United States Patent [19]

Holm

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[54] **APPARATUS FOR UNCURLING THE EDGES OF A RUNNING WEB**

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[52] **U.S. Cl.** **26/68,** 26/DIG. 1, 34/160, 38/143

[51] **Int. Cl.** **D06c 3/00**

[58] **Field of Search** 26/DIG. 1, 68; 34/160, 34/225; 38/143

[56] **References Cited**

UNITED STATES PATENTS

1,717,004	6/1929	Buck	34/160 X
1,912,724	6/1933	Remington	26/DIG. 1 UX
2,613,522	10/1952	Heffelfinger	26/DIG. 1 UX
2,674,023	4/1954	Foley	26/DIG. 1 UX
2,747,250	5/1956	Bramhall, Jr. et al.	26/DIG. 1 UX
3,142,107	7/1964	Wittig	26/DIG. 1 UX
3,398,466	8/1968	Brown	34/160

FOREIGN PATENTS OR APPLICATIONS

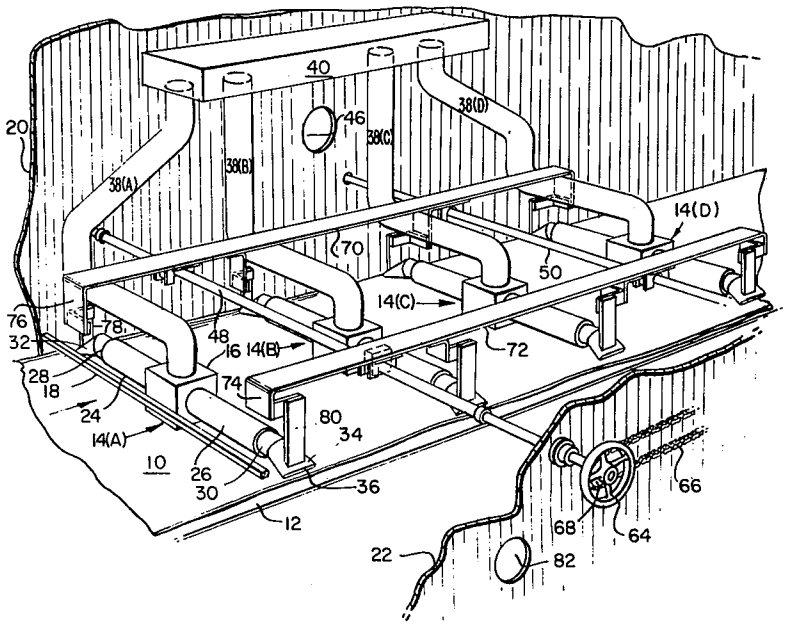
506,270	10/1951	Belgium	26/DIG. 1
663,739	8/1938	Germany	26/DIG. 1
934,955	8/1963	United Kingdom	26/DIG. 1
937,512	9/1963	United Kingdom	26/DIG. 1

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Attorney, Agent, or Firm—Morse, Altman, Oates & Bello

[57] **ABSTRACT**

An adjustable apparatus is provided for uncurling both edges of a running web to insure that the web moves in a flat or open width condition for proper drying. A plurality of transversely extending telescopic tubes are mounted in closely spaced parallel relation with respect to the face of the running web. The tubes are connected to a common plenum chamber which, in turn, is connected to a blower driving recirculated vapor or air through the tubes under pressure. The outer end of each tube is provided with a movable nozzle for directing a jet of air or vapor against the opposing selvedges, forcing them flat against a supporting conveyor. The nozzles are connected to a common support and drive mechanism which allows transverse adjustment of the nozzles to accommodate webs of different widths.

3 Claims, 2 Drawing Figures



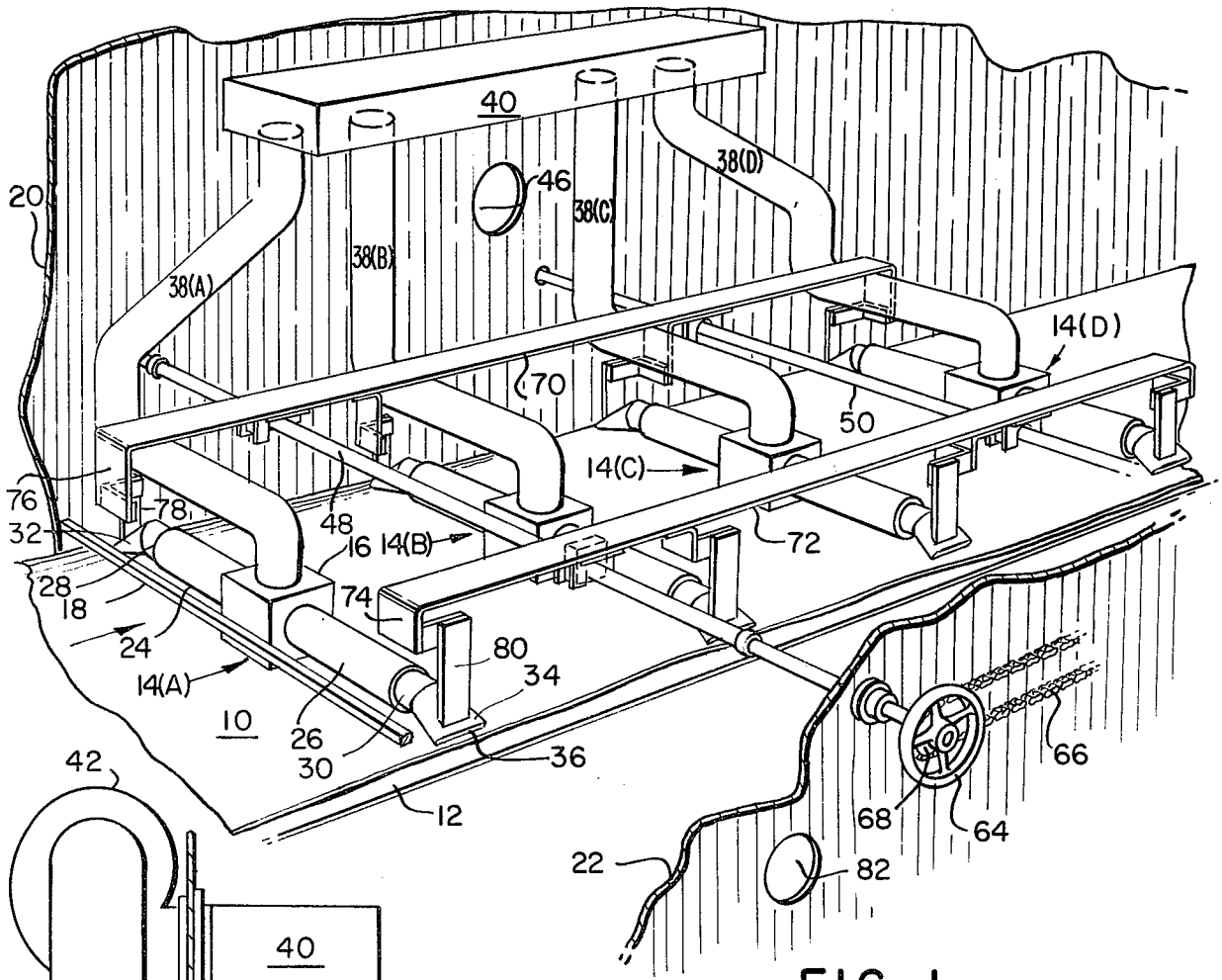

40
46
38(C)
38(D)
38(B)
38(A)
20
14(D)
70
50
14(C)
76
78
48
72
32
16
14(B)
28
18
74
24
80
34
14(A)
10
26
30
36
42
12
66
68
64
22
82

FIG. 1

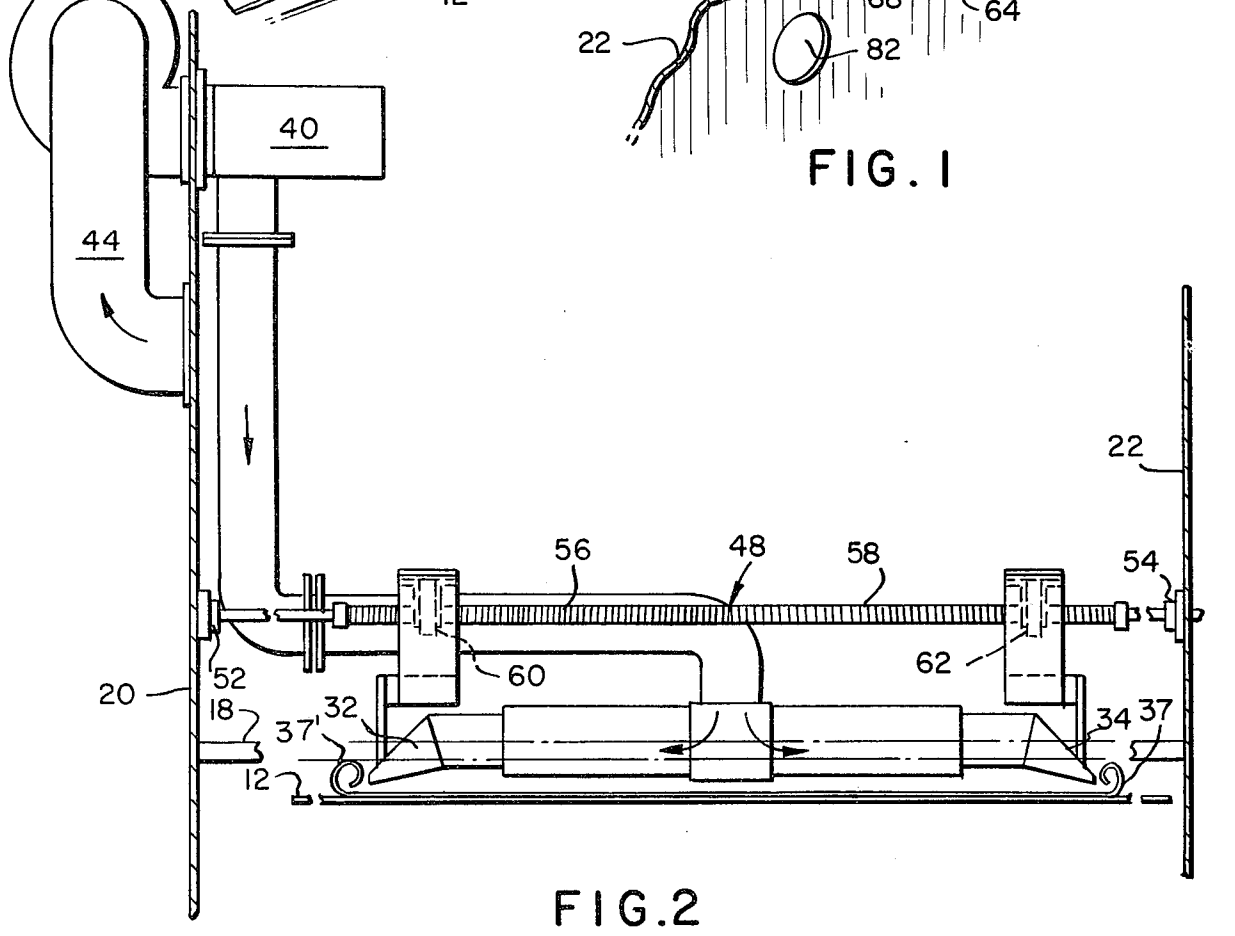

40
44
22
56
48
58
54
52
60
62
20
18
32
37'
34
37
12

FIG. 2

APPARATUS FOR UNCURLING THE EDGES OF A RUNNING WEB

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to textile machinery and more particularly is directed towards a new and improved apparatus for use in uncurling the edges of a running web such as knit goods and the like.

2. Description of the Prior Art

In the processing of various types of webs, particularly textiles such as knit goods and the like, the web displays a strong tendency to curl along the side edges. This characteristic is particularly prevalent in knit goods and the problem interferes with production processes. For example, knit material leaving a scouring operation very often will curl along the edges so as to prevent proper drying of the web. While tenter frames and the like have been used to flatten webs, such equipment is generally quite complex and expensive and also may damage the selvedges. Nip rolls have also been used but these have not been adjustable and have not improved the drying action.

Accordingly, it is an object of the present invention to provide improvements in equipment for uncurling the edges of a running web. Another object of this invention is to provide a web edge uncurling apparatus that is readily adjustable to webs of different widths. Another object of this invention is to provide an apparatus adapted to simultaneously uncurl and dry both edges of a running web.

SUMMARY OF THE INVENTION

This invention features an apparatus for uncurling and drying the edges of a running web, comprising a conveyor adapted to carry the web along a longitudinal path in a flat or open width condition, a plurality of telescopic tubes extending transversely above the face of the running web, a nozzle movably mounted to opposite ends of each tube proximate to each edge of the web, conduit means connecting the tubes and a blower means connected to the conduit means for delivering vapor or air through the conduit means, the telescopic tubes and through the nozzles against the edges of the web to straighten and dry the edges. Each of the nozzles is connected by a common bracket and a transversely extending lead screw is drivingly connected to the bracket for selectively moving the nozzles inwardly and outwardly depending upon the width of the web being processed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary view in perspective of an apparatus for uncurling and drying the edges of a running web made according to the invention, and,

FIG. **2** is a sectional end view of the apparatus.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the reference character **10** generally indicates a web of textile material which may be a woven material in an open width condition or a knit material in a flat, tubular condition. The web is carried longitudinally by means of a conveyor **12** which preferably is of an openwork construction such as a mesh screen or perforated belt in order to enhance the draining and drying of the web **10**, particularly if the web has passed through a washing or scouring process. The present apparatus is particularly useful in a drying stage of a web scouring apparatus of the sort shown in U.S. Pat. No. 3,643,475. In such web scouring apparatus, the web is subjected to a scouring action by means of jets of scouring solvent directed across the web and/or passing the web in and out of a tank of scouring solvent for the purpose of removing various impurities and particularly oil from the web. The web leaving the scouring station is then carried in a flat form through a drying chamber where heat is employed to vaporize the solvent from the web. This may be done by passing the web about a set of heated rotary drums, preferably together with a conveyor if the web is knit material in order to prevent stretching of the material. A preferred alternative, when handling knit goods, is to carry the web in a flat, tensionless condition through a drying chamber in which the atmosphere is heated. This may be done by recirculating the atmosphere within the chamber through a heat exchanger and back into the driving chamber whereby the heated vaporized solvent is used as the drying medium. In either case, the web, particularly if a knit material, will curl along both edges so as to interfere with the handling of the web as well as the drying thereof and produces an uneven roll when wound. If the edges curl back upon themselves, the double fold is less likely to be fully dry when the web leaves the drying chamber and the present invention is provided to eliminate this problem.

Preferably the conveyor **12** carries the web **10** along in a horizontal path as shown in FIG. **1.** Disposed above the upper reach of the conveyor and web is a plurality of heads **14** (A), (B), (C) and (D) disposed in spaced parallel relation extending transversely of the web in closely spaced parallel relation to the face thereof. While four heads are shown, this number may be increased or decreased as desired. Each head **14** is comprised of a center housing **16** which, in the illustrated embodiment, is generally cubicle. This configuration may be altered. Each housing preferably is supported in fixed position by means of a bracket **18** mounted between opposing side walls **20** and **22** which form a drying chamber for the web **10.** For the sake of clarity, only one bracket **18** is illustrated and it will be understood that a bracket or other suitable support means are provided for each of the other heads in the system.

Extending from opposite faces of the housing **16** are tubes **24** and **26,** preferably co-axial and extending in closely spaced parallel relation to the face of the web **10.** The tubes **24** and **26** extend transversely of the web length and are provided at their outer free ends with a telescopic tube section **28** and **30** slidably mounted in their respective tubes. Each telescopic section **28** and **30** is mounted for smooth sliding movement with respect to its supporting tube and each terminates in a nozzle **32** and **34,** respectively. Each nozzle extends diagonally downwardly and outwardly terminating in a somewhat flattened tip forming an elongated slot opening **36** through which gas or air is delivered under pressure to curled edges **37** and **37'** of the web **10,** as best shown in FIG. **2.**

In practice, the telescopic tubular sections **28** and **30** are pre-positioned by moving them in and out as required so that the nozzle tips are located a short distance inwardly of the curled edges in optimum position so that the air or gas delivered by the nozzles will force

the curled edges 37 and 37' to uncurl outwardly and lie flat against the supporting conveyor 12. By utilizing a number of units 14 spaced along the path of the web and employing the flat-type nozzle tip, the web edges will be kept uncurled for a time sufficient for the edges to dry and then lie flat naturally.

Air or vapor is fed to the nozzles 32 and 34 by means of a conduit or riser 38, one connected to each of the heads 14 (A), (B), (C) and (D) and indicated by reference characters 38 (A), (B), (C) and (D). All of the risers 38 (A), (B), (C) and (D) connect to a common plenum chamber 40 mounted to the wall 20 and connected to the discharge side of a blower 42 mounted to the opposite side of the wall 20, as best shown in FIG. 2. In the vapor re-circulating embodiment shown, the blower 42 is connected at its intake side to the interior of the drying chamber by means of a duct 44 communicating with an exhaust port 46 in the wall 20. In this fashion, heated vapor in the drying chamber is drawn through the exhaust port 46 and forced by the blower 42 into the plenum chamber 40 down through the riser 38 into the respective heads 14 from whence the pressurized vapor is delivered in opposite directions through the nozzles 32 and 34 against the curled edges. A heat exchanger can be added to this system to heat the vapor.

Insofar as the web 10 may be fabricated in different widths, the present apparatus provides for conveniently adjusting all of the heads simultaneously to the same extent whereby the nozzles will be properly located for drying and uncurling action regardless of web width. As shown in the drawings, the adjustment mechanism of the illustrated embodiment includes a pair of lead screws 48 and 50 extending transversely above the conveyor and web with the ends thereof rotatably supported to walls 20 and 22 by means of bearings 52 and 54. Each lead screw had a pair of oppositely threaded sections 56 and 58 with each section engaging a separate follower 60 and 62. Thus, rotation of the lead screw 48 will cause the follower 60, 62 to move in opposite directions in or out depending upon the direction of rotation. Both lead screws 48 and 50 are controlled by means of a hand wheel 64 located on the outside of the wall 22. The two lead screws are drivingly connected to one another by means of a continuous chain 66 engaging a gear 68 mounted on the outer end of each of the lead screws.

Each of the followers 60 and 62 is connected to and supports a pair of longitudinally extending parallel frames 70 and 72 from which depend in spaced relation a plurality of hangers 74, 76 each carrying a bracket 78 and 80 rigidly connected at its lower end to a nozzle 32 and 34, respectively. In this fashion, rotation of the hand wheel 64 will cause both lead screws to rotate thereby moving the two frames 70 and 72 simultaneously to or away from one another depending upon the direction of rotation. This movement of the braces, in turn, will cause the nozzles to move in or out to a set position as best suited to the width of the web passing thereunder. The adjustment may be made quickly and easily by manipulation of the hand crank 64. A viewing port 82 is conveniently provided in close proximity to the hand crank in order to allow the operator to view the position of the nozzles.

Having thus described the invention what I claim and desire to obtain by Letters Patent of the United States is:

1. Apparatus for uncurling and drying the edges of a running web, comprising

a. walls defining a substantially closed housing containing a hot gaseous atmosphere therein,

b. a conveyor belt having a flat horizontal upper reach disposed in said housing for conveying said web through said housing in a flat and substantially tensionless condition,

c. a plurality of fixed, rigid tubes mounted to said housing and extending in spaced parallel relation, transversely above the upper reach of said belt and said web,

d. a tubular nozzle telescopically connected to each end of each of said fixed tubes and terminating in a downwardly and outwardly directed restricted slot opening oriented parallel to the edge of said web,

e. at least one lead screw having oppositely threaded portions mounted to opposite side walls of said housing with at least one end extending through one of said walls, said lead screw being parallel to said tubes,

f. a pair of followers mounted in spaced relation to each lead screw and threaded one to each threaded portion,

g. a bracket mounted to each follower and movable therewith,

h. all of said nozzles adjacent one side of said web connected to the same bracket and follower whereby rotation of said lead screw will move all of said nozzles along one side of said web in the same transverse direction and all of said nozzles along the other side of said web in the opposite direction,

i. conduit means connected to each of said fixed tubes, and,

j. blower means connected to said conduit means,

k. the intake of said blower means communicating with the interior of said housing whereby the heated gaseous atmosphere is recirculated from said housing through said nozzles to uncurl and dry the edges of said web.

2. Apparatus according to claim 1 wherein said conveyor belt is foraminous.

3. Apparatus according to claim 1 wherein said intake for said blower means is positioned above the level of said belt.

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