

Jan. 12, 1971

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3,553,801

FABRIC TREATING APPARATUS

Filed Feb. 19, 1968

3 Sheets--Sheet 1

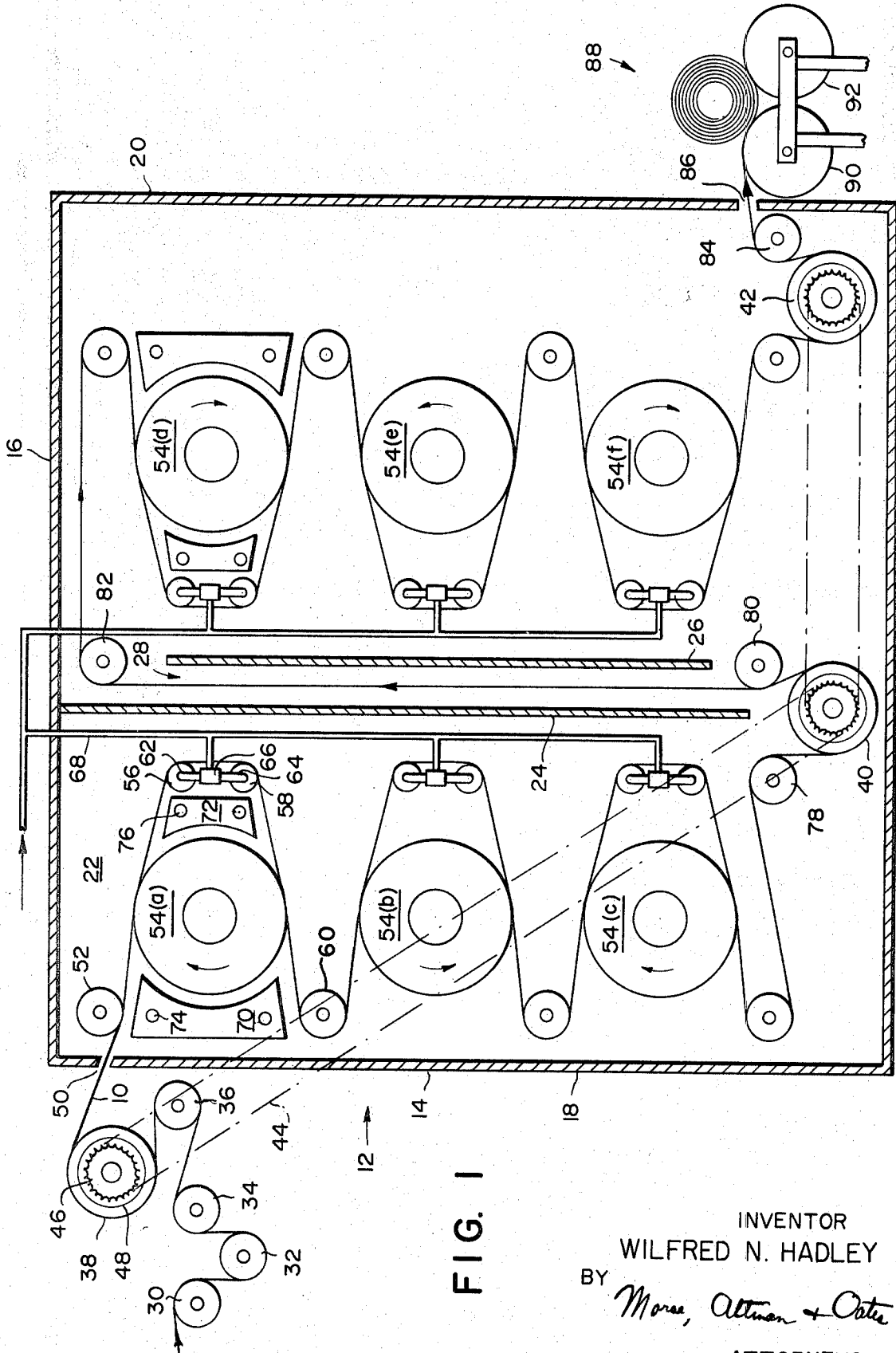


FIG. 1

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3 Sheets-Sheet 2

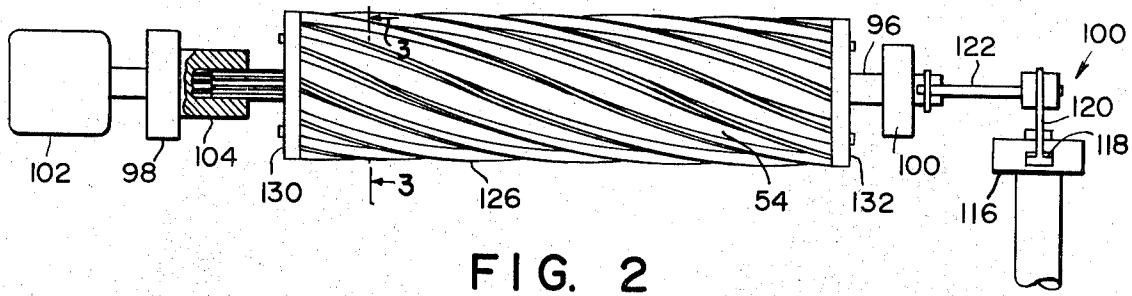


FIG. 2

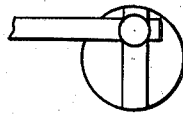


FIG. 6

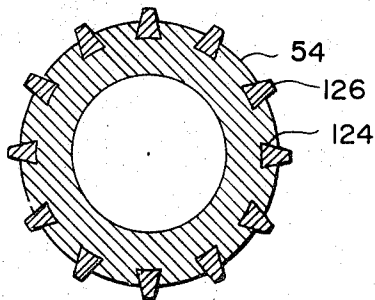
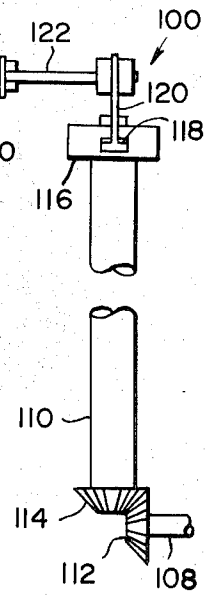


FIG. 3

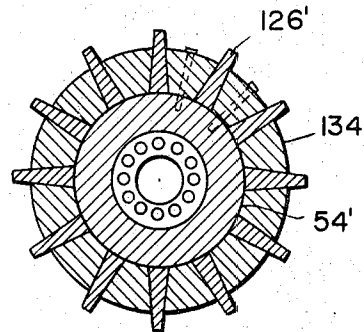


FIG. 4

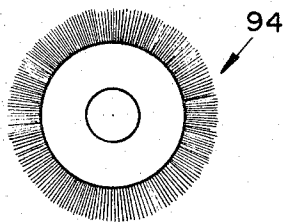


FIG. 5

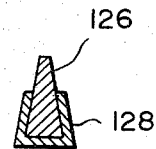


FIG. 7

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FABRIC TREATING APPARATUS

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3 Sheets-Sheet 3

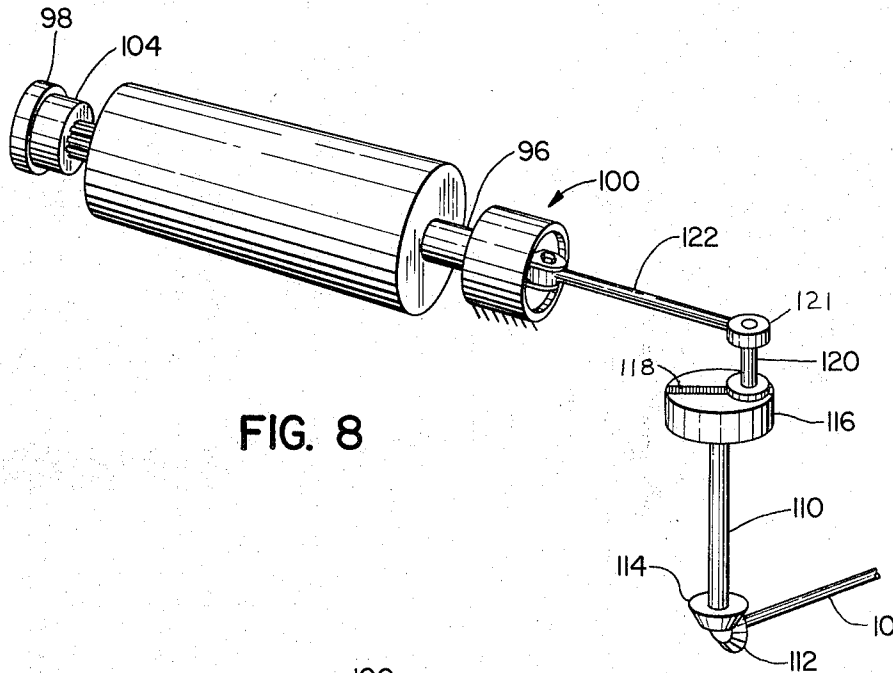


FIG. 8

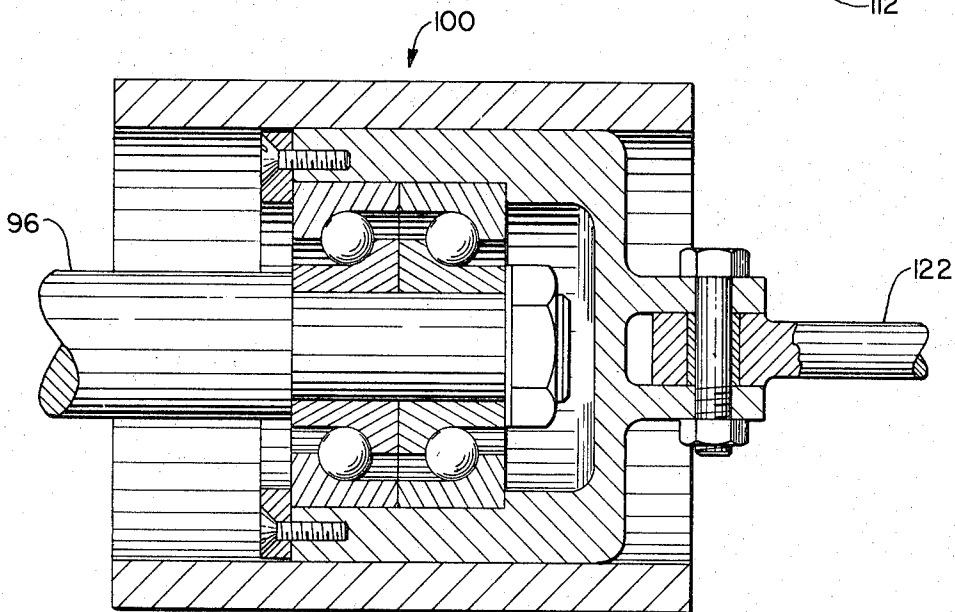


FIG. 9

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FABRIC TREATING APPARATUS

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U.S. Cl. 26—28

1 Claim

ABSTRACT OF THE DISCLOSURE

Apparatus is provided for removing nibs, slubs, pills, etc., from a running fabric web, napping or sueding the fabric or pouncing the fabric. The apparatus in a preferred mode includes a plurality of driven rotary rolls having working surfaces which may be in the form of abrasive helical ribs for some applications. The web is guided first into tangential contact with one portion of each roll and then back into tangential contact with a different portion of the roll. A pair of movable applicator rolls permits increasing or decreasing the amount of wrap between the web and each working roll.

(1) FIELD OF THE INVENTION

This invention relates generally to fabric treating machines and more particularly is directed toward a novel apparatus for treating a running fabric web efficiently and at high speeds with a compact unit which may be operated separately or in a tandem range. The invention is also directed toward a novel abrasive cylinder having particular utility in treating fabric webs.

(2) DESCRIPTION OF THE PRIOR ART

In the manufacture of textiles it is the practice, particularly with some fabrics, to physically work their surfaces in different ways. For example, some fabrics are brushed to remove slubs, pills, etc. Other fabrics are abraded to produce a nap or suede finish on the fabric and buffing or grinding machines are sometimes employed to pounce felts and other non-woven materials. Heretofore, machinery for carrying out these operations has been specialized for a particular type of fabric, has been rather slow in operation and not completely efficient in obtaining the desired results.

Accordingly, it is an object of the present invention to provide improvements in fabric finishing machines. Another object of this invention is to provide a compact, high speed and highly efficient apparatus capable of carrying out a variety of finishing operations on a running web.

SUMMARY OF THE INVENTION

This invention features apparatus for treating the surface of a moving web comprising, in its preferred mode, a plurality of working cylinders rotated about their axes and carrying on their outer cylindrical surfaces a fabric working medium such as brushes or abrasives. Applicator rolls guide the work tangentially against one portion of each cylinder and then into tangential contact with another portion thereof so that each cylinder contacts the web surface twice during each pass. Means are provided for increasing or decreasing the degree of wrap between the web and the cylinder surface. In the preferred embodiment the rolls are arranged in sets, one set being arranged to treat one side of the web and the other set is arranged to treat the opposite side thereof in a continuous fashion.

As another feature of this invention an improved working cylinder is provided employing helical ribs of abrasive material disposed about its outer cylindrical surface. The

helical abrasive ribs provide a more effective action in treating the fabric surface than is the case with a roll covered with a continuous abrasive stratum.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view in side elevation of a web treating apparatus made according to the invention,

FIG. 2 is a view in front elevation of a working cylinder made according to the invention,

FIG. 3 is a cross-sectional view taken along the line 3—3 of FIG. 2,

FIG. 4 is a view similar to FIG. 3 but showing a modification thereof,

FIG. 5 is a view similar to FIG. 3 but showing a wire clothed cylinder,

FIG. 6 is a detail view showing portions of the oscillating drive mechanism for the FIG. 2 cylinder,

FIG. 7 is a sectional end view of an abrasive rib made according to the invention,

FIG. 8 is a perspective view of the oscillatory mechanism, and,

FIG. 9 is a detail sectional side view of the oscillating rotary bearing of FIGS. 2 and 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the drawings the reference character 10 indicates a web typically a woven or non-woven fabric, which is fed in the direction of the arrow through a fabric treating apparatus generally indicated by reference character 12 and organized about a housing 14. The illustrated housing 14 is a box-like enclosure having a top wall 16, front and rear walls 18 and 20, respectively, and side walls 22. Partitions 24 and 26 extend vertically within the chamber in spaced parallel relation to define a passage 28 through which the web travels from one chamber to another as will presently appear.

The web 10 is fed over and under idler rolls 30, 32, 34 and 36 to a draft roll 38 which is drivingly connected with other draft rolls 40 and 42 as by means of a chain 44 and sprocket gear 46. The chain 44 is, of course, driven by a motor or other means, not shown, and serves to drive the draft rolls so as to carry the web through the unit under longitudinal tension.

Air operated pneumatic clutches 48, or the like, are provided for each draft roll so that their relative speeds may be adjusted to produce the desired longitudinal tension on the web. Obviously other drive means for the draft rolls may be provided. From the draft roll 38 the web 10 passes through a slot 50 in the front wall 18 of the housing near the top thereof and engages the lower portion of idler roll 52. The idler roll 52 is positioned so that its lower portion lies generally along a line which is tangential to the lower portion of the idler roll 52, the upper portion of a worker cylinder 54 and the upper portion of an upper applicator roll 56 which is one of a pair of applicator rolls, the other being a lower applicator roll 58. Similarly the lower applicator roll 58 is mounted in position with respect to the lower portion of the worker roll 54 and an idler roll 60 such that the web 10 will be generally tangential to the lower surface of the worker roll 54.

The applicator rolls 56 and 58 serve as spreaders and are supported at their ends by upper and lower piston rods 62 and 64 respectively, extending outwardly from opposite ends of an air cylinder 66 containing a double piston arrangement with the cylinder being connected through a conduit 68 to a source of compressed air. It will be understood that the applicator rolls 56 and 58 thus may be moved vertically apart or closer towards one another according to the pressure within the cylinder. This permits control over the degree of contact between the

web 10 and the worker cylinder 54 or complete separation of the web from the cylinder 54 by spreading the applicator rolls apart to their maximum extent. Thus the action of the worker roll 54 against the web 10 may be increased or decreased by adjusting the amount of spread between the applicator rolls 56 and 58.

Mounted adjacent each worker roll 54 are hoods 70 and 72 connected by ducts 74 and 76 to a vacuum source for withdrawing lint and the like from around the working area and thereby improve the action of the worker cylinder with respect to the web. To this end the housing 14 serves to prevent lint, etc., from flying about the room and adjustable air vents may be provided to control air flow. The partitions 24 and 26 further aid in the control of the lint by minimizing its transfer from one chamber to the next.

In the illustrated embodiment, the unit is made up with six worker cylinders 54a, b, c, d, e and f, three in each chamber and located in vertical alignment, each with associated idler rolls and spreader type applicator rolls having the air cylinders all connected to a common compressed air line 68. The left-hand group of three worker cylinders serves to treat one surface of the web with the web making two passes against each worker cylinder. Preferably the direction of rotation of the worker cylinders alternate from one to another as indicated by the arrows in FIG. 1. It is also preferred that each worker cylinder be separately driven by a reversible electric motor, or the like, and the direction of rotation of each cylinder will be reversed every so often so as to provide more uniform wearing of the cylinder surfaces. As an alternate measure the cylinders may be continuously oscillated at a rather high frequency.

The web is guided from the left-hand chamber FIG. 1 by means of an idler roll 78, about the draft roll 40, about another idler roll 80, then upwardly through the passage 28 about an idler roll 82 into the right-hand chamber where it is passed back and forth about the worker cylinders 54d, e, and f in an arrangement in reverse to that of the left-hand system so as to treat the opposite surface of the web 10. The web after it has had both surfaces treated is fed by the draft roll 42 about an idler roll 84 out through a slot 86 in the rear wall 20 of the housing where it is wound up in a batcher 88 comprising a pair of batcher rolls 90 and 92. Alternatively, the web 10 may be installed in a range and the web fed further along to additional operations.

The worker cylinders are preferably fabricated with a heavy welded frame with tubular steel cores adapted to run at speeds on the order of 1500 r.p.m. without vibration or subjected to centrifugal forces. Typically the worker cylinders may be on the order of 16" in diameter although this may be increased or decreased according to particular applications. The worker cylinders, as previously indicated, are preferably driven by separate motors that can be removed easily to permit each cylinder to be serviced from time to time. The cylinder surface may be covered with a continuous abrasive layer for certain fabric treatment operations, or may be covered with metal or fiber brushes or mixed metal and fiber brushes as indicated in FIG. 5 depending upon type of fabrics being run through the system and the particular finish which is desired. As previously indicated the worker cylinders are reversible according to a predetermined cycle, typically on the order of three or four hours. This will insure that the working surfaces of the cylinders will wear evenly and will produce a more uniform finish on the fabric. This is particularly important when processing nylon materials.

In order to enhance the action between the worker cylinder and the web, axial oscillating means may be provided as shown in FIG. 2. As shown, the worker cylinder 54 is mounted on a shaft 96 and supported by bearings 98 and 100 at opposite ends thereof. The cylinder 54 is driven by means of a motor 102 connected to the left-

hand end of the shaft 96 by means of a spline connection 104. The right-hand bearing 100 permits a sliding, oscillating action imparted to the cylinder by means of an oscillating drive mechanism generally indicated by reference character 106. This mechanism includes a drive shaft 108, which may be connected to the cloth feed drive system, and a shaft 110 connected through beveled gears 112 and 114. Pivoted at the top of the shaft 110 is mounted a circular casting 116 milled with a recessed slot 118 and engaging an upright shaft 120 (carrying a bearing 121) that may be radially adjusted in the slot to increase or decrease the circular offset action. This assembly provides an eccentric action when actuated and is connected to the end of the shaft 96 by a thrust lever 122 at a desired point. It will be understood that when the shaft 108 is rotated the eccentric connection between the shaft 120 and the lever 122 will act as a crank to push and pull the cylinder 54 axially as it is rotated.

In FIGS. 2 and 3 there is shown a novel worker cylinder for use in performing abrasive treatment of a web in a manner superior to that of a cylinder having a continuous abrasive surface. In FIGS. 2 and 3 the cylinder 54 is formed by milling or the like the cylindrical outer surface with an array of helical grooves 124, preferably dovetailed and in which are seated slats or ribs 126 of abrasive material. Each rib is tapered or wedge shaped to fit snugly into the dovetailed grooves 126 to prevent the ribs from coming away from the cylinder 54 at high rotational speeds. The abrasive ribs 126 are mounted so that their upper portions extend above the surface of the cylinder and present an array of helical abrasive edges which provide a better abrasive action than a continuous cylindrical abrasive surface. The abrasive ribs may be of a material ranging from a heavy grit down to a pumice, depending upon particular applications. The ribs may be molded in molds 128 as in FIG. 7 in which the abrasive particles with a binder are cast to make a full length rib or slat. These ribs may be inserted in their respective grooves by sliding them from either end of the cylinder. When the ribs become worn they may be quickly and easily removed and replaced by new ones. End plates 130 and 132 are removably mounted on the ends of the cylinder to retain the ribs in position. In practice, the ribs will be arranged in alternating directions from a left-hand twist to a right-hand twist from one worker roll to the other to more effectively work out neps, nibs, etc., from the web and these may be run in either direction.

Referring now more particularly to FIG. 4, there is shown a modification of the worker cylinder and in this embodiment abrasive ribs 126' are fastened to a worker cylinder 54' by means of wedge shaped cleats 134 between adjacent ribs and secured to the cylinder 54' by screws or the like.

The apparatus may be used for a variety of web treating applications and with speeds up to 150 yards per minute, for example, giving uniform results. The unit is highly compact and efficient and, by changing the working surfaces of the cylinders, different finishes may be provided for different types of materials. The degree of working action between the web and the cylinders may be readily adjusted by changing the positions of the applicator rolls.

While the invention has been described with particular reference to the illustrated embodiments, numerous modifications thereto will appear to those skilled in the art. For example, other arrangements may be employed to control the contact between the web and the worker cylinder such as moving certain other idler rolls instead of the applicator rolls, for example. Also various drive systems may be used to advantage in operating the apparatus.

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

1. Apparatus for treating a longitudinally moving web, comprising

(a) a worker cylinder having fabric treating means on its outer cylindrical surface,

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- (b) drive means for rotating said cylinder about its longitudinal axis,
- (c) guide rolls for said web mounted in spaced parallel relation to said cylinder in an array defining at least two web paths that are tangential to said rolls and to at least two different portions of said cylinder, 5
- (d) control means for moving at least one of said rolls with respect to said cylinder and thereby change the path of said web with respect to said cylinder,
- (e) feed means for advancing said web through said apparatus, 10
- (f) said fabric treating means including a plurality of elongated abrasive ribs mounted in spaced helical relation on said surface and dovetailed thereto, each of said ribs being of solid abrasive material throughout having a cross-section of a truncated wedge and formed with a plurality of angularly disposed faces presenting a helical leading edge for contact with said web, and, 15
- (g) axial oscillating means connected to said cylinder 20 for oscillating said cylinder along its axis as it is rotated.

6

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ROBERT R. MACKEY, Primary Examiner

U.S. Cl. X.R.

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