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TEXTILE OPERATION

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This invention relates to textile operations, and in particular to the operation of weaving on looms of the type in which weft is supplied from a stationary supply, that is, from a supply package which does not pass through the shed in the manner of a shuttle during weaving.

It has been found that in weaving on looms of the above type, particularly when employing yarns which become readily electrified, such as for example yarns of cellulose acetate or other organic derivatives of cellulose, the electric charge in the yarns or engendered in the yarns by the friction involved on the loom gives rise to considerable difficulty by preventing the weft from being laid straight in the shed. This is especially the case in looms e. g. such looms as are described in U. S. Patent No. 2,012,121, in which the weft is inserted in the shed in cut lengths, as by means of a dummy shuttle or other inserting device which on releasing the weft allows it to lie freely in the shed. The weft being thus substantially without tension on release, it is subject to attraction towards or repulsion from the reed or warp threads because of the electric charges on the yarns. Thus, a thread which forms part of a weft length sufficient to form two picks for insertion in "hairpin" form into two different sheds, may, though held in place at one end within the shed, be caused to curl within the shed, so that its free end fails to reach the opposite edge of the fabric. In consequence the weft does not lie straight inside the shed during beat-up, and faulty fabric results.

It has been found that these difficulties can be overcome by utilizing the de-electrifying properties, when applied to textile materials of organic compounds of the formula $R_1—X—R_2$ where R_1 and R_2 are hydroxy or amino-groups, or acid derivatives thereof, and X is an aliphatic residue. Organic compounds which may be used in accordance with the present invention are the hydroxy alkylamines and/or their derivatives, such as salts, soaps, esters and acid amides, particularly of the higher fatty acids, such for instance, as capric, lauric, myristic oleic or stearic acids, or di- or poly-hydric alcohol derivatives in which some of the hydroxy-groups of the alcohols have been esterified by fatty acids, particularly the higher fatty acids. Mixtures of two or more of such bodies may also be used.

By applying such materials to the weft or warp or preferably both, the resultant dead nature of the yarn avoids the undesirable attraction or repulsion of the weft threads and straight laying of the weft within the shed is obtained.

According to the invention, therefore, weaving in shuttleless looms, particularly in looms in which the weft is inserted in the shed in the form of cut lengths, is carried out on yarns to which have been applied organic compounds of the formula $R_1—X—R_2$ where R_1 and R_2 are hydroxy or amino-groups, or acid derivatives thereof, and X is an aliphatic residue. Organic compounds which may be used in accordance with the present invention are the hydroxy alkylamines and/or their derivatives, such as salts, soaps, esters and acid amines, di- or poly-hydric alcohol derivatives in which some of the hydroxy groups of the alcohols have been esterified by fatty acids, particularly the higher fatty acids. Mixtures of two or more of such bodies may be used.

The hydroxy-alkylamines to be employed may be simple alkylolamines such as, for example, mono-, di- or tri-ethanolamine or propanolamine, dioxy-propylamine or substituted alkylolamines such, for example, as hydroxy ethyl aniline. Preferably, however, there are used hydroxy-alkylamines of relatively high molecular weight. Further, as stated above, the hydroxy-alkylamines may be employed as such or in the form of their derivatives, such as salts, soaps, esters, and acid amides. The salts or soaps may be the true salts or soaps, that is, containing the molecular equivalents of hydroxy-alkylamines and acid, or they may contain excess of the same or a different hydroxy-alkylamines or of the same or a different acid. Mixtures of hydroxy-alkylamines and/or their salts, soaps, esters or acid amides and/or the ω-amino-alkylolamides of fatty acids may, of course, be employed.

As examples of partial esters of polyvalent alcohols which may be used according to the invention may be mentioned the higher fatty acid esters of glycols or glycerol, which esters contain free hydroxyl groups, for example glycerol mono-oleate, glycerol di-oleate, ethylene glycol mono-oleate, and diethylene glycol mono-oleate. Instead of the oleates there may be used corresponding esters of other saturated or unsaturated higher fatty acids containing more than 5, e. g. more than 10 carbon atmos, for example stearic, palmitic or ricinoleic acid.

The de-electrifying substances or mixtures thereof may be employed as such, or, where convenient or desired, in the form of solutions or suspensions in water or organic solvents in the presence or absence of other materials, for example, hygroscopic substances e. g. polyhydric alcohols such as glycerol, ethylene glycol, or di-

ethylene glycol, or the hygroscopic solids described in British Patent No. 388,768. Solutions of ethanolamines in paraffin oils, such for instance as solutions of triethanolamine in paraffin oils of boiling points between about 110 and 350° C., and containing from about 10 to 40% or more of triethanolamine, may be mentioned as examples of solutions that may be employed for the purposes of the invention.

The substances employed should not be capable of exerting any detrimental action on the materials of the yarns or on any size employed on the yarns. Again when the substances are applied as solutions or suspensions, the liquid employed in the solution or suspension should not be capable of detrimental solvent or other action on the materials of the yarn or on any size employed.

The de-electrifying substances may be incorporated in or upon the yarns at any stage during or after their manufacture. For example, in the production of yarns containing continuous artificial filaments by the extrusion of solutions of organic derivatives of cellulose into an evaporative atmosphere, as in dry spinning, or into a precipitating bath as in wet spinning, the de-electrifying substances may be introduced into the spinning solution in the case of dry spinning and into the spinning solution and/or into the coagulating bath in the case of wet spinning. Or, for instance, whether or not the de-electrifying substances are introduced into the spinning solution or coagulating bath, the filaments or the like after formation and on leaving the spinning cabinet or coagulating bath may be treated e. g. by spraying, passing over wicks etc., with the de-electrifying substances or solutions or suspensions thereof prior to winding or during winding from one package to another.

Similarly, continuous filaments, threads, yarns and the like, whether made of organic derivatives of celluluose, or of natural silk or of other material, may be treated with the de-electrifying substances during winding and/or twisting or like operations by padding, spraying, passage through baths containing the de-electrifying substances or solutions or suspensions thereof, or by passage in contact with wicks, rollers or like means supplied with the same.

Again, the de-electrifying substances may be applied to spun yarns, for example by treating the staple fibres with the de-electrifying substances prior to spinning. It is, however, most convenient to apply the de-electrifying substances to the warp threads after the threads have been made up into a warp beam, and such application may be readily carried out in a manner analogous to the sizing of warps. The application may be carried out as a separate and distinct operation, for example by passing the warps through a sizing machine after the usual sizing operation but applying de-electrifying substances instead of size. The warps may be dried, if required, after the application, for example, by passing the warps over one or more drying drums. It is generally advantageous to apply the de-electrifying substance after sizing, and such application may be carried out continuously with sizing. Thus, after the sized yarns have left the drying drum or drums, they may be caused to pass over a roller supplied with the de-electrifying substance or a solution or suspension thereof, so that the de-electrifying coating lies on top of the size. In some cases, as for instance when using solutions of ethanolamines and paraffin oils as described above, it is not necessary to dry the warps after this application. The de-electrifying substance may even be applied to the warps while on the loom, but it is preferred to effect the application as a previous operation on the lines above suggested.

The weft may be wound on to supply packages after having received the de-electrifying substance in any convenient manner, as by immersion, spraying, or passage over a wick or roller supplied with the substance, or the weft package may be immersed in the de-electrifying substance or otherwise treated to give thorough impregnation. The de-electrifying substance may, however, be applied to the weft as it is proceeding from the supply package to the weft inserting means, such a method being particularly advantageous where evaporation of the applied material is undesirable, since the weft can then be inserted and beaten up before any undue evaporation has time to take place. Such application of the substances to the weft may be very conveniently carried out by the use of a wick, pad, or roller suitably supported with respect to the path of the weft and supplied with the substance from a container into which it depends. The application of the substances to the weft in this manner may be facilitated, and, particularly, uniformity of application may be increased, by the use of means for ensuring that the weft thread is drawn from the substantially stationary supply at a uniform rate. Means for this purpose, particularly adapted for use in looms in which weft is inserted in the shed in cut lengths, as in U. S. Patent No. 2,012,121, are described in U. S. Patent No. 1,964,079.

What we claim and desire to secure by Letters Patent is:—

1. In weaving on looms of the type in which weft is supplied from a stationary supply, and is inserted in the shed in the form of cut lengths which at one stage of the weaving are in the warp without tension, the step of preventing the curling of the weft due to electrification phenomena by applying to the yarns during weaving an organic compound of the formula $R_1—X—R_2$ where R_1 and R_2 are hydroxy or amino groups, or acid derivatives thereof, and X is an aliphatic residue.

2. A process in accordance with claim 1 wherein the specified organic compound of the formula $R_1—X—R_2$ is a hydroxy alkylamine.

3. A process in accordance with claim 1 wherein the specified organic compound of the formula $R_1—X—R_2$ is a hydroxy alkylamine which is applied in the form of a solution in paraffin oil.

4. A process in accordance with claim 1 wherein the specified organic compound of the formula $R_1—X—R_2$ is a hydroxy alkylamine soap.

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