Aug. 9, 1938. D. H. JONES 2,125,925

FINISHING OF TEXTILE MATERIALS OF MIXED TYPES OF FIBERS

Filed Aug. 15, 1935

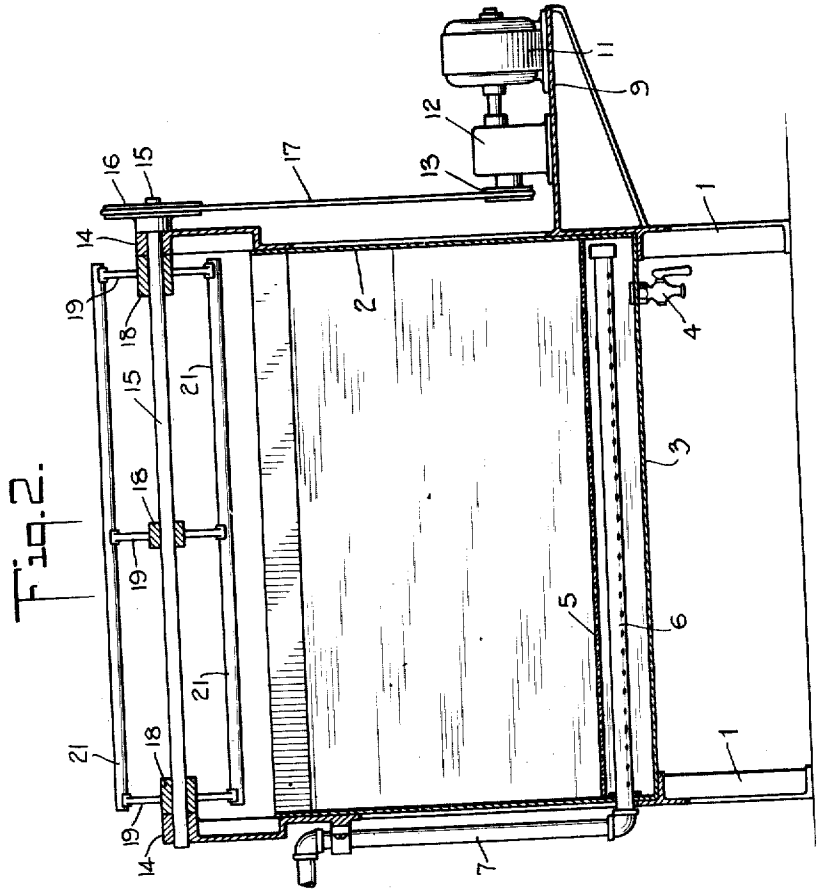


Fig. 2.

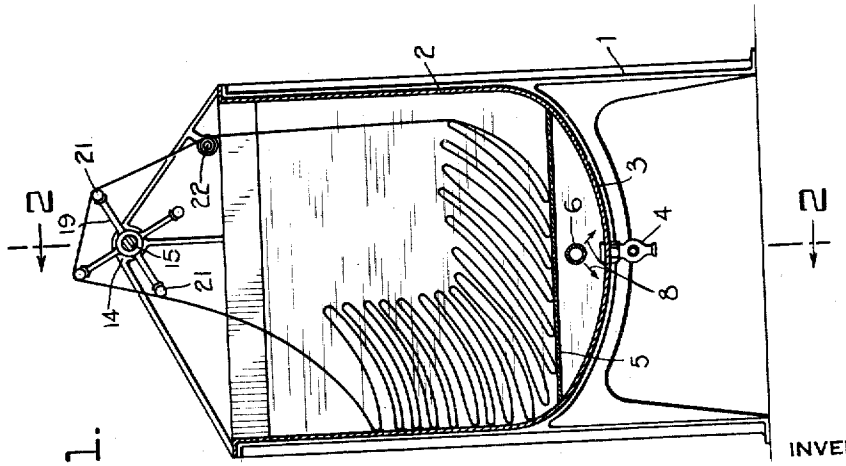


Fig. 1.

INVENTOR
Daniel H. Jones
BY
ATTORNEYS

Patented Aug. 9, 1938

2,125,925

UNITED STATES PATENT OFFICE

2,125,925

FINISHING OF TEXTILE MATERIALS OF MIXED TYPES OF FIBERS

Daniel H. Jones, Collingswood, N. J., assignor to Celanese Corporation of America, a corporation of Delaware

Application August 15, 1935, Serial No. 36,266

9 Claims. (Cl. 26—19)

This invention relates to the manufacture of fabrics from a mixture of animal fibers and artificial fibers and more particularly to the finishing of fabrics, containing a mixture of such fibers, to control the relative position of the two types of fibers therein.

An object of the invention is the manufacture of fabrics from a mixture of animal fibers and artificial fibers and the finishing of such fabrics whereby the animal fibers are caused to lie substantially in the surface of the fabric, thus producing a fabric having a flannel-like hand or a wooly hand, although the percentage of artificial fibers may be much greater than the percentage of animal fibers. Other objects of the invention will appear from the following detailed description.

In the drawing, wherein like reference numerals refer to the same or similar elements in the various views,

Fig. 1 is a cross-sectional view in side elevation of a device for carrying out this invention showing the position of the fabric while under treatment and

Fig. 2 is a sectional view in front elevation taken on the line 2—2 of Fig. 1 with the fabric omitted.

Yarns have been formed by the worsted, woolen and cotton methods of forming yarns from a mixture of animal fibers and artificial fibers, which yarns contain a substantially intimate mixture of the two types of fibers. These yarns may be woven, knitted, knotted and netted into fabrics of various types that have characteristics of hand, cover and drape dependent upon the type of fibers employed, methods of forming the yarn and the manner in which the yarns are formed into fabrics. The fabrics may have the appearance of the most valuable fabrics formed entirely of animal fibers and yet they may lack the hand or feel of the valuable fabrics due to the high percentage of smooth, and sometimes soft, artificial fibers in the surface, masking the hand or feel of the animal fibers. However, by finishing the fabric containing animal fibers and artificial fibers in accordance with this invention, the animal fibers may be caused to be exposed on the surface in any desired amount, namely from a mere increase of the percentage of animal fibers at the surface to a substantial nap consisting mainly of the animal fibers. By controlling the conditions of the finishing treatment, fabrics may be produced having the appearance of fabrics normally produced from the same mixture of fibers and by the same processing steps, yet have a feel and hand substantially the same as a fabric containing all animal fibers or fabrics may be produced having a nap or surface of animal fibers. As the animal fibers are brought more and more to the surface the cover of the fabric is increased and the yarns of the fabric are opened up more and more.

In accordance with my invention, I treat fabrics, made of a mixture of animal fibers and artificial fibers by processes in which the two fibers are intimately and substantially uniformly dispersed in each other, in a finishing operation which causes a relative change of position of the two types of fibers in the fabric so that the ratio of the animal fibers in the surface of the fabric is increased and the ratio thereof in the interior of the fabric is decreased. In thus treating the fabric there also may be an opening up of the yarns of the fabric under certain conditions of the treatment, producing a more voluminous fabric and a fabric having a higher covering power than similar fabrics finished by prior methods.

This invention, as stated, is applicable to fabrics containing yarns that are formed of a mixture of animal fibers and artificial fibers. The yarns containing animal fibers and artificial fibers may be formed from a mixture of the two types of fibers by the cotton method, the woolen method or the worsted method of making yarns. For instance, a mixture of animal fibers and artificial fibers may be uniformly dispersed, partially parallelized, and formed into rovings by passing them through the ordinary card machines employed in the woolen industry. Rovings from such cards may be spun into yarn by mule spinning machinery or by ring twisters normally employed in the woolen art.

Any suitable percentage of animal fibers as compared with the artificial fibers may be employed in forming the yarns. The invention is particularly applicable, however, to yarns formed from a mixture of animal fibers and artificial fibers wherein the percentage of animal fibers is below fifty per cent of the yarn by weight. The invention is especially applicable to yarns containing seventy per cent of artificial fibers, such as those containing cellulose acetate, and thirty per cent of animal fibers, such as wool.

The animal fibers employed in the yarn may be of any suitable grade or type. For instance, any suitable grade of wool, llama, mohair, rabbit fur, dog hair, camel hair, etc. may be employed as the animal fiber component of the yarn.

The artificial fiber employed in forming the yarn may be in the form of short lengths, for instance, one-half inch to ten or more inches in length, of any suitable artificial fiber having an overall diameter substantially that of animal fibers. The base material of the artificial fiber may be any suitable material employed in forming artificial filaments, such as regenerated cellulose, reconstituted cellulose and organic derivatives of cellulose. Examples of organic derivatives of cellulose that may be employed in forming the fibers are organic esters of cellulose and cellulose ethers. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose proprionate and cellulose butyrate, while examples of cellulose ethers are methyl cellulose, ethyl cellulose and benzyl cellulose. The artificial fiber may contain, besides the base material, effect materials such as dyes, lakes, plasticizers, white or colored pigments of an organic or inorganic nature, filling materials, fire retardants, etc.

Although any artificial fibers may be employed in the yarn, the best results are produced when employing thermoplastic fibers, such as those made of organic derivatives of cellulose. The filaments from which the fibers are made may be formed from the organic derivatives of cellulose by extruding the organic derivatives of cellulose dissolved in a volatile solvent through orifices into a suitable evaporating or precipitating medium, i. e., they may be formed by either the dry or wet method of spinning. The substantially continuous filaments thus formed may be cut, broken, torn or otherwise divided into staple fibers of any suitable length, i. e. from one-half inch to ten inches or more.

The fabric to be treated in accordance with this invention is preferably formed solely of yarns containing a mixture of animal fibers and artificial fibers. However, the fabric may be formed of such yarns together with yarns formed entirely of animal fibers or yarns formed entirely of artificial fibers or filaments. For instance, this invention may be employed upon fabric formed of a warp consisting of yarns formed entirely of filaments of an organic derivative of cellulose and a weft of yarns formed from a mixture of animal fibers and artificial fibers. Furthermore, fabrics having a warp of yarns containing a mixture of animal fibers and artificial fibers and a weft of yarns formed entirely of animal fibers or entirely of artificial fibers or filaments may be treated in accordance with this invention. Also, fabrics comprising yarns formed of a mixture of animal fibers and artificial fibers and yarns formed entirely of animal fibers or entirely of artificial fibers or filaments in any degree of alternation, either in the warp or in the weft or in both, may be treated in accordance with this invention.

The treatment of the fabrics comprises working the fabric in a heated bath containing a fiber lubricant. The working of the fabric may be accomplished by agitating the fabric in the bath by the aid of mechanical agitators or causing an ebullition of the bath by passing steam or air into the bath. For instance, the fabric may be worked in the bath by means of reciprocating dollies similar to those found on ordinary washing machines or the fabric may be caused to move in the bath by passing a stream of air or steam into the bath, causing a substantial ebullition of the bath.

A preferred method of working the fabric may be performed on the device shown in the drawing, which device also forms a part of my invention. The treating and working of the fabric in this device will be explained with reference to the description of the device.

The device for treating and working the fabric comprises a main frame 1 having supporting legs, a motor support and suitable bearings. A tank 2 is supported by the main frame 1. The tank 2 preferably has a circular bottom 3 and a suitable drain valve 4. The tank 2 may be made of any suitable material, for instance, Monel metal, wood, steel, aluminum, etc. Adapted to rest on the curved sides of the bottom of the tank as shown in the drawing or supported by suitable brackets, may be a perforated plate 5. Between the bottom of the tank and the perforated plate 5 may be positioned a perforated steam or air pipe 6 connected to a suitable source of steam or air by means of the feed line 7. Perforations in the pipe 6 are preferably so positioned that the force of the fluid emitted from the pipe is directed at an angle toward the circular bottom of the tank as shown by the arrows 8. When employing steam in the pipe 6 the same may be employed to agitate the bath and also to maintain the bath at a desired temperature. When employing external heating means, for instance, an open flame, electrical heating element or jacket, to maintain the temperature desired, the pipe 6 and the perforated plate 5 may be dispensed with.

On a suitable stand 9, preferably carried on the main frame 1, may be mounted an electric motor 11 connected with a speed reducing and controlling device 12, which in turn drives a pulley 13. Mounted above the tank in suitable bearings 14 may be a shaft 15 on which is mounted a pulley 16. A suitable driving connection 17, such as a belt, chain, etc., may be employed for driving the pulley 16 from the pulley 13. Mounted on the shaft 15 are a plurality of hubs 18. Each hub 18 is adapted to support a star wheel having any suitable number of arms 19. The arms 19 of the various star wheels are connected to rods 21, thus producing an elongated noncylindrical fabric propelling rack. Also attached to the main frame is a suitable guide rod 22 that may be supported either rotatably or in locked relationship thereto. The functions of the guide rod 22 are to smooth out the fabric, cause a bending of the fabric and a rubbing of the same.

The guide roller 22 and the fabric propelling rack mounted on the shaft 15 are so positioned relative to each other and to the tank that as the fabric is pulled out over the guide roller 22 by the cloth propelling rack, there is a slight friction of the cloth on the guide roller 22. The friction of the fabric on the guide roller 22 should be just sufficient to cause the fabric to flatten out prior to passing over the fabric propelling rack mounted on the shaft 15. The position of the shaft 15 and the fabric propelling rack is such that the fabric leaving the rack and entering the bath flows into one side of the tank causing a bunching up of the fabric in the tank. The bunching of the fabric is preferably performed in such a manner that the fabric being pulled out of the tank by the fabric propelling rack is taken from the bottom of the bunched up fabric and caused to frictionally engage with itself.

In the operation of the device, the tank 2 is filled with a quantity of heated water containing a lubricant for the fibers of the fabric to be treated and the bath then heated to a sufficient treating temperature. The fabric is then threaded about the guide roller 22 and the fabric

propelling rack mounted on the shaft 15 and allowed to feed into the tank. The ends of the fabric are attached to each other, making an endless band, which upon rotation of the shaft 15 by the motor 11, passes continuously through the bath.

The treating bath preferably contains a lubricant for the fibers. The lubricant may consist of soap, a mixture of soap and an oil, or a mixture of soap and a sulphonated oil. Any suitable soap may be employed, for instance, the neutral sodium and potassium soaps of the vegetable and animal oils. In place of, or in connection with soap, other wetting-out agents may be employed. A preferred lubricant may be formed from two parts of olive oil soap to one part of sulphonated castor oil. Any suitable sulphonated oil may be employed with soap as the fiber lubricant, or it may be employed with soap and an unsulphonated vegetable, animal or mineral oil. Any suitable sulphonated vegetable or mineral oil may be employed. Examples of suitable sulphonated oils are sulphonated castor oil, sulphonated olive oil, sulphonated alkyl and aryl olefines, etc. Sulphonated alcohols, preferably those containing more than six carbon atoms, may be substituted for all or a part of the oily component of the fiber lubricant. This lubricant may be added to the bath in sufficient quantity that suds are present in the bath throughout the treatment. It is understood that the invention is not limited to the use of the particular soap and oil specified above but that any suitable lubricant may be employed. Although it is preferable to use soaps or wetting-out agents and oils or other types of lubricants which produce a neutral or slightly alkaline bath, such neutral or alkaline reagents are not essential. The pH value of the bath is not so important as the fact that the bath contains a lubricant for the fibers which is evidenced by the formation of suds.

The treating bath may, if desired, contain dyestuffs, thus accomplishing in one treatment, both the positioning of the animal fibers in the material and the coloration of the fabric. The dyestuffs may be dyestuffs having an affinity for the artificial fibers employed in the fabric or for the wool fibers or the dye material may be a mixture of dyestuffs so compounded as to dye both the animal fibers and the artificial fibers. When employing certain dye materials the same, quite often, exert a cutting action on soaps and sulphonated oils and thus remove their wetting-out and lubricating properties. Therefore, when employing these types of dyestuffs an additional quantity of soap and oil, sufficient to always maintain an active lubricant therein, should be added to the treating bath. In most types of baths about 2 grams of soap and 1 gram of sulphonated oil or sulphonated alcohol per litre of liquid will be found to give satisfactory results.

The temperature of the treating bath will depend upon the type of artificial materials employed. It has been found desirable, however, to employ temperatures between 160° F. and 195° F. when the fabric being treated contains fibers of a thermoplastic derivative of cellulose. The duration of the treatment depends upon the temperature used and may vary between one-half hour or less to eight hours or more. For instance, in treating a fabric consisting of a mixture of cellulose acetate fibers and wool fibers at 175° F., the length of treatment necessary to cause the wool to appear at the surface is three hours or less, while a treatment of eight hours produces a nap of wool fibers on the fabric.

The ratio of the amount of liquid to the amount of fabric is of importance. There should be used as much water as possible without floating the material. The preferred ratio of treating liquid to fabric is twenty parts or more by weight of a treating liquid to one part by weight of fabric. The ratio of treating liquid to fabric may be, however, from 15 or less to more than 60 parts of liquid to one part of fabric, depending upon the device used in treating the fabric.

As an illustration and not as a limitation, the following example is given:

Example

A treating bath is formed consisting of 4,800 parts of water, 96 parts of olive oil soap, 48 parts of sulphonated castor oil and the temperature of the same raised to 175° F. 250 parts by weight of fabric are immersed and worked in this bath maintained at 175° F. for from four to six hours. After rinsing the fabric is removed and dried and it is found to have a nap of animal fibers on the surface.

If desired, the fabric after having received this treatment to raise or place the animal fiber at the surface of the fabric, may be sheared, singed, or otherwise treated to remove these surface fibers. By this method, the fabric may be formed from yarns containing a mixture of animal fibers and artificial fibers and then by removing at least a part of the animal fibers produce a fabric in which the yarns are less compact and a fabric having a distinct hand.

It is to be understood that the foregoing detailed description and drawing are given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and artificial fibers the steps of repeatedly immersing and working the fabric in a heated path under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

2. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and organic derivatives of cellulose, the steps of repeatedly immersing and working the fabric in a heated bath under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

3. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and cellulose acetate, the steps of repeatedly immersing and working the fabric in a heated bath under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

4. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and organic derivatives of cellulose, the steps of repeatedly immersing and working the fabric in a bath maintained at about 160° F. under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

5. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and cellulose acetate, the steps of repeatedly immersing and working the fabric in a bath maintained at above 160° F. under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

6. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and artificial fibers, the steps of repeatedly immersing and working the fabric in an aqueous soap and oil bath maintained at about 160° F. under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

7. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and organic derivatives of cellulose, the steps of repeatedly immersing and working the fabric in an aqueous soap and oil bath maintained at above 160° F. under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

8. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and cellulose acetate, the steps of repeatedly immersing and working the fabric in an aqueous soap and oil bath maintained at above 160° F. under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

9. In a method of manufacturing fabrics containing yarns formed from a mixture of wool fibers and artificial fibers, the steps of repeatedly immersing and working the fabric in a heated bath under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of wool fibers in the surface of the fabric is increased.

DANIEL H. JONES.

CERTIFICATE OF CORRECTION.

Patent No. 2,125,925. August 9, 1938.

DANIEL H. JONES.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, lines 5 and 28, claims 4 and 6 respectively, for the word "about" read above; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of September, A. D. 1938.

Henry Van Arsdale

Acting Commissioner of Patents.

(Seal)

4. In a method of manufacturing fabrics containing yarns formed from a mixture of animal fibers and organic derivatives of cellulose, the steps of repeatedly immersing and working the fabric in a bath maintained at about 160° F. under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of animal fibers in the surface of the fabric is increased.

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9. In a method of manufacturing fabrics containing yarns formed from a mixture of wool fibers and artificial fibers, the steps of repeatedly immersing and working the fabric in a heated bath under such conditions that it bunches upon itself in the bath and the folds frictionally engage each other, withdrawing the fabric from the bath and frictionally engaging the same with a roller so as to flatten the fabric, whereby the proportion of wool fibers in the surface of the fabric is increased.

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