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APPARATUS FOR BOARDING AND PRESETTING TEXTILES

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3 Sheets-Sheet 1

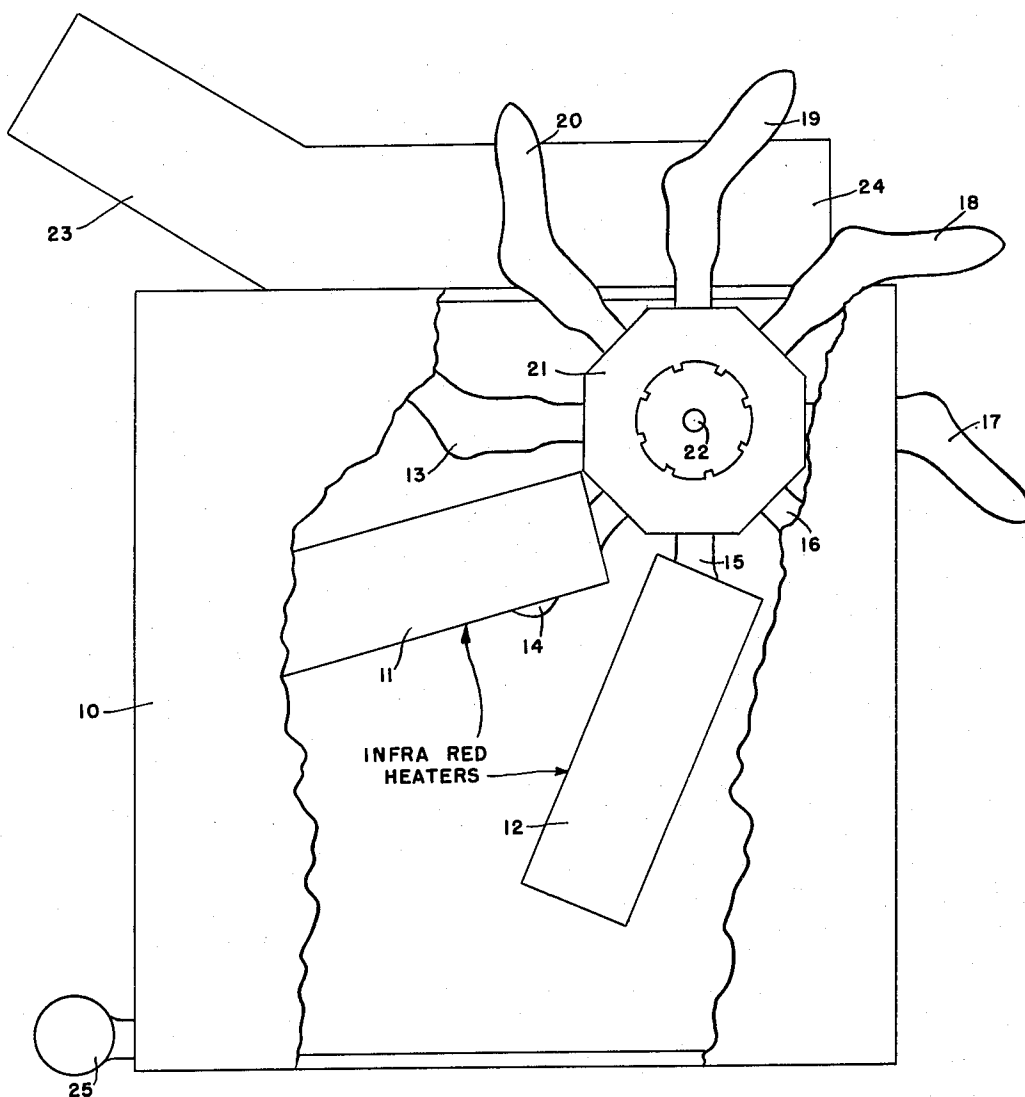


FIG. 1

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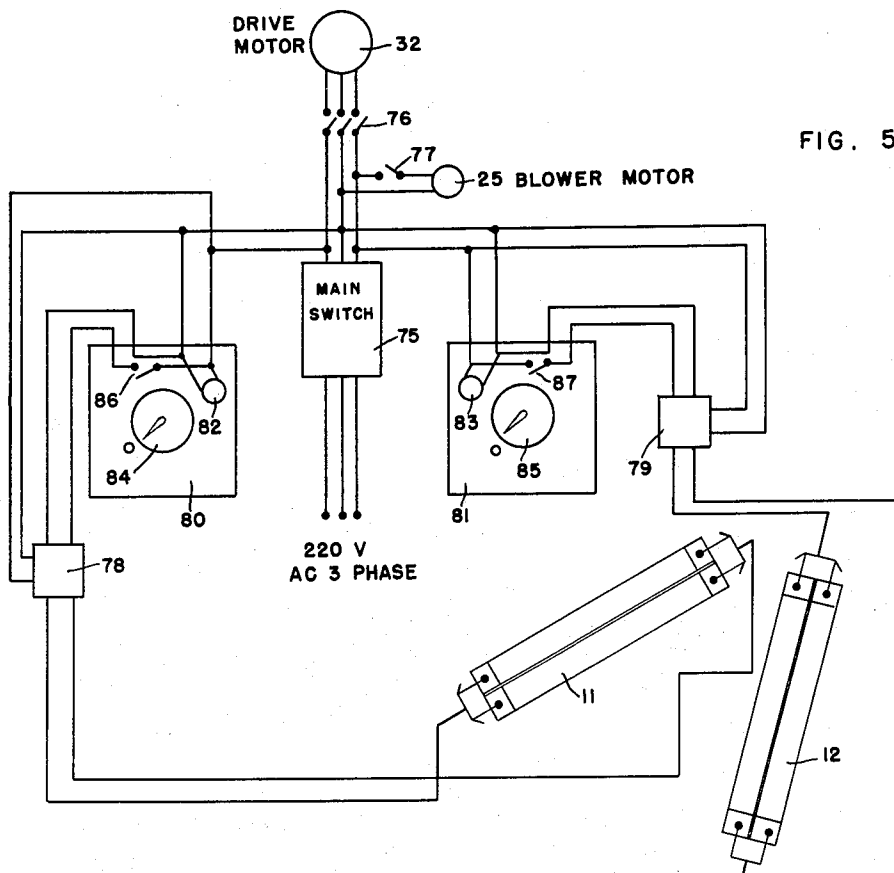
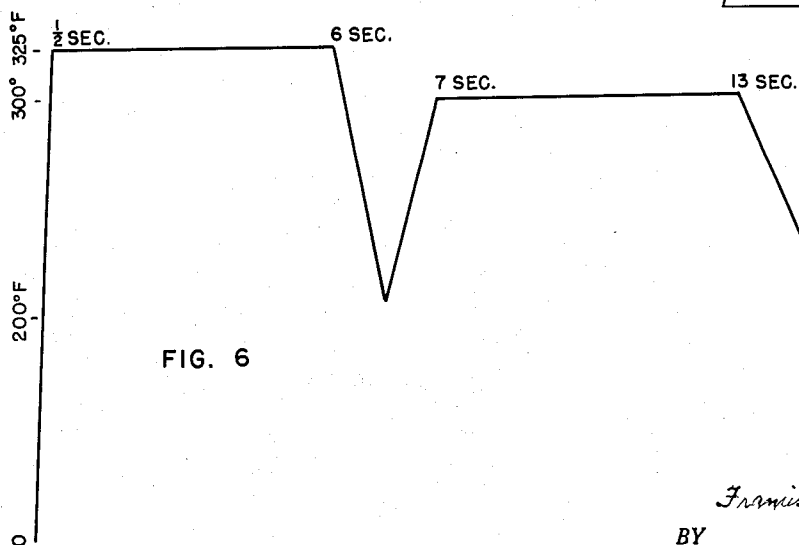
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3 Sheets-Sheet 3



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APPARATUS FOR BOARDING AND PRESETTING TEXTILES

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10 Claims. (Cl. 34—66)

The present invention relates to an improved boarding or presetting apparatus.

Boarding and presetting machines for processing knit hosiery or the like are generally known and used in order to dry and set hosiery by the application of controlled amounts of heat. Prior to this invention, continuously operated machines having hosiery boards for mounting hosiery and moving the mounted hosiery through a drying oven have been used with varying degrees of success. Difficulties have been encountered in the control of the application of heat to the hosiery variously resulting in scorched hosiery, unset hosiery, or melted filaments when attempting to preset hosiery knit from synthetic filaments.

It is an object of the present invention to provide an improved apparatus for boarding and presetting textile goods to obtain more uniformly good results.

In practicing the invention, the textile article to be boarded or preset is subjected to successive applications of controlled heat for controlled periods of time so that the article may be initially heated to a comparatively high temperature for a fixed period of time, thereafter cooled to a lower temperature over a known period of time, and subsequently reheated to a high temperature somewhat lower than the first high temperature for another period of time.

A feature of the invention is the provision of a boarding machine having at least two heaters spaced along the path of travel of the textile article through the machine together with a board moving mechanism arranged to move the textile article with uniform speed through the machine from one heater to the next heater such that controlled amounts of drying heat are imparted from each heater with a cooling interval additionally provided during the passage of the textile article from the respective heaters.

Other objects, features and the attending advantages of the invention will be apparent with reference to the following specification and drawings in which:

Fig. 1 is a side elevation partly broken away to show the position of the heaters within a rotary type boarding machine;

Fig. 2 is a plan layout of the drive mechanism for intermittently moving the textile boards through the heaters;

Fig. 3 is a fragmentary view of the boarding wheel ratchet drive mechanism taken in the direction of the arrows on the line A—A of Fig. 2;

Fig. 4 is a view similar to Fig. 3 but taken in the direction of the arrows on the line B—B of Fig. 2;

Fig. 5 is a wiring diagram; and

Fig. 6 is a graphic representation of the heat and time factors as controlled in accordance with the method teachings of the invention.

The boarding and presetting procedure obtainable by this invention has resulted from the discovery that much more uniformly good results could be obtained by heating the article in a plurality of successive steps with a cooling interval between each heating step. Of course, the exact amount of heat for each heating step and the period of

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time for applying the heat together with the length of the cooling interval are variable factors which are in part determined by the type and nature of the textile article to be treated. However, effective and uniformly good results may be obtained when presetting knit hosiery by applying heat to the hosiery boards under the conditions shown by the chart of Fig. 6 of the drawings. In the chart, the ordinate represents board temperature in degrees Fahrenheit and the abscissas represent the time in seconds during which the article to be boarded assumes the temperature indicated in passing through the heaters. The machine of the invention, as will be described, may be adjusted for speed of movement of the hosiery boards to and from the drying heaters, for degree or percentage of heat in each drying heater, and for length of time during which the board is positioned in each heater, such as to provide the conditions shown in the chart of Fig. 6. For example, the machine may be adjusted to provide that a hosiery board will remain in the first heater for a total time period of six seconds, will move from the first heater to the second heater in one second and will remain in the second heater for six seconds following which the board and hosiery are allowed to cool to room temperature. The first heater is adjusted to bring the hosiery from room temperature to 325° F. in one-half second and to maintain such temperature for an additional five and one-half seconds until the board is moved to the second heater after a total six-second interval. In passing to the second heater during a time interval of one second, the temperature of the board and hosiery cools to about 200° F. and then again rises as it approaches the second heater to a temperature of 300° F. which is maintained in the second heater for a further period of six seconds. After passing from the second heater, the hosiery and board are allowed to cool to room temperature. It should be understood that the apparatus enables controlled heating and cooling in a plurality of successive steps and should not be limited to a particular number of heating steps nor to the particular temperatures and time intervals just described as they may vary for different articles to be boarded and preset.

Referring now to Fig. 1 of the drawings, the rotary boarding machine of the invention is comprised of a cabinet 10 containing two infra-red strip heaters 11, 12 respectively. Of course, any suitable type of heaters may be provided in place of the infra-red strip heaters 11, 12 as should be readily understood. A number of hosiery boards 13-20 are respectively secured at one end to a boarding wheel hub 21 that is secured to a rotary shaft 22. The boards are positioned to radially extend in equi-angular positions from the wheel 21. Each of the boards 13-20 may be formed of aluminum or any other suitable material and may be individually heated by internal wiring if desired although the preferred arrangement being described does not provide for the internal heating of the boards. The boards 13-20 and wheel 21 may be intermittently rotated in a counter-clockwise direction as seen by Fig. 1 of the drawings by means of a ratchet drive and escapement mechanism to be later described so that a machine operator may place a sock to be treated on the board 20 and remove a treated sock from the board 19 during the intervals between the intermittent rotation of the wheel 21. Suitable shelves and counters 23 and 24 may be provided for separately storing the untreated and treated socks. The intermittent rotation of the wheel 21 and boards 13-20 is adjusted to provide a desired interval such as six seconds for the positioning of each successive board in the heating area of the first heater 11 and the heating area of the second heater 12 with about one second required for movement from the first heater position to the second heater position. Obviously, the heaters

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11 and 12 are positioned and spaced from each other in a predetermined angular relation equal to the spacing between the free ends of the equi-angularly positioned boards 13-20 on the boarding wheel 21 and the boarding wheel is intermittently rotated only an angular distance equal to the angular spacing between the respective boards 13-20 and the heaters 11 and 12. A blower fan 25 may be provided to control the general temperature of the air within the cabinet 10 and hence the degree of cooling for each board as it comes from the first heater 11 to the second heater 12. Although the heaters 11, 12 are not shown in detail, they preferably comprise infra-red strip heaters mounted in reflector casings positioned on each side of the path of movement of the hosiery boards.

Now referring to Figs. 2-4 of the drawings, a suitable form of ratchet drive and escapement mechanism for intermittently moving and positioning the boards will be described, although it should be understood that other forms of drive mechanisms may be used without departing from the spirit of the invention. The board wheel 21 and drive shaft 22 are journaled on pillow block bearings 30, 31 secured to suitable frame members within the cabinet 10. The frame members within the cabinet 10 are not shown in order to simplify the drawings and any suitable frame structures obvious to those skilled in the art may be used. An electric motor 32 is arranged to continuously run during the operation of the machine. The motor 32 is connected by a pulley 33 and belt 34 to the input drive pulley 35 of a suitable variable speed hydraulic transmission 36. The transmission 36 may be of a conventional form having a speed control lever 37 which may be adjusted to vary the output speed of the output pulley from zero to 600 revolutions per minute.

The output pulley 38 is connected by a belt 39 to the drive pulley 40 secured to a countershaft 41 journaled in pillow block bearings 42, 43 suitably mounted on the machine framework (not shown). A slotted crank 45 is secured to one end of the countershaft 41 and a crank arm 46 is slidably and rotatably connected at 47 to the crank 45. The other end of the crank arm 46 is provided with bifurcated side portions 48, 49 and a ratchet roller 50 for cooperation with the ratchet wheel 51, to be referred to again.

As the countershaft 41 is rotated, the slotted crank 45 is likewise rotated to cause reciprocation of the crank arm 46. The geometrical perimeters of the crank 45, crank arm 46, and ratchet wheel 51 are such that upward movement of the crank arm 46 moves the ratchet roller 50 over the ratchet wheel 51 to the next ratchet tooth. Thereafter, continued rotation of the slotted crank 45 tends to move the crank arm downward to rotate the ratchet wheel 51 in the counter-clockwise direction as seen on the drawings. However, such movement of the ratchet wheel 51, which is secured to the shaft 22, is prevented by an escapement mechanism until the escapement locking cam 52, also secured to the shaft 22, is released and during such time the crank arm 46 is therefore caused to move along the slot 45a of the slotted crank 45.

The continuously rotated countershaft 41 is also provided with a release cam 53 which controls the operation of the push rod 54 and cam locking or escapement dog 55 pivotally supported on the shaft 56. As the countershaft 41 revolves, the release cam 53 operates the push rod 54 to pivot the cam locking dog 55 out of engagement with a particular one of the locking cam escapement notches, such as shown at 57 or 58. The release cam 53 is timed to effect a release of the locking cam 52 while the crank arm 46 is trying to move downward so that thereafter the crank arm 46 moves downward to rotate the ratchet wheel 51, drive shaft 22, locking cam 52, and hosiery board wheel 21 by an angular amount equal to the spacing between the ratchet teeth, locking cam notches

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and hosiery boards, all of which are equal to each other. At this time the release cam 53 has rotated to a position again allowing the push rod 54 to drop and the locking dog 55 to engage the next successive locking cam escapement notch 58, thereby locking the new position of the hosiery boards with respective ones of the boards in the heating areas of respective ones of the heaters 11 and 12 until the next revolution of the countershaft 41.

Obviously the speed with which the countershaft 41 is driven by the variable speed hydraulic transmission 36 will control the time interval between which the ratchet wheel 51 and board wheel 20 are intermittently rotated thus controlling the length of time during which each board 13-20 is positioned in a respective one of the heaters 11, 12. Additionally, the speed with which the transmission drives the countershaft 41 will also control the speed of movement of the boards from one heater to the next and hence the degree of cooling of the boards between successive applications of heat. A spring pressed brake 60 is arranged to normally engage a side surface of the ratchet wheel 51 and thereby prevent jerking operation or movement of the hosiery boards and assure positive locking operation of the escapement locking cam 52.

As described above, the timing of the positioning of each hosiery board in each of the first and second heaters 11, 12 respectively is obtained by adjusting the output speed of the hydraulic transmission 36. Fig. 5 of the drawings is a simplified wiring diagram of a control system including the necessary controls to adjustably determine the amount of heat provided by each heater 11 or 12. A two hundred twenty volt three-phase alternating current supply is connected through a main switch 75 to the three-phase A. C. drive motor 32 through a motor control switch 76. The single-phase cabinet blower motor 25 is connected through the control switch 77 to one phase of the power line as controlled by the main switch 75. The infra-red strip heaters 11 are adapted to be connected through a relay type current breaker 78 to one phase of the power supplied through the main switch 75. Similarly, the infra-red strip heaters 12 are adapted to be connected through the relay type circuit breaker 79 to one phase of the power from the main switch 75. Suitable so-called current percentage input controllers generally shown at 80 and 81 are provided to control the operation of the relay circuit breakers 78, 79 and hence the degree of heat furnished by the heaters 11, 12 respectively. Each of the controllers 80, 81 are driven by small electric motors 82, 83 respectively which together with the setting of the manual controls 84, 85 respectively control the operation of the switch points 86, 87 and hence the operation of the relay circuit breakers 78, 79 to supply the desired amounts of heat. The input controllers 80, 81 have not been described in detail as they form no part of the present invention and may have various forms and arrangements. It has been found that a commercially available input controller known as the "Chromalox Type VCA 230 v.—20 amps." is entirely satisfactory.

With the foregoing, a new apparatus for boarding and presetting textile goods such as knit hosiery has been described. Although the machine has been specifically described as a rotary type it should be understood that presetting the goods by a plurality of successive heating and cooling operations may be performed with other types of machine having other forms of movement such as a straight line movement or the like. Various modifications may be made within the spirit of the invention and the scope of the appended claims.

I claim:

1. A textile boarding and presetting machine of the rotary type comprising a boarding wheel, a plurality of textile boards, each of said boards being secured at one end to said wheel and radially extending from said wheel in equi-angular spaced positions, at least two heaters, each of said heaters being mounted to provide heating areas in the path of movement of said boards as said wheel is

ing a movable textile board supporting means, a plurality of textile boards, each of said boards being secured at one end to said supporting means and extending from said supporting means in spaced positions, a heating cabinet, at least two radiant heaters in said cabinet, each of said heaters being mounted to provide heating areas in the path of movement of said boards as said supporting means is moved and being spaced from each other by a distance substantially equal to the spacing between said boards and defining a cooling area between said heaters, means for controlling the temperature of each of said heaters, and drive means to intermittently move said supporting means by an amount substantially equal to the spacing between said boards.

10. A textile boarding and presetting machine comprising a movable textile board supporting means, a plurality of textile boards, each of said boards being secured at one end to said supporting means and extending from said supporting means in spaced positions, a heating cabinet, at least two radiant heaters in said cabinet, each of said heaters being mounted to provide heating areas in the path of movement of said boards as said supporting means is moved and being spaced from each other by a

distance substantially equal to the spacing between said boards and defining a cooling area between said heaters, means for controlling the temperature of each of said heaters, means for controlling the temperature in said cooling area, and drive means to intermittently move said supporting means by an amount substantially equal to the spacing between said boards.

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