Oct. 28, 1969 H. D. BRAY 3,474,509

APPARATUS FOR STRETCHING FABRIC

Filed April 22, 1966

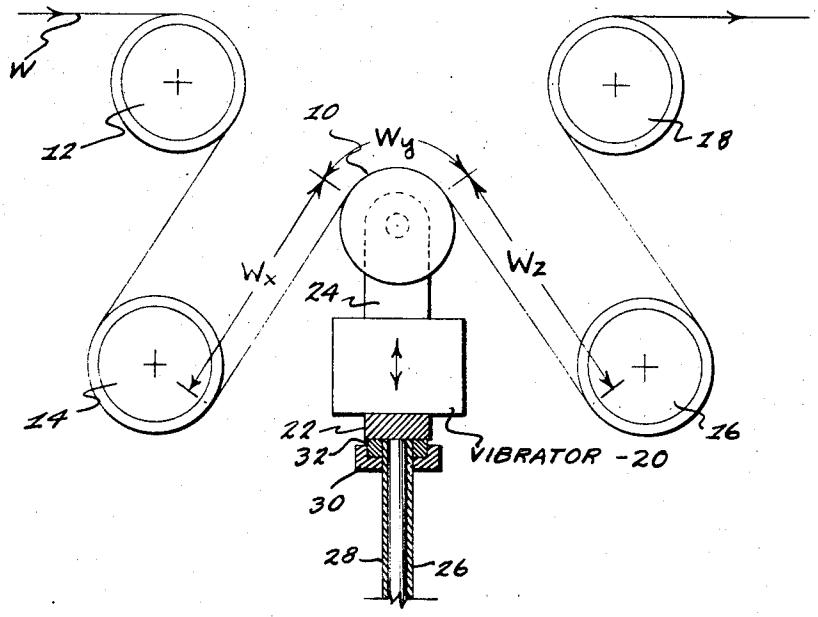


Fig. 1

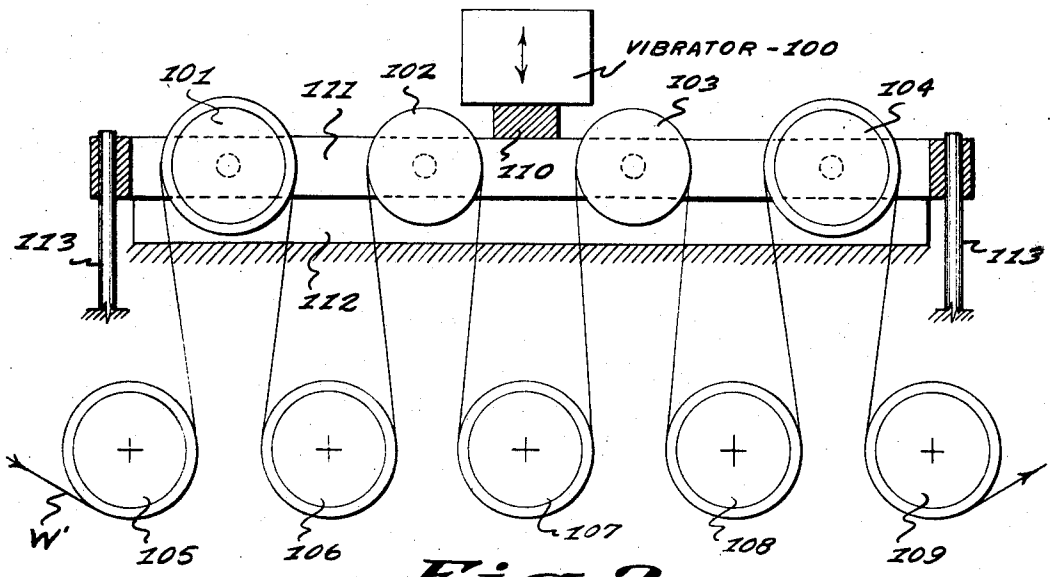


Fig. 2

INVENTOR
HORACE D. BRAY

BY
Channing L. Richards &
Dalbert U. Shafte
ATTORNEYS

United States Patent Office 3,474,509 Patented Oct. 28, 1969

3,474,509

APPARATUS FOR STRETCHING FABRIC

Horace D. Bray, Lyman, S.C., assignor to M. Lowenstein & Sons, Inc., New York, N.Y., a corporation of New York

Filed Apr. 22, 1966, Ser. No. 544,457
Int. Cl. D06c 3/06
U.S. Cl. 26—51 1 Claim

ABSTRACT OF THE DISCLOSURE

A method and means by which the fabric shrinkage and misalignment difficulties commonly encountered in finishing operations are effectively counteracted by applying a local vibratory stretching influence in supporting relation to a standing transverse zone of a fabric web traveling at open width, while holding the web locally taut against the vibratory influence.

This invention relates to the treatment of fabric webs in the course of conditioning them for ultimate use and provides a particularly advantageous method and means for physical treatment of such webs to combat the shrinkage and misalignment difficulties that commonly result from conventional finishing operations.

Shrinkage losses are a usual incident of greige goods finishing, and the accumulation of such losses in the lengthwise direction of the fabric web is usually difficult to maintain within reasonable bounds. Some gain against the accumulated shrinkage loss can be obtained by imposing a lengthwise pulling tension on the web during subsequent handling, but the resulting gain does not readily distribute through the fabric uniformly and the fabric structure may be damaged unduly by excessive pulling tension, so that the possibilities for combatting yardage loss from shrinkage have remained limited.

Greige goods finishing also often requires handling of the fabric web in rope form with a resulting disturbance of the fabric structure, so that when the web is returned to open width the structure is apt to be severely and irregularly skewed or bowed transversely. Such skew and bow must be corrected in order to render the fabric web useable, and the correction normally requires highly complicated and expensive apparatus arranged to sense the structural misalignment in the fabric and actuate the indicated straightening action on the fabric as it passes through the apparatus.

According to the present invention, the foregoing shrinkage and misalignment difficulties are dealt with to exceptional advantage in an exceptionally simple manner. Briefly described, the present invention is characterized by the application of a local vibratory stretching influence in supporting relation at a standing transverse zone of a fabric web traveling at full width, while holding the traveling web locally taut against this vibratory influence.

The result of such physical treatment of the web is apparently to induce a return of the fabric structure toward its initial condition in the greige, through the localized impacting that is effected as the traveling web passes the vibratory influence. As far as shrinkage is concerned, it may be that the vibratory impacting acts locally on the fiber to release or dissipate shrinkage stresses; while it seems probable that the reaction to misalignment is one of tending to equalize the fabric structure at the locally held length of the web across its open width, so as to exert a corrective action against the imbalance that is represented by skew or bow. In any event, while just what happens is not fully understood, the effect of the vibratory influence on shrinkage and misalignment is remarkable, both from the standpoint of the corrective action obtained, and in terms of the simplicity of the treatment and the absence of any adverse effect on the fabric. In point of fact, the treatment appears to improve the hand of the fabric and may have surther significance in that respect.

The manner in which the vibratory influence is applied to the fabric according to the present invention is described in further detail below in connection with the accompanying drawing, in which:

FIG. 1 is a diagrammatic illustration of means arranged for physical treatment of a fabric web in accordance with the present invention; and

FIG. 2 is a comparable illustration of a multiple effect modification.

The FIG. 1 illustration diagrams an arrangement by which a traveling web W is subjected to vibratory influence at a floating roll member **10**, while respective pairs of spaced roll members **12, 14** and **16, 18** are disposed adjacently on fixed axes for substantial preceding and succeeding S-wrapping of the web W so as to hold it locally against the vibratory influence mechanically applied at the roll member **10**. Alternatively, the web W can be locally held by pairs of weighted nip rolls, but the illustrated arrangement is preferred because it is simpler and avoids the necessity for driving any of the roll members under usual circumstances.

The adjacent disposition of the holding roll pairs **12, 14** and **16, 18** is illustrated typically in FIG. 1 to represent an installation employing 4″ holding roll members **12, 14, 16** and **18**, with a horizontal spacing of about 14½″ between the bottom roll members **14** and **16**, and with a floating roll member **10** of 3½″ size located centrally at a relative elevation that extends web reaches Wx and Wz of about 7″ at each side thereof, while contacting a standing transverse web zone Wy on an arc of about 3½″ for mechanically applying the previously mentioned vibratory influence in supporting relation from a connected vibrator **20**.

The vibrator **20** is suitably connected by attachment to a crossbar **22** arranged below the floating roll member **10** to carry a standard **24** at each end on which the roll journals are supported. The underside of the crossbar **22** is additionally fitted with a locating leg **26** toward each end that is disposed within a fixed slip sleeve **28** having a cup-shaped flange **30** fixed at its upper end to interpose an annular cushioning element **32** of rubber or the like, at the bottom face of the crossbar **22**.

As thus arranged, the weight of the floating assembly is supported at the cushioning elements **32** with the roll member **10** free to assume a pulsing reciprocation vertically in response to the connected vibrator **20**. Any conventional type of vibrator **20** may be used. In the FIG. 1 arrangement an air-operated vibrator of the sort commonly provided for powder feeding and the like has been employed with good results. Such a vibrator **20** in the size rated for feeding action on bins up to 10-ton capacity is ample. The comparable electrically operated vibrators may be employed just as well and as a matter of choice. The selected vibrator **20** should be of the variable speed type with a frequency range perferably in the order of 1,000 to 10,000 vibrations per minute, and a stroke amplitude that does not exceed about 1/16″.

The vibratory influence is applied to web W best with a smooth-surfaced metal roll at **10**, preferably of stainless steel, while the holding rolls **12, 14, 16** and **18** are preferably rubber-covered to enhance their holding action.

With rolls of this sort, a FIG. 1 arrangement as otherwise described above was installed for testing purposes at the end of a drying range just ahead of highly sensitive straightening apparatus that was already in place for

dealing with the misalignment normally encountered in the dried fabric coming through the range. The dried fabric entered from the drying range, as indicated at W in FIG. 1, and was taken off through the straightening apparatus without driving any of the FIG. 1 rolls.

The result was not only to effect a restorative stretch gain quite readily against the shrinkage loss in the fabric coming from the drying range, but also to reduce materially the load on the following straightening apparatus. The sensitivity of this straightening apparatus was adjustable through a range running to a maximum setting of 10. Previous operation at this drying range had normally required a sensitivity setting of 8. With the FIG. 1 arrangement inserted and operating in advance, however, it was found that the sensitivity setting could be reduced to 2 and still obtain the necessary straightening result.

Where it is desired to emphasize the straightening advantage thus obtained a multiple effect arrangement of the sort illustrated in FIG. 2 may be employed to apply the vibratory influence to a fabric web W' from a vibrator **100** through a plurality of floating roll members as at **101, 102, 103** and **104**. Local holding of the web W' in such an arrangement is provided for by a staggered series of holding rolls **105, 106, 107, 108** and **109** that exceed by one the number of floating rolls, and that are spaced on fixed axes for training of the web W' about a holding roll **105, 106, 107, 108** or **109** preceding and succeeding each floating roll **101, 102, 103** and **104**.

As in the FIG. 1 arrangement, all of the fixed-axis holding rolls **105, 106, 107, 108** and **109** are preferably rubber-covered, and the first and last floating rolls **101** and **104** of the multiple effect FIG. 2 series preferably are too, while the intermediate floating rolls **102** and **103** are smooth-surfaced metal rolls, preferably of stainless steel, as employed in the FIG. 1 embodiment.

The vibrator **100** is again connected for transmission of the vibratory influence to the web in supporting relation by the attachment on a crossbar **110** reaching centrally between side members **111** arranged to provide a common journal support for the floating rolls **101, 102, 103** and **104**. Resilient cushioning pads **112**, of rubber or the like, are fixed beneath the side members to support the weight of the floating assembly and to serve as bottoming bumpers, while fixed guide elements, as at **113**, are provided in any convenient fashion for slidably locating the floating assembly to accept a pulsing vertical reciprocation under the influence of the vibrator **100**.

With a multiple effect arrangement of the FIG. 2 type, it will usually be necessary to drive one or more of the fixed-axis holding rolls **105, 106, 107, 108** and **109** in order to avoid imposing an undue aggregate drag on the web W' in causing it to travel through the multiple effect rolls.

Arrangements of the FIG. 1 or FIG. 2 types may be installed for use in any of a variety of situations. The installation may be related to other processing equipment, as in the case of the drying range noted above, or it may be separately arranged for subjecting a fabric web to the vibratory treatment as an independently controlled operation. The significant aspect is that this vibratory treatment of the present invention provides an additional processing tool for conditioning fabric webs in the course of finishing, and that it may be employed to good advantage in circumstances that vary to the same extent that finishing treatments variously call for physical web treatment of the sort that the invention provides.

This invention has been described in detail above for purposes of illustration only and is not intended to be limited by this description.

I claim:

1. Means for counteracting fabric shrinkage and misalignment difficulties encountered in finishing operations comprising a plurality of roll members of moderate diameter and of a length sufficient for open width training of a fabric in mechanically supported relation thereover, means for supporting said roll members for vibratory motion normal to their axis, means for causing vibration of said supported roll members at relatively high frequency and low amplitude, and respective additional web training means formed by further roll members in a number exceeding that of said first mentioned roll members by one, said further roll members being disposed on fixed axes in the staggered relation for festooning of a fabric web about a further roll member preceding and succeeding each of said first mentioned roll members and thereby locally tensioning said fabric web in mechanically supported relation over said first mentioned roll members while allowing continuous web travel.

References Cited

UNITED STATES PATENTS

2,694,307	11/1954	Henry.	
3,084,020	4/1963	Loosli.	
3,084,393	4/1963	Rodenacker.	
3,098,370	7/1963	Poole et al.	
2,486,217	10/1949	Slack et al.	26—25
2,566,075	8/1951	Taylor et al.	26—26
2,699,592	1/1955	Newman	26—18.5
2,730,786	1/1956	Kindstrand et al.	26—1
2,904,981	9/1959	Macomson.	
2,943,377	7/1960	Freiberger.	

FOREIGN PATENTS

1,342,601	9/1963	France.

ROBERT R. MACKEY, Primary Examiner

U.S. Cl. X.R.

26—1, 54; 28—72