

Aug. 4, 1936.

H. C. BORGHETTY

2,050,156

STABILIZED NONSLIPPABLE FABRIC AND METHOD OF ITS MANUFACTURE

Filed July 23, 1934

Fig. 1.

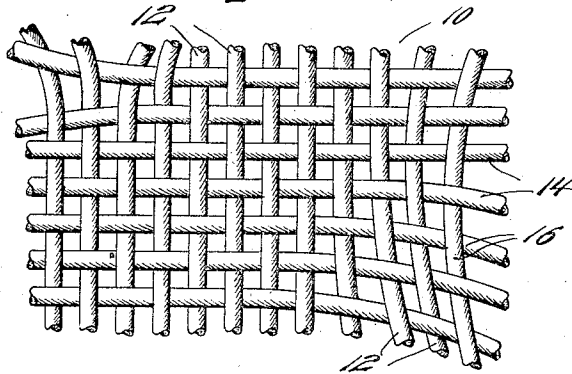


Fig. 2.

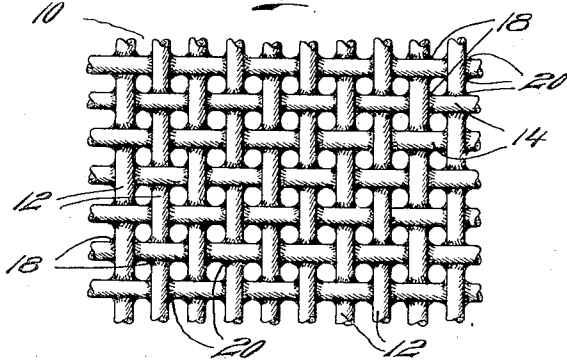


Fig. 3.

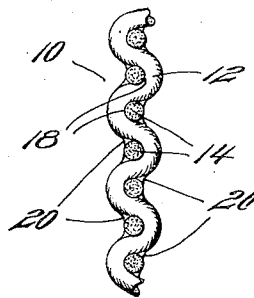
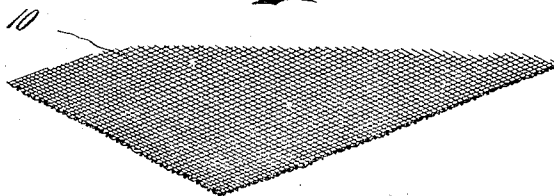


Fig. 4.



Inventor
Hector C. Borghetty
By Thomas A. Jenkins
Attorney

UNITED STATES PATENT OFFICE

2,050,156

STABILIZED NONSLIPPABLE FABRIC AND
METHOD OF ITS MANUFACTURE

Hector C. Borghetty, Jewett City, Conn., assignor
to The Aspinook Company, Jewett City, Conn.,
a corporation of Connecticut

Application July 23, 1934, Serial No. 736,478

6 Claims. (Cl. 91—79)

My invention relates to improvements in fabrics, particularly those constructed wholly or in part of artificial silk, although it is also adapted for use with fabrics constructed of cotton, silk, and other fibres or mixtures that have slippable characteristics.

I employ the words "artificial silk" to include all types of synthetic cellulose threads whether they be constructed of cellulose acetate, cellulose nitrate, viscose, or otherwise and whether the fabric be constructed wholly or in part of said threads. As these threads are made synthetically they are extruded through a nozzle or spinnerette and the outer surfaces thereof are rendered very smooth, so smooth in fact that when said threads are knitted or woven into a fabric that they will tend to slip and fray relative to each other, especially the threads subjected to strain adjacent to the sewing at seams.

A main object of my invention is to render fabrics mentioned above, preferably those constructed wholly or partially of artificial silk non-slippable by, where woven fabrics are employed, binding the warp and filling or other interwoven threads thereof at the contacting areas of interweave thereof by a transparent plasticized covering of such a type that it will not interfere with the appearance of the fabrics, but will prevent the relative slipping of the woven warp and filling threads or other threads, where other fabrics are employed, such as lace, knit goods, etc., at the contacting portions or areas of the threads thereof.

A further object of my invention is to provide fabrics of the types mentioned above, preferably ones constructed wholly or in part of artificial silk which will be non-shrinkable, by employing the transparent bond heretofore referred to at the contacting areas of interweave of the warp and filling threads thereof or the contacting areas of the threads thereof while said cloth is in a stretched condition so that the threads will be bonded together at these points and will not stretch or shrink in use. It is apparent that where my invention is employed the fabric will become substantially stabilized, that is, it will partially or wholly resist any tendency to shrink or stretch.

Further features of my invention relate to the improved method I employ for bonding these areas of interweave or areas of contact of the threads of the fabric together and the combination of materials I use in the plasticized bonded covering for said areas.

These and such other objects of my invention

as may hereinafter appear will be best understood from a description of an embodiment thereof employed on a woven fabric such as is shown in the accompanying drawing.

In the drawing, Fig. 1 is an enlarged diagrammatic plan view of a woven fabric constructed wholly of artificial silk showing how the smooth cylindrical surfaces thereof tend to slip and fray relative to each other.

Figure 2 is an enlarged plan view of such an artificial silk fabric shown in Fig. 1 with the contacting areas of interweave of the warp and filling threads bonded together by a transparent covering in accordance with the teachings of my invention to prevent slippage thereof and shrinkage or stretching of the fabric.

Fig. 3 is a sectional view taken along my improved fabric shown in Fig. 2 showing how the binding material bonds the threads together at the contacting areas of interweave.

Fig. 4 is a perspective view of a portion of an artificial silk fabric constructed in accordance with my invention.

In the drawing, 10 generally indicates a fabric constructed wholly or partially of artificial silk and as shown in enlarged form in Figs. 2-4, constructed in accordance with my invention. Said fabric 10 usually has the warp threads 12 and the filling threads 14, woven in the usual manner. As stated hitherto, as artificial silk fibres are extruded through the spinnerettes, having smooth metal surfaces in their manufacture, as they become plastic in the solution into which they are extruded, their outer surfaces 16 tend to become very smooth, almost glassy and when woven into the fabric in the usual manner tend to slip relative to each other as shown in Fig. 1. As stated hitherto, a main object of my invention is to render said threads 12 and 14 of said fabric non-slippable, relative to each other, and for this purpose I preferably bond together said warp and filling threads 14 at their contacting areas of interweave 18 by the transparent coverings 20. In order to render a fabric constructed in this manner non-shrinkable the plasticizable transparent covering 20 is preferably bonded around the areas of interweave of said threads preferably while said fabric is in a stretched condition.

The tendency of textile fabrics to slip is noticeable especially in fabrics of low filling and warp counts, for example, rayon taffeta 72 x 48, where the slipping effect causes fraying. Fabric on the market at present which have this tendency, 55

are considered defective particularly in the lining trade.

I therefore impregnate the fabric as shown in Fig. 1 with a plastic transparent covering or immerse it therein, then preferably stretch the fabric to the desired width if a stabilized non-shrinkable fabric be desired and subject said stretched fabric to such a heat for a sufficient period of time to form a plasticized, insoluble, transparent covering around each contacting area of interweave of said warp and filling threads.

While any suitable type of a plastic transparent covering may be employed, I have obtained best results by using a water soluble resin, colorless and odorless, applied to the fabric and then rendered insoluble or cured on the fabric so that the stabilized non-slip and non-shrinkable effect will be lasting and not wash out after laundering. For this purpose I preferably employ a solution, preferably a water solution of a soluble intermediate condensation product of a suitable synthetic resin, preferably one of the urea formaldehyde or phenol formaldehyde type, or others having similar properties, a plasticizer and a catalyst. While any suitable type of a urea formaldehyde resin may be employed; such as described in Patents Nos. 1,355,834, 1,460,606, 1,507,624, 1,671,596, 1,672,848, 1,926,786, 1,734,516, 1,926,063, etc., I preferably employ a soluble resin of the type KI 406 sold by the Resinous Products Company, which may be cured after application by heating at a temperature of at least 230° F. To accelerate the curing time, however, in order to make the process conform to the practical production requirements of the textile industry, I preferably employ a suitable catalyst either of the alkaline or acid type, such as sodium hydroxide, ammonium sulphite or other metallic salts, or acids, mineral or organic, acid salts thereof, hydrochlorides of organic basis, organic acids, such as oxalic acids or salts thereof, such as potassium tetroxylate as more fully described in Patents Nos. 1,734,516 and 1,926,063. I preferably employ catalyst L-89-G of the Resinous Products Company as it lowers the curing time of thirty minutes to two to four minutes in working with soluble resin 406. I preferably also employ a suitable plasticizer so as not to render the feel of the fabric too brittle but to retain pliability. Any of the well known plasticizers, such as castor oil, glycerine, or usual dope synthetic plasticizers may be employed. After the synthetic resin has become bonded around the areas of contact and/or interweave of the warp and filling threads by curing at the above temperature for the above period of time the fabric is permanently set or stabilized in regard to anti-slipping qualities, but it may still be subjected to the ordinary routine of textile finishing operations to obtain the correct hand of the goods desired by the finished goods market. For suitable types of finish, it is found desirable to add plasticizers in order to obtain a softer feel. Another feature about the process if carried out correctly is that aside from the newly acquired properties of anti-slipping the fabric conserves its original appearance even under the microscope and although the resin is deposited in and around the fibres, there is no clogging of the spaces between the threads.

To date the most suitable method of application is the following:

The cloth is padded through a solution of resin. This solution has been prepared by add-

ing water (at room temperature) to resin 406. Five parts of water to one part of resin gives a good solution. Precaution must be taken to add water to the resin slowly, to avoid separation of an insoluble resin.

Do not add resin 406 to water because this condition causes partial precipitation of resin. Catalyst L-89-G is then dissolved in water and added to the solution of resin. 1% of catalyst to the weight of the original resin has been found sufficient. Once the catalyst is added it will be found necessary to utilize the bath as soon as possible, otherwise separation will occur owing to the fact that the addition of the catalyst has diminished the stability of the solution of resin in water. To this mixture is added one-half to three per cent. by weight to the weight of the goods of suitable plasticizer such as castor oil, glycerine, etc.

Once the cloth has been immersed in the bath it passes to a tenter frame where the temperature must be at least 230° F., otherwise curing cannot take place. Just before curing sets in it will be absolutely necessary to have the cloth framed to the desired width because after curing it is no longer possible to stretch the goods, without tearing the selvages.

This problem, however, is solved in the regular textile finishing frame on account of the fact that the cloth already is stretched to the correct width during the first one-half minute in the hot chamber. Curing instead does not set in until during the first and third minute at 230° F. The cloth after coming out of the tenter frame is rinsed in warm water, dried, and processed in a warm hydraulic calender. This operation of calendering can be carried out twice, that is, once for each side of the cloth and a very fine smooth lustrous finish results.

Another method: The cloth is padded through a solution of one part of resin to two parts of water, plus the correct amount of catalyst, (1% of resin employed) and plasticizer if desired, then dried on dry cans at just sufficient speed to obtain a slightly damp hand, and at a temperature below 200° F., so that the resin does not yet begin to cure, then it is run through the tenter frame at the desired width and at 230° F. in order to effect curing.

This preliminary drying on dry-cans speeds up the operation.

The cloth is then rinsed in warm water to remove the catalyst and soluble parts of resin, then finishing and drying takes place on the tenter frame.

Another method: The cloth is padded in a solution as in the first method, then dried on a frame at a temperature of 180°-200° F., then cured by drying over dry cans at a temperature of 230° F. for a period of three minutes. Then rinsed and finished on tenter, calendered through warm hydraulic calender.

I have also obtained good results by employing "Beetle" resin manufactured by the Synthetic Plastics Co., Rockefeller Plaza, New York city. This resin is a urea formaldehyde resin and it may be used in any of the methods described above by making a 10% water solution thereof and by adding 1% of tartaric acid as a catalyst. This resin, however, requires a curing temperature of 250° F. If desired, Catalin #500 manufactured by Catalin Corporation of America, of Ford, New Jersey, may be employed. This may be used with any of the methods described above by making a solution consisting of 10% of Cata-

lin #500, 10% of ammonia and 80% water. Prior to use, however, it is necessary to heat the above mixture for fifteen or twenty minutes. This is a phenol formaldehyde resin and the ammonia

is employed therewith as a catalyst. Good results may also be obtained by employing synthetic resin #13 manufactured by the Advance Solvents & Chemical Company, of 245 Fifth Avenue, New York city. This resin may be employed with any of the methods described above by employing 10% thereof mixed with 10% of ammonia and 80% of water, the ammonia also acting as a catalyst. This resin will cure in about five minutes at a temperature of 240° F.

While I have described my invention as applied to a woven fabric having warp and filling threads, it is obvious that my invention may be applied to lace fabric, knitted or braided fabrics, etc., over the areas of contact of the desired threads thereof. I therefore in the claims employ the word "interwoven" to include interweaving warp and filling threads, lace making, braiding, knitting, etc., or any operation where the threads of which the fabric is composed overlap and/or contact each other.

While I preferably apply the transparent covering around the contacting areas of interweave of the threads while the fabric is in a stretched condition to render it stabilized and hence non-shrinkable, and/or non-stretchable, it is obvious that if this property is not desired and merely a slip-proof fabric is desired, my improved method may be applied to the goods without stretching.

It is apparent, therefore, that I have provided a novel type of artificial silk or like fabric preserving the exact appearance of artificial silk or like fabric in which the individual threads thereof are non-slippable and the fabric itself is stabilized and non-shrinkable with the advantages portrayed above.

It is understood that my invention is not limited to the specific embodiments shown and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What I claim is:

1. A partially or wholly non-slippable stretched fabric composed partially or wholly of relatively slippable spaced interwoven threads, bonded together solely at the contracting areas of interweave thereof by a transparent covering of synthetic resin substantially identical with the product of claim 3.

2. A partially or wholly non-slippable fabric composed partially or wholly of relatively slippable spaced interwoven threads bonded together solely at the contracting areas of interweave thereof by a transparent covering of transparent synthetic resin substantially identical with the product of claim 4.

3. The method of producing a fabric partially or wholly stabilized against shrinkage or slipping,

comprising relatively slippable spaced interwoven threads, which comprises impregnating the contacting areas of interweave of said spaced interwoven threads of the fabric with a solution of a synthetic resin, stretching the fabric to the desired width before curing sets in and subjecting said stretched fabric to such a heat for a sufficient period of time as to form a plasticized insoluble transparent covering of synthetic resin around each contacting area of interweave of said interwoven threads, whereby the fabric is stabilized against shrinkage or slipping without substantially changing the appearance of the fabric.

4. The method of producing a fabric partially or wholly stabilized against shrinkage or slipping comprising relatively slippable spaced interwoven threads, which comprises, impregnating the contacting areas of interweave of said spaced interwoven threads of the fabric with a dilute solution of a synthetic resin and subjecting said fabric to such a heat for a sufficient period of time as to form a plasticized insoluble transparent covering of a synthetic resin solely around each contacting area of interweave of said interwoven threads, whereby the fabric is stabilized against shrinkage or slipping without substantially changing the appearance of the fabric.

5. The method of producing a fabric partially or wholly stabilized against shrinkage or slipping, comprising, relatively slippable spaced interwoven threads, which comprises impregnating the contacting areas of interweave of said spaced interwoven threads of the fabric with a solution of a soluble, intermediate condensation product of a synthetic resin, a plasticizer and a catalyst, stretching the fabric to the desired width before curing sets in and subjecting said stretched fabric to such a heat for a sufficient period of time as to form a plasticized insoluble transparent covering of synthetic resin around each contacting area of interweave of said interwoven threads, whereby the fabric is stabilized against shrinkage or slipping without substantially changing the appearance of the fabric.

6. The method of producing a fabric partially or wholly stabilized against shrinkage or slipping comprising relatively slippable spaced interwoven threads, which comprises, impregnating the contacting areas of interweave of said spaced interwoven threads of the fabric with a dilute solution of a soluble intermediate condensation product of a synthetic resin, a plasticizer and a catalyst and subjecting said fabric to such a heat for a sufficient period of time as to form a plasticized insoluble transparent covering of synthetic resin solely around each contracting area of interweave of said interwoven threads, whereby the fabric is stabilized against shrinkage or slipping without substantially changing the appearance of the fabric.

HECTOR C. BORGHETTI.