

# United States Patent [19]

[ 19 ]

Buckley et al.

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[54] STEAM AIR CABINET FINISHER

[75] Inventors: **Norman A. Buckley**, Wauwatosa;  
**Peter D. Rasmussen**, Cedarburg,  
both of Wis.

[73] Assignee: **McGraw-Edison Company, Elgin, Ill.**

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68/5 C, 8/142, 8/149.3 312/271 34/241

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34/DIG. 13; 8/147, 149.3, 150, 142; 68/5 C,  
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[56]

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*Primary Examiner*—John J. Camby

*Assistant Examiner—John S. Camby*

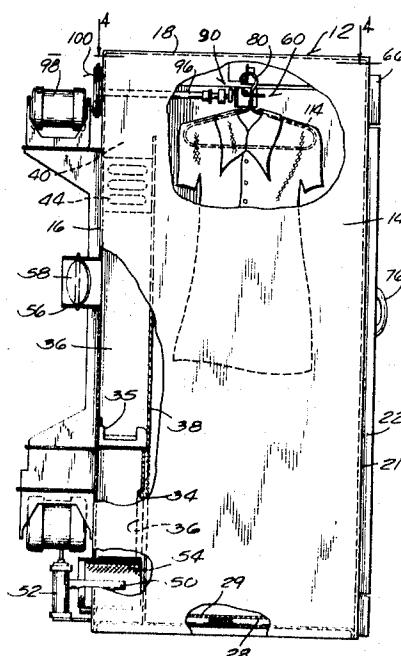
Attorney—Charles F. Lind

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## ABSTRACT

A steam air finisher having an enclosure defining cabinet including a door that can be opened to provide access to the enclosure, a garment support rack or holder and means mounting the rack to move between an outer loading and unloading position generally outside the cabinet enclosure and an inner operating position and linkage connecting the door to the rack that causes such rack movement upon movement of the door between its open and closed positions, whereby garments to be finished are typically hung on conventional hangers which in turn are hooked on the rack and carried thereon, shaker mechanism located within the cabinet which cooperates with the rack when the latter is in the inner position to mechanically reciprocate the hanger crosswise to the normal plane of the hung garment, steam inlet means located near the bottom of the enclosure also including an opening for admitting outside air into the enclosure concurrently with and upon the discharge of steam for cooling the steam yet providing a high humidity conditioning atmosphere, means for circulating drying fluid over the garments including a blower having an inlet located near the bottom of the enclosure and an outlet to a passage separate from the enclosure with a heat exchanger in the passage between the blower outlet and the passage return to the enclosure near the top thereof effective for circulating heated fluid, such as air downwardly over and past the garments, and a normally closed bleed damper provided to vent part of the circulating fluid when the blower is operated.

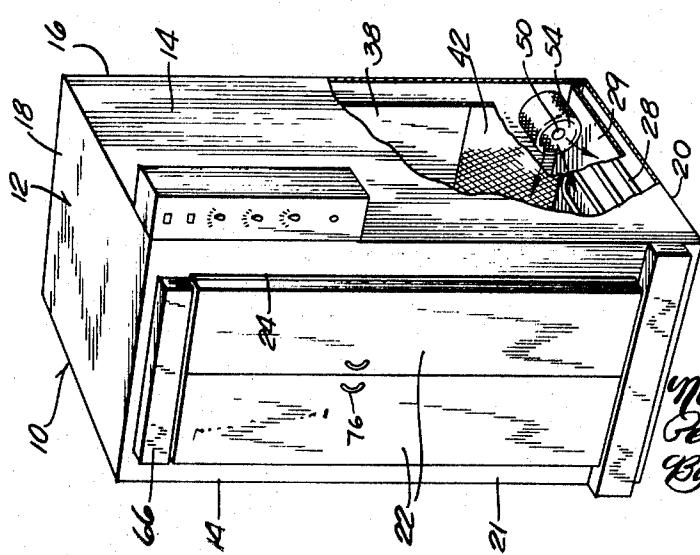
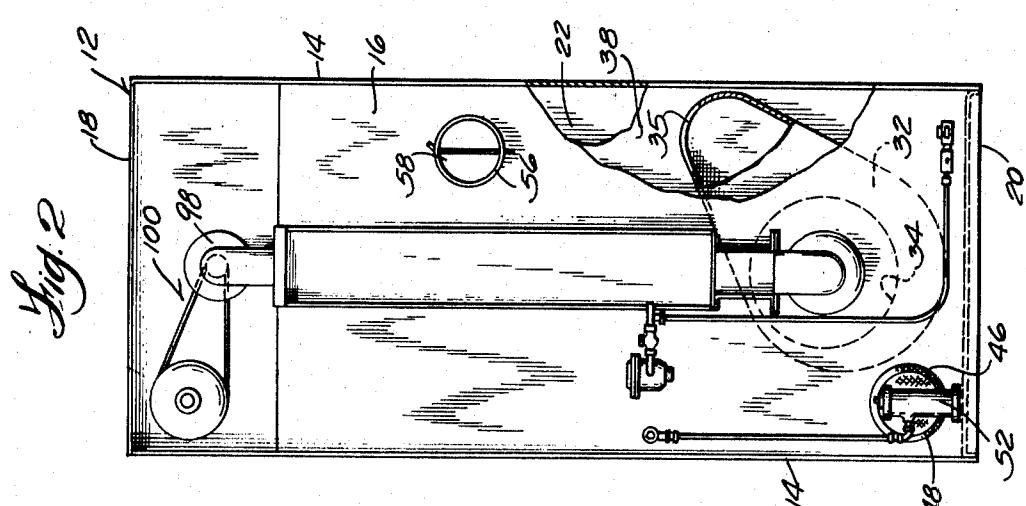
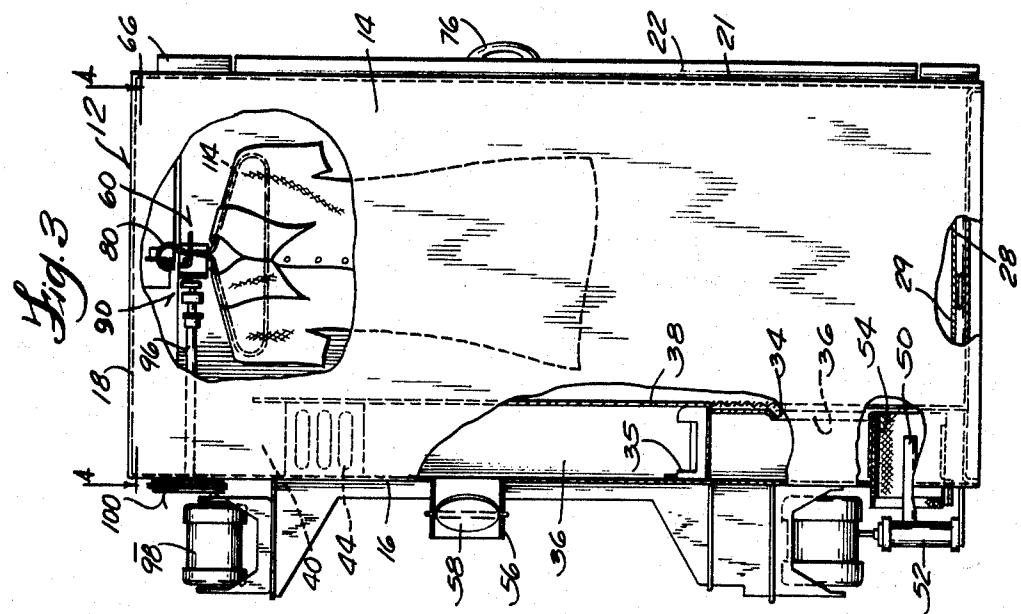
## 13 Claims, 6 Drawing Figures



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SHEET 1 OF 3



Inventors  
Norman A. Buckley  
Peter A. Rasmussen  
By  
Charles F. Lind  
Attorney

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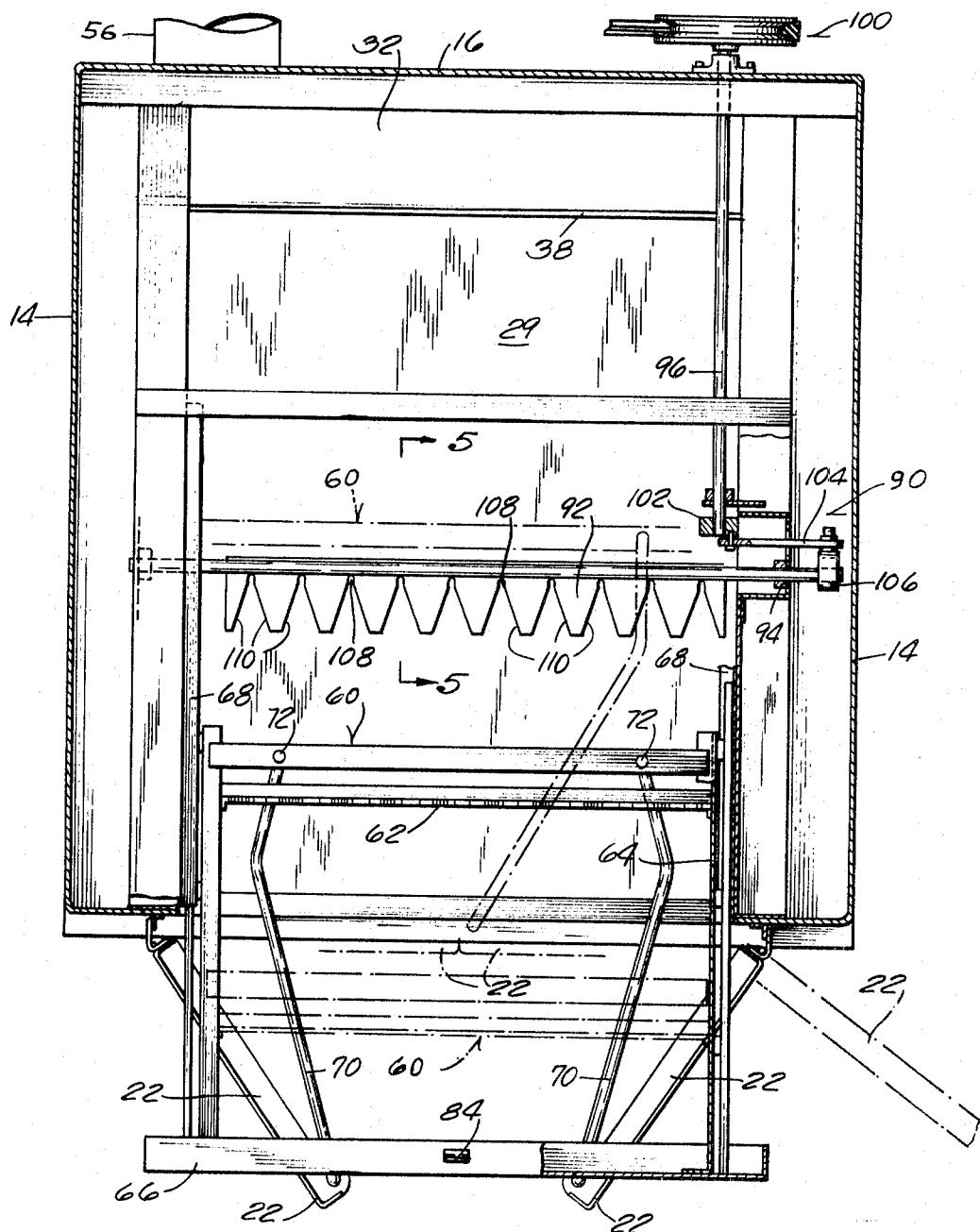


Fig. 4

Inventors  
Norman A. Buckley  
Peter D. Gasmussen  
By Charles F. Lind

*Attorney*

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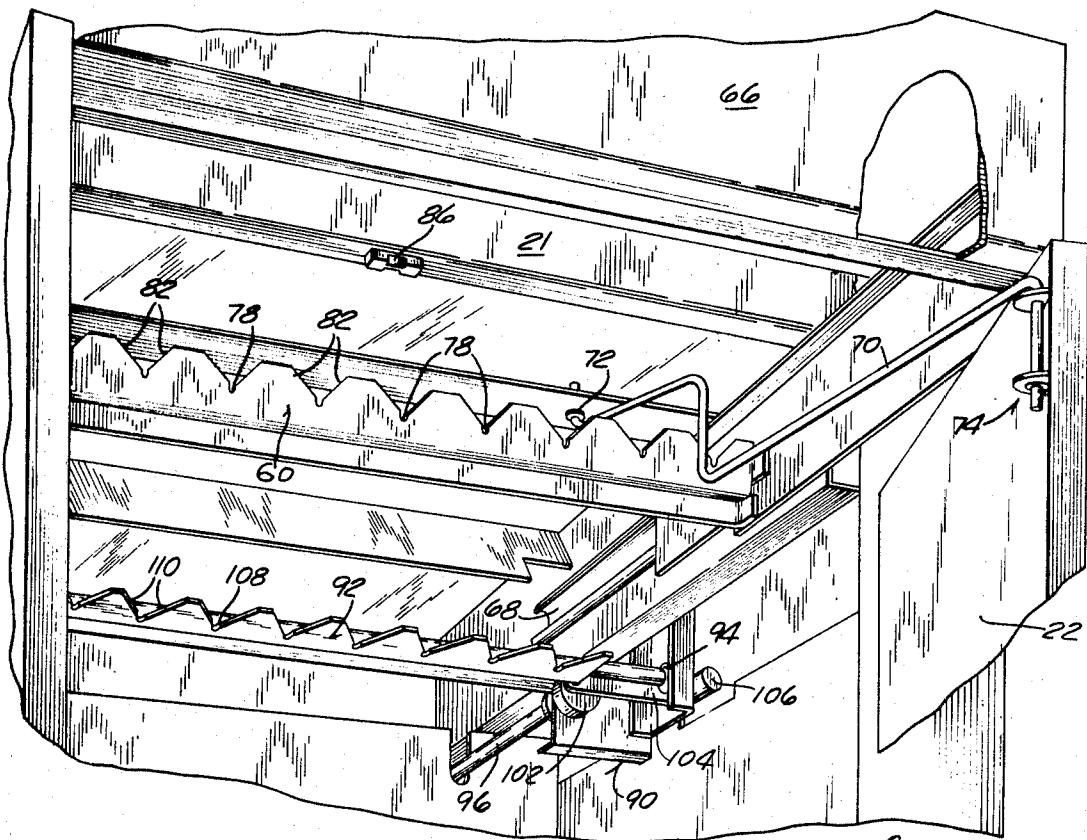


Fig. 6

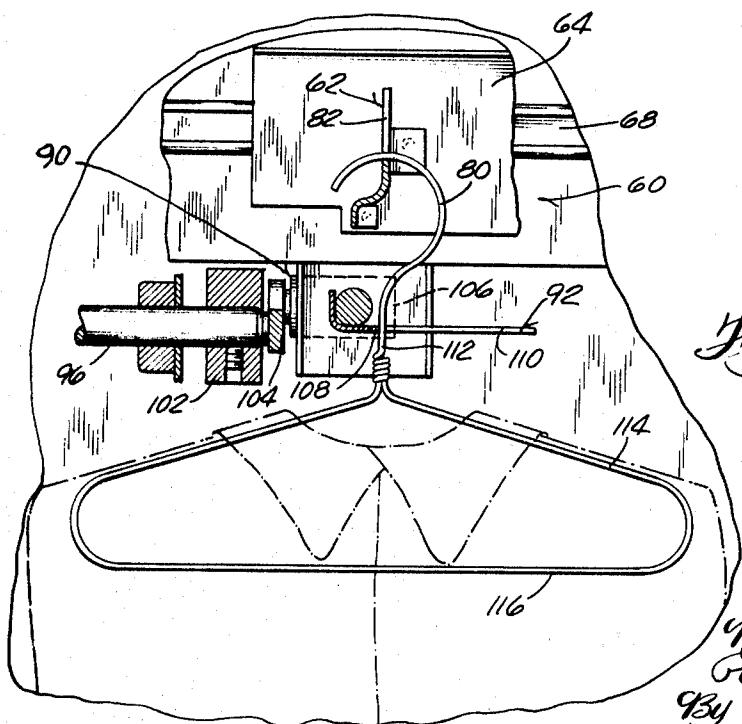


Fig. 5

Inventors  
Norman A. Buckley  
Peter D. Gasmussen  
934  
Charles F. Lind  
Attorney

## STEAM AIR CABINET FINISHER

In finishing garments after cleaning or the like, it is frequently only necessary to condition the garment with a conditioning fluid such as steam and then dry the garment with heated air provided the garment can be dressed or held during this cycle in the wrinkle-free condition. This finishing in effect actually only returns the garment to its original manufactured condition which was wrinkle-free.

One disadvantage of some finishers is that the garments must be individually dressed on a specific finisher form and even then require some hand touch up for good quality work so that the consequent cost per finishing each garment is quite high. Another disadvantage of many finishers is that only certain garments can be finished on the specific dressing forms provided, which limits the versatility and appeal of the finisher. Other drawbacks of some finishers are the high initial cost caused by complex construction or operation, and high likelihood of damaging the garment by stretching, or shrinking, or ripping it during the finishing cycle.

This invention relates to an improved finisher of the type classified as a batch box where more than one garment can be finished during any one operating cycle.

A basic object of this invention is to provide a finisher having a simplified garment holding means where a conventional wire or wood hanger can hold most garments to be finished and where the hanger in turn can be easily loaded on a support rack or holder while it is conveniently and accessibly situated relative to an operator but further which rack and garments thereon almost effortlessly can be moved to within a generally tight enclosure for the finishing cycle.

Another object of the invention is to provide in a finisher a mechanism for mechanically shaking the garments in a controlled manner selectively during the conditioning and/or the drying phases of the finishing cycle whereby most if not all undesired wrinkles can be shaken from the garment to leave it in virtually wrinkle-free condition.

A more detailed object of this invention is to provide simplified structure for accomplishing the preceding objects whereby the shaking mechanism works in conjunction with the garment support rack or holder but only when the latter is in the inner operating position.

Another object of this invention is to provide an improved manner of shaking the garments while hanging in the finisher where although the shaking can be quite violent it is in a direction crosswise to the normal plane defined by the hanging garments to set up a general wave pattern in each garment itself so that conditioning fluid such as moistening steam and/or drying air in the finisher is both driven by and over the garments but also into the garments for thoroughly conditioning and removing unwanted wrinkles for high quality finishing.

Another object of this invention is to have a garment support rack or holder which automatically is shifted between its outer accessible loading or unloading position and its inner operating or finishing position inside the enclosure merely by and upon the operator opening or closing the access door of the cabinet.

Another object of this invention is to provide an improved means of conditioning the garments where ordinarily available high pressure steam can be discharged and automatically cooled to a lower temperature to moisten the garments without exposing them to the

possibly damaging high vaporizing temperature of the raw steam while yet having no noticeable problem of water droplet formation in the conditioning atmosphere.

5 Another object of this invention is to provide an improved operating cycle where conditioning fluid can be admitted to the cabinet enclosure during which time and for a period thereafter the garments are mechanically shaken in the conditioning atmosphere to utilize 10 the conditioning fluid by complete and more thorough penetration into the garments.

Another object of this invention is to provide improved means for drying the garments as suspended in the finisher specifically by bleeding off part of the air 15 typically most laden with moisture automatically only during the drying phase of the finishing cycle, thereby minimizing the heating capacity of the air and waste of steam leakage during the conditioning phase of the finishing cycle.

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

25 FIG. 1 is a front perspective view of a preferred embodiment of the subject finisher, except having part of the structure broken away for clarity of disclosure;

FIG. 2 is a broken away rear elevational view of the unit shown in FIG. 1;

30 FIG. 3 is a broken away side elevational view of the unit as seen from the right of FIG. 2;

FIG. 4 is a plan type sectional view as seen generally from line 4-4 in FIG. 3;

35 FIG. 5 is a sectional view as seen generally from line 5-5 in FIG. 4, except showing the garment support rack in its inner operating position with a hanger and garment thereon as typically oriented relative to such structure; and

40 FIG. 6 is a perspective view of the shaker mechanism and garment support rack as seen generally looking upwardly from the access opening of the cabinet.

As shown, the finisher 10 includes a cabinet 12 having opposed side walls 14, a rear wall 16, opposed top and bottom walls 18 and 20 respectively, and a front wall 21 having an access opening. Doors 22 are hinged along side hinges 24 to the front wall 21 and cooperate when closed to define an enclosure within the cabinet. The doors and walls are insulated with plastic or other conventional insulations, and a heat coil 28 preferably is located on the bottom wall with a watertight tray 29 of aluminum or other heat conductive material overlying this heat coil. The insulated walls keeps heat in the cabinet while the heated floor drives off condensation collected on the floor back into the enclosure.

45 A blower 32 is mounted adjacent the rear wall 16 and has its inlet 34 open to the enclosure and spaced slightly above the floor and has its outlet 35 open to within passage 36 defined between the rear wall 16 and a partition 38 which extends between the side walls 14 upwardly to outlet 40 for discharge back to the enclosure. A perforated plate or screen 42 acts as a lower continuation of the partition 38 to cover the inlet 34 of the blower for protectively keeping the garments from possibly becoming entangled in the blower. A heat exchanger 44 typically operated off of steam is located near the upper discharge end of the channel 36 to heat the fluid discharged to within the enclosure upon the operation of the blower.

For introducing conditioning steam into the enclosure, opening 46 is provided in the rear wall 16 and a tubular element 48 projects into the enclosure to just short of perforated plate 42, and a steam pipe 50 is centrally located within the tube 48 with its nozzle directed for radial discharge inwardly towards the enclosure. The steam pipe 50 is supported from a steam separator tank 52 which is typically connected to a high pressure steam system of 50 - 100 psig having vaporizing temperatures higher than 275° - 325° F. With the structure noted herein, steam discharge from pipe 50 draws in outside air in specific volumes depending on the size of tube 48 for admixture with the steam which thereby lowers the effective temperature of the enclosure atmosphere without reducing the conditioning level of moisture. An absorbant cloth type sleeve 54 is used to cover the tube both on the inside and outside and around the inboard end so that any drippings from the nozzle or other condensate will not be splattered as drops into the enclosure but will be only driven off as humidity.

A bleed outlet 56 is formed from the enclosure and preferably from the channel or passage 36 downstream of the blower outlet 35 but upstream in the flow pattern from the heat exchanger 44. A butterfly type damper 58 is counterbalanced to be closed under normal equilized pressure conditions between the passage and the outside ambient air. Upon operation of the blower, the back pressure created by the heat exchanger increases the channel pressure to above that of the outside air so that the damper opens to bleed off a set of percentage of approximately 5 - 15 percent of blower air to the outside. Because the damper is separated from the enclosure by the heat exchanger and the blower, discharge of steam into the enclosure normally does not sufficiently open the damper to significant quantities of steam from the enclosure. Moreover, when the blower is operated, as during the drying phase of the finisher cycle and the damper opens, the fluid is that is bled off is from the moisture laden air returning from the enclosure and before being heated by heat exchanger 44.

Referring now to FIGS. 3 - 6, the garment support rack or holder and the shaker mechanism are shown. The holder or rack 60 has a generally horizontally disposed bar 62 that is connected at its ends to side elements 64, and the side elements 64 are connected to a front plate 66 that extend across and closes the top part of the access opening above the doors 22. Rails 68 are located along the inner faces of the side walls 14 and appropriate antifriction means, such as roller bearings or the like (not shown), are connected between the rails 68 and the side elements 64 for mounting the rack 60 to move front to rear of the unit in a direction parallel to the rails 68. A pair of links 70 are pivotally connected at each inner end 72 to a cross bar part of the rack 60 and at each outer end 74 to spaced ears on one or the other of the doors 22. Consequently, upon opening either door with the use of a handle 76 provided thereon, the other door not only likewise opens but the support rack shifts from its inner operating position (FIGS. 3 and 5) to its outer loading and unloading position (phantom in FIG. 4).

The horizontally oriented bar 62 has at its upper edge spaced teeth or fingers (FIG. 6) that define therebetween upwardly open receiving slots 78 that are disposed along the direction of the bar 62 at spacings of approximately 2 to 3 inches. These slots 78 are adapted to receive and laterally confine the hook portion 80 of

a conventional hanger (FIG. 5), with diverging faces 82 on opposite sides of each slot assisting the operator in placing the hanger on the holder with the minimum of searching.

The outer loading and unloading position of the garment rack 60 is generally outside of the enclosure forward of the front cabinet wall and at this position the doors 22 are fully swung well beyond a 90° arc and are sidewardly removed from any interference with the rack. The operator can then easily load or unload a group of garments as they are hung on conventional hangers into or from the appropriate receiving slots of the support rack 60 since the rack is conveniently accessible outside of the enclosure. There is sufficient spacing provided between the slots that there is some clearance between adjacent garments even with each slot used, but if bulky overcoats or the like are finished in the unit, it is obvious that a slot or two can be skipped to provide greater clearance between adjacent garments. Preferably the garments can be predressed on hangers and the hangers hung on a portable rack or the like located outside of the finishing enclosure so that an operator can stand between the portable rack and the finisher and merely transfer the garments to or from the finisher. Once all garments are appropriately hung on the support rack 60, the operator need only close the doors 22 which through the linkage 70 shifts the rack 60 rearwardly until it is located approximately centrally spaced front to rear of the unit between the closed doors and the inner partition wall 38. At this location, a pin element 84 on the closure element 66 (FIG. 4) rides past a detent member 86 (FIG. 6) and thereby holds the element across the access opening and concurrently holds the doors closed and the support rack in its inner operating position.

The particular shaker mechanism 90 will now be disclosed, and it can be seen clearly in FIGS. 3 - 6. The shaker includes a horizontal bar 92 which is mounted in appropriate bearings or the like 94 at its opposite ends so that it can reciprocate laterally of the enclosure in a direction generally parallel to its length. A shaft 96 is rotatably supported by appropriate bearings and extends from within the enclosure through the rear wall 16 of the unit where a motor 98 (FIG. 2) is connected by a conventional pulley and a belt configuration 100 to rotate the shaft. An eccentric plate 102 is keyed to the shaft and thereby rotates therewith, and a link 104 is connected at one end to the eccentric and at the other end through bracket 106 to reciprocating bar 92. Operation of the motor 98 causes the bar 92 to oscillate or reciprocate laterally of the enclosure with a stroke preferably of  $\frac{1}{2}$  to 2 inches or approximately twice the throw of the eccentric plate 102.

Bar 92 has a horizontally spaced tooth arrangement like the vertical tooth arrangement of the support bar 62, including horizontally open receiving slots 108 and the adjacent diverging side edges 110. The shaker mechanism bar 92 is located at a vertically orientation approximately 1  $\frac{1}{2}$  to 3 inches below the support bar 62 such that the slot 108 receives and laterally confines the stem or neck part 112 of the hanger hung from the receiving slot 78 of the support bar when the rack 60 is in its inner operating position. Consequently, upon an operator closing the cabinet door 22 and moving the support rack 60 to its inner operating position, each hanger supported on the rack is automatically laterally confined in a corresponding slot 108 on the shaker

mechanism bar 92 to bring the hanger under the two point lateral control of the hook 80 at support 60 and the stem or neck 112 at the shaker actuator 90.

Upon actuation of motor 98, the shaker bar 92 is caused to oscillate laterally of the enclosure to swing each hanger as confined at the two point restrain of the hook 80 and neck 112 about the hook support in a direction generally laterally or crosswise to the plane normally assumed by the garment as it is hung on the hanger. In the preferred embodiment, the motor is at least a two-speed motor and can in fact be an infinitely variable speed motor where the speed of oscillation can be varied from between possibly 50 cycles per minute to 600 cpm. In any regard, since the garment as hung on the hanger shoulder 114 and as urged by the hanger cross element 116 is physically moved some, between at least  $\frac{1}{2}$  to 1  $\frac{1}{2}$  inches on the low side and possibly 4 to 6 inches on the high side in a direction crosswise to the plane it normally assumes when suspended freely, and since the hanger movement is uniform, the garment itself assumes a wave configuration which wave moves down the length of the garment away from the hanger support. This wave action of the garments has a tendency to circulate conditioning fluid in the enclosure from the top to the bottom between the garments and back up along the enclosure walls. This garment movement gives more complete penetration into the garment of the conditioning fluid and moreover removes wrinkles from the garment better than when subjected to fluid movement only. The steam entering the cabinet from the lower part is circulated upwardly along the side edges of the garment and then downwardly between adjacent garments and this garment wave action is effect forces the garments into the steam for firstly good usage of the steam and secondly good conditioning of the garments. The same effective usage is made of drying air admitted through the opening 40 as caused by the operating blower.

In the typical use of the subject finisher, the operator would load a plurality of garments as hung on hangers in the receiving slots 78 of the support rack 60 while the rack is in the outer loading position. Upon closing the doors the rack automatically moves through the linkage connection 70 to its inner operating position where the hanger stems 112 thereby become laterally confined within the slots 108 of the shaker actuator bar 92. Appropriate controls can be provided for operating the shaker motor 98 if at all or at the various high or low speed desired. The conditioning phase of the cycle would then be instigated and steam would be discharged from the pipe 50 drawing admixing cooling air in through the tube 48 for common discharge into the enclosure. During this steam discharge time the shaker actuator can be operated which pumps the steam about the enclosure as noted. After the steam discharge has concluded the garments can be continuously agitated to effectively use the moisture in the enclosure atmosphere by penetration into the garments during what can be considered a soak phase of the cycle. The drying phase of the cycle then begins with the blower 32 being operated to circulate heated air within the enclosure and to drive part of the returning moist air from the enclosure through the now open damper outlet 56. Circulation of the heated air downwardly over and past the undulating garments dries the garments and leaves the garments generally wrinklefree. Again, an appropriate control can be used for operating the shaker agitator

during the drying cycle at any fast or slow speed of oscillation depending upon the type of garments. After the drying phase of the finishing cycle has been concluded, the operator need only open the doors whereupon the finished garments supported on rack 60 automatically move to the outer accessible unloading position where the garments can then be unloaded still suspended on the hanger and transferred for packaging or the like onto a slick rail, portable rack, or other such 10 auxilliary component.

What is claimed:

1. A garment finisher, comprising a walled cabinet having an access opening and a pair of adjacent side hinged doors selectively closing the opening to define an interior enclosure, means to discharge a conditioning fluid in the enclosure, an elongated rack for holding a plurality of garments to be finished in side-by-side relationship within the enclosure each such garment generally being hung on a conventional hanger having a hook and a lower stem, spaced rails extended within the enclosure toward the access opening and antifriction means on the rack engaged with the rails for mounting the rack to move between an inner operating position located within the enclosure and an outer loading or unloading position located generally at the access opening, linkage means connected between the doors and the rack operable upon movement of the doors between the closed and the opened positions automatically to move the rack between its inner and outer positions respectively, and means for circulating drying fluid in the enclosure over and past the garments therein.

2. A garment finisher according to claim 1, wherein said rack includes an elongated element having a top edge defining a plurality of upwardly open narrow spaced slots and inclined edges diverging upwardly from opposite sides of each slot whereby for loading the finisher each hanger hook can be guided by the inclined edges to the respective slot and each slot is 35 adapted to receive and support the hook with little possible hook movement along the rack.

3. A garment finisher according to claim 2, further including means to reciprocate all supported hangers in a direction generally transverse to the normal plane of 45 the garment as hung thereon operable while the rack is located in the inner operating position, each garment thereby assuming a wave of undulating movement which progresses along the garment downwardly from the hanger.

4. A garment finisher according to claim 1, wherein said fluid circulating means includes a passage separate from the enclosure, a blower having an inlet open to the enclosure and outlet open to the passage, a heat exchanger in the passage downstream of the blower but upstream of the passage outlet to the enclosure, and means including a bleed opening from the passage between the blower outlet and heat exchanger to outside the cabinet operable for venting part of the circulating fluid from the enclosure upon operation of the blower.

5. A garment finisher, comprising a walled cabinet having an access opening and a door selectively closing the opening to define an interior enclosure, means to discharge a conditioning fluid in the enclosure, means for holding a garment to be finished within the enclosure such garment generally being hung on a conventional hanger having a hook and a lower stem, means for mounting the holding means to move between an

inner operating position located within the enclosure and an outer loading or unloading position located generally at the access opening, means connected between the door and the holding means operable upon movement of the door between its closed and opened positions automatically to move the holding means between its inner and outer positions respectively, means for circulating drying fluid in the enclosure over and past the garments therein means to reciprocate all supported hangers in a direction generally transverse to the normal plane of the garment as hung thereon operable while the holding means is located in the inner operating position, each garment thereby assuming a wave or undulating movement which progresses along the garment downwardly from the hanger, said reciprocating means including an actuator element located at an elevation lower than the holding means and having means to receive and laterally confine the hangers supported on the holding means when the holding means is in the inner operating position to bring the hanger under two point confinement at the holding means and the actuator element, and means to reciprocate the actuator element in a direction generally crosswise to the two point confinement relative to the holding means.

6. A garment finisher, comprising a walled cabinet having an access opening and a door for selectively closing the opening to define an interior enclosure, means to discharge a conditioning fluid into the enclosure and including a tube communicating between the enclosure and the outside ambient air and a steam nozzle located with clearance within the tube whereby steam discharge from the nozzle into the enclosure draws outside ambient air through the tube for admixture and common discharge with the steam into the enclosure, means for holding garments to be finished within the enclosure such garments being hung on conventional hangers each having an upper hook and a lower stem, means for circulating drying fluid downwardly from above the holding means and over and past garments in the enclosure and including means defining a passage separate from the enclosure and a blower having an inlet open to the lower portion of the enclosure and an outlet open to the passage which in turn communicates with the upper portion of the sure, a heat exchanger in the passage downstream of the blower but upstream of the discharge to the enclosure, means including a bleed opening from the passage between the blower and heat exchanger to outside the cabinet and having a normally closed damper that opens upon blower operation for venting part of the circulating fluid from the enclosure means to shake all supported hangers and move the garments hung thereon in a direction generally crosswise to the plane of the garment as freely suspended on the hanger, means supporting the holding means to move between an inner operating position centrally located in the enclosure and an outer loading and unloading position located generally outside of the enclosure at the access opening, and wherein the shaking means includes means to engage and confine each hanger on the holding means when the latter is in the inner position but which engaging and confining means become disengaged from the hanger when the holding means is in the outer position.

7. A garment finisher according to claim 6, wherein means are connected between the door and the holding means operable upon movement of the door between

its closed and the opened positions automatically to move the holding means between its inner and outer positions, respectively.

8. A garment finisher comprising a walled cabinet generally defining an interior enclosure, means to discharge a conditioning fluid in the enclosure, a rack for holding a plurality of garments to be finished within the enclosure each such garment generally being hung on a hanger having an upper hook portion and a lower stem portion and the hook portion being confined on the rack, means to shake each hanger and garment thereon in a direction transverse to the garment as it is hung on the hanger whereby the garment assumes a wave or undulating pattern that progresses from the hanger downwardly along the garment, said shaking means being located below the rack and having means to engage and confine the stem portions of the hangers against movement in the direction transverse to the garments as hung on the hangers, whereby each hanger is under the two point confinement of the rack and the shaking means, and means to reciprocate the shaking means relative to the rack in a direction generally transverse to the garments as hung on the hanger.

9. A garment finisher according to claim 8, wherein the cabinet has an access opening and closure means therefor, and further including support means for the rack suitable for moving the rack between an inner operating position within the enclosure and an outer loading or unloading position located generally at the access opening, and wherein the engaging and confining means of the shaking means operates only on the hanger stem portions only when the rack is in the inner position and becomes disengaged from the hanger stem portions when the rack is in the outer position.

10. A garment finisher according to claim 9, wherein said engaging and confining means includes an elongated element having an edge located adjacent the rack at a level to line up with the stem portions of the carried hanger, said edge having a plurality of narrow slots spaced apart corresponding to the spacing of the confined hook portions on the rack and further having inclined edges diverging away from the opposite sides of each slot, whereby the diverging edges guide the stem portions of the hangers to each respective confining slot during the movement of the rack to its inner operating position.

11. A garment finisher according to claim 10, wherein the shaking means includes a shaft supported to rotate about an axis generally parallel to the movement of the rack into and out of the cabinet, means to rotate the shaft, means supporting the elongated element for reciprocation parallel to the rack, and linkage means between the shaft and the elongated element operable upon rotation of the former to reciprocate the latter.

12. A garment finisher according to claim 9, wherein the closure means includes a pair of doors hinged along vertical outer edges to the cabinet, and linkage means connected between each door near its inner edge and the rack operable upon movement of the doors between the closed and open positions to move the rack automatically between its inner and outer positions, respectively.

13. A garment finisher according to claim 12, wherein the rack includes spaced side elements extended forwardly of the confined hook portions of the hanger, and wherein the closure means includes a front plate which moves with the rack and extends across and closes the upper part of the access opening.