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SELVAGE GUIDING AND DRYING APPARATUS

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2 SHEETS—SHEET 2

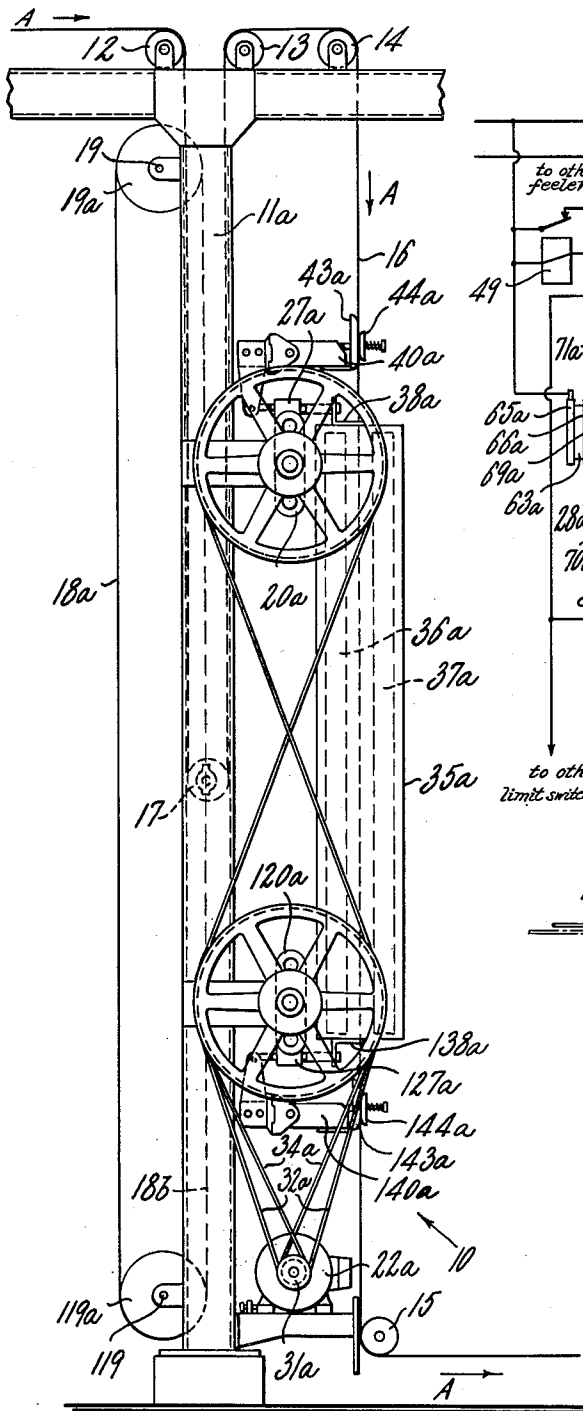


Fig. 2

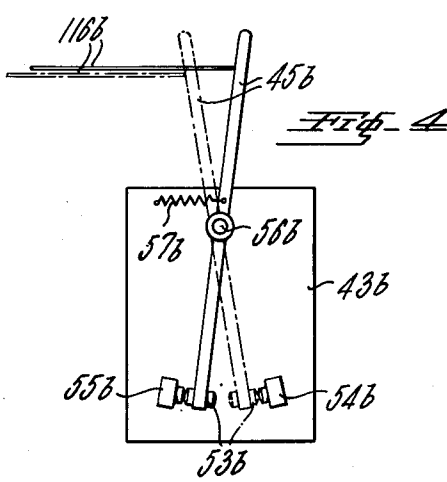
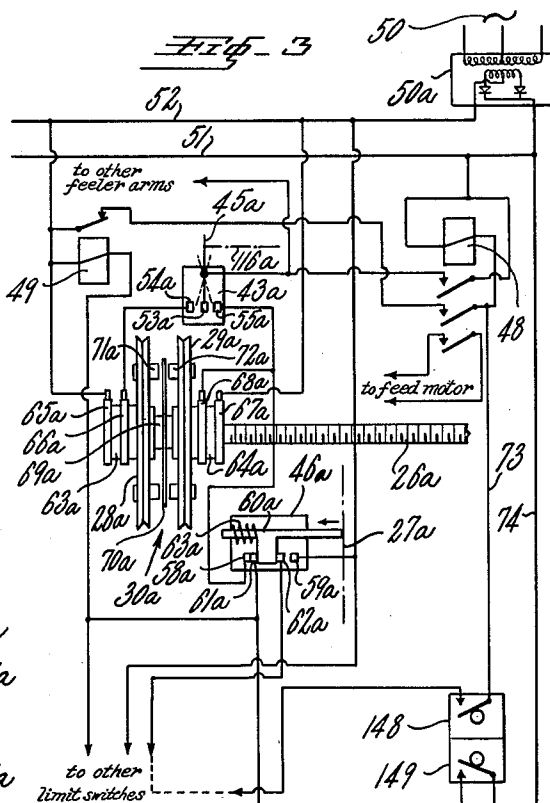


Fig. 4

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SELVAGE GUIDING AND DRYING APPARATUS

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The present invention relates to an apparatus for treating, in particular drying, the selvedge or like border edges of sheet or web materials in a continuous operation and as the material passes through the apparatus.

A primary object of this invention is to provide means affording adaptation of the apparatus of the aforesaid type to any changes in the location or extent of the selvedge and automatic adjustment of the treatment zone of the apparatus to such changes so as to insure continuity of treatment.

Another object of the invention is to provide means orienting the treatment or heating element or elements along which the treatment zone extends so that the treatment element will remain in operative engagement throughout its entire length, with one or both opposite edges of the material to be treated, as the case may be, even while substantial variations in the width and/or position of the material occur.

A further object of the invention is to provide means enabling the treatment element to follow and assume a position parallel to or commensurate with the edge or edges of the material to be treated even when the latter is inclined with respect to the direction of movement of the sheet or web material.

Still another object of the invention is to provide means rendering working condition and function of the apparatus inoperative whenever the displacement or adjustment of the treatment element or elements tends to become excessive and threatens the orderly functioning of the apparatus.

Yet a further object of the invention is to provide means controlling the power supply of the apparatus so that the latter will be arrested whenever the configuration of the edge of the web material under treatment necessitates entirely different working conditions of the apparatus than those for which the latter has been initially set.

The invention is particularly, though not exclusively, applicable to apparatus for drying the selvedges of a pretreated fabric material to facilitate engagement thereof by tentering clips during a subsequent treatment.

With the above and other objects in view, the invention will be hereinafter more fully described and the combination and arrangement of parts will be shown in the accompanying drawings and pointed out in the claims which form part of the specification.

The apparatus according to the invention is described with reference to the accompanying drawings, in which:

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Fig. 1 is a front elevation of an apparatus embodying the invention;

Fig. 2 is a side elevation of the apparatus shown in Fig. 1;

Fig. 3 is a circuit diagram illustrating the operation of the limit switch and follower means; and

Fig. 4 is a detail view of a switch forming part of the follower means.

Referring now more particularly to Figs. 1 and 2 of the drawings, there is disclosed an apparatus 10 comprising two standards 11a, 11b between which extends a set of spaced rollers 12, 13, 14 and 15 journaled on these standards. A web of cloth material 16 passes around the first roller 12, subsequently around a weight roller 17 to keep said material in desired tension, thereafter over rollers 13, 14 and finally along rollers 15, as indicated by the arrows A in Fig. 2. In order to maintain the roller 17 in its horizontal position, the same is floatingly supported at its ends by two endless transmission means 18a, 18b which pass around pulleys 19a, 19a and 19b, 19b, respectively, the pulleys 19a, 19b being fixed on a shaft 19 and the pulleys 19a, 19b being fixed on a shaft 119 for simultaneous rotation.

The left-hand standard 11a has secured thereto an upper bracket 20a, a lower bracket 120a and a platform 21a on which latter rests a motor 22a; similarly, the right-hand standard 11b has secured thereto an upper bracket 20b, a lower bracket 120b and a platform 21b with a motor 22b resting on the latter. The brackets 20a and 20b are interconnected by a pair of parallel rods 23, 24 which at their center support a block 25; in analogous manner the brackets 120a and 120b are interconnected by a pair of parallel rods 123, 124 which at their center support a block 125.

Lodged in the upper left-hand bracket 20a and in the upper block 25 is a threaded spindle 26a which passes through and meshes with an internally threaded slide 27a displaceably supported on the rods 23, 24; similarly, there is lodged in the lower left-hand bracket 120a and in the lower block 125 a threaded spindle 126a which passes through and mates with an internally threaded slide 127a displaceably supported on the rods 123, 124.

The arrangement on the right-hand side of the apparatus is identical, with a spindle 26b lodged in bracket 20b and supported in block 25 while threadedly engaging a slide 27b, and with a spindle 126b lodged in bracket 120b and in block 125 while threadedly engaging a slide 127b. The free, outer end of each spindle 26a, 26b, 126a and 126b carries a pair of pulleys 28a, 29a; 28b, 29b; 128a, 129a; and 128b, 129b, respectively, which are free-

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ly rotatable thereon and may be selectively coupled to the spindle by a magnetic clutch generally indicated at 30a, 30b, 130a and 130b, respectively, details of which will be described in connection with Fig. 3.

When the motor 22a is energized, the outer pulleys 28a and 128a are rotated in a first direction (e. g. clockwise and counterclockwise, respectively, as viewed in Fig. 2) by means of a pulley 31a and a belt 32a having one cross-over point, while the inner pulleys 29a and 129a are driven in the opposite direction (e. g. counterclockwise and clockwise, respectively) by means of a pulley 33a and a belt 34a having two cross-over points. The arrangement on the right-hand side of the apparatus is analogous and includes motor pulleys 31b, 33b and belts 32b, 34b.

Associated with the selvages 116a, 116b of the endless cloth material 16 are treatment elements 35a, 35b, respectively, each element consisting essentially of an inwardly open, elongated drying channel provided with heaters, such as indicated by numerals 36a, 37a (Fig. 2) adapted to lie on and cover opposite sides of the cloth material when the respective selvedge passes through the channel. Each drying element 35a, 35b is provided at its lower end with a lug 139a, 139b, respectively, pivoted at 138a, 138b to respective lower slides 127a, 127b. On its upper end the drying elements are provided with lugs 39a, 39b, respectively, having each an elongated slot engaged by a pin 38a, 38b extending from the slides 27a, 27b, respectively.

Also secured to each of the slides 27a, 27b, 127a, 127b is a respective bracket 43a, 40b, 140a, 140b carrying a shoe 41a, 41b, 141a, 141b displaceable relative thereto by means of a hand-wheel 42a, 42b, 142a, 142b, respectively. Each of these shoes carries a follower member comprising a base 43a, 43b, 143a, 143b, respectively, to which there is resiliently secured a pressure foot 44a, 44b, 144a and 144b for yieldably holding the cloth 16 in contact with the base. Each follower member includes a feeler arm 45a, 45b, 145a and 145b, respectively, adapted to be engaged by the selvedge of the cloth and to be displaced by it commensurate with its changes in the selvedge, as more clearly apparent from Figs. 3 and 4.

Fixed to the rods 24 and 124, externally of the slides 27a, 27b and 127a, 127b, are four identical limit switches 46a, 46b, 146a and 146b adapted to cooperate with the associated slides as will be more fully described in connection with Fig. 3. It will thus be seen that the apparatus 10 comprises four identical controllers which consist of clutches 30a, 30b, 130a and 130b, follower members 43a, 43b, 143a and 143b and limit switches 46a, 46b, 146a and 146b, respectively.

The circuit shown in Fig. 3 comprises a number of elements common to the four controllers referred to, including a transformer and rectifier unit 50a, a start relay 48, a stop relay 49, a start button 148 and a stop button 149.

A source 50 of alternating current supplies power, via the transformer circuit 50a, to a positive bus bar 51 and a negative bus bar 52. Also shown in Fig. 3, by way of example, are the spindle 26a with its associated clutch 30a and pulleys 28a, 29a, the follower 43a with its feeler arm 45a, and the limit switch 46a cooperating with slide 27a. The selvedge 116a is in contact with feeler arm 45a as previously explained.

Turning to Fig. 4 for a detailed description of the four identical follower members (here the member 43b), it will be seen that the arm 45b

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carries a movable contact 53b adapted to cooperate with either of two stationary contacts 54b, 55b positioned on opposite sides thereof. Arm 45b is pivoted to the base 43b at 56b and is biased by a spring 57b toward engagement of its contact 53b with the stationary contact 54b.

The selvedge 116b, on the other hand, bears upon and slidably engages the arm 45b so as to limit the displacement of the latter by the spring 57b and, under certain conditions subsequently pointed out, to swing this arm about its pivot 56b for engagement of contact 53b with contact 55b. The corresponding contacts of follower 43a are shown in Fig. 3 at 53a, 54a and 55a, respectively.

The limit switch 46a (Fig. 3), has two stationary contacts, 58a and 59a, a movable arm 60a and a pair of movable contacts 61a, 62a carried on the arm 60a. A spring 63a urges the arm 60a toward the slide 27a and toward engagement of contact 62a with contact 59a. When, however, the slide 27a bears upon the projecting end of arm 60a, under conditions that will subsequently become apparent, contacts 59a, 62a are broken and contacts 58a, 61a become engaged to establish a circuit, as will be later described.

The clutch 30a comprises a pair of solenoids 63a, 64a provided with slip rings 65a, 66a and 67a, 68a, respectively, forming part of their respective energizing circuits. The two solenoids act upon a collar 69a, slidably keyed to the spindle 26a, which carries a disk armature 70a. The two pulleys 28a, 29a are provided with solenoid cores 71a, 72a facing the disk 70a, the disk being normally spaced from these cores unless said disk is drawn toward one or the other of the pulleys upon the energization of the respective solenoids. As above pointed out the two pulleys rotate in opposite directions; accordingly, energization of one or the other solenoid 63a—71a; or 64a—72a will result in the rotative entrainment of disk 70a and spindle 26a in one or the other direction.

Feeler arm 45a is connected to the positive bus bar 51, in parallel with the other feeler arms, by way of the front contact of the upper armature of start relay 48. This relay has an energizing circuit leading from the positive bus bar 51 over its winding and conductor 73 to start button 148, thence via contacts 59a, 62a of the limit switch 46a and corresponding contacts of the other limit switches in series therewith to the negative bus bar 52.

Stop relay 49 has an energizing circuit leading from the positive bus bar 51 over conductor 74, stop button 149, winding of relay 49 to negative bus bar 52. The stop button 149 is shunted by a circuit traceable from bus bar 51 over the upper armature of relay 48, feeler arm 45a, contacts 53a and 55a, contacts 58a and 61a to the winding of relay 49.

The center armature of relay 48 serves to establish a locking circuit for the latter over the armature and back contact of relay 49, while the lower armature of relay 48 closes a circuit for energizing the feed motor (not shown) to advance the cloth material 16 when this relay is energized. The rings 65a and 67a are connected to the negative bus bar 52, as shown; rings 66a and 68a are connected to stationary contacts 54a and 55a, respectively, of the follower member 43a.

The operation of the arrangement described above is as follows:

When the start button 148 is momentarily pressed, relay 48 is energized in the circuit previ-

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ously traced and locks over the armature and back contact of relay 49.

Power is supplied to the feed motor and also to motors 22a, 22b which may be connected in parallel therewith or, if desired, may be continuously and independently energized. At the same time the feeler arm 45a (and the corresponding arms of the other follower members) is connected to potential at the upper armature of relay 48. It has been assumed that the limit switch 46a remains neutral, its contacts 59a, 62a being normally closed. The same is true of the other limit switches 46b, 146a and 146b, this being a necessary prerequisite for the operation of the start relay 48.

As long as the selvage 116a maintains the feeler arm 45a in such a position as to keep its contact 53a out of engagement with either of the contacts 54a and 55a, no further change will take place in the circuit of Fig. 3 as the selvage of the advancing fabric passes continuously between the heating coils or means 36a and 37a of the treatment or drying element 35a, this being the position illustrated on the left-hand side of Fig. 1 and in solid line on the right-hand side thereof.

Under these conditions both selvages of the fabric material will remain operatively engaged with the respective drying elements 35a, 35b and the treatment will proceed in a continuous manner and operation. If it be desired to stop the operation of the machine for some reason, actuation of the stop button 149 will momentarily energize stop relay 49, thereby breaking the holding circuit of start relay 48 and de-energizing the feed motor. It is also contemplated by this invention to cut off simultaneously the circuit for the heating means.

Let us assume, however, that the width of the advancing fabric 16 is subject to change, as indicated in dot-dash lines in Fig. 1. Thus, if selvage 116b starts to recede, spring 57b (Fig. 4) is enabled to close the circuit through contacts 53b and 54b by swinging the arm 45b counterclockwise. This will immediately energize one of the solenoids of clutch 30b, resulting in a rotation of spindle 26b so as to displace the slide 27b toward the left (Fig. 1), this movement in turn entraining the follower 43b as well as the upper end portion of drying element or channel 35b.

In analogous manner the lower end of the channel 35b will be displaced when the discontinuity in the selvage 116b reaches the follower 43b, so that this channel or treatment element will be caused to assume the dot and dash line position indicated in Fig. 1 registering with the particular configuration or inclination of the edge of the cloth. Had the width of the cloth material increased instead of decreased, the other solenoid of clutches 30b and 130b would have been energized, thus resulting in an outward displacement of the slides 27b and 127b.

The energization of these solenoids will be clearly apparent from Fig. 3 from which it will be seen that engagement of contact 53a with contact 54a closes the circuit through solenoid 63a-71a while engagement of contact 53a with contact 55a closes, however, the circuit through solenoids 64a-72a.

If, on account of inertia, the follower overshoots the point in which its feeler arm is just centered with respect to the associated stationary contacts, the direction of rotation of the spindle will be reversed and the controller will "hunt"

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until the correct position has been reached. In extreme cases, this "hunting" may carry some or more of the slides, say, 27a, into a position in which it engages the switch arm 60a of the associated limit switch 46a.

This will break the energizing circuit of start relay 48 but, since the latter is locked, nothing further will happen since under such conditions the contact 53a will not be in engagement with contact 55a, relay 49 thus remaining unoperated. If, however, the actuation of the limit switch has been due to an excessive widening of the fabric or other disturbing causes resulting in an outward displacement of the selvage 116a beyond a predetermined limit, such actuation of the limit switch 46a will coincide with the feeler arm 45a occupying an extreme off-normal position, so that the relay 49 operates in the circuit previously traced which includes the contacts 53a, 55a of the follower member and the contacts 58a, 61a of the limit switch.

The release of the start relay 48 thereupon stops the feed motor and removes potential from the feeler arm 45a, thus de-energizing the solenoid 64a and arresting the spindle 26a. Because the starting circuit has been opened at contacts 59a, 62a, actuation of start button 148 will be without effect until the operator has corrected the working condition and situation giving rise to the interruption.

It should be noted that the invention is capable of numerous modifications and adaptations without exceeding its scope. Thus it will be possible to provide additional limit switches, similar to the switches 46a, 46b, 146a and 146b, positioned so as to prevent excessive inward displacement of the drying elements 35a, 35b and associated parts, in order to guard against possible damages to the machine in the event the start button 148 is actuated with no web material 16 in place.

Such a switch, which in analogy with the foregoing description may be arranged to become operative only upon the feeler arm occupying a position such as to tend to displace the associated slide toward the center (the position illustrated in dot-dash lines in Fig. 4, with the feeler arm 45b engaging contact 54b), could also operate to stop the feed motor (and, if desired, the motors 22a and 22b), thus preventing useless power consumption by these motors.

It may also be mentioned that, if interruption of the feeding movement by means of the limit switches is not necessary or desired, there may be provided individual start and stop relays, such as 48 and 49, for each limit switch and follower member, so that each clutch mechanism will be inactivated only when the particular selvage engaged by the associated feeler arm moves out of bounds.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In an apparatus for continuously treating an edge of an advancing web material, in combination, a treatment element engageable with said edge, actuating means operable to displace said treatment element, and follower means controlling said actuating means to maintain said treatment element engaged with said edge upon displacement of the latter, said follower means including a feeler member in contact with and displaceable by movements of said edge.

2. The combination according to claim 1, wherein said follower means comprises spring

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means urging said feeler member toward said edge.

3. The combination according to claim 1, wherein said follower means is mechanically coupled with said treatment element for simultaneous displacement.

4. The combination according to claim 1, including limit switch means disabling said follower means upon said treatment element reaching a predetermined position.

5. The combination according to claim 4, wherein said limit switch means is responsive to said treatment element and said feeler member simultaneously occupying a respective predetermined position.

6. In an apparatus for continuously treating an edge of an advancing web material, in combination, a treatment element engageable with said edge, first drive means adapted to displace said treatment element toward said edge, second drive means adapted to displace said treatment element away from said edge, said treatment element being normally disengaged from both of said drive means, coupling means selectively operable to engage said treatment element with either of said drive means, thereby displacing said treatment element in a respective direction, and follower means mechanically coupled with said treatment element for simultaneous displacement, said follower means including a first and a second set of contacts, a feeler member having a first position in which said first set of contacts are closed, thereby actuating said coupling means to engage said treatment element with said second drive means, and a third position intermediate said first and second positions in which neither of said sets of contacts are closed, thereby maintaining said treatment element disengaged from both of said drive means, said feeler member being engageable by said edge and displaceable thereby toward said second position, said follower means being provided with spring means urging said feeler member toward said first position, said feeler member being aligned with said treatment element to maintain the latter in operative engagement with said edge when the feeler element is held in said intermediate position by contact with said edge.

7. The combination according to claim 6, including limit switch means operable to disable said coupling means upon said treatment element reaching an extreme position and said feeler member simultaneously occupying a position such as to tend to drive said treatment element beyond said predetermined position.

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8. The combination according to claim 7, wherein said limit switch means operates to stop the advance of said material simultaneously with disabling said coupling means.

9. In an apparatus for continuously treating an edge of an advancing cloth material, in combination, an elongated treatment element engageable with a predetermined length of said edge, first actuating means coupled with one end of said treatment element and operable to displace said one end, second actuating means coupled with the other end of said treatment element and operable to displace said other end, first follower means controlling said first actuating means to maintain said one end engaged with said edge upon displacement of the latter, said first follower means including a first feeler member connecting said edge adjacent said one end and displaceable by the movement of said edge, and second follower means controlling said second actuating means to maintain said other end engaged with said edge upon displacement of the latter, said second follower means including a second feeler member contacting said edge adjacent said other end and displaceable by movement of said edge.

10. The combination according to claim 9, wherein said first and second follower members are mechanically coupled with said one end and said other end of said treatment element, respectively, for simultaneous displacement.

11. The combination according to claim 9, wherein said treatment element comprises a U-shaped channel for receiving said edge, and a heater means within said channel.

12. The combination according to claim 11, wherein said heater means includes a pair of elongated heating elements positioned on opposite sides of said edge within said U-shaped channel.

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