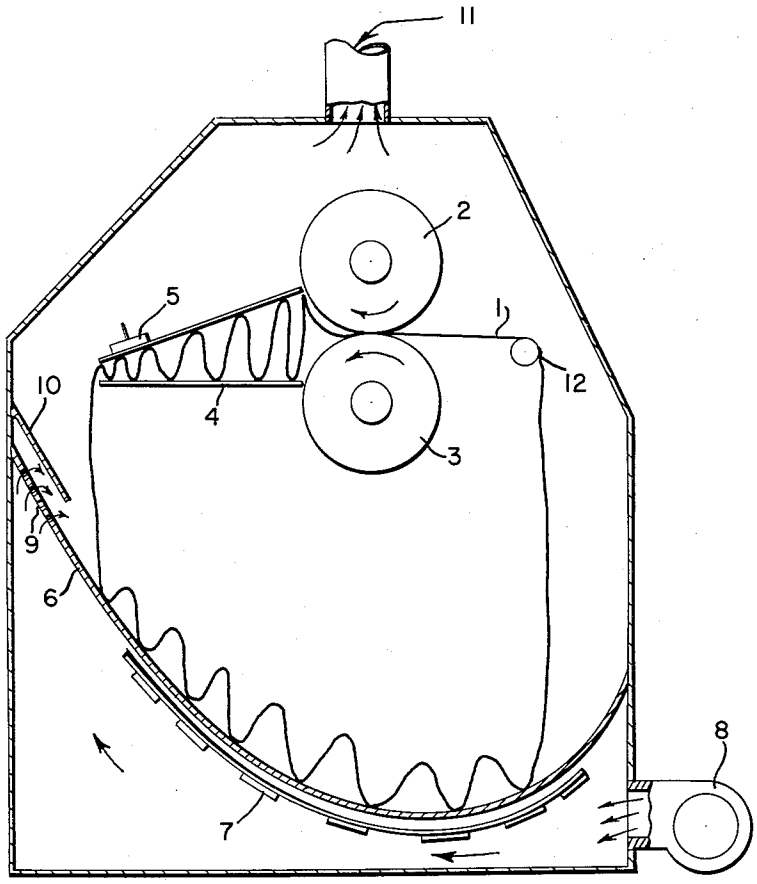
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PROCESS OF COMPRESSIONAL WORKING TEXTILE FABRICS

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PROCESS OF COMPRESSIONAL WORKING TEXTILE FABRICS

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4 Claims. (Cl. 26—1)

This invention relates to a process. More specifically it relates to a process for finishing a fabric containing a high proportion of man-made fiber.

By the term "fabric containing a high proportion of man-made fiber" is meant a fabric structure woven, non-woven or knitted from yarn containing at least about 60% of a man-made staple. By "man-made staple" is meant staple prepared from extruded regenerated cellulose, cellulose acetate, a polyamide, a polyester, a polyacrylonitrile, a polyurethane or the like.

An object of the present invention is to provide a novel finishing process for a fabric containing a high proportion of man-made fiber.

Another object is to provide a softening process for a fabric containing a high proportion of man-made fiber.

These and other objects will become apparent in the course of the following specification and claims.

In accordance with the process of the present invention a fabric containing a high proportion of man-made fiber and wet out with water is subjected to compressional working at a temperature of between about 100° and 210° F. for a period of at least about one hour.

The invention will be more readily understood by reference to the drawing.

The single figure is an illustration of an apparatus suitable for applying compressional working in accordance with the teachings of the present invention. In the drawing a fabric **1** in rope form with its selvedges tacked together is subjected to compressional working by stuffing it by means of feed rollers **2** and **3** into spout **4** against the resistance of adjustable top weight **5**. When the spout fills to capacity the fabric spills onto bottom plate **6**, the bottom plate being heated by strip heaters **7**. As the fabric passes over the bottom plate it is heated further by a blast of hot air which originates at blower **8**, passes through the bottom plate perforations **9** and is directed onto the fabric by deflection plate **10**. Air flow is exhausted at vent **11** and recirculated to the blower. The fabric is lifted over guide **12**, being drawn from the bottom plate by action of feed rollers **2** and **3** previously described.

The following examples are cited to illustrate the invention. They are not intended to limit in any manner. In the following examples flexural rigidity and bending length, which are a measure of the stiffness of the fabric are determined by the "hanging heart" method described in the Journal of the Textile Institute, 21, T 377 (1930), and performed as described by Hoffman and Beste in Textile Research Journal, 21, 66 (1951). The liveliness (i.e. recovery from bending) and intrinsic liveliness (compensating for the effect of stiffness upon liveliness and expressed as

$$\frac{L}{\sqrt{G}}$$

are determined by the method described by Hoffman and Beste in Textile Research Journal, 21, 69–71 (1951).

Example I

A 10 oz. per yard hound's tooth fabric is woven in a 50 x 50 loom count from 30/2 cotton count yarn, 17 **Z** turns per inch in the singles and 21 **S** turns per inch in the ply, spun from 3 denier per filament 2½ inch staple of a copolymer containing 94% acrylonitrile and 6% methyl acrylate. The fabric is noted to be thready and lack resilience. Fifteen yards of the fabric are treated in the apparatus described in the single figure. Temperature of the air is regulated to 180° F. Prior to loading, the fabric is immersed in an approximately 15% aqueous solution of sodium oleate. It is loaded without wringing. It is fed through the apparatus at a rate of 70 yards per minute and is subjected in the spout to a compressional load of about 5 pounds per square inch. After one hour of treatment the fabric is removed and noted to have lost all traces of threadiness. Improvement in resilience is noted.

Example II

A 4 oz. per yard fabric woven in a plain weave has a 98 x 46 loom count, using as warp yarns 40/1 cotton count having a twist of 20½ turns per inch **Z** and 50/2 cotton count filling, the singles twist having 25 **Z** turns per inch and the ply twist 17.8 **S** turns per inch, the yarns being spun from 2 denier per filament, 1½ inch staple of a copolymer 94% acrylonitrile and 6% methyl acrylate. The fabric as manufactured has a harsh hand. It is subjected to the compressional working as described in Example I for one hour at a temperature of 200° F. The resulting fabric is exceptionally soft and possesses a luxurious hand. Laboratory characteristics of the fabric are as follows:

	Unworked	Worked
Average Bending Length (cm.)	1.39	1.20
Average Flexural Rigidity, G (mg./cm.)	32	23
Liveliness, L (cm./sec.)	35	38
$\frac{L}{\sqrt{G}}$	6.2	7.9

Example III

A 6 oz. per yard fabric having a plain weave is woven in a 48 x 44 loom count from a 2/44 worsted count having a twist of 16 **Z** turns per inch in the singles and 20 **S** turns per inch in the ply, spun from 3 denier per filament, 2½ inch staple of polyethylene terephthalate. The fabric as prepared is very thready and boardy. After compressional working for 60 minutes at 200° F. following the technique of Example I, laboratory observations are made as follows:

	Unworked	Worked
Average Bending Length (cm.)	1.72	1.52
Average Flexural Rigidity, G. (mg./cm.)	104	73
Liveliness, L (cm./sec.)	72.7	81.4
$\frac{L}{\sqrt{G}}$	7.1	9.5

Example IV

A 7 oz. per yard 3 x 2 twill fabric having a 110 x 66 loom count is woven from 26/2 cotton count warp yarn having a **Z** twist of 18 turns per inch in the singles and 13.9 **S** turns in the ply and 23/1 cotton count filling having a **Z** twist of 17.3 turns per inch, spun from a 3 denier per filament 1½ inch staple of polyethylene terephthalate. This fabric is boardy and harsh to the touch. After compressional working for one hour at 180° F. in accordance with the technique and with the apparatus

of Example I, the fabric is observed to become soft. Handle, drape and resilience are noted to be improved. Laboratory characteristics are as follows:

	Unworked	Worked
Average Bending Length (cm.)	1.78	1.72
Average Flexural Rigidity, G. (mg./cm.)	132	125
Liveliness, L (cm./sec.)	77	112
$\frac{L}{\sqrt{G}}$	6.7	10.0

While it is known in the art to apply compressional working to woolen and worsted fabrics, normally at room temperature, it has not hitherto been recognized that highly beneficial results can be obtained by compressional working of fabrics containing a high proportion of man-made fibers as taught in the present invention. As can be seen from the above examples such compressional working results in improvement in fabric handle, drape and resilience. Softness and slickness are also improved.

The apparatus employed to attain compressional working may be of any type commonly used in the milling or fulling of woolen or worsted fabrics. This may be accomplished by mechanical beating or even by such primitive methods as treading upon the moistened warm fabric. Apparatus as illustrated in the figure wherein the compressional working is attained by stuffing the fabric in a weighted box is preferred due to the ease with which process conditions can be controlled.

While the examples are limited to fabrics in hounds tooth, twill and plain weaves, the type of weave is not critical. Many other weaves such as basket, oxford and herringbone may be employed. Furthermore, the improvements can be attained in knitted fabrics. The fibers from which such fabrics amenable to the present process may be prepared include all man-made fibers such as those prepared from regenerated cellulose, cellulose acetate, polyacrylonitrile, polyamides, polyurethanes, polyesters, polysulfonamides and the like. Furthermore, fabrics from blends of two or more fibers may be used. As much as 40% wool and other natural fibers may be present in such blends.

The optimum period of compressional working will be dependent upon the temperature and the presence and nature of the lubricant employed. Generally a temperature of about 100° F. to about 210° F. is required to attain the beneficial results desired. In general, a temperature of between about 150° F. and 210° F. is preferred for fabrics in which there is no wool. A temperature between about 100° F. and 160° F. is preferred for wool containing fabrics. Within these temperature ranges a compressional loading when performed in the apparatus described in the figure will be preferably between about 60 minutes and 120 minutes to obtain optimum balance of properties in the treated fabric.

While the presence of a lubricant in addition to aqueous wetting of the fabric is not essential, it is preferable to employ one because its presence usually results in a shorter period of compressional working. Among many suitable materials useful as lubricants are included green soap, synthetic detergents, acids, alkalis, Turkey red oil, silicones and the like. An aqueous paste of green soap is preferred.

Many obvious modifications will be apparent to those skilled in the art without a departure from the inventive concept.

What is claimed is:

1. A process for finishing a fabric, the fibers of the yarn of which are members of the class consisting of man-made and vegetable fibers, the said fabric containing at least 60% of the said man-made fiber, which process comprises wetting out the said fabric with water and thereafter subjecting the said wetted fabric to compressional working in a gaseous medium at a temperature between about 100° F. and 210° F. for a period of at least one hour.

2. The process of claim 1 wherein the man-made fiber is formed from a synthetic polymer.

3. The process of claim 2 wherein the temperature is maintained at 160° F.

4. The process of claim 2 wherein the temperature is between 150° F. and 210° F.

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