Feb. 12, 1957 R. C. WILKIE 2,780,838

TEXTILE FIBER PACKAGE

Filed April 19, 1954 3 Sheets-Sheet 1

FIG. 1

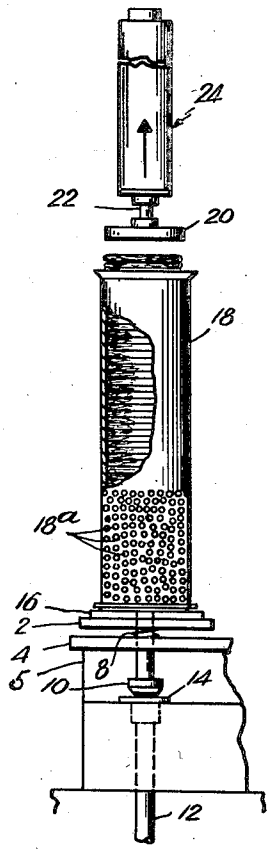


FIG. 2

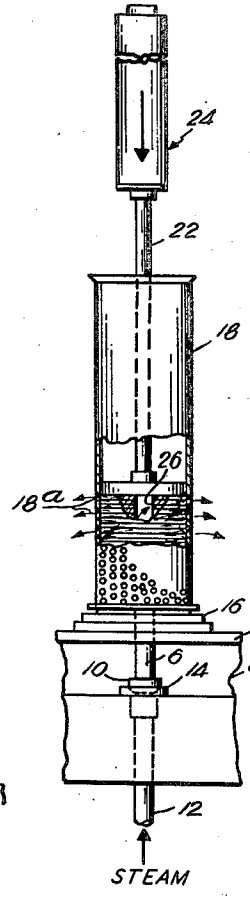


FIG. 3

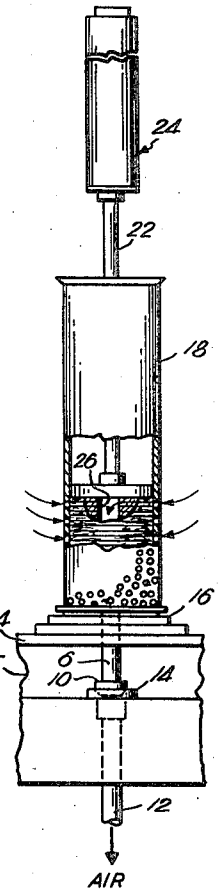


FIG. 4

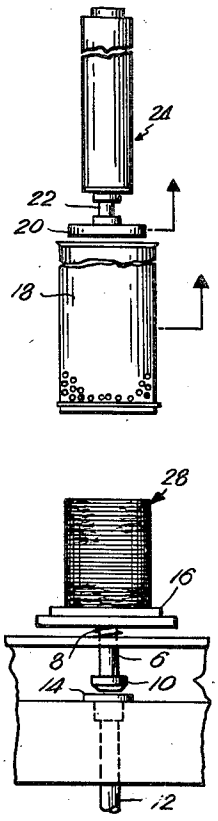


FIG. 5

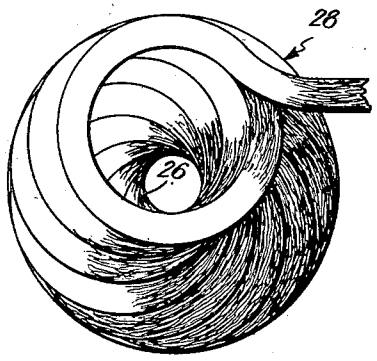
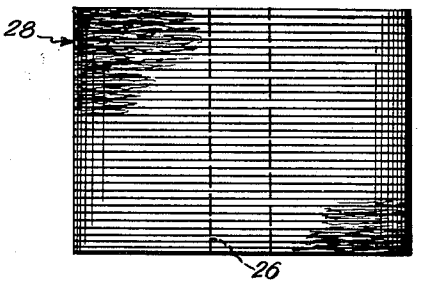


FIG. 6



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Feb. 12, 1957 R. C. WILKIE 2,780,838

TEXTILE FIBER PACKAGE

Filed April 19, 1954

3 Sheets-Sheet 2

FIG. 7

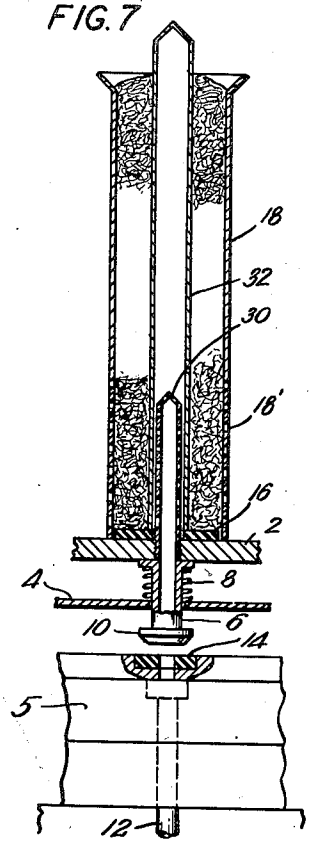


FIG. 8

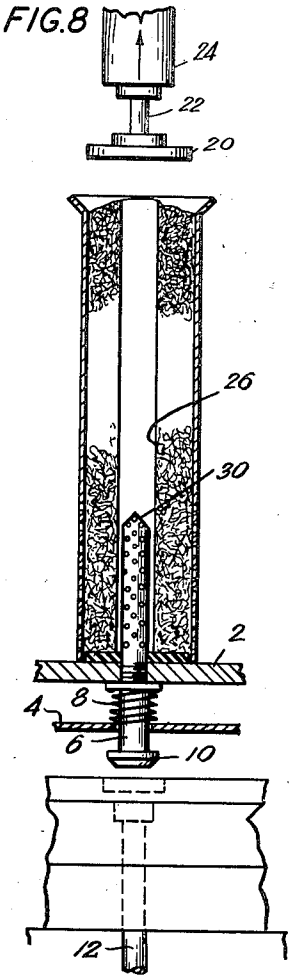


FIG. 9

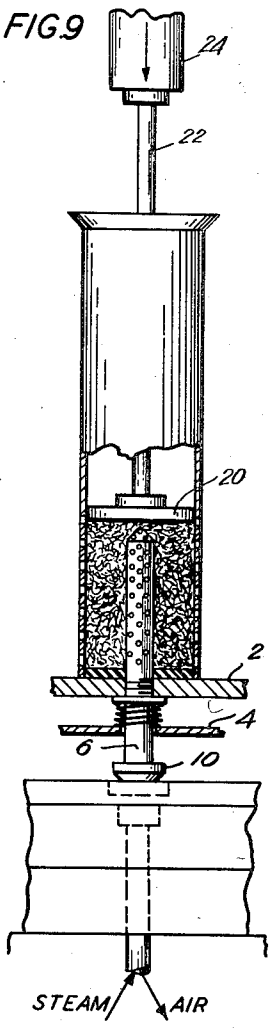
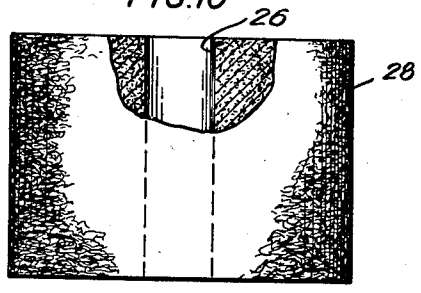


FIG. 10



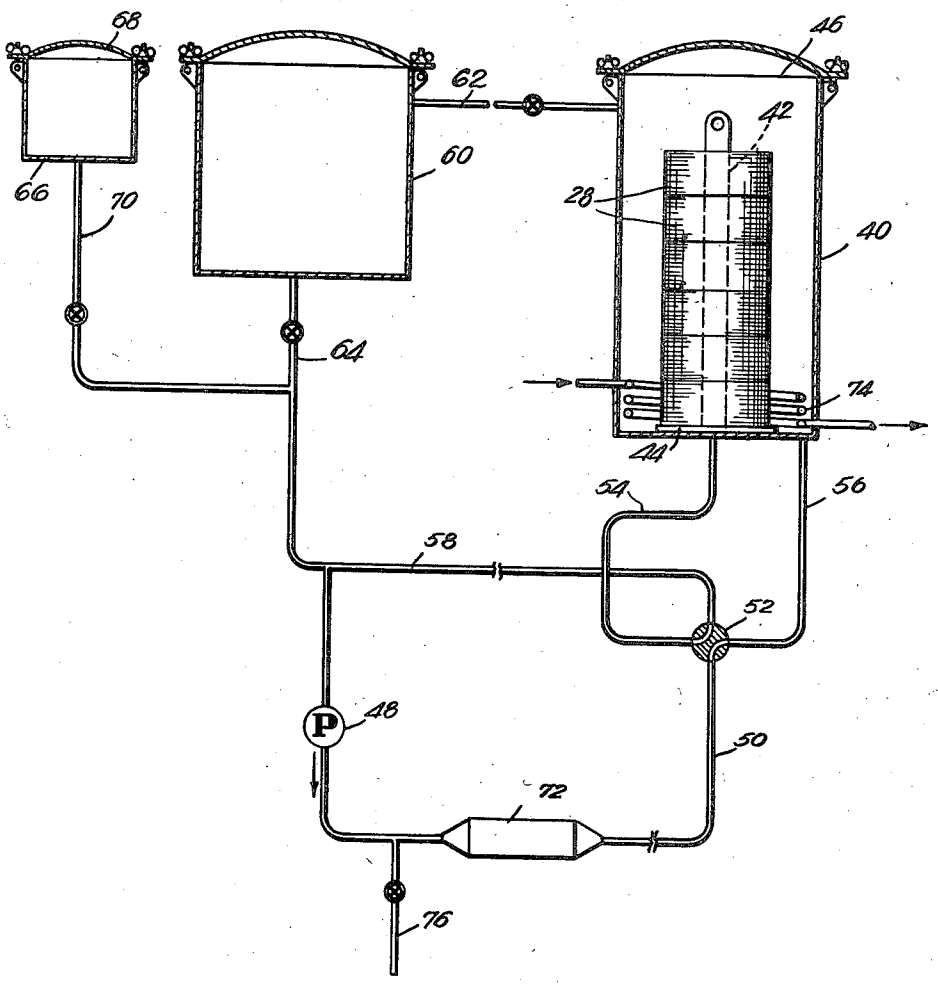
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Feb. 12, 1957 R. C. WILKIE 2,780,838

TEXTILE FIBER PACKAGE

Filed April 19, 1954 3 Sheets-Sheet 3

FIG. 11



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2,780,838

TEXTILE FIBER PACKAGE

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Application April 19, 1954, Serial No. 423,986

5 Claims. (Cl. 19—66)

The present invention relates to the handling and liquid treating of textile fibers, and more particularly the invention relates to a package of textile fibers in either sliver or bulk form of such a character as to facilitate subsequent dyeing or other liquid treatment of the fibers.

Heretofore one practice in the processing of wool to top has been to process the fibers into the form of a strand, as a sliver, and then to form the combed wool sliver into tightly wound balls weighing about 12 pounds and to wrap these balls in paper and store them for as long a period as possible, depending on the economic policies of the user. This storage period served the purpose of causing the fibers to become more dormant and less springy, due to the tension and compression of the wind causing the fibers to assume their tensioned form to a more or less permanent degree depending on the duration of the ageing period. Such loss of springiness of the fiber insures a greater degree of control in subsequent drawing operations and, hence, better operating efficiency and better quality, reflected in a more uniform and stronger yarn. However, by the practice involving winding the sliver into balls these advantages cannot be fully realized due to the excessive cost and risk of having large quantities of valuable material in storage for many months.

Whenever reference is made herein to dyeing it will be understood that dyeing is referred to as representative of liquid treating processes to which textile fibers are to be subjected. In dyeing, or otherwise liquid treating sliver in the form of such balls, it has been a preferred practice to force several of the balls on to a perforated spindle and then immerse the loaded spindle in a tank and pass the dye (or other liquid) through the fibers by forcing it to flow through the perforated spindle, either inwardly or outwardly, or both. With this procedure it has been extremely difficult to produce a uniform distribution of the color or chemical. Forcing of the balls on to the spindle causes a good deal of damage to the fibers and distortion of the sliver. The fibers nearer the spindle tend to filter treating liquid flowing from the spindle, lessening its effect on fibers located farther from the spindle, and vice versa when flow is in the opposite direction. Further, the liquid flowing through the ball from or toward the holes in the spindle tends to "channel" due to the fact that balls from different winding machines vary in the pattern and tightness of wind, and because it is impossible to compress the balls on a spindle with any substantial degree of uniformity with respect to density within a given ball or from top to bottom of the spindle. Consequently, as the dye liquor or other liquid is forced through the balls under very high pressure some portions of the balls have a greater concentration of dye or chemical applied than other portions. With such balls, any color or chemical distribution-gradient due to the filtering action of the fibers or to "channeling" is distributed over some 300 yards of sliver so that many subsequent doublings and

draftings are required to bring the entire batch to a uniform condition.

When processing wool, the difficulties mentioned above are serious, but when dealing with various synthetics, such as rayon, nylon, Orlon, Dacron, etc., the problems are magnified many times, and also new ones appear. For instance, in the case of viscose rayon, the fibers are very slippery and only by winding under high tension can a compact ball be made, and then only up to a certain size, when the sliver starts to slip sidewise. Viscose swells when wet, and tightly wound balls pressed on to a spindle become such a solid block of material due to the swelling action that great difficulty is encountered in forcing any liquor through the package and in removing the treated balls from the spindle.

An alternative prior practice has been to wind the sliver directly on a spindle and to place 6 or 8 such spindles in a dye bath, usually with about 20 pounds of fiber on each spindle. With this procedure, the uniformity of liquid treatment can be appreciably improved if the diameter of the spindle is made large enough, but then fewer yards of material can be wound on a spindle, necessitating a very large and expensive kettle to accommodate a sufficient number of spindles to make the system economically feasible. With certain fibers, such as viscose, so much swelling of the fiber occurs that the sliver would have to be wound so loosely as merely to slide down to one end of the spindle when it is turned on end in the bath.

The present invention overcomes the foregoing difficulties both as respects ageing of the fibers to reduce their springiness and as respects high quality uniform dyeing (or other liquid treatment) of the fibers, whether in the form of sliver or raw stock. By raw stock I mean fibers in any form before they have been given any treatment or mechanical manipulation leading to the production of a continuous strand, such as loose wool, noils, "broken top," cut staple or cut man-made fibers. To obtain the advantages of storing the wool in tightly wound balls, and the advantages of package dyeing on spindles, as described, it has heretofore been necessary first to form the fiber into a strand such as a combed sliver. According to my invention, the fibers can be "aged" and can be package dyed in either raw stock or strand form. I provide a package of raw stock which can be dyed like sliver, i. e., on spindles under pressure, which never has been possible before. The fibers of my packages have, without ageing, all of the advantages of aged fibers for use in any system of yarn-forming operations.

In addition, the present invention provides other advantages. The packages of my invention occupy much less space for a given weight than any known before, with substantial savings in shipping and storage costs. The packages when placed in cartons lend themselves to handling by the pallet system with automatic machinery, leading to substantial savings in labor costs. Further, since storage for protracted periods no longer is required, the expense and risk of warehousing, formerly required for ageing, are eliminated.

The invention is applicable to textile fibers in the form of raw stock, as has been pointed out, or to packages of fibers in the form of sliver. In processing of sliver I prefer to start with packages of sliver arranged in evenly compacted symmetrically placed coils disposed eccentrically of the package, each coil turn lying in part adjacent the outside of the package and in part adjacent to but spaced from the opposite side of the axis of the package, providing an axial opening or passageway through the package, such as the packages produced by the process and apparatus described in Wilkie Patent No. 2,478,960, dated August 16, 1949.

In accordance with the invention, such packages of sliver, or masses of fibers before being formed into strand form, containing from 25 to 70 pounds of fiber, are compressed into the form of a right circular cylinder having an axial opening or passageway therethrough and flat surface at its ends. I perform such compression under very high pressures, in excess of about 15 pounds per square inch, as with a hydraulic ram, to reduce the mass of fibers to a volume which is from two-fifths to one-quarter, or less, the volume of the uncompressed fibers. Then, while the fiber is confined under such high pressure, a hot fluid, such as hot air or hot water, or, preferably, steam at low pressure, is forced through the package for from about ½ minute to about 2 minutes by flowing it under pressure into the passageway in the middle of the package, and radially outwardly through the fibers, or vice versa. Following the steaming treatment, air (or other fluid) at room temperature or lower temperature is caused to flow among the fibers, as by passing it under pressure inwardly of the side wall of the package, through the fiber, and out at one end of the passageway, for from about 3 to about 5 minutes. This treatment cools the fibers and when air is employed, removes free moisture. These operations of steaming followed by cooling of the fibers while they are under compression sets the fibers in their compressed form and reduces the normal springiness thereof so that when the compressive force is removed the packages retain their form and size.

Thereafter the compressive force is removed and the packages are transported to temporary storage or to other points at which they are to be further processed, as by dyeing, liquid treating, or processed through further textile operations, such as drafting, etc.

A form of apparatus by which the packages may be manufactured and the principal steps and features of the manufacturing procedure, and of subsequent liquid treating operations which the product makes possible, as applied both to raw stock and to a sliver package, are illustrated in the accompanying drawings, wherein:

Fig. 1 is an elevation of apparatus for forming my novel package from packages of sliver, showing the position of parts at the beginning of the operation;

Fig. 2 is similar to Fig. 1 but illustrates a later step in which the package is compressed and undergoing steam treatment;

Fig. 3 is similar to Fig. 2 but illustrates the subsequent cooling and drying step;

Fig. 4 shows the apparatus of Fig. 1 at the end of the process with the completed package in position for removal;

Fig. 5 is a plan view of a finished package of sliver;

Fig. 6 is a side elevation of the same;

Fig. 7 is a vertical elevation partly in section of a modified form of apparatus for use in forming my packages from raw stock or top;

Fig. 8 is similar to Fig. 7 but illustrates a subsequent step in the operation;

Fig. 9 is similar to Fig. 8 but illustrates the subsequent compressing step;

Fig. 10 is an elevation partly broken away of the completed package of fibers in the form of raw stock, as produced by the apparatus of Figs. 7, 8 and 9; and

Fig. 11 is a diagrammatic view, partly in vertical cross section, illustrating the process of liquid-treating the completed packages on spindles, under pressure.

Referring to Figs. 1–4 of the drawings, the apparatus comprises a platform 2 supported for vertical movement on a carriage 4 which may be moved horizontally on the base 5 of the machine. A hollow tube 6 is supported on and passes through the platform 2, and, surrounding the tube 6, a coil spring 8 normally holds the platform 2 spaced above the carriage 4. This apparatus is described in more detail in my prior copending application Serial No. 208,562 filed January 30, 1951 now Patent No. 2,707,806, May 10, 1955, and also is described in my prior application Serial No. 359,602, of which the present application has been filed as a division in response to a requirement of restriction. As used in mill practice, the platform 2 is arranged to be moved horizontally over the base 5 by the carriage 4 to selectively position the lower, enlarged end 10 of the tube 6 above and in axial alignment with a steam, liquid, or air conduit 12 passing upwardly through the base 5. The conduit 12 has at its upper end a resilient pad 14 (Fig. 7), e. g. of rubber or neoprene, to serve as a seat for the lower end 10 of the tube 6, whereby an air and steam-tight seal between conduit 12 and tube 6 is established when the platform 2 is moved downwardly against the force of spring 8 during the step of compressing the fibers.

On its upper face the platform 2 is provided with a pad 16 of rubber or other resilient flexible material providing a vapor-tight joint between the bottom of the package of fibers and the platform 2, whereby escape of steam or entry of air at this point is prevented, thus assuring a radial flow of steam or air through the package. Desirably, as shown in Fig. 7, this pad may be of such a diameter as to snugly fit inside the lower end of the can 18, next to be described.

A hollow open-ended cylinder or can 18 having perforations 18*a* in the lower part of its wall is provided to be placed on platform 2 and around or on the flexible pad 16 to hold the fibers during the compression operation. The compression operation is performed by a hydraulic ram disposed above the top of can 18 and in axial alignment with the conduit 12. This ram comprises a head 20, slightly smaller than the inside diameter of the can, carried on a vertically movable plunger 22 which is adapted to be operated by the admission of fluid above or below a piston (not shown) in the hydraulic cylinder 24, in a conventional manner.

When an empty can 18 has been placed upon the platform 2, a package of sliver, for example the package of sliver which is the product of the apparatus disclosed in said Wilkie Patent No. 2,478,960, is placed within the can. The carriage 4 is then moved on the base 5 to position the can beneath the ram head 20 and with the tube 6 aligned with the conduit 12. Thereupon the apparatus is operated to move the ram head 20 downwardly into the position of Fig. 2, thus moving the platform 2 downwardly against the force of the spring 8 to seat the tube end 10 on the seat 14, and to compress the fibers as shown to a volume which is of the order of less than two-fifths its original volume. I have found pressures of the order of 30–60 or more pounds per square inch give good results, although in some cases with some fibers pressures as high as 106 pounds per square inch have been used. This compressing action results in slight compression of the deformable pad 16 and thus the formation of a vapor-tight seal between the lower face of the package of fibers and the tube 6.

Turning now to Figs. 7, 8, 9 and 10, when the fibers to be treated are in the form of raw stock a modified form of the apparatus just described is employed, as shown in these figures. A carriage 4 is provided, as before, horizontally movable on a fixed base 5, and a platform 2 is carried on the carriage 4 for vertical movement with respect thereto. The tube 6 having an enlarged lower end 10 is fixed on and moves with the platform 2, and the platform is urged upwardly by a coil spring 8 surrounding the tube between the platform and carriage. The sliver package referred to in connection with Figs. 1–6 has an open-ended axial passageway therethrough but in the case of the raw stock or top such a passageway must be provided. For this purpose a perforated tubular spindle 30 is provided on the platform 2 to extend upwardly from the tube 6. A light tubular member 32, which may be of light inexpensive material, is provided to be placed over the spindle 30 as shown in Fig. 7. With a perforated can 18 in position on the

platform with its lower end surrounding or resting upon the resilient pad 16, the loose stock, which first has been carefully weighed to assure uniformity from package to package, can be readily filled into the can about the tube 32, by hand or by machine, and pressed downwardly, to pack it sufficiently to cause it so far to maintain its form as to retain an open passageway through its middle as the tube 32 is removed by drawing it upwardly out of the mass of fibers, as in Fig. 8.

With the can thus loosely filled with fibers, the carriage 4 is operated as before to bring the can and the tube 6 into axial alignment with the ram head 20 and the conduit 12. The ram is then lowered and as it descends the fibers are compressed into the space between the spindle 30 and the lower, perforated, portion 18' of the can. The spindle 30 is of a length such as to clear by a small distance, for example ¼ inch, the ram head 20 in its lowermost position. Preferably its upper end is pointed as shown to facilitate downward movement of the fibers while preserving the central passageway provided by the nozzle 30. The thin layer of fibers which may remain at the top of the package across the passageway may be readily pushed through.

As before, downward movement of the ram head 20 moves the platform 2 downwardly against the force of spring 8 and with it the tube 6 into seating relationship with the pad 14 surrounding the conduit 12.

When the ram has reached its lower position, both in the case of the apparatus of Fig. 2 and of that of Fig. 9 just described, the ram is held in this lower position to maintain the fibers under compression while they are set in their compressed form. For this purpose the apparatus is operated to admit steam to the conduit 12 so that it flows upwardly through tube 6 and into the passageway 26 in the package, providing steam at a substantially uniform pressure throughout the length of this passageway and, therefore an equal flow of steam outwardly through the mass of fibers at all points from end to end of the package. The steam escapes from the can 18 through the perforations 18*a*. After the desired interval, which may be from about 15 seconds to about 2 minutes or more, the apparatus is operated to discontinue the steam flow and to apply a negative pressure to the conduit 12, whereupon air flows inwardly throughout the perforations 18*a*, as indicated in Fig. 3, into the opening 26 and out through the conduit 12 to cool the fibers and remove free moisture. When adequate cooling has taken place, in about 3 to about 5 minutes, depending upon conditions, pumping of air is discontinued.

The ram is then operated to raise the head 20 clear of the can 18. The can is removed by lifting it upwardly, as shown in Fig. 4, first moving the platform 2 sidewise, if desired, out of the way of the ram and beneath a hoist, which is used for lifting the can, thus leaving the compressed cylindrical package on the platform in exposed position, readily accessible for removal by the operator. The compressed fibers remain in their compressed condition and the package retains its compressed small size and form as is illustrated in Figs. 5 and 6 for the sliver package and in Fig. 10 for the raw stock package, respectively.

I have found that this procedure is applicable for the production of the compressed packages of this invention from textile fibers of all types, cellulosic fibers, raw or scoured wool fibers or synthetic fibers. It has been used successfully with wool, cotton, regenerated cellulose (both viscose and cuprammonium) Dacron, cellulose acetate, Vicara, nylon and Orlon. The raw stock used in my process may be a heterogeneous mass of fibers just as they come from the bale, scouring equipment, or picker.

The completed package, as shown in Figs. 5, 6 and 10, occupies a space which is of the order of less than two-fifths the volume of the fiber in its normal condition, in the form of raw fiber, top, sliver, or roving, as in Figs. 1 and 7. This small size is retained by the package due to the described steaming and cooling treatment, under all normal conditions of atmospheric humidity and temperature so that all of the described advantages in handling, shipment and storage are fully realized.

In addition, the package, whether of sliver or raw stock, has the advantage that it can be dyed by use of the Hussong, Riggs and Lombard, Venango, Smith-Drum, Morton, Frederics, Franklin, Obermeier or similar systems, either open or pressure tight, by stacking the packages on a perforated spindle which is passed through the open-ended axial passageway in the package without damage to the fiber by fiber breakage and without disturbing the integrity of the individual strands of fibers.

For use in illustrating this advantage of the package I have selected the simplified representative pressure dyeing apparatus shown in Fig. 11, in which the dye kettle is indicated at 40. The system illustrated is a closed system and the kettle 40 is provided with a tightly fitting removable head 46. The perforated hollow spindle 42 which passes through the axial passageway of each of the packages 28 is provided with means 44 at its lower end for supporting the packages so that the spindle and assembled packages can be lowered into the kettle as a unit. Dyestuff or other chemical treating liquid is continuously circulated under pressure through the packages by means of a pump 48, discharge line 50, 4-way valve 52 and selectively, by adjustment of valve 52, either through line 54 which leads to the interior of the spindle or through line 56 which leads into the kettle outside the packages. After flowing through the fibers the liquid returns to the pump through line 56 or line 54, depending upon the setting of valve 52, and thence through the intake line 58. A closed expansion tank 60 is connected to the top and bottom of the kettle through valved lines 62 and 64 respectively, the latter line communicating with the kettle through 4-way valve 52 and either line 54 or line 56. Provision for adding materials to the kettle while keeping it under pressure is provided by a tank 66 having a tight fitting cover 68 and connected into the kettle through a valved line 70. A heat exchanger 72 may be provided in the circulating line for controlling the temperature of the circulating liquid and, usually, steam and cold water coils 74 also are provided within the kettle 40.

In practice, up to 6 packages are placed on a single spindle, providing a total load of 270 lbs. or more per spindle. The spindle or spindles are then placed in kettle 40 and a treating liquid, for dyeing or other chemical treatment, is pumped under pressure through the packages, as by pumping the liquid through line 54 into the spindle, from which it flows outwardly through the perforations of the spindle and through the fiber. Alternatively, if line 56 is connected by valve 52 to the pressure side of the pump, liquid flows inwardly through the packages, through the perforations and into the spindle from which it is pumped back into the kettle. The liquid may be caused to flow alternately in each of these directions. With packages of raw stock I prefer to circulate the treating liquid continuously in the same direction and inwardly of the packages, that is, into the kettle through line 56.

The time required for dyeing or other liquid treatment is markedly reduced as contrasted with prior processes—in dyeing of wool the cycle can be reduced by ½ or more.

The symmetrical arrangement of the coils of the sliver packages and the fact that all packages on a spindle are identical, together with the fact that the packages are perfectly cylindrical in shape with bottom and top surfaces well squared off and perpendicular to the axis of the package and to the perforated spindle, provide an extremely uniform distribution of liquor. The packages fit uniformly one against the other and in practice channeling

of the liquor is rarely observed even under relatively high pressures. In the rare event that there is a difference in color (or chemical distribution) from the inside to the outside of the package, the whole range of color (or chemical) differential extends over only about 18" of sliver, as contrasted with 300 yards or more in prior practice with wound balls, with the result that it is relatively easy to bring all of the wool of a large batch to a uniform color, or to a uniform condition or degree of chemical treatment, with very few drafting or other operations. It has been found that hydrophobic fibers, such as nylon, when formed into a package and dyed according to this invention can be processed into cloth with an astonishing uniformity of color distribution over hundreds of yards of cloth, which can be accomplished only with great difficulty, if at all, by prior stock-dyeing or piece dyeing methods.

As a result of the larger amount of fiber in a given volume which is made possible by my package, it is possible, I have found, to reduce the amount of dyestuff and dye assistants employed to obtain a given desired shade. As the dyestuff is a costly element in the dyeing operation, this reduction is economically important. At the same time, the liquor ratio of the bath can be reduced, that is, the total amount of liquid based on the weight of the fiber can in my process be reduced by as much as 75%, while still obtaining equally satisfactory results.

In addition, my package provides the possibility, for the first time in the practical art so far as I am aware, of dyeing raw stock or top under pressure conditions. While this is advantageous with all fibers, it is of particular significance in connection with some of the synthetic fibers, e. g., Orlon, in providing the poossibility of producing shades and effects which cannot be obtained with these difficulty dyeable materials at atmospheric pressure.

With fibers which swell excessively when wet, such as some of the cellulosic fibers, I have found that, with my package, such swelling is not detrimental, which result I attribute to the fact that the pressure exerted by the swelling fiber is in a radial direction coupled with the fact that my arrangement of the fibers, particularly of the coils when laids as shown in Fig. 5, allows for relatively free movement, as contrasted with the conventional wool balls, even though the packages are closely confined top and bottom on the spindle. Therefore, any swelling of the individual fibers results only in an increase in diameter of the package with no apparent increase in the density of the package and, thus, no increase in difficulty of liquor penetration or in difficulty in removal of the package from the spindle.

It has been found that a batch of fine wool weighing 30 pounds when formed into my package occupies as little space as the old conventional 12 pound ball. With coarse wools and certain synthetic fibers the volume reduction is even greater, as much as 50 pounds or more of fiber being contained in this same space.

In the worsted industry it has not been common heretofore to dye the wool in the form of raw stock for the reason that it has not been economically possible to dye as large an amount of wool in this form at one time as can be done with sliver, yarn or piece goods. Ordinarily, also, the mills do not dye raw wool for the worsted system because of the loss due to colored noils which are almost worthless. My package now makes it possible to dye raw stock wool, or other fibers, by the methods applicable to sliver—which never could be done before.

The present application is a continuation-in-part of my prior application Serial No. 208,562 filed January 30, 1951 now Patent No. 2,707,806, May 10, 1955, and is a division of my prior application Serial No. 359,602 filed June 4, 1953.

I claim:

1. A compressed package consisting of textile fibers modified by treatment by heating and cooling under compression, said package being cylindrical in shape with flat ends at right angles to the axis of the cylinder and having an open-ended axial passageway therethrough, the volume-to-weight ratio of the package being less than two-fifths that of an uncompressed package of the same fibers, said fibers being, as a result of the heating and cooling treatment, set in a dead and dormant condition characterized by a lack of their normal springiness, the package having the property of remaining, under normal handling and atmospheric conditions, in its compressed form and size without support, and the fibers being well adapted, without ageing, for yarn forming operations.

2. A compressed package consisting of 25 to 70 pounds of textile fibers modified by heating and cooling under compression, the volume-to-weight ratio of the package being less than two-fifths that of an uncompressed package of the same fibers, said fibers being, as a result of the heating and cooling treatment, set in a dead and dormant condition characterized by a lack of their normal springiness, the package having the property of remaining under normal handling and atmospheric conditions in its compressed form and size without support, the fibers being well adapted for drawing and spinning without ageing, and the package being cylindrical in shape with flat ends at right angles to the axis of the cylinder and having an axial passageway therethrough, the package of fibers being adapted to be dyed by flowing dyestuff radially through the package and through said opening under pressure with the production of exceptionally level dyestuff distribution, both radially and from end to end of the package.

3. A compressed package consisting of treated textile fibers modified by treatment by heating and cooling under compression, said package being cylindrical in shape with flat ends at right angles to the axis of the cylinder, said fibers being in the form of a sliver arranged in evenly compacted symmetrically arranged coils disposed eccentrically of the package, each coil turn lying in part adjacent the outside of the package and in part adjacent to but spaced from the axis of the package on its opposite side, providing a central passageway extending through the package along said axis, the volume-to-weight ratio of the package being less than two-fifths that of an uncompressed package of the same fibers, said fibers being, as a result of the heating and cooling treatment, in a dead and dormant condition characterized by a lack of their normal springiness, the package having the property of remaining, under normal atmospheric conditions, in its compressed state, and the fibers being well adapted for drawing and spinning without ageing.

4. A compressed package consisting of 25 to 70 pounds of treated wool or wool-like textile fibers modified by treatment by steaming and cooling under compression, said package being cylindrical in shape with flat ends at right angles to the axis of the cylinder, said fibers being in the form of a sliver arranged in evenly compacted symmetrically arranged coils disposed eccentrically of the package, each coil turn lying in part adjacent the outside of the package and in part adjacent to but spaced from the axis of the package on its opposite side, providing a central passageway extending through the package along said axis, the volume-to-weight ratio of the package being less than two-fifths that of an uncompressed package of the same fibers, said fibers being, as a result of the steaming and cooling treatment, in a dead and dormant condition characterized by a lack of their normal springiness, the package having the property of remaining, under normal atmospheric conditions, in its compressed state, and the fibers being well adapted for drawing and spinning without ageing.

5. A compressed package consisting of 25 to 70 pounds of treated wool or wool-like textile fibers modified by treatment by steaming and cooling under compression, said package being cylindrical in shape with flat ends at right angles to the axis of the cylinder, said fibers being in the form of a sliver arranged in evenly compacted

symmetrically arranged coils disposed eccentrically of the package, each coil turn lying in part adjacent the outside of the package and in part adjacent to but spaced from the axis of the package on its opposite side, providing a central passageway extending through the package along said axis, the volume-to-weight ratio of the package being less than two-fifths that of an uncompressed package of the same fibers, the fibers being dyed with a substantially uniform distribution of color both radially and from end to end of the package, said fibers being, as a result of the steaming and cooling treatment, in a dead and dormant condition characterized by a lack of their normal springiness, the package having the property of remaining, under normal atmospheric conditions, in its compressed state, and the fibers being well adapted for drawing and spinning without ageing.

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