United States Patent

Beeley et al.

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[54] GARMENT FINISHER AND METHOD OF FINISHING GARMENTS

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[21] Appl. No.: **50,578**

[52] **U.S. Cl.** ..... **8/150**, 8/137, 8/149.3, 34/37, 68/5 C, 68/20, 223/70

[51] **Int. Cl.** **B08b 3/02**, D06c 1/06

[58] **Field of Search** ..... 68/3 R, 5 C, 20; 223/51, 70, 223/73; 8/149.3, 150, 137; 34/37

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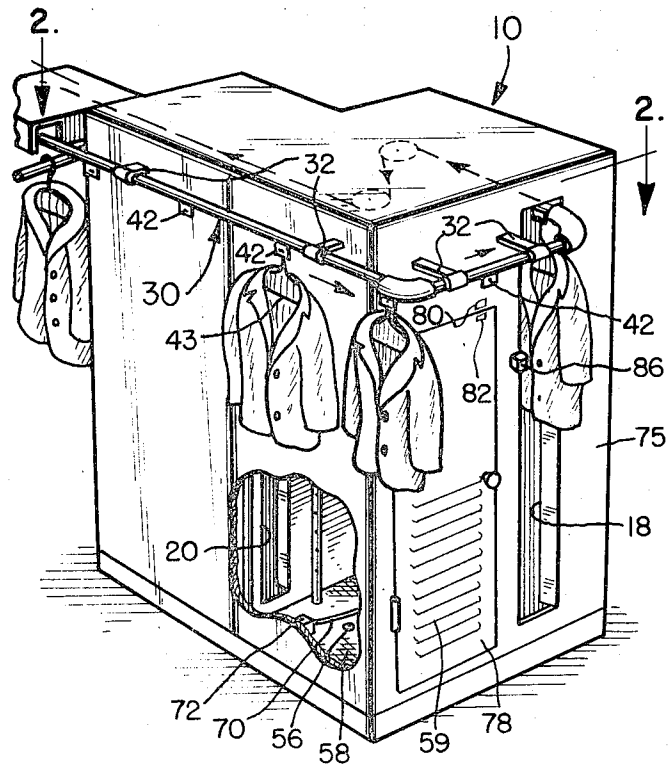
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[57] **ABSTRACT**

A garment finisher with adjacent internally communicating conditioning and drying chambers, respectively each having horizontally narrow inlet and outlet openings, means discharging steam within the conditioning chamber and as converging inwardly directed jets from opposite sides of the inlet and outlet openings, and means directing heated air downwardly at high velocity within the drying chamber, a first conveyor for carrying successive garments suspended in adjacent generally edge-to-edge spaced orientation on approximately 20 to 30 inch centers to within the conditioning chamber and then through the drying chamber, a second conveyor for carrying the garments suspended within the conditioning chamber but in adjacent spaced generally front-to-rear orientation on approximately only 3 to 6 inch centers, means to transfer the garments from the first conveyor to the second conveyor and back again from the second conveyor to the first conveyor all in the conditioning chamber, means driving the conveyors in synchronization where the second conveyor feed is slower than the first conveyor feed by an approximate ratio of the garment center spacings of the respective conveyors, and the method of finishing garments including a dual-speed garment feed through adjacent conditioning and drying chambers where the garments are normally in general edge-to-edge orientation at liberal center spacings except in the conditioning chamber where they are in general front-to-rear orientation and at much reduced center spacings.

It is possible to finish garments, particularly those of a material having memory retaining characteristics, without actually pressing the garment between hot press faces. The garment is initially conditioned, by steam for example, and then is fluffed and dried typically with high-velocity heated air to remove the wrinkles. Equipment is available to finish the garments individually or in batches for each cycle of the finisher unit, or successively on a continuing progressive cycle basis where the garment moves relative to the finisher unit. Tunnel-type finishers, as they are called, operate according to the last-mentioned basis and pass a series of garments successively and continuously, through adjacent internally communicating conditioning and drying chambers.

17 Claims, 7 Drawing Figures



PATENTED FEB 22 1972 3,644,085

SHEET 1 OF 3

FIG. 1

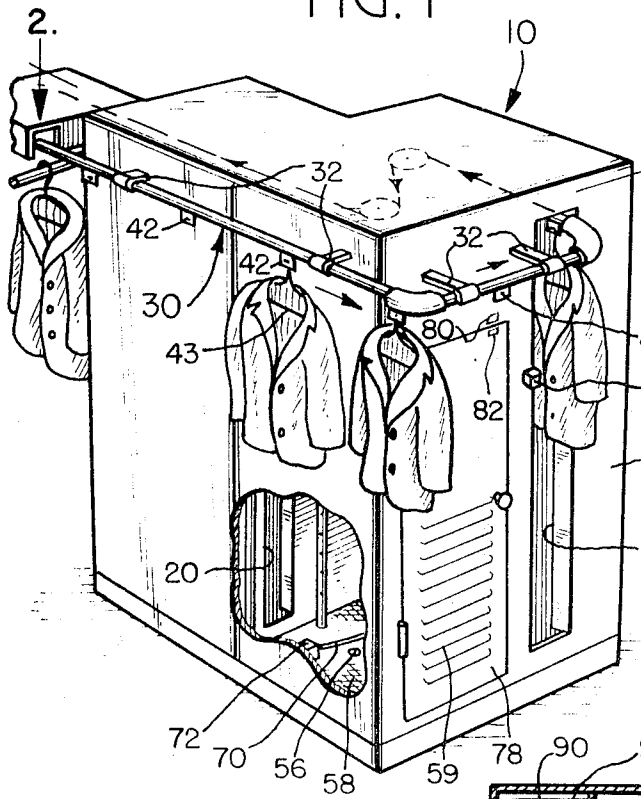


FIG. 3

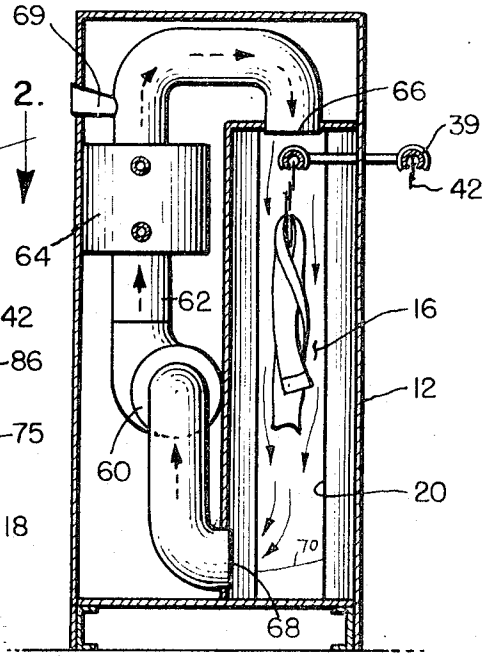
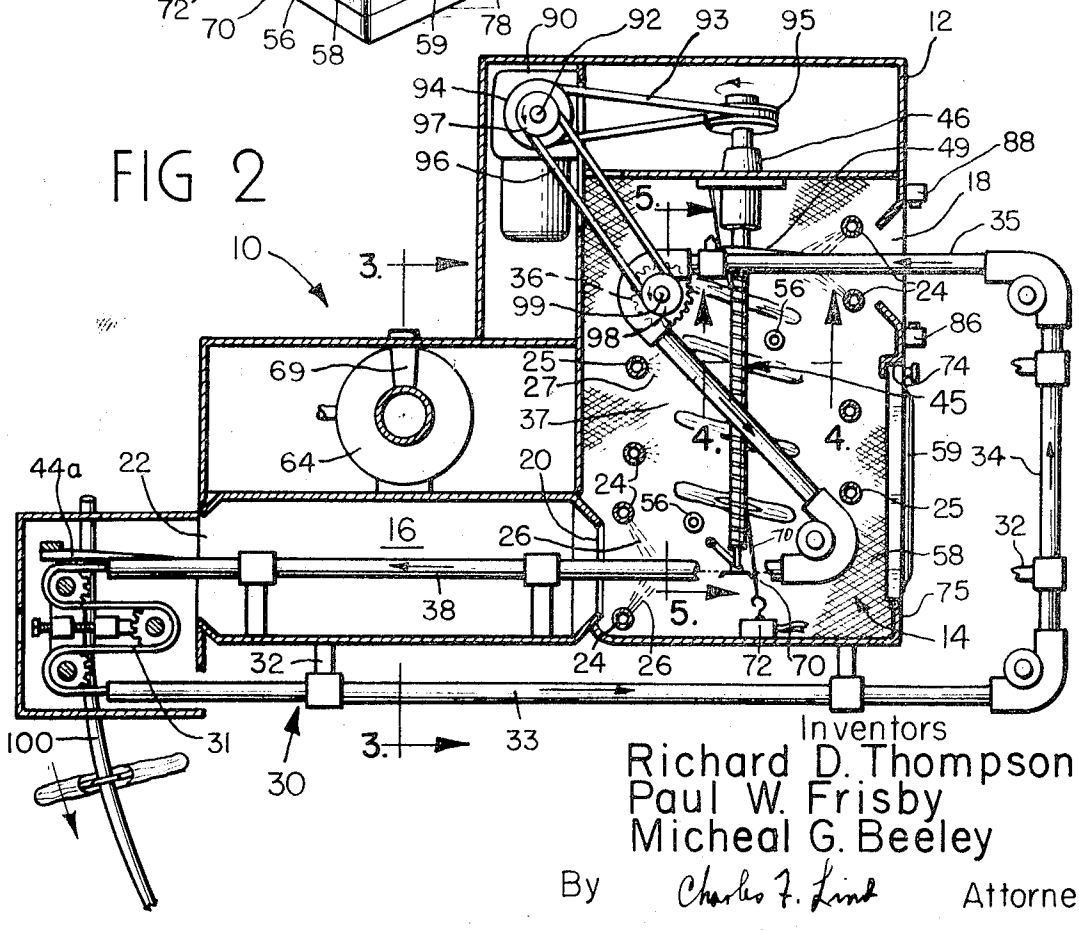


FIG 2



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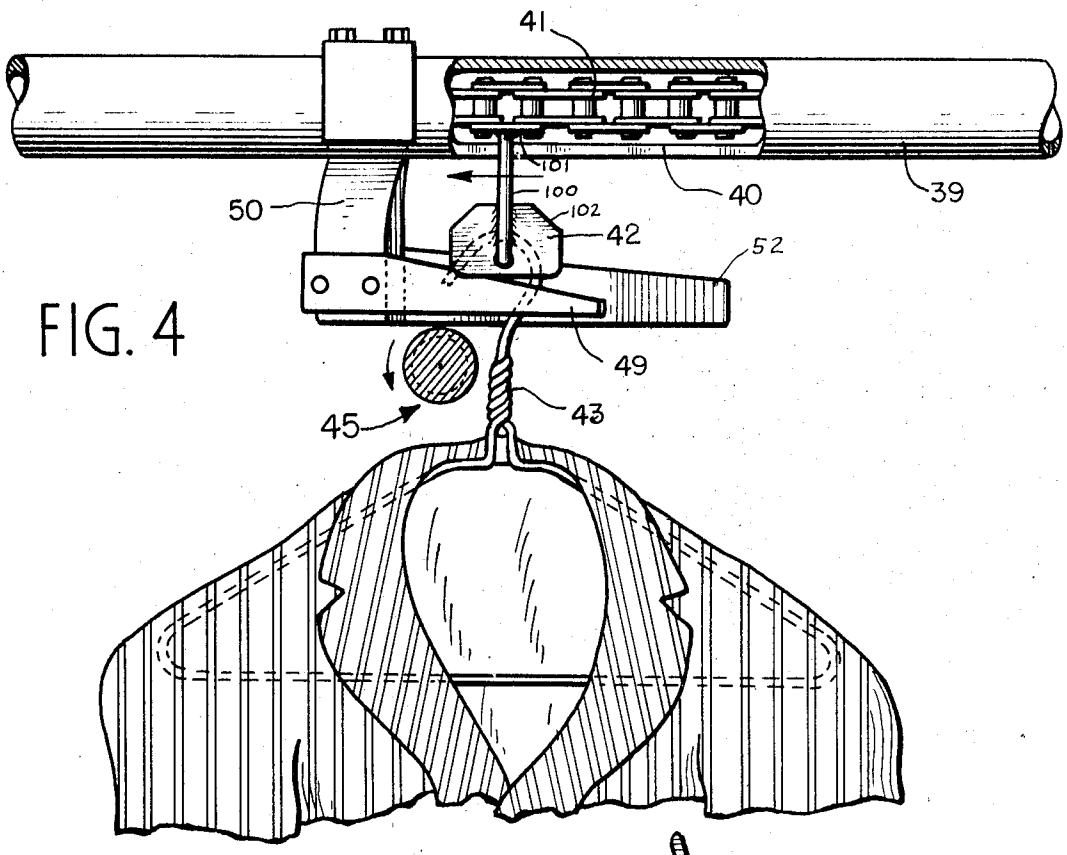
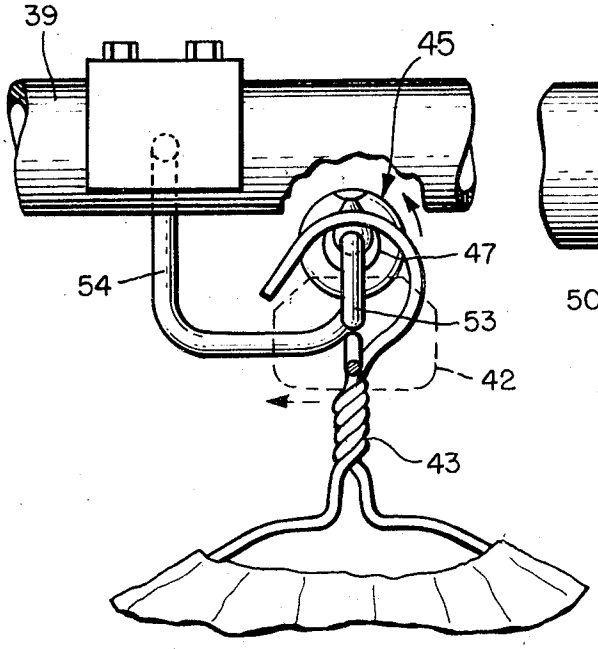


FIG. 4

FIG. 7



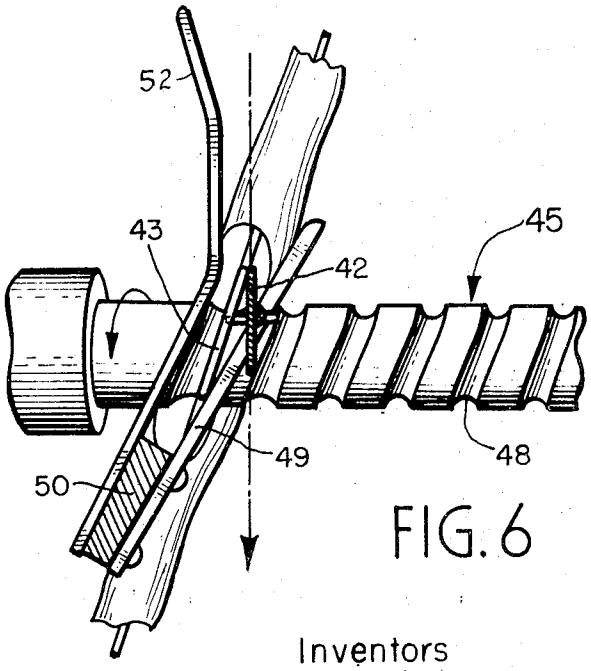


FIG. 6

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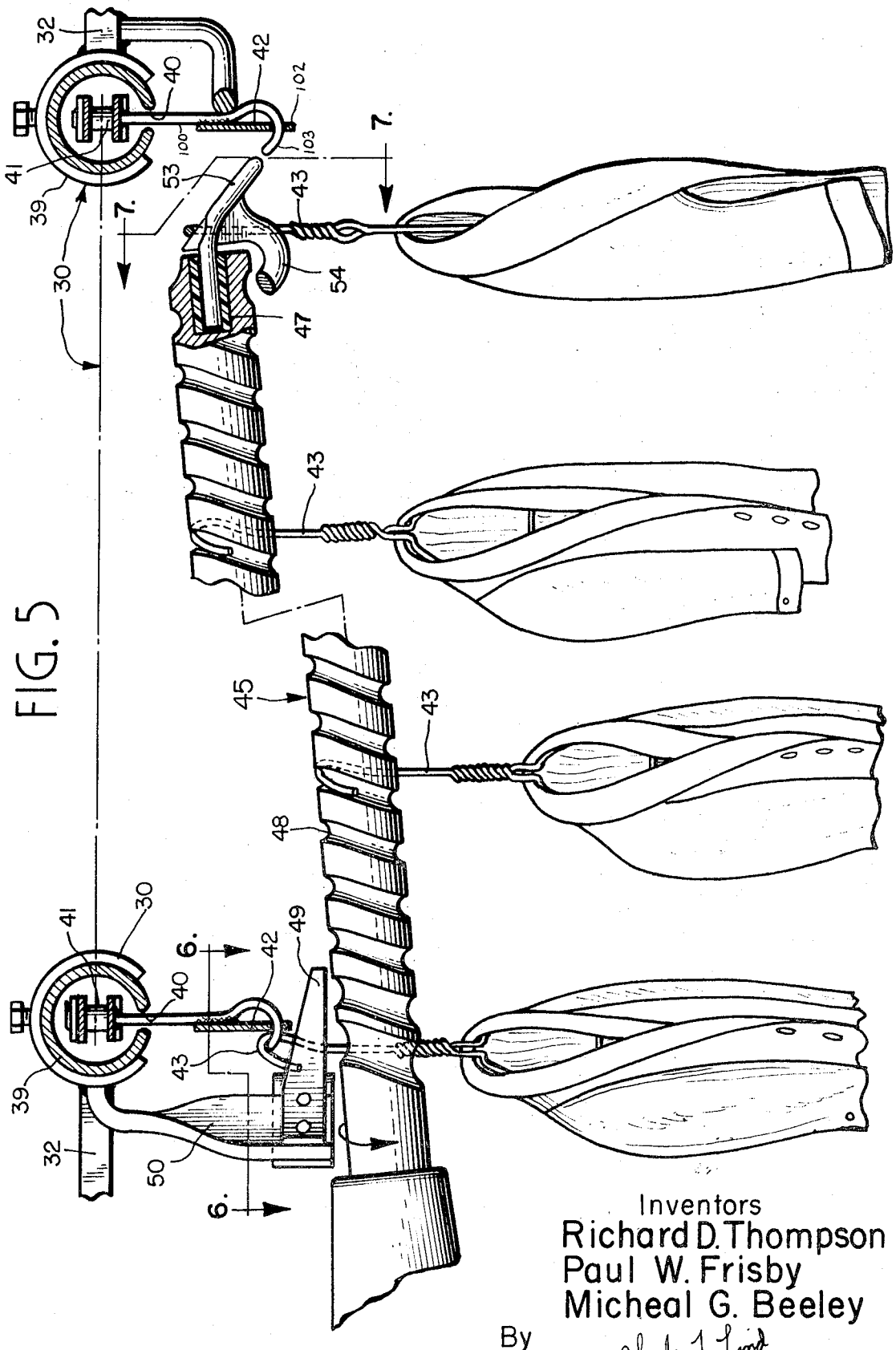


FIG. 5

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GARMENT FINISHER AND METHOD OF FINISHING GARMENTS

This invention relates specifically to, and an object of this invention is to provide, an improved garment finisher where communicating adjacent chambers are provided for conditioning and for drying successive garments, and where means are employed and the method of finishing practiced for advancing the garments through the chambers at different speeds and spacings at the same overall rate.

Another object of this invention is to provide a continuous through feed garment finisher having garment advancing means operating at different speeds and garment holding spacings within and through adjacent conditioning and drying chambers, the method practiced of having the garments more closely spaced and slower moving in the conditioning chamber than in the drying chamber thereby allowing more time for thoroughly conditioning the garment without overly increasing the size of the unit and further having a uniform rate of feed through the finisher, and where the garment speeds and spacings are changed internally of the finisher.

Another object of this invention is to provide a device of this general type and to practice a method where the garments are suspended on hangers or forms, and where successive garments enter the conditioning chamber in adjacent generally aligned edge-to-edge or arm-to-arm orientation and where the garments internally of the conditioning chamber are then shifted to an adjacent front-to-rear or facing orientation at much closer spacings or less separation, and are then returned to the adjacent edge-to-edge or arm-to-arm orientation and leave the conditioning chamber.

Another object of this invention is to provide a continuous feed rate, pass through conveyor system where, for example, successive articles or garments supported on center spacings of approximately 20 to 30 inches and generally in aligned edge-to-edge orientation enter the conditioning chamber through a narrow inlet opening, where the garments are then reoriented to a general front-to-rear or face-to-face alignment on much reduced center spacings of, for example, 3 to 6 inches and held within the conditioning chamber, and lastly where the garments are returned to the general edge-to-edge orientation on nominal center spacings of 20 to 30 inches for exit from the conditioning chamber and for transfer through an adjacent but internally communicating drying chamber, and where the flow rate of the garments through the conditioning and drying chambers is equal even though the speed of advance is different.

Another object of this invention is to provide a tunnel finisher having narrow vertical inlet and outlet openings to and from the conditioning chamber and particularly to means for directing steam from opposite sides of and adjacent the openings inwardly to define in effect a venturi that draws air into the openings and/or at least minimizes the escape of steam or other conditioning fluid from the conditioning chamber.

These and other objects of this invention will be more fully understood and appreciated after reviewing the following specifications, the accompanying drawings forming a part thereof, wherein:

FIG. 1 is a perspective view of the subject finisher, with part being broken away for the sake of improved disclosure.

FIG. 2 is a top plan view particularly as seen from line 2—2 in FIG. 1.

FIG. 3 is a vertical sectional view as seen from line 3—3 in FIG. 2, particularly showing the drying chamber.

FIGS. 4 and 5 are enlarged sectional views showing the relation of the conveyors within the conditioning chamber, particularly as seen from lines 4—4 and 5—5 in FIG. 2, respectively; and

FIGS. 6 and 7 are detailed views showing the relation of the conveyors, particularly as seen from lines 6—6 and 7—7 in FIG. 5.

The particular unit 10 as shown includes a hollow frame 12 within which is defined adjacent steam conditioning chamber 14 and an air drying chamber 16. A horizontally narrow vertically elongated inlet opening 18 is defined in the frame to the steam conditioning chamber 14, a horizontally narrow vertically elongated opening 20 is defined between the conditioning chamber 14 and drying chamber 16, and the drying chamber 16 has a horizontally narrow vertically elongated outlet opening 22. The drying chamber itself is rather horizontally narrow and vertically elongated between the openings 20 and 22.

The conditioning chamber 14 has provided therein a plurality of steam discharge pipes 24 and 25 extending almost between the floor and ceiling of the chamber and having selectively directed horizontal and inclined openings for discharging the steam as jets 26 and 27 respectively at a rather high velocity into the chamber and toward the garments, particularly as the garment passes between the openings 18 and 20. This fills the chamber 14 with a high humidity condition and also directly penetrates the fibers of the garment to condition them.

A first conveyor 30, supported by brackets 32 to the frame, passes as runs 33 and 34 along the outside of the finisher, as run 35 through opening 18 into the steam conditioning chamber 14, around sprocket 36 and along run 37 within the chamber 14, as run 38 from the conditioning chamber and through the drying chamber 16 out opening 22, and through a take up loop 31 continuously to the exterior run 33.

This conveyor can include a support pipe 30 having a lower open slot 40, where a conventional roller chain 41 is guided within the pipe and around corner sprockets (36 being typical). Adjacent hooks 42 are connected to the chain 41 and extend through the pipe slot 40 and are located uniformly on approximately 20 to 30 inch centers. Hangers 43 of the conventional construction, or other suitable forms, can be removably positioned on and held in place by gravity within each hook 42, and in turn a garment can be neatly dressed on the hanger and supported relative to the conveyor 30.

A second conveyor 45 of the screw type is supported by bearings 46 and 47 rotatably within the steam conditioning chamber 14, and extends across runs 35 and 38 of the conveyor 30. The screw has a continuous spiral groove 48 that can receive a hanger 43, and according to the direction of rotation advance the hanger from the loading end located below the hook at run 35 (FIG. 5) to the discharge end located above the hook run 38. A discharge rail 49 supported by arm 50 cams each hanger off its hook and from the conveyor 30 as the conveyor advances so that the hanger falls onto the loading end of the screw conveyor 45. A guide bar 52 can be located next to the cam bar 49 at the right discharge location to help the hanger fall in the right groove. The screw conveyor advance moves the supported hanger from the loading end to the discharge end where there is an inclined discharge chute 53 for dropping the hanger back onto a hook 42 of the conveyor 30. The chute 53 can be held by arm 54 which arm likewise can support the screw bearing 47.

Successive garments moved along the conveyor 30 in generally edge-to-edge or arm-to-arm orientation, on approximate center spacings of 20 to 30 inches, which typically is sufficient to allow independent free hanging of adjacent garments. As the conveyor 30 discharges the garments onto the screw conveyor 45 the adjacent garments are reoriented from generally edge-to-edge or arm-to-arm alignment to generally front-to-rear or facing aligned relation on approximately 3 to 6 inch centers. This allows the garments to be more closely packed together, still without touching normally, to increase the number of garments that can be suspended from and advanced by the screw conveyor 45 within the conditioning chamber, for a given size of chamber or length of conveyor.

The advance of the screw conveyor 45 is slower than that of the conveyor 30, so that it takes a longer time to pass each garment through the steam conditioning chamber on this dual conveyor system than it would on the single conveyor 30. For example, it might take only 2 or 3 seconds for one hook on the conveyor 30 to pass the screw conveyor 45 between runs 35 and 38, while it may take 30 or 45 seconds for the screw con-

veyor 45 to pass the garment between these same locations, so that the total time in the steam conditioning chamber 14 is greatly increased. This is significant since it takes more time to properly steam condition the garment than it takes to dry it in the drying chamber with heated high-velocity air. For every garment that is thus passed through the finisher, it advances at one rate and orientation to within the conditioning chamber, it advances at a slower rate and different orientation within the steam conditioning chamber and it again advances at a faster rate and orientation from the steam conditioning chamber and through the drying chamber.

The steam pipes 24 at the inlet opening 18 and the outlet opening 20 direct steam jets 25 inwardly toward the chamber from opposite sides of the openings and against the opposite sides of the garment. The high-velocity discharge and inward direction of steam jets in effect causes a venturi action to draw air into the chamber from the outside and minimize the escape of steam from the chamber. Additional steam pipes 25 can be located in the chamber to discharge as jets 27 against the garments. Moreover, preferably steam outlets 56 are located below the garments to discharge upwardly and inside or under the garment to condition the lining thereof. The floor of the conditioning chamber is preferably perforated having an open pattern 58 to minimize collection of water condensate along the floor. The conditioning chamber walls are heated by conventional steam coils (not shown) to minimize condensation of the steam on the walls. Louver openings 59 are formed to the lower part of chamber 14 to allow air to be drawn into the chamber to cool the steam and thus make it moist.

As relates to the drying chamber 16, a blower 60 (FIG. 3) forces air through a conduit 62 and over heat exchanger 64 where it is heated, and from discharge opening 66 at the top of the drying chamber 16 downwardly onto the garment supported on the conveyor 30 and into a return 68 at the bottom of the chamber back to the blower. To minimize humidity build up in the drying chamber, about 5 percent to 10 percent of the air is vented from bleed outlet 69 and fresh make up air is drawn into the system through outlet opening 22 and the return 68. The narrow chamber allows the air to whip the garment quite violently and also dry it rapidly.

An important detail relates to a control effective to sense if a garment should fall from either conveyor 30 or 45 within the conditioning chamber 14 which then responds to stop the steam discharge. To do this, a string 70 is suspended above the floor between the opposite walls of the chamber 14 where one end is tied to and actuated a sensitive microswitch 72 which switch in turn is connected in an appropriate control circuit (not shown). The circuit when completed should terminate the steam discharge in the chamber 14 and further would sound a whistle, light a lamp or activate some appropriate signal device to advise the operator of the malfunction. This minimizes the possibility of any garment remaining on the floor of the conditioning chamber and becoming saturated and damaged.

Another important feature of this invention includes providing an aperture 74 in the wall 75 of the steam chamber and having a closing door 78 therefor. This permits an operator to easily enter the chamber 14 to pick up a garment should it fall from either conveyor. As a safety control, a magnetic switch 80 located in the frame of the unit and actuated only when the door is closed by a magnet 82 carried in the door can be connected in the steaming control to permit steaming only when the door is closed.

Photocell units 86 and 88 are located spanning the inlet opening 18 and are connected in an appropriate control to start the steaming cycle automatically as a garment passes into the finisher and breaks the beam. A timer (not shown) can be used to determine the duration of the steaming cycle automatically, preferably for that duration required for the garment to pass completely through the steaming chamber, which typically would be between 20 and 60 seconds depending on the type of garment. This permits individual piece work of the finisher or continuous work if a series of garments are suspended on consecutive hooks 42. It is desirable to have the conveyors driven continuously when the finisher is operating independently of steaming.

The two conveyors 30 and 45 preferably are driven in synchronization, and at adjustable speeds to suit the specific finishing times required of different garments. Along these lines a variable speed reducer 90 can be provided with an output shaft 92 extending vertically. A flexible continuous loop cable drive 93 is trained over a pair of sprockets 94 and 95 keyed to the output shaft 92 and to the screw conveyor 45 respectively, and likewise flexible continuous loop chain drive 96 is trained over a pair of sprockets 97 and 98 keyed to the output shaft 92 and to drive shaft 99, respectively. The drive shaft 99 in turn is connected to the sprocket 36 of the chain conveyor 30. Once the drives are adjusted, the two conveyors operate in a synchronized manner and the speed of each conveyor is varied simultaneously and exactly merely by changing the rate of the variable speed reducer 90.

The transfer of garments from conveyor 30 to the conveyor 45 and back again is synchronized such that adjacent hooks 42 are uniformly spaced around the continuous loop conveyor 30, and after a hanger is transferred from a hook on the conveyor 30 onto the screw conveyor 45 it falls into a particular groove or thread of the screw, is advanced along the screw in this thread, and ultimately is dropped from the thread at the discharge end of the screw exactly onto another different hook 42 coming about on the conveyor 30. In this manner, there need not be any special catching or storing mechanism other than the synchronized conveyors themselves. In this regard further, the relative speed of advance of the conveyors 30 and 45 is directly proportional to the ratio of the center spacings between hooks 42 and the respective hanger holding groove. Thus, with center spacings of 25 inches and 5 inches on the conveyors 30 and 45 respectively, the advancing speed of the conveyor 30 is five times that of the conveyor 45.

For effective use of this finisher, one or more operators can dress the garments to be finished on conventional hangers or other appropriate forms and hang the hangers on consecutive hooks 42 along the exterior runs 33 or 34 of the conveyor 30. The conveyor 30 carries the garments successively into the steaming chamber 14 where the transfer to the conveyor 45 takes place, thereby allowing extended steaming time, and again the garments are transferred back to the conveyor 30 and carried through the drying chamber 16. The garments can be unloaded automatically by means of a camming device 44a similar to 49 at the exit end of the drying section and carried away on a slick rail 100, for example, or other appropriate transfer mechanisms. In this regard, it has been found desirable in use to allow the garments to hang suspended on the form for some five or possibly ten minutes after being discharged from this finisher unit which gives the fibers of the garment time to set. Most any type garment can be finished on the disclosed unit with varying degrees of success. Lighter weight synthetic garments can be passed through the finisher at a rate up to 1,000 garments per hour and yet have commercially acceptable finishing qualities. For heavier garments, where longer conditioning and drying times are required, 250 garments per hour might be a more reasonable rate.

Another feature of this invention relates to the conveyor hook 42 for supporting the hanger or form 43 on which the garment is dressed. The hook 42 has an elongated element 100 secured to a link 101 of the conveyor chain and a flat plate 102 is connected to the element in a centered manner parallel to the link and a tab 103 projects from the plate. The hanger 43 fits in place over the tab and abuts the plate at the opposite sides of the tab to be rotationally stabilized relative to and aligned parallel with the hook plate, and thus the chain. Consequently, even when the chain direction is changed such as at the corner, the garment follows the chain, and the costly guide rails required in prior conveyors for this general type apparatus can frequently be eliminated.

What is claimed is:

1. The method of finishing on a continuous basis a series of successive garments, comprising the steps of supporting the garments so that one lateral dimension is generally longer than another lateral dimension, locating the successive garments in spaced adjacent relation where the longer lateral dimensions of the garments are generally aligned and on center spacings to provide clearance between the garments, conveying the garments as oriented along a path generally parallel to the longer lateral dimensions and at a first rate or speed, reorienting the garments successively to where the shorter lateral dimensions of the garments are generally aligned and are on substantially closer center spacings but yet providing clearance between the garments and conveying the garments as oriented along a path generally parallel to the shorter lateral dimensions but at a substantially slower rate of speed, and after a predetermined time reorienting the garments with the longer lateral dimensions generally aligned and increasing the center spacings for providing clearance between the garments, and also increasing the rate of speed, and conditioning the garments during the time they are oriented and conveyed with the shorter lateral dimensions aligned and drying the garments thereafter during at least part of the time the garments are oriented and conveyed with the longer lateral dimension aligned.

2. A method of finishing garments according to claim 1, wherein the path of transfer of the garments when the longer lateral dimensions are aligned is transverse to the path for transfer of the garments when the shorter lateral dimensions are aligned. lateral speed, the

3. The method of finishing on a continuous basis a series of successive garments, comprising the steps of supporting the garments so that one lateral dimension is generally longer than another lateral dimension, locating the successive garments in spaced adjacent relation where the shorter lateral dimensions of the garments are generally aligned and on center spacings to provide clearance between the garments, conveying the garments as oriented along a path generally parallel to the shorter lateral dimensions and at a first rate or speed, reorienting the the garments successively to where the longer lateral dimensions of the garments are generally aligned and are on substantially increased center spacings but yet providing clearance between the garments and conveying the garments as oriented along a path generally parallel to the longer lateral dimensions but at a substantially faster rate of speed, and conditioning the garments during the time they are oriented and conveyed with the shorter lateral dimensions aligned and drying the garments thereafter during at least part of the time the garments are oriented and conveyed with he longer lateral dimensions aligned.

4. In a garment finisher, the combination of means for supporting garments so that one lateral dimension of each is generally longer than another lateral dimension, first means for holding a plurality of garment supporting means on first centers spaced apart by slightly more than the shorter lateral dimension, means for applying a conditioning fluid over the garments as held on the first centers, second means for holding a plurality of garment supporting means on second centers spaced further apart than the first centers and at most by slightly more than the longer lateral dimensions, means for applying a drying fluid over the garments as held on the second centers, and means for individually transferring successive garment supporting means from the first holding means to the second holding means.

5. A garment finisher combination according to claim 4 further including means for progressively adding new garment supporting means to the first holding means.

6. A garment finisher combination according to claim 4, further including means for sequentially removing garment supporting means from the second holding means.

7. In a garment finisher, the combination of an enclosure defining adjacent first and second chambers communicating with one another and having an inlet to the first chamber and an outlet from the second chamber, means to discharge conditioning fluid to the first chamber and means to discharge drying fluid to the second chamber, conveyor means extending though the inlet and into and through the first chamber and from the first chamber through the second chamber and out the outlet, garment suspending means adapted to be carried on the mentioned conveyor means, and means in the first chamber to index the garment suspending means relative to the conveyor means operable to shift the orientation of adjacent supported garments relative to one another.

8. In a garment finisher, the combination of an enclosure defining a first chamber having an inlet and an outlet, means to discharge conditioning fluid to the first chamber, a first conveyor run extending through the inlet and into the first chamber and a second conveyor run extending from the first chamber and out the outlet, a third conveyor run extending only within the first chamber and generally between the first and second conveyor runs, garment suspending means adapted to be carried on the mentioned conveyor runs, means to transfer the garment suspending means from the first conveyor run to the third conveyor run and means to transfer the garment suspending means from the third conveyor run to the second conveyor run, and means operating the mentioned conveyor runs at related speeds for advancing garments at an overall uniform rate through the inlet and outlet.

9. A garment finisher combination according to the claim 8, wherein the third conveyor run is adapted to carry the garment suspending means so that adjacent garments are generally facing and in closely packed orientation, and wherein the first and second conveyor runs are adapted to carry the garment suspending means so that the adjacent garments are in more generally extending orientation.

10. A garment finisher combination according to claim 8, wherein the third conveyor run is a rotating screw-type conveyor and operates in a direction generally transverse to the first and second conveyor runs.

11. In a garment finisher, the combination of dimensions enclosure defining a chamber having an inlet opening thereto and an outlet opening therefrom, means for supporting each garment with a large and a small lateral dimension, first means extending through the inlet opening to within the chamber for holding and conveying successive garment supporting means in single file on first centers and with the adjacent garments oriented with the small lateral dimensions extended generally transverse to the advance of the first means, second means in the chamber for holding and conveying the garment supporting means on second centers much closer together than the first centers and with the adjacent garments oriented with the large lateral dimensions extended generally transverse to the advance of the second means, third means extending from the chamber through the outlet opening for holding and conveying successive garment supporting means on third centers much further apart than the second centers and with the adjacent garments oriented with the small lateral dimensions extended generally transverse to the advance of the third means, means for transferring the garment supporting means from the control of the first means to the control of the second means and means for transferring the garment support means from the control of the second means to the control of the third means, and means for applying a conditioning fluid to the chamber.

12. A garment finisher combination according to claim 11, wherein the first means and the second means operate at a synchronized rate where the advance of the first means is faster then the advance of the second means by a factor corresponding to the ratio of the first means centers to the second means centers.

13. A garment finisher combination according to claim 11, wherein the second means and the third means operate at a synchronized rate where the advance of the third means is faster than the advance of the second means by a factor corresponding to the ratio of the third means centers to the second means centers.

14. A garment finisher combination according to claim 11, wherein the means for applying a conditioning fluid includes steam discharge pipes elongated in the direction and disposed on opposite sides of the inlet opening to the chamber and of the outlet opening from the chamber and are located to discharge steam jets inwardly and away from the openings and toward and against the garment passing therebetween.

15. A garment finisher combination according to claim 11, further including means for controlling the operation of the conditioning fluid applying means and including means for detecting the presence of a garment within the chamber of the enclosure and not properly supported on the first, second or third means and including a flexible line spaning the enclosure between opposite walls thereof, and control means including a switch actuated responsive to a garment being disposed on said line operable to terminate the operation of the conditioning fluid applying means.

16. A garment finisher combination according to claim 11, wherein the centers on the first and third means are spaced apart approximately 20 to 30 inches and wherein the centers on the second means are spaced apart on approximately 3 to 6 inch centers.

17. In a garment finisher, the combination of an enclosure defining adjacent first and second chambers communicating with one another through a narrow passage where the first chamber has an inlet opening thereto and the second chamber has an outlet opening therefrom, means for supporting each garment with a large and a small lateral dimension, first means extending through the inlet opening to within the first chamber for holding and conveying successive garment supporting means in single file on first centers and with the adjacent garments oriented with the small lateral dimensions extended generally transverse to the advance of the first means, second means in the first chamber for holding and conveying the garment supporting means on second centers much closer together than the first centers and with the adjacent garments oriented with the large lateral dimensions extended generally transverse to the advance of the second means, third means extending from the first chamber through the passage and second chamber and outlet opening for holding and conveying successive garment supporting means on third centers much further apart than the second centers and with the adjacent garments oriented with the small lateral dimensions extended generally transverse to the advance of the third means, means for transferring the garment supporting means from the control of the first means to the control of the second means and means for transferring the garment support means from the control of the second means to the control of the thirds means, and means for applying a conditioning fluid to the first chamber and means for applying a drying fluid to the second chamber.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,644,085 Dated Feb. 22, 1972

Inventor(s) Michael G. Beeley, Paul W. Frisby and Richard D. Thompson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 27, delete "path for" add ---path of---.

Column 5, line 30, delete "lateral speed, the".

Column 6, line 3, delete "though" (first occurrance) and insert ---through---(first occurrance).

Signed and sealed this 19th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents