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PROCESS OF TREATING TEXTILE FABRICS TO PREVENT UNRAVELING AT CUT EDGES THEREOF

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Fig. 1

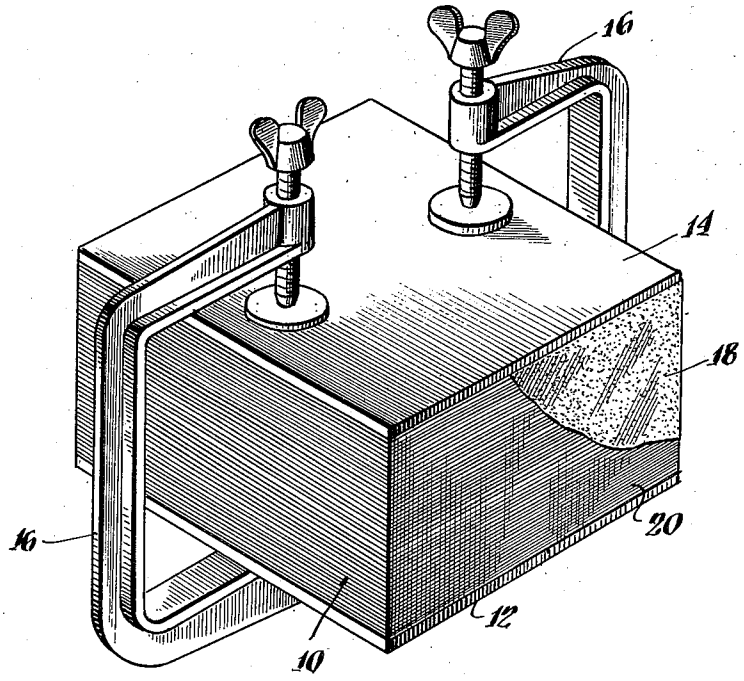
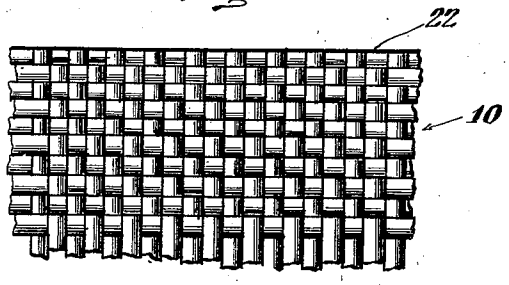


Fig. 2



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PROCESS OF TREATING TEXTILE FABRICS TO PREVENT UNRAVELING AT CUT EDGES THEREOF

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13 Claims. (Cl. 117—44)

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The present invention relates to a process of treating textile fabrics to prevent unraveling at cut edges thereof and to the product produced thereby.

The problem of preventing fraying of cut edges of textile fabrics is of long standing. Various expedients have been employed or proposed from time to time, including among others the application of an adhesive along one or both sides of the fabric adjacent the edge to form a finished edge approximating in appearance an ordinary selvage. It has also been proposed to weave threads of a material soluble in certain organic solvents into the fabric adjacent the cut edge thereof and parallel to the cut edge and thereafter to treat the fabric in these portions to partially dissolve the thread so interwoven and thereby bind the associated base fibers together. Such methods as those mentioned have the drawback that they require individual treatment of each piece of fabric and are consequently relatively expensive. Besides, the appearance created is often objectionable. So far as I am aware these methods have not been used to any great extent. It has also been customary for many purposes such as in garment manufacture to allow for a free edge of one-half inch or more of the fabric at the seams to insure against pulling apart at the seams because of the fraying out of the cut edges.

My invention has for an object to provide a simple and most economical method of treating cut edges of fabrics formed from various materials and that are of widely diversified weaves so that the tendency for fraying is positively prevented and the cut edge is at the same time modified to produce a bonded edge having the functional characteristics of a selvage but which is controlled in width as desired.

It is a further object of the invention to produce at the cut edges of a fabric a bonded edge area or zone that may be relatively narrow as compared with the selvages normally provided on woven fabrics and which preserves either fully or to a large extent the feel and flexibility of the body of the fabric.

The invention includes in a more specific embodiment the production of bonded edges on various woven fabrics that are so little altered in appearance as to present little or no evidence to the naked eye that the edge has undergone any treatment whatsoever.

With appropriate modifications of the treatment that will be hereinafter more fully described, the invention may be applied indifferently to fabrics formed from cotton, wool, silk, linen and the

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various synthetic textile materials such as rayons, nylons, Vinyon and fabrics made from casein fibers.

The invention will be described with particular reference to the accompanying drawing, wherein:

Fig. 1 is a perspective view of an assembly of a large number of layers of a fabric undergoing treatment according to the process of the present invention, and

Fig. 2 is an enlarged plan view showing a part of a strip of fabric that has been treated according to the invention.

According to one advantageous embodiment of the process, the fabric that is to undergo the treatment and which has been previously cut into "lifts" each made up of a suitable number of layers, is cut to the desired final shape and size. The smaller "lifts" thus produced are then assembled in a pile on a suitable support with the cut edges in alignment. As shown in the drawing, a larger number of squares 10 of the cut fabric may be assembled on a rigid support 12 which may, for example, be formed from a sheet of plywood of appropriate stiffness. A second rigid sheet 14 of plywood or the like is then applied to the top of the pile and the whole pressed together by means of clamps 16.

When the pile has been made up as shown in Fig. 1 and brought to the desired state of compression, the treating agent is applied to the exposed edges in any suitable manner, as by a brush or by spraying. As shown in Fig. 1 the pile has been partially treated, the treated portion being indicated at 18 and the untreated edges being shown at 20. As shown in exaggerated form in Fig. 2 the treating agent has formed a thin coating bridging the gaps between the cut ends of the threads and binding the cut ends to the adjacent crosswise threads that are shown as running parallel to the cut edge. When all of the exposed surfaces have been covered with the treating agent, the pile is set aside to permit the coating to dry. When the coating has become dry the pieces of fabric may be readily separated. In order to facilitate the drying and to minimize any tendency of the layers to adhere to one another at the treated edges, the clamps may be released upon completion of the coating treatment. This is particularly desirable when a more highly compressible fabric has been treated.

The choice of the treating agent is important to the success of the process. Any liquid solvent or lacquer composition may be used to serve the purpose providing it will either dissolve the con-

stituents of the fibers sufficiently to cause fusing together of the cut edges of the threads and their welding to the cross threads adjacent the cut edge or will bind the cut edges to the cross threads adjacent the cut edge. However, care must be taken in selecting the treating agent and in controlling the pressure applied by the clamps to the pile undergoing treatment to insure that the treating agent will not penetrate the fabric to such an extent as to produce objectionable stiffness or give to the edge of the fabric an undesirable appearance.

The extent of penetration of the treating agent into the fabric from the cut edges is controlled by the degree of compression imposed on the assembly of pieces of fabric undergoing treatment and also by the viscosity of the lacquer when a lacquer is employed. When the fabric is of a closely woven type and consists of relatively fine threads such as are represented by muslins, broadcloths and fine linens for example, the clamps ordinarily will be turned down very tight so as to minimize the tendency for any of the treating agent to penetrate beyond cut edges of the layers of the fabric as they are exposed at the surface of the compressed pile. When dealing with more coarsely woven materials or with woolen fabrics the pressure usually may be somewhat less so as to permit greater penetration of the treating agent into the fabric from the cut edge portions.

The extent of penetration of the treating agent inwardly from the edges may also be controlled to some extent by permitting the edges of the aligned sheets of fabric to project slightly beyond the edges of rigid confining sheets or boards 12 and 14 and thus leave marginal portions of the individual layers of the fabric under relatively little lateral compression. This modification of the process may be employed to advantage when it is desired to form a bonded edge of substantial width which may approach that of the conventional selvage.

When using solvents and solvent compositions in treating certain fabrics, such for example as acetate rayon cloth and other fabrics that tend to dissolve in the solvent employed, it is advisable to interleave the layers of cloth with paper preferably before the cloth is cut to the exact size required. In mass production operations it will ordinarily be convenient to assemble anywhere from 10 to 50 or more layers of cloth in interleaved relation with the paper and then to cut all of the layers simultaneously. The cut batch or "lift" may then be transferred to a suitable support and there assembled with other like batches to form a pile of as many as 250 to 300 layers of the cut cloth. A piece of plywood of dimension conforming to the cut contour of the pieces of cloth may serve as the support and may for convenience be disposed on skids to facilitate handling of the pile. A second piece of plywood or other suitable rigid material is applied at the top and the two drawn together to place the cloth under compression. When a pile of acetate rayon is arranged in interleaved relation with sheets of paper or a similar material that will not be acted on by a solvent for the rayon, the treating agent may consist of acetone or another suitable solvent for the rayon fibers when applied as a surface coating to the exposed edges of the material. Acetone will dissolve the exposed fibers of the cut edges sufficiently to cause them to fuse together with the cross fibers of the fabric and form what is in effect a selvage invisible to the naked eye.

When employing acetone or another solvent it is preferred to associate therewith a suitable proportion of a plasticizer for the fibers of the fabric that is to be treated. In this way any tendency toward undesired stiffening of the treated edge portion is avoided. A suitable solvent composition of this type may be formed by mixing 25 parts by weight of M17 Santicizer[1] and 220 parts by weight of acetone.

If acetate rayon is not interleaved with paper or a similar suitable separating material the difficulty arises in using acetone or another agent having a solvent action on the fibers that the acetate sheets will be fused together along the cut edges so that it will be practically impossible to separate them.

The interleaving of the cloth with paper or similar separating sheets may be dispensed with, in dealing with acetate rayon and other synthetic fibers that behave similarly toward solvents, by using as the treating agent a suitably chosen and prepared lacquer or a similar coating composition that will serve to bond the cut fibers to the cross threads of the fabric but at the same time will not, under the conditions of the process, tend to bond the layers to one another adjacent the zone of the cut edges. It will be understood that any tendency for the layers to be bonded together by the lacquer at the cut edges is overcome by releasing the pressure on the layers along the cut edges and in this way permitting the cut edges of adjacent layers of the cloth to move slightly away from one another and remain so disposed during the drying stage.

The difficulty above observed in reference to the use of acetone or similar solvents with rayons and other synthetic fibers is not encountered when using treating agents having solely a binding action on the textile fibers. In these cases interleaving will not ordinarily be required under any circumstances. However, for convenience of operation I prefer to use a suitably prepared lacquer composition instead of a solvent or a solution of a plasticizer in a solvent when treating any of the various insoluble textile fabrics whether made from natural or synthetic fibers.

There are submitted below by way of example several lacquer formulas that have been used with conspicuous success and found particularly adapted for the various fabrics indicated, the proportions being given in parts by weight:

Formula #1—Cotton

LL1 low viscosity cellulose acetate	40
M17 Santicizer	10
Acetone	220

Formula #2—Wool

LL1 low viscosity cellulose acetate	40
M17 Santicizer	12
Acetone	150

Formula #3—Cellulose acetate fabric

LL1 low viscosity cellulose acetate	40
M17 Santicizer	32
Acetone	180

Formula #4—Cotton

VYHH vinyl copolymer	20
M17 Santicizer	5
Methyl ethyl ketone	100

[1] "Santicizer" is the trade name of a group of plasticizers manufactured by the Monsanto Chemical Company. "M17" is the trade designation of the Santicizer product consisting of methyl phthalyl butyl glycollate.

Formula #5—Wool

VYHH vinyl copolymer	20
M17 Santicizer	10
Methyl ethyl ketone	70

Formula #6—Cellulose acetate fabric

VYHH vinyl copolymer	20
M17 Santicizer	16
Methyl ethyl ketone	180

All of the formulas above given may be employed on fabrics that are destined for uses requiring that they be capable of dry cleaning and are wash resistant. Where a high degree of wash fastness is required, it is preferred to use one of the lacquers above mentioned having a Vinylite base but the cellulose acetate base lacquers serve very well for medium wash fastness and resistance to dry cleaning. The Vinylite base lacquers are resistant to the action of all solvents used in dry cleaning except that chlorinated solvents. Where these are to be employed, the cellulose acetate base lacquers are preferred. In formulating lacquers to be used for the purposes of the present invention it will be understood that various other solvents may be employed than those specified. Acetone is, of course, a very quick drying solvent but where desired this action may be slowed down by the addition of appropriate high boiling solvents. Although I have specified M17 Santicizer as the plasticizer of the lacquer compositions above mentioned, it will be understood that various other plasticizers known to the plastics art may be employed having in mind the desired results and the nature of the lacquer base and the solvents to be used therewith. Likewise, various others of the known lacquer bases may be substituted for either a vinyl resin or cellulose acetate.

When the treated fabric is not to be used in situations where resistance to heat is important, for example when it is not to be ironed, the treating agent may consist of a suitable fusible composition applied in the form of a hot melt, for example a melt formed by mixing 20 parts by weight of low viscosity ethyl cellulose and 80 parts by weight of beeswax or another suitable wax.

While the invention has been described by way of specific embodiment as practiced in a batch operation, it will be understood that the principles are applicable in many other ways. For example, the invention lends itself readily to use in treating fabrics in a continuous process, it being necessary only that the fabric strip, at the time the lacquer or solvent is applied, shall be compressed firmly in the area adjacent and up to the cut edge that it is desired shall be sealed against raveling. This may be done in a continuous operation by leading the fabric in strip form between rolls and so guiding its travel therethrough as to present the cut edge precisely at the common end surfaces of the rolls at the time it passes the "bite" of the rolls and applying the treating agent thereto at the point where it is being held under the compression of the rolls.

In the example of a batch operation hereinbefore described, the cut pieces are shown as rectangular in shape. It will be understood, however, that the pieces may be cut to various desired shapes such as to the shapes required for parts of a garment.

While the invention is capable of many other applications its use in the garment industry makes it possible to effect large savings both from the standpoint of elimination of various tedious and expensive hemming operations heretofore required and also from the standpoint of saving of materials. This latter saving is made possible because the invention makes it unnecessary to provide the excess fabric at the seams that has heretofore been required.

Various other applications of the invention as well as changes in the details of the procedure and in the components and proportions of the lacquer or other treating compositions may be made without departing from the invention which is not to be deemed as limited otherwise than as indicated by the language of the appended claims.

I claim:

1. The process of treating textile fabrics to prevent unraveling at the cut edges thereof which comprises providing an assembly of pieces of a cut fabric having the pieces associated in superposed relation with their cut edges in alignment, then compressing the assembly from both sides along the lines of the cut edges, and, while maintaining the state of compression, applying a fiber bonding treating agent in liquid form to the cut edges only of the assembled layers of the fabric and thereby promoting a bonding action between the cut fibers at the edge and the adjacent uncut threads of the fabric, and thereafter releasing the compression on the fabric and permitting the treated edges to dry.

2. The process of treating textile fabrics to prevent unraveling at the cut edges thereof which comprises providing an assembly of pieces of a cut fabric having the pieces associated in superposed relation with their cut edges in alignment, then compressing the assembly from both sides along the lines of the cut edges, and, while maintaining the state of compression, applying a fiber bonding treating agent in liquid form to the cut edges only of the assembled layers of the fabric and thereby promoting a bonding action between the cut fibers at the edge and the adjacent uncut threads of the fabric, thereupon and before the bonding action is complete releasing the compression upon the assembled pieces and then permitting the bonding action to proceed to completion.

3. The process of treating textile fabrics to prevent unraveling at the cut edges thereof which comprises providing an assembly of pieces of a cut fabric having the pieces in superposed relation with their cut edges in alignment, then compressing the assembly from both sides along the lines of the cut edges, and, while maintaining the state of compression, applying a volatile solvent for the fibers to the cut edges only of the assembled pieces of fabric and thereby dissolving the fibers at the cut edges of the fabric, thereupon and before the solvent has evaporated releasing the pressure upon the assembled pieces and then permitting the treated fabric to dry.

4. The process of treating textile fabrics to prevent unraveling at the cut edges thereof which comprises providing an assembly of pieces of a cut fabric having the pieces in superposed relation with their cut edges in alignment, then compressing the assembly from both sides along the lines of the cut edges, and, while maintaining the state of compression, applying a liquid lacquer composition to the cut edges only of the assembled layers of fabric, thereupon and before the lacquer has become hardened releasing the compression upon the assembled pieces

and thereafter permitting the lacquer to dry.

5. The process of treating acetate rayon textile fabrics to prevent unraveling at the cut edges thereof which comprises providing an assembly of pieces of a cut fabric having the pieces superposed in a pile in interleaved relation with a thin sheet material insoluble in acetone with the cut edges of the pieces in alignment, then compressing the assembly from both sides along the lines of the cut edges, then applying acetone to the cut edges only while maintaining the state of compression, and thereafter releasing the compression upon the assembled pieces and permitting the acetone to evaporate.

6. The process according to claim 1 wherein the treating agent is a cellulose acetate base lacquer.

7. The process according to claim 1 wherein the treating agent is a vinyl resin base lacquer.

8. The process according to claim 1 wherein a vinyl resin base lacquer is used as the treating agent and the textile fabric is composed essentially of cotton.

9. The process according to claim 1 wherein a cellulose acetate base lacquer is used as the treating agent and the textile fabric is composed essentially of wool.

10. The process of treating a piece of textile fabric to prevent unraveling at a cut edge thereof comprising the steps of: compressing at least a portion of said fabric piece between members having compressive surfaces engaging the upper and lower surfaces of said fabric piece and lateral surfaces extending in substantially the same plane as the cut lateral edge of said piece; while maintaining the compression, applying a fiber-bonding treating agent in liquid form to the cut lateral edge of said piece between said members and thereby promoting a bonding action between the cut fibers and the adjacent uncut threads of the fabric; separating said members from the fabric sufficiently to inhibit the formation of a bond between said members and the fabric; and thereafter permitting the treated edge to dry.

11. The process of treating a piece of textile fabric to prevent unraveling at a cut edge thereof comprising the steps of: compressing at least a portion of said fabric piece between members having compressive surfaces engaging the upper and lower surfaces of said fabric piece and lateral surfaces extending in substantially the same plane as the cut lateral edge of said piece; while maintaining the compression, applying a fiber-bonding treating agent in liquid

form to the cut lateral edge of said piece between said members and thereby promoting a bonding action between the cut fibers and the adjacent uncut threads of the fabric thereafter separating said members from the fabric sufficiently to release the compression thereon; and permitting the treated edge to dry.

12. The process of treating textile fabrics to prevent unraveling at the cut edges thereof which comprises providing an assembly of pieces of a cut fabric having the pieces in superposed relation with their cut edges in alignment, compressing the assembly from both sides along the lines of the cut edges, applying a hot melt of a thermoplastic composition to the cut edges of the pieces of fabric and thereby promoting a bonding action between the cut fibers at the edge and the adjacent uncut threads of the fabric, while maintaining the compression to confine the hot melt to said cut edge portions only of the fabric, releasing the compression on the assembly before the bonding action is completed by solidification of the hot melt, and thereafter allowing the hot melt to cool and solidify.

13. The process of treating textile fabrics soluble in a volatile solvent to prevent unraveling at the cut edges thereof which comprises providing an assembly of pieces of soluble cut fabric having the pieces superposed in a pile in interleaved relation with pieces of a thin sheet material insoluble in said solvent for the fabric with the cut edges of the pieces in alignment, then compressing the assembly from both sides along the lines of the cut edges, then applying said solvent to the cut edges only while maintaining the state of compression and thereby promoting a bonding action between the cut fibers at the edge and the adjacent uncut threads of the fabric, thereupon and before the bonding action is complete releasing the compression upon the assembled pieces and permitting the treated fabric to dry.

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