an acidic aqueous colloid solution of a positively charged, partially polymerized methyl ether of methylol melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 6 mols of combined methanol per mol of melamine, said solution containing from 1.4 to 2% by weight of formic acid calculated on the basis of a 10% by weight solution of the condensation product, and thereafter washing the fabric to remove acid therefrom.

12. A process of finishing a textile fabric containing at least 70% of cellulose yarns which comprises wetting out said fabric in an acidic aqueous colloid solution of from 1 to 12% by weight of a positively charged, partially polymerized methyl ether of methylol melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 6 mols of combined methanol per mol of melamine, from 1 to 40% by weight, on the weight of said condensation product, of dispersed polyvinyl acetate and from 1.2 to 8.5% by weight, calculated on the basis of a 10% by weight solution of the condensation product, of a water-soluble organic acid selected from the group consisting of acetic acid, hydroxyacetic acid and formic acid, said solution being free of polyhydric alcohols; extracting the fabric to deposit from 1 to 12% by weight of said condensation product, based on the fabric, heating the fabric to a temperature between about 200 and 350° F. to dry the fabric and insolubilize the condensation product, washing the fabric to remove the acid therefrom and drying the fabric.

13. A composition for treating cellulose textile fabrics which contain at least 70% of cellulose yarns comprising essentially a mixture of an acidic aqueous colloid solution of a positively charged, partially polymerized methyl ether of methylol melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 6 mols of combined methanol per mol of melamine, from 1 to 40% by weight, on the weight of said condensation product, of dispersed polyvinyl acetate and from 1.2 to 8.5% by weight, calculated on the basis of a 10% by weight solution of the condensation product, of a water-soluble organic acid selected from the group consisting of acetic acid, hydroxyacetic acid and formic acid, said composition being free of polyhydric alcohols.

14. A process of finishing a textile fabric containing at least 70% of cellulose yarns which comprises wetting out said fabric with an acidic aqueous colloid solution of a positively charged, partially polymerized methyl ether of methylol melamine condensation product containing from 2.8 to 6 mols of combined formaldehyde and from 2 to 6 mols of combined methanol per mol of melamine, said solution containing from about 1.2 to 8.5% by weight, calculated on the basis of a 10% by weight solution of the condensation product, of a water-soluble organic acid selected from the group consisting of acetic acid, hydroxyacetic acid and formic acid, and being free of polyhydric alcohols, allowing from 1 to 12% by weight of said condensation product, based on the weight of the fabric, to deposit on said fabric, heating the fabric to insolubilize the condensation product sufficiently to make it resistant to removal by washing, washing the fabric to remove acid therefrom and drying said fabric.

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