Nov. 10, 1959 B. A. WOOD 2,911,729

METHOD OF AND MEANS FOR STEAM TREATING AND VIBRATING GARMENTS

Filed Nov. 30, 1956 2 Sheets-Sheet 1

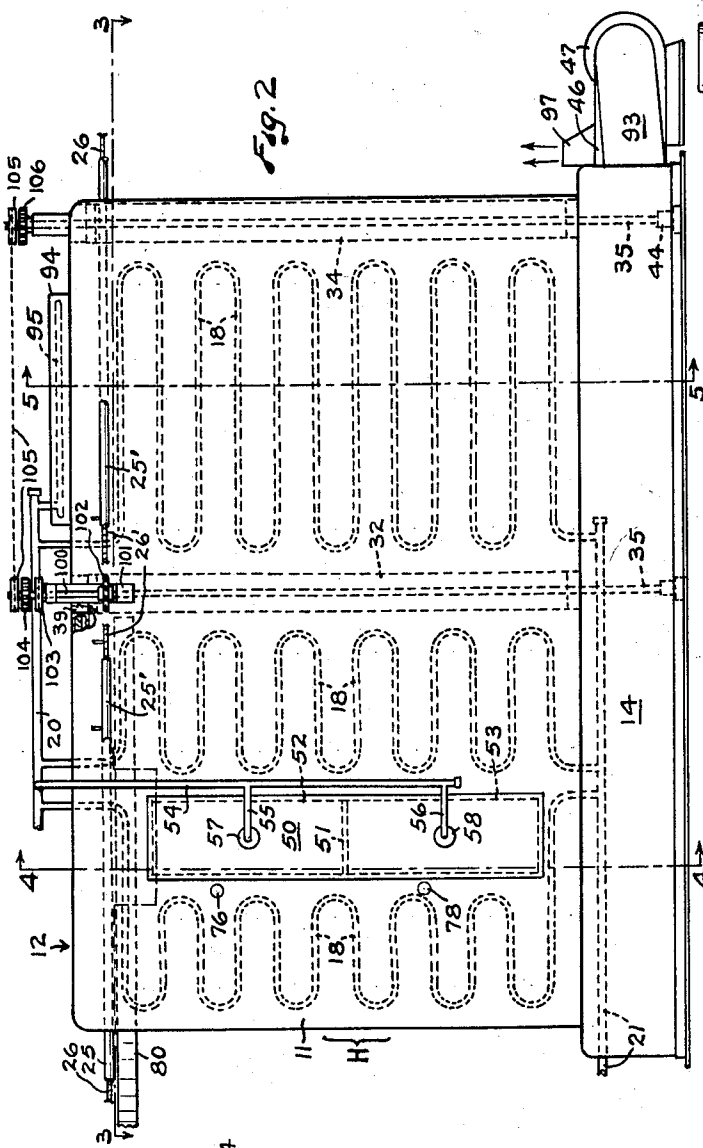


Fig. 2

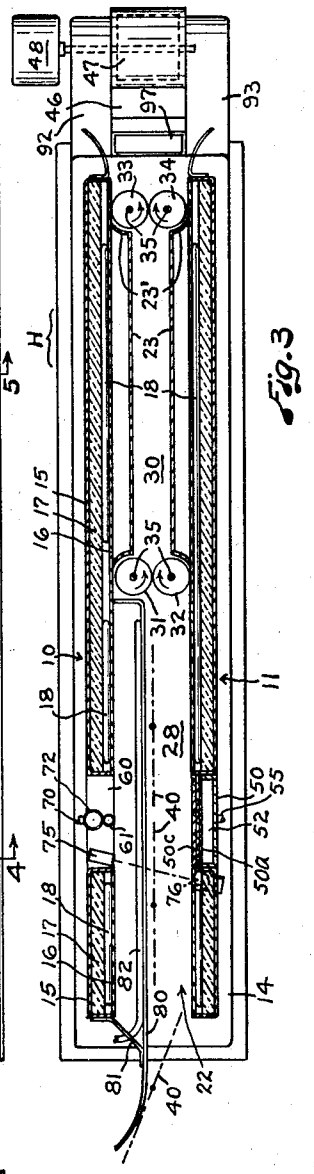


Fig. 3

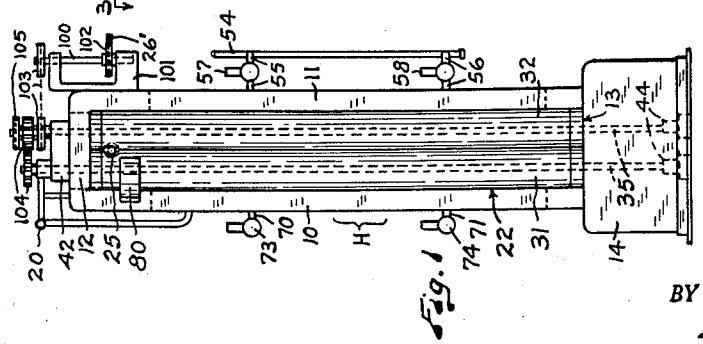


Fig. 1

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METHOD OF AND MEANS FOR STEAM TREATING AND VIBRATING GARMENTS

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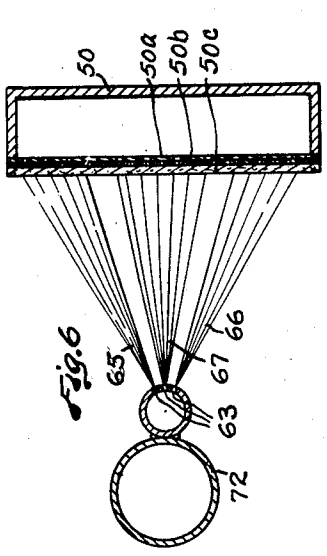


Fig. 6

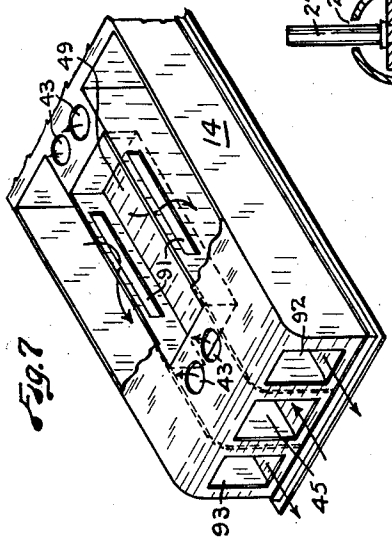


Fig. 7

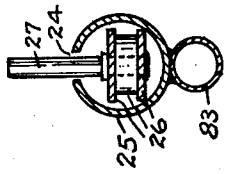


Fig. 9

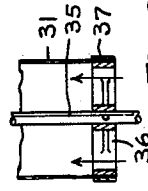


Fig. 8

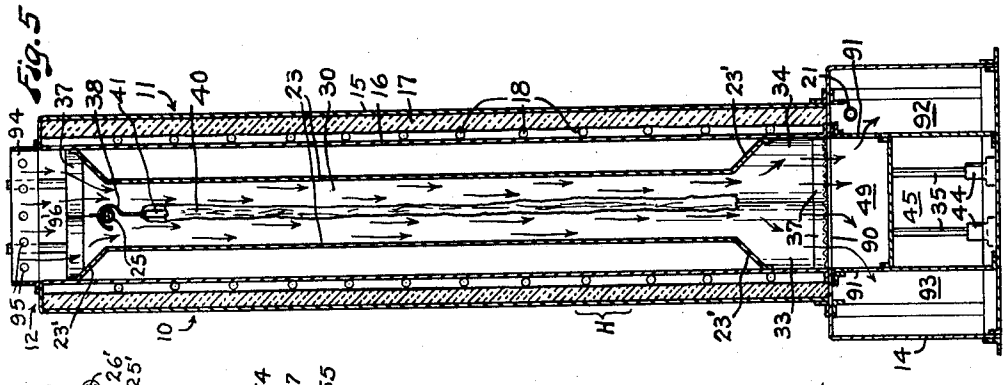


Fig. 5

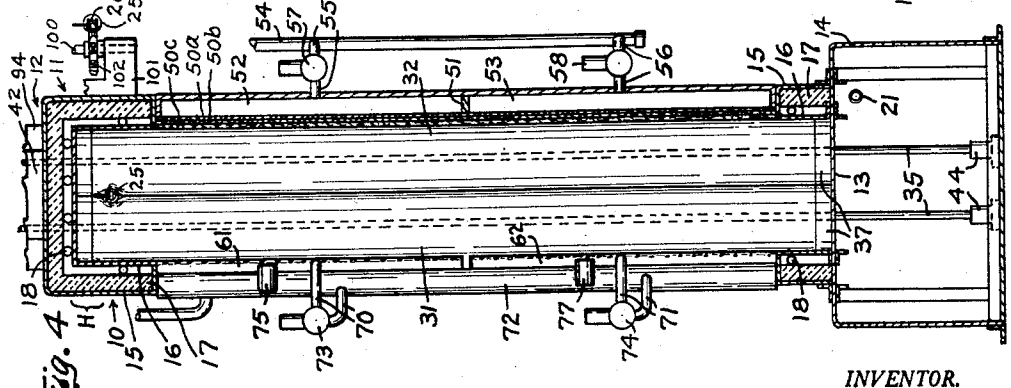


Fig. 4

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2,911,729

METHOD OF AND MEANS FOR STEAM TREATING AND VIBRATING GARMENTS

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Application November 30, 1956, Serial No. 625,541

12 Claims. (Cl. 34—37)

My invention relates to a method of and means for steam treating and vibrating garments to remove wrinkles therefrom.

In shipping garments, such as dresses, coats and the like, it is common practice to use fairly large boxes or packing cases in which the garments are laid one on top of another. The packing cases may be subjected to rough handling in shipment and the garments are liable to remain in the packing cases for fairly long periods of time. When the garments are unpacked preparatory to displaying them for sale they are liable to be badly wrinkled.

An object of my invention is to provide a rapid, efficient and time saving method of and means for removing the wrinkles from and straightening out and conditioning large numbers of garments at the time they are unpacked preparatory to offering them for sale.

Another object is to provide a method of and means for removing wrinkles from garments by first applying steam to the garments to soften up the fabric and then vibrating the garments by passing air over them to shake out the wrinkles and carry off the moisture left in the garments.

Another object is to apply divergent jets of steam to the garments in such a manner as to spread the garments and tend to straighten them out.

Another object is to provide a garment conditioning device in which suspended garments are carried first through a garment steaming compartment where they are subjected to the proper amount of steam to soften the fabric and thence through a garment vibrating compartment where air at a substantial velocity, sufficient to produce a mild whipping or vibration of the fabric, is passed downwardly over the suspended garments to shake the wrinkles out of the softened fabric.

Another object is to provide a garment conditioning device having a narrow garment passageway wherein pairs of upright pliable air inflated driven rollers are disposed in normally contacting relation in such a manner as to form upright barriers dividing the passageway into compartments and restricting transverse movement of steam and air while allowing free passage of the garments between the two pliable rollers of each pair.

Other objects of this invention will be apparent from the following description taken in connection with the accompanying drawings.

Figure 1 is an end elevation showing the intake end of a garment steaming and vibrating device constructed in accordance with this invention.

Fig. 2 is a side elevation of the same, parts being shown by dotted lines.

Fig. 3 is a horizontal sectional view taken substantially on broken line 3—3 of Fig. 2, parts being shown in plan and the positions of suspended garments being shown diagrammatically by dot and dash lines.

Fig. 4 is a view in vertical cross section, with parts broken away and parts in elevation, taken substantially on broken line 4—4 of Fig. 2.

Fig. 5 is a vertical sectional view, with parts broken away and parts shown in elevation, taken substantially on broken line 5—5 of Fig. 2.

Fig. 6 is a somewhat diagrammatic view, partly in cross section and on a larger scale than the preceeding figures, showing a steam chest or buck and steam pipes capable of directing divergent jets of steam against a garment passing between the buck and the steam pipes in spreading the garment.

Fig. 7 is a fragmentary isometric view, with parts in section, showing air chambers in the base portion of this device near the garment exit thereof.

Fig. 8 is a detached fragmentary sectional view showing tubular means for attaching a pliable roll to a shaft.

Fig. 9 is a fragmentary sectional view of a conveyor track and link belt conveyor suitable for use with this invention.

Like reference numerals refer to like parts throughout the several views.

The apparatus shown in the accompanying drawings comprises a housing H formed of two spaced apart upright side walls **10** and **11**, a top wall **12** and a bottom wall **13**. A base **14** supports the housing H. The side walls **10** and **11** and top wall **12** are preferably of double construction and are each formed of spaced apart sheet metal outer and inner shell members **15** and **16** with insulating material **17**, which may be spun glass, therebetween. The inner shell or lining member **16** is preferably of a smooth non-corrosive material, such as stainless steel. This lining member **16** is heated, during operation, to prevent moisture from condensing on it and possibly spotting the clothing. One satisfactory way to heat this inner lining member **16** is to place heating pipes **18**, preferably copper tubes, against the outer surface of the same and to connect these pipes **18** with a steam supply pipe **20** and a steam outlet or exhaust pipe **21**.

The four walls **10**, **11**, **12** and **13** cooperate to form a long narrow upright garment passageway **22** of sufficient height from bottom to top to provide clearance for the longest garments ordinarily handled when the garments are suspended from near the top of said passageway. The passageway **22** is open at both ends so that garments may enter at the end shown at the left in Fig. 2 and discharge from the end shown at the right.

In the drawings the garment passageway **22** is shown straight from end to end but it will be understood that the direction of this passageway may vary as long as the passageway is continuous and has an entrance opening and an exit opening in the housing walls so that garments can be moved progressively through said passageway.

A conveyor track **25**, which may be a pipe with an upwardly directed longitudinally extending slot **24**, Fig. 9, extends lengthwise through the passageway **22** and is supported near the top housing wall **12** and mid way between the side walls **10** and **11**. One lap of an endless link belt type conveyor **26** is movably supported in said track **25**. Flight lugs or pins **27** are secured to the conveyor at intervals and extend above the track **25** for moving garment hangers **41** along said track **25**, as hereinafter explained. A return lap **26'** of the endless conveyor, a fragment of which is shown in Figs. 1, 2 and 4, is supported and guided in a section of track **25'**, which preferably is positioned alongside of the upper portion of the housing H. The conveyor **26** and track **25** may extend any desired distance in either direction from the housing and may receive and discharge garments in any desired manner.

The garment passageway **22** is divided into a garment steaming compartment **28** and a garment vibrating compartment **30** by two parallel, upright, driven, pliable, air inflated rollers **31** and **32**. The rollers **31** and **32** operate

as a pair and preferably are positioned approximately half way between the two ends of the garment passageway 22. Another pair of upright, driven, pliable, air inflated rollers 33 and 34 is provided near the discharge end of the garment passageway 22 and forms an end wall for the garment vibrating compartment 30. Both pairs of air inflated driven pliable rollers allow garments to pass freely between the two rollers of the pair without adversely affecting the garments.

The walls which form the sides of the garment vibrating compartment 30 are inwardly offset, as shown in Figs. 3 and 5, to narrow the width of this garment vibrating compartment. The narrowing of this garment vibrating compartment is desirable because it has been found in practice that when air is passed through a narrow compartment over a suspended garment it is more efficient in producing a vibration of the garment than it is if the compartment is wider. One practical way to narrow the width of this garment vibrating compartment 30 is to place therein two large flat secondary wall members 23 of relatively thin stainless steel spaced equal distances from the medial plane of the housing. Each secondary wall member 23 has outwardly inclined marginal portions 23' which rest against and are secured to the lining member 16 and properly position the secondary wall member and prevent air from passing between the secondary wall member and the adjacent lining 16.

The pliable rollers 31, 32, 33 and 34 are cylindrical tubes of pliable substantially air tight material with a fairly smooth external surface and may be made of plastic which is not adversely affected by heat. An upright shaft 35 is positioned axially within each roller and has a spoked mounting wheel or sleeve 36, Fig. 8, secured thereon at the location of each end of the pliable roller member. The adjacent end portion of the roller fits telescopically over the sleeve 36 and is secured thereto. A thin metal collar or band 37 can be used to secure each end portion of each pliable roller to the mounting sleeve 36 over which it fits.

The upper end portion of each shaft 35 extends through an air outlet opening 39 in the top of the housing H and is journaled in a bearing 42. Air can escape upwardly from each pliable roller through the opening 39 at the top end thereof. The lower end portion of each shaft 35, Figs. 2, 5 and 7, extends downwardly through an air inlet opening 43 in the bottom 13 of the housing and is journaled in a combined radial and thrust bearing 44. Each air inlet opening 43 provides communication between a lower centrally positioned air chamber 45 and one of the pliable rollers so that air under slightly more than atmospheric pressure may be discharged upwardly through the pliable rollers and thus keep said rollers lightly inflated. The air chamber 45 is connected with the air discharge conduit 46 of a blower 47. The air discharge conduit 46 has an upwardly directed branch conduit 97 of restricted size positioned just below and just outwardly from the opening through which garments emerge from the housing H to provide an updraft of air through and over the discharging garments. The garments look better on the hangers if they are subjected to this updraft of air. The blower 47 can be driven by a motor 48. A pan shaped receptacle 49, which forms a suction chamber, is positioned directly below the garment vibration compartment 30 and between the two sets of pliable rollers and communicates through an opening 90, Figure 5, with the garment vibrating chamber 30. Preferably a guard 98 of screen wire or expanded metal is placed over the opening 90 to safeguard the blower 47 against drawing in articles of clothing or like things which might get loose in the garment vibrating compartment 30.

Two slots 91 in the respective side walls of the pan shaped receptacle 49 communicate with two air suction conduits 92 and 93 through which air is drawn to the blower 47. An air heating compartment 94 having therein heating pipes 95 which communicate with the steam supply pipe 20 is provided on the top of the housing above the garment vibrating compartment 30 and communicates with the garment vibrating compartment 30 through an opening 96.

When the blower 47 is operating air will be drawn downwardly through heating compartment 94, opening 96 and garment vibrating compartment 30 into the pan shaped receptacle 49 and thence through conduits 92 and 93 to the blower 47. Some of this air will be discharged through conduit 46, chamber 45, and pliable rollers 31, 32, 33 and 34 outwardly through the top of the housing H. Also some of this air will be discharged through the upwardly directed branch conduit 97 over and through the garments as they emerge from the housing H.

Roller driving means is provided by which the pliable rollers 31, 32, 33 and 34 are driven in the directions indicated by the arrows in Fig. 3 at a peripheral speed equal to the lineal speed of the conveyor 26. The roller driving means illustrated in Figs. 1 and 2 can be used for this purpose. It comprises an upright shaft 100 supported alongside of the housing H in bearings 101 and having a sprocket wheel 102 which meshes with the return lap 26' of the conveyor. The upper end portion of the shaft 100 is connected by sprocket wheel and link belt means 103, shown diagrammatically, with the shaft 35 of one of the pliable rollers, in this instance roller 32. The two shafts 35 of rollers 31 and 32 are geared to each other by two spur gears 104 of equal size. The shaft 35 of one of the pliable rollers of the other pair, in this instance the roller 34, is connected by sprocket wheel and link belt means 105, shown diagrammatically, with the corresponding shaft 35 of the roller 32. The two shafts 35 of rollers 33 and 34 are geared to each other by spur gears 106 of equal size. The several sprocket wheels just described are of the correct size so that the pliable rollers are all driven at a peripheral speed equal to the lineal speed of the conveyor. Thus there is no slippage between the pliable rollers and the garments.

A vertically disposed steam chest or buck 50 is provided in one wall 11 of the housing H a short distance inwardly from the inlet end thereof. This chest or buck 50 extends from near the bottom to near the top of the housing and its purpose is to apply steam to one side of each passing garment 40. The buck 50 has a horizontal partition 51 dividing it into an upper compartment 52 and a lower compartment 53. The buck 50 is further provided with a built up face or inner side. This built up face preferably comprises a perforated plate 50*a*, a fine mesh screen 50*b* overlying said perforated plate 50*a* and a layer of padding material 50*c* overlying the screen 50*b*. This built up buck face is capable of permitting the passage of steam therethrough and it will spread the steam evenly and it has a smooth outer face positioned substantially flush with the lining 16 of the housing.

When conditioning short garments it will only be necessary to admit steam to the upper buck compartment 52 but for longer garments steam will be admitted to both compartments 52 and 53. A steam supply pipe 54 is connected by a branch pipe 55 with the upper compartment 52 and by anoother branch pipe 56 with the lower compartment 53. Two electrically controlled valves 57 and 58, herein referred to as solenoid valves, are provided in the respective branch pipes 55 and 56.

A vertical opening 60 is provided in the housing wall 10 at a location opposite to the buck 50 and extends from near the bottom to near the top of the housing H. Means for directing divergent jets of steam against the adjacent side of a garment 40 is disposed in the wall opening 60 in opposed relation to the buck 50 and is controlled in such a manner as to discharge jets of steam in the upper half of the housing or the lower half of the housing or substantially from bottom to top of said housing. One jet-

ting apparatus which will accomplish this two level control of the steam comprises two upright aligned jet delivery pipes 61 and 62, Fig. 4, positioned one above the other in the opening 60. Each pipe 61 and 62 has a plurality of jet openings 63, Fig. 6, positioned and arranged so that they will deliver jets of steam against the side of a garment 40 opposite to the buck 50. At least some of the jets of steam delivered from pipes 61 and 62 are divergent, as illustrated by the jets of steam numbered 65 and 66 in Fig. 6. Other jets 67 of steam are preferably delivered between the divergent jets 65 and 66. The divergent jets of steam 65 and 66 spread the garment and tend to open out the wrinkles and urge the garment toward the buck 50. Usually the garment will not contact or rub against the face of the buck 50 because an even distribution of steam issuing from the face of the buck will hold the garment clear of the buck. Steam is supplied to the jet delivery pipes 61 and 62 through branch pipes 70 and 71 respectively, which are connected with a steam supply conduit 72 and are respectively provided with electrically operated valves 73 and 74, preferably of solenoid type.

The supply of electric current to the two solenoid valves 57 and 73 which control the inlet of steam to the upper buck compartment 52 and upper steam jet pipe 61 is controlled by light responsive means, herein shown diagramatically as a photo-electric cell 75 positioned at one side of the path of movements of the garments 40 and a source of light 76 positioned at the other side of the path of movement of said garments 40 and focused on the cell 75. Similarly the supply of current to the two lower solenoid valves 58 and 74 is controlled by a photo-electric cell 77 and a source of light 78. The steam applicator and control mechanism just described provides a two stage applicator for long and short garments. This applicator is responsive to the length of the garment and is useful in conserving steam. Obviously one relatively long set of devices for delivering steam against opposite sides of the garments can be used and can be controlled by a single control means such as one photo-electric cell and lamp, or more than two shorter sets of steam delivery devices positioned one above another and each having an independent control means can be used.

The track 25 in which the link belt conveyor 26 operates is adapted to receive the hooks 39 of ordinary garment hangers 41. These hooks 39 slide on the track 25 and are moved along the track 25 by the flights 27. Garments 40 on hangers 41 approaching the housing H from the left as respects the showing in Figs. 2 and 3 ordinarily hang in planes approximately transverse to the length of the track 25. A guide rail or bar 80, having an outer end which curves away from the track 25, is positioned so that it will be engaged by the approaching garments and will turn these garments into edge to edge relation and into a plane generally parallel with the track 25 before the garments enter the passageway 22. The guide rail 80 can be secured to the housing H by brackets 81 and it extends from a location a substantial distance forwardly of the housing H to a position near the upright rollers 31 and 32. A steam pipe 82 is supported against the outer face of the guide rail 80 to keep said guide rail hot and prevent condensation of moisture thereon. Also a steam pipe 83, Fig. 9, is preferably positioned in contact with that part of the conveyor track 25 within the housing H to keep this track hot enough to prevent condensation thereon. The garments are maintained in approximately edge to edge relation throughout their travel through the housing H. The hooks 38 of most garment hangers now in common use either are pivoted in the hanger or have enough resiliency so that the hanger can be positioned either at right angles to or parallel to the track 25 without danger of displacing the garment hanger hook from the track. The track 25 and hanger hooks 38 engaged thereover are below the collars 37 and sleeves 36 at the upper ends of the rollers where they pass between said rollers.

In the operation of this garment conditioner the garments on hangers suspended at proper intervals from the track 25 move in edge to edge relation in the medial plane of the housing. At about the time each garment passes between the buck 50 and the jet pipes 61 and 62 it interrupts the light to one or both of the photo-electric cells 75 and 77. This energizes either the upper set or both sets of solenoid valves and applies steam to both sides of the garment. After a garment has moved clear of the light the solenoid valve or valves will be closed and steam shut off until the next succeeding garment again opens the steam control valves at one or both levels. Time delay means may be provided in the circuits which control either or both the opening and closing of the steam control valves to time the delivery of steam for best treatment of the garments. In the garment vibrating compartment 30 warmed air is drawn downwardly at a substantial velocity over each suspended garment causing the steam softened fabric of the garment to vibrate and thus the wrinkles are shaken out of the garment and any steam or moisture which remains in the garment is removed. The blast of air directed upwardly through and over the garments as they emerge from the housing H spreads the garments and causes them to assume a better and fuller and more pleasing appearance.

The foregoing description and accompanying drawings clearly disclose a preferred embodiment of my invention but it will be understood that changes may be made within the scope of the following claims.

I claim:

1. The method of steam treating a garment which comprises suspending the garment in an enclosure; spreading the garment by directing divergent jets of steam against one side thereof while simultaneously supporting the garment from its upper end; and simultaneously applying evenly distributed steam to the other side of the garment while the garment is maintained in spread condition by the divergent jets of steam.

2. The method of successively steam treating a plurality of garments to remove wrinkles therefrom, which comprises suspending said garments in edge to edge relation; moving said suspended garments edgewise in a narrow passageway; spreading said garments within said passageway by directing divergent jets of steam against one side of successive moving garments while simultaneously supporting the garments from their upper ends; and simultaneously applying evenly distributed steam to the other sides of the successive moving garments while the garments are maintained in spread condition by the divergent jets of steam.

3. The method of successively treating recently unpacked fabric garments to remove wrinkles therefrom, which comprises suspending the garments in edge to edge relation; progressively moving the suspended garments edgewise in succession through a narrow passageway; directing steam against both sides of each suspended garment at one position in the passageway while simultaneously supporting the garments from their upper ends in softening the fabric of the garment; then vibrating the garment at another position in the passageway by passing air at substantial velocity down over the same; and then blowing air upwardly over and through the garment.

4. In apparatus for steaming and vibrating wrinkled garments, a housing having walls provided with a long upright inlet opening and a long upright outlet opening and having a narrow upright passageway of substantial height and length extending between said inlet and outlet openings; a traveling conveyor in the upper portion of said passageway operable in suspending garments in said passageway and moving garments through said passageway; upright pliable driven rollers dividing said passageway into two compartments, said rollers being operable in passing garments between said two compartments

while restricting the passage of steam and air between said compartments; steam supply means communicating with the compartment adjacent the inlet opening; and air circulating means connected with the compartment adjacent the outlet opening.

5. In apparatus for steaming and vibrating wrinkled garments, a housing having walls provided with an inlet opening and an exit opening for suspended garments; and having a narrow upright passageway for suspended garments extending between said inlet and exit openings; a traveling conveyor in the upper portion of said passageway operable in suspending garments and moving them in said passageway; upright pliable driven rollers dividing said passageway into a garment steaming compartment and a garment vibrating compartment, said rollers cooperating in passing garments between said two compartments while retarding the passage of air and steam between said compartments; other upright pliable driven rollers in said passageway adjacent said exit opening cooperating in passing garments toward said exit opening while retarding the passage of air between said exit opening and said garment vibrating compartment; steam inlet means positioned to admit steam through opposite side walls of the housing into the garment steaming compartment; and air moving means providing a circulation of air downwardly through said garment vibrating compartment.

6. In a garment steaming apparatus, a housing having therein a narrow upright garment passageway providing clearance for a suspended garment; a garment conveyor in the upper portion of said passageway capable of suspending garments in edge to edge relation and moving said garments along said passageway; a steam buck having an inwardly directed steam emitting face positioned at one side of said passageway; and divergent steam jet emitting means positioned at the other side of said passageway in opposed relation to said steam buck, said steam jet means being capable of directing divergent jets of steam against the sides of garments opposite to the buck in spreading the garments and urging them toward the buck as the garments are passing between the buck and the jet emitting means.

7. In garment conditioning apparatus, a housing having a long narrow upright garment passageway of substantial height; a garment conveyor operable in moving garments is suspended edge to edge relation along said passageway; a steam buck having an inwardly directed steam emitting face positioned at one side of said passageway; divergent steam jet emitting means positioned at the side of said passageway opposite to said steam buck, said steam jet means being capable of directing divergent jets of steam against the sides of the garments opposite to the buck in spreading the garments and urging them toward the buck as said garments pass between the divergent steam jet emitting means and the buck; electrically actuated steam supply means connected with said buck and said steam jet emitting means; and electrical control means responsive to the presence of garments between said buck and said jet emitting means controlling said steam supply means.

8. In garment conditioning apparatus, a housing having a straight narrow upright garment passageway extending therethrough; a garment conveyor operable in moving garments in suspended edge to edge relation through said passageway; a steam buck having an inwardly directed steam emitting face positioned at one side of said passageway adjacent the garment intake end thereof; divergent steam jet emitting means positioned at the side of said passageway opposite said steam buck and directed toward said steam buck, whereby garments passing between said jet means and said buck can be spread and urged toward said buck by directing divergent jets of steam against the sides of the garments opposite to said buck; a pair of air inflated upright driven rollers of pliable material positioned intermediate the ends of said housing dividing said passageway into a garment steaming compartment and a garment vibrating compartment, said rollers forming a garment transferring air and steam partition between said two compartments; another pair of air inflated upright parallel driven rollers positioned adjacent the discharge end of said passageway capable of passing garments therebetween and forming a partition which retards the passage of air; and a blower having an air intake conduit connected with the lower portion of said vibration compartment drawing air downwardly through said vibration compartment and having an air outlet opening directing air upwardly at the discharge end of the housing, whereby discharging garments are subjected to upwardly directed air from said air outlet opening.

9. In garment conditioning apparatus, a housing having internal walls forming a narrow upright garment passageway extending therethrough; an endless traveling garment conveyor operating in said passageway in moving garments suspended in edge to edge relation from said conveyor through said passageway; steam applicator devices positioned at each side of said passageway adjacent the garment intake end thereof and capable of applying steam to both sides of garments traveling in said passageway; two air inflated upright parallel peripherally contacting rollers of pliable material positioned intermediate the ends of said housing dividing said housing into a garment steaming compartment and a garment vibrating compartment said rollers forming a garment transmitting air and steam partition between said two compartments; two other air inflated upright parallel peripherally contacting rollers positioned adjacent the discharge end of said passageway capable of passing garments therebetween and forming a partition retardant to the passage of air; driving means connected with said conveyor driving all of said rollers at a peripheral speed equal to the lineal speed of the conveyor and with the contacting portions of each set of rollers moving in the same direction as the conveyor; and air circulating means operable in circulating air downwardly through said garment vibrating compartment.

10. The apparatus as claimed in claim 9 in which two plane flat opposed secondary wall members are supported within said garment vibrating compartment in spaced relation from the inside walls thereof reducing the effective width of said garment vibrating compartment.

11. The apparatus as claimed in claim 9 in which the internal walls of the garment passageway are of non-corrosive metal and in which heating devices are positioned in contact with said internal walls heating said walls and precluding condensation of moisture thereon.

12. In apparatus for steaming and vibrating garments which are suspended from garment hangers having hooks; a housing having therein a relatively long narrow garment passageway of substantial height; steam applicator means disposed within the forward end portion of said garment passageway; air circulation means circulating garment vibrating air in the discharge end portion of said garment passageway; a conveyor track extending longitudinally through the upper portion of said garment passageway capable of supporting garment hangers with the hooks of the hangers engaged over the track; a conveyor movable in said track; pins carried by said conveyor protruding from said track and capable of engaging with garment hanger hooks which are hooked over said track; and a guide bar supported at least partially within said garment passageway parallel with said track and in the path of movement of hangers supported from said track, said guide bar having a forward end portion protruding from said housing and curved away from said track, said guide bar positioning and holding hangers and the garments on said hangers substantially parallel

with said track as the hangers and garments move into and along said garment passageway.

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