

[54] **METHOD OF FINISHING OF GREIGE WOVEN FABRICS**

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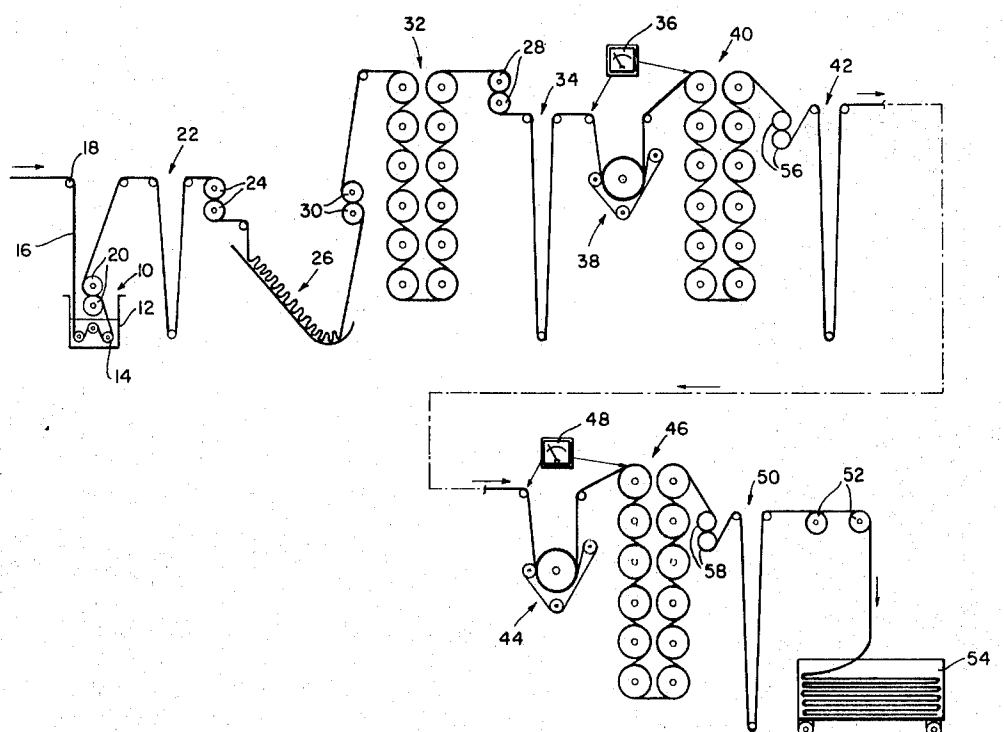
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[57] **ABSTRACT**

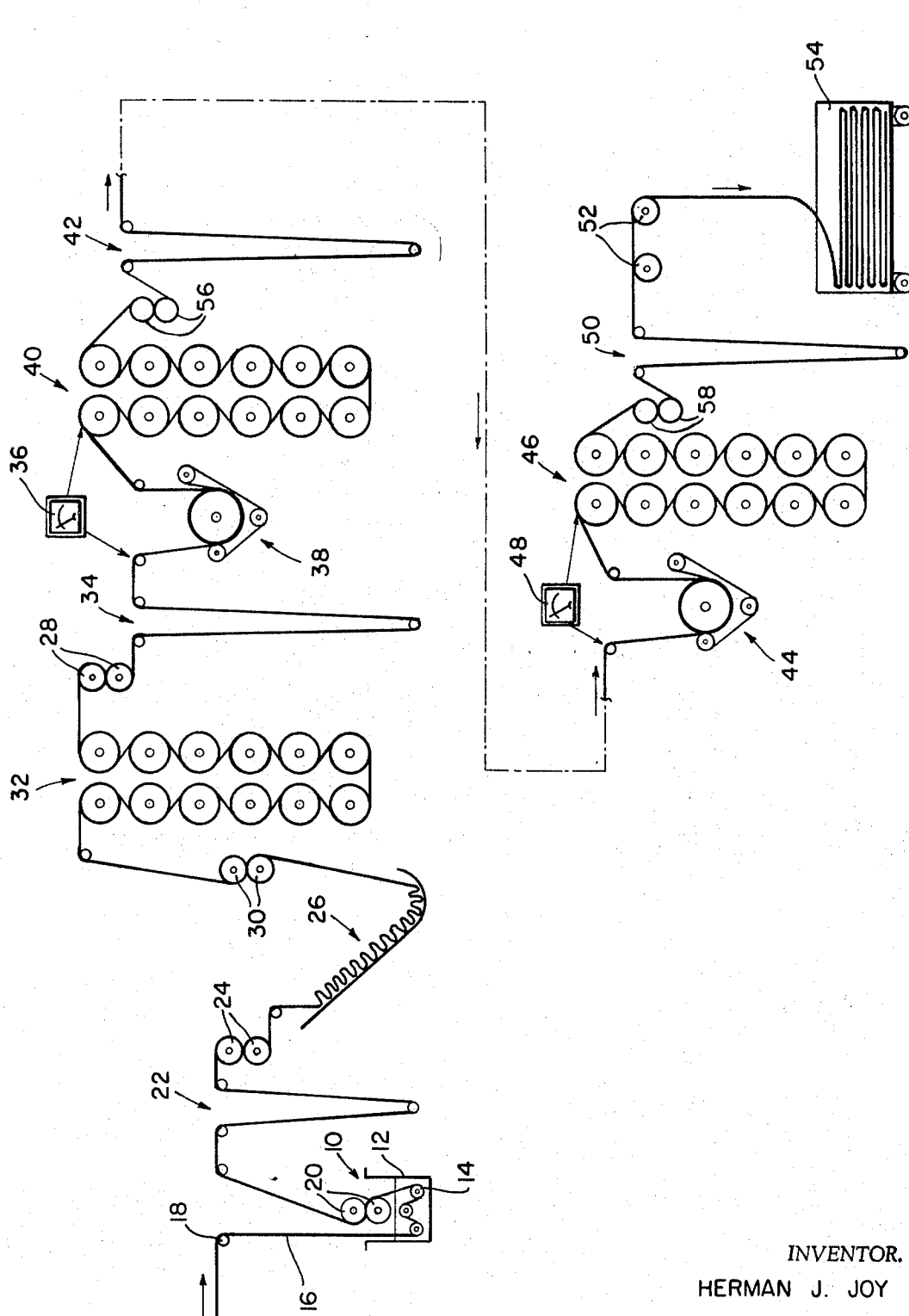
This invention pertains to an improved method and apparatus for finishing greige goods in a single processing range. The invention is applicable particularly to the finishing of high-shrinkage fabrics such as denim. The apparatus of the invention includes the following combination of devices for sequentially processing the fabric: a padder for impregnating the fabric with a desired liquid finishing preparation; a scray for collecting and storing temporarily the fabric when it is discharged from the padder; a free-rolling heated can assembly for partially drying the fabric received from the scray, and having control rollers at its input and output sides for controlling the tension of the fabric as it is advanced through the can assembly; a first compressive-preshrinkage unit for preshrinking the fabric an amount equal to about one half of its total potential-shrinkage characteristic; a driven second heated can assembly for further drying the fabric; a second compressive preshrinkage unit for shrinking the fabric a final amount to comply with predetermined standards, such as, established Sanforized label standards and a driven third can assembly for fully drying the fabric for discharge to a storage facility.

2 Claims, 1 Drawing Figure



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METHOD OF FINISHING OF GREIGE WOVEN FABRICS

BACKGROUND OF THE INVENTION

Heretofore greige goods, such as denim, have been processed in two processing ranges with the first range including a padder for applying a liquid finishing preparation to the fabric (to impart desired "handle" qualities thereto) followed by at least four heated can assemblies for drying the fabric and the second range including conventional compressive-preshrinkage apparatus for reducing the shrinkage potential of the fabric to a desired level. Thus, two separate drying facilities have been required, together with operators for both processing ranges. Denim fabrics, delivered from the first range, have a potential shrinkage of approximately 12½ percent to 16½ percent which must be removed all at one time in the second range. Difficulties are encountered in such conventional processing in that the removal of potential shrinkage may be inconsistent, unless the processing is controlled to a high degree, and in that the removal of such a high potential shrinkage in a single step results in possible "creep out" or elongation of the fabric amounting to at least 2 percent during its subsequent handling. For instance, in the conventional processing of denim, high lengthwise tension must be applied to provide the denim with its desired width, and this high lengthwise tension interferes with accurate preshrinking of the fabric thereby resulting in potential wash shrinkage. Therefore, an object of the present invention is to provide means for processing high-shrinkage fabrics so that their post-processing tendency toward elongation can be reduced significantly.

SUMMARY OF THE INVENTION

In accordance with the invention, there is disclosed herein a method and apparatus for finishing and preshrinking a high-shrinkage fabric in a single processing range. The apparatus includes a padder for receiving the high-shrinkage fabric (which may be delivered from a loom) and for impregnating the fabric with a finishing liquid which imparts desired "handle" qualities to the fabric. A scray is provided following the padder for accumulating the fabric in folds or pleats, so that the wet fabric can begin to relax in length while disposed therein. The fabric withdrawn from the scray is passed through control rollers, and then through a heated can assembly comprising a plurality of free-rolling cans wherein approximately 70 percent of the moisture is removed from the fabric. The control rollers at the input to the heated cans combine with rollers at the output thereof for controlling tension on the fabric as it is drawn through the heated can assembly, whereby a desired width of the fabric can be achieved as the fabric is drawn over the cans. The fabric is next advanced through a compressive-preshrinkage unit in which about one half of the potential shrinkage of the fabric is accomplished, whereupon the fabric is advanced through a second heated can assembly comprising a plurality of driven cans which reduce the moisture of the fabric to approximately 12 percent. The fabric is further advanced through a second compressive-preshrinkage unit wherein the remaining amount of potential shrinkage is accomplished, and the fabric is then passed through a final heated can assembly for

complete drying, whereupon it is deposited in a storage receptacle or passed otherwise for additional processing and/or conversion.

Monitoring devices are provided at the input and output of the two compressive-preshrinkage units for indicating the percent of shrinkage of the material so that the compressive-preshrinkage units can be maintained in desired adjustment.

DRAWING

The accompanying drawing illustrates one embodiment of the invention and shows a single processing range for finishing and preshrinking a high-shrinkage fabric.

PREFERRED EMBODIMENT

A preferred method practiced in accordance with the present invention comprises the steps of impregnating a high-shrinkage fabric with a finishing liquid by advancing the fabric through a padder, collecting the wet fabric in a scray and storing it therein for several minutes, partially drying the impregnated fabric by passing it through a heated can assembly to remove about 70 percent of its moisture content, compressively preshrinking the partially dried fabric to remove approximately one half of its potential shrinkage characteristic, further drying the partially preshrunk fabric so that only about 12 percent of the moisture remains therein, compressively preshrinking the fabric a second time to its final preshrunk condition and completely drying the preshrunk fabric by passing it through a third heated can assembly. In the preferred method, the fabric is subjected to a tension as it passes through the first heated can assembly so that the width of the fabric can be adjusted to its desired dimension.

A preferred embodiment of the apparatus of the invention, as illustrated in the drawing, can be used for performing the above-described method, and includes a padder 10 having a tank 12 containing a finishing liquid, and having a plurality of rollers 14 for controlling the passage of a fabric 16 drawn into the padder over an input roller 18. After the fabric is advanced through the tank 12 and over the rollers 14, it passes through a pair of squeeze rollers 20 at the output of the padder, and then through a dance-roller assembly 22, and a pair of drive rollers 24, to a scray 26. The scray causes the fabric 16 to assume a folded or pleated configuration and the fabric accumulated in the scray in this manner is disposed in a relaxed state wherein it begins to shrink or relax in length and width. Preferably, the scray has a capacity to hold at least 300 to 400 yards of the fabric 16 (and assuming that the speed of the fabric as it is drawn through the processing range is less than 100 yards per minute) the fabric will continue to relax in length within the scray for a period of at least 3 to 4 minutes. After this relaxing period, the fabric is drawn out of the scray 26 by a pair of drive rollers 28 which pull the fabric through a pair of tensioning rollers 30, and through a heated can assembly 32 comprising a stack of free-rolling heated cans for partially drying the fabric 16, so that only about 30 percent of the moisture remains in the fabric when it is delivered from the heated can assembly 32. The rollers 28 and 30 are adjustable to control the tension of the fabric as it is drawn through the can assembly 32, thus

reducing accurately the width of the fabric to its desired dimensions as it passes over the cans.

The fabric 16, as it is withdrawn from the can assembly 32 by the rollers 30, is advanced through a second dance roller assembly 34 whereupon the fabric is received by a compressive-preshrinkage unit 38. The compressive-preshrinkage unit 38 is adjusted to compressively preshrink the fabric to remove approximately one half of its potential-preshrinkage characteristic. In the case of denim, the shrinkage unit 38 is adjusted to preshrink the material approximately 8.5 percent, thus establishing the remaining potential-shrinkage characteristic of the denim at approximately 5.5 to 8.5 percent. A second heated can assembly 40, comprising a plurality of driven cans, receives the denim delivered from the compressive-preshrinkage unit 38, and the rotational speed of the cans in the assembly 40 controls the amount of shrinkage imparted to the fabric by the compressive-preshrinkage unit 38 in a manner similar to a conventional felt belt dryer in a conventional system. The percent preshrinkage of the material as it passes to the driven can assembly 40 is monitored by an indicating device 36, so that the process can be controlled accurately. Desirably, the fabric delivered by the driven can assembly 40 has a moisture content of about 12 percent and such fabric is coupled through a third dance roller assembly 42 to a second compressive-preshrinkage unit 44, and then to a third heated can assembly 46 comprising a plurality of driven cans having the same function as the can assembly 40 insofar as it controls the rate at which the fabric 16 is drawn through the second compressive-preshrinkage unit 44. In this second compressive-preshrinkage unit 44, the remainder of the potential-shrinkage characteristic is removed from the fabric so that the fabric will comply, for example, with established Sanforized label standards. Thus, the second compressive-preshrinkage unit need remove only 5.5 to 8.5 percent of the potential shrinkage of the fabric, as compared with the prior art system which had to remove 12 to 16 percent shrinkage at this point. Accordingly the problem of "creep out," elongation of the fabric during subsequent handling thereof, is minimized because the fabric does not undergo an extremely high compressive-preshrinkage process in either of the compressive-preshrinkage units 40 or 44.

Again, the fabric 16 is monitored at the input and output of the second compressive-preshrinkage unit 44, and the percent of shrinkage is indicated on an indicating device 48 which is identical to the device 36 associated with the first preshrinkage unit 38. All of the remaining moisture is removed from the fabric in the driven can assembly 46, and the fabric is withdrawn therefrom by a dance-roll assembly 50 and a plurality of cloth reels 52 for reception in a truck or receptacle 54, or is otherwise transported for further processing and/or converting. Drive rollers 56 and 58 advance the fabric continuously as a substantially endless web.

Thus, it can be seen that in the present method and apparatus, the fabric is subjected to a plurality of preshrinkage processes from the time it is first impregnated with the finishing liquid by the padder 10 to

the time it is withdrawn from the driven can assembly 46. Furthermore, it is also seen that the fabric is only subjected to a single wetting procedure, and that the finishing and preshrinking processes are all accomplished in a single processing range, thereby reducing labor costs, processing time, and investment in equipment. Furthermore, it is found that high shrinkage fabrics, processed in accordance with the method and apparatus disclosed herein, have a reduced tendency to undergo elongation during subsequent handling, and that such elongation can be held to a maximum of one-half percent.

Should operating conditions change the potential-shrinkage characteristic from that expected, such change can be adjusted responsive to speed differential between the fabric as it enters the padder 10 and as it exits the third can assembly 46.

It will be understood by those familiar with processing of fabrics that wide deviations may be made from the preferred embodiment disclosed herein without departing from the main theme of invention set forth in the following claims. For example, the dance roller assembly 22, the drive rollers 24, the scray 26 and the tensioning rollers 30 could be eliminated with the fabric 16 delivered directly from the padder 10 to the can assembly 32. The last three cans of the assembly 32 could be driven, whereby the drive rollers 28 could be eliminated. The last three driven cans of the assembly 32 would create tension needed between the padder 10 and the compressive-shrinkage unit 38 to reduce fabric width to a desired dimension prior to entry of the fabric 16 into the compressive-shrinkage unit 38. Economies in the disclosed controls are also envisioned.

I claim:

1. A method for finishing and preshrinking a woven grieg fabric having a high potential-shrinkage characteristic in a single processing range, the method comprising the sequential steps of:

impregnating a fabric with a finishing liquid to establish an initial moisture content in the fabric, temporarily storing the fabric in a relaxed state by collecting it in a scray and retaining it therein for a duration of approximately three to four minutes, partially drying the fabric to remove all but approximately 30 percent of said initial moisture content, compressively preshrinking the fabric to remove approximately one half of its potential-shrinkage characteristic,

partially drying the fabric a second time to remove all but approximately 12 percent of said moisture content,

compressively preshrinking the fabric a second time to remove a predetermined amount of the remainder of the potential-shrinkage characteristic thereof, and fully drying the fabric.

2. A method for finishing and preshrinking fabric as set forth in claim 1, further comprising the step of subjecting the fabric to a longitudinal tension while the fabric is in the first partial drying step for establishing a desired width of the fabric.

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