June 10, 1930. H. A. SHIELDS 1,763,193

STEAMING AND DRYING MACHINE

Filed Jan. 28, 1929 3 Sheets-Sheet 1

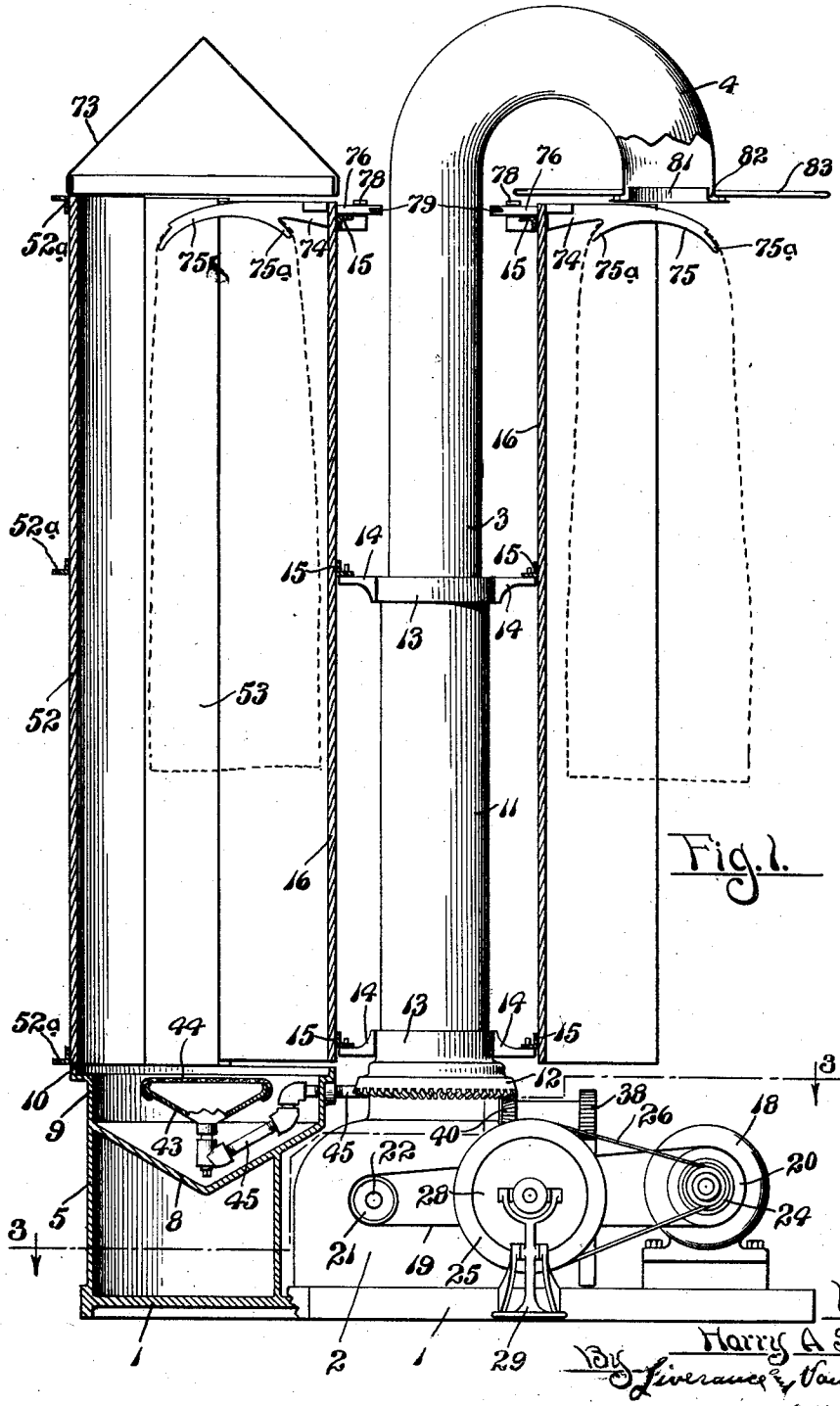


Fig. 1.

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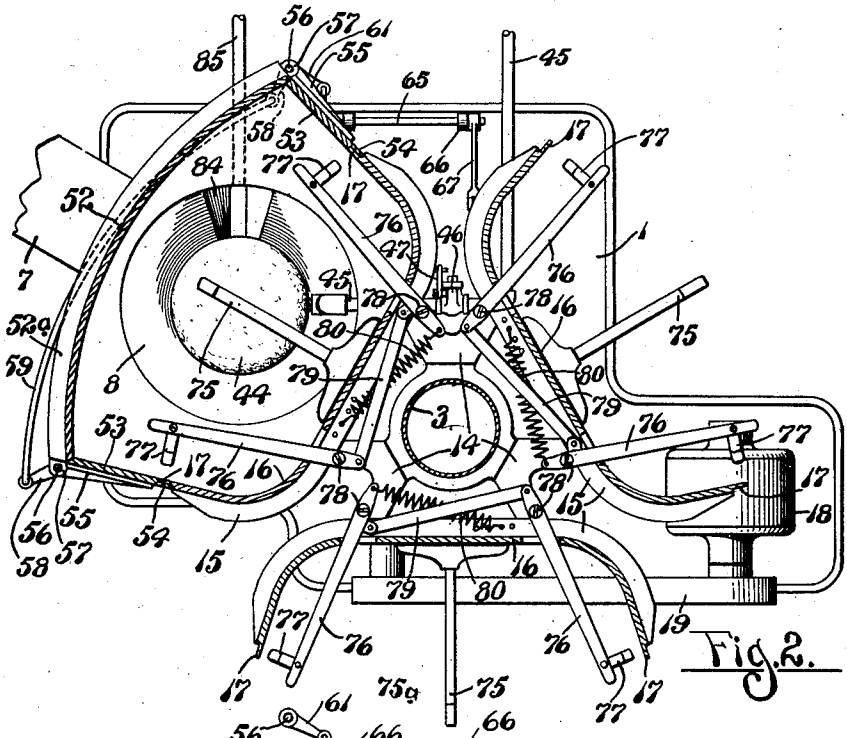


Fig. 2.

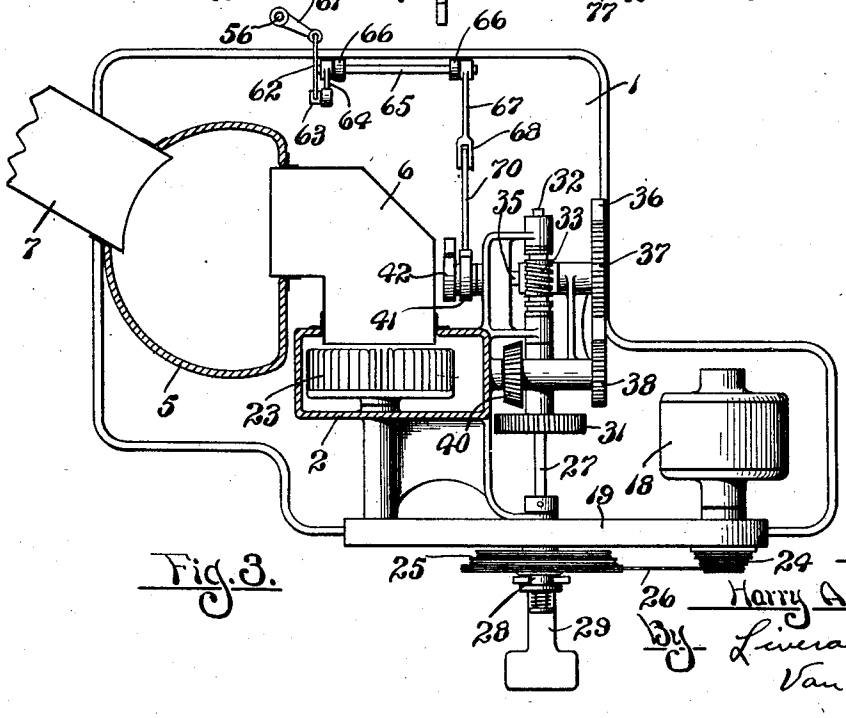


Fig. 3.

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STEAMING AND DRYING MACHINE

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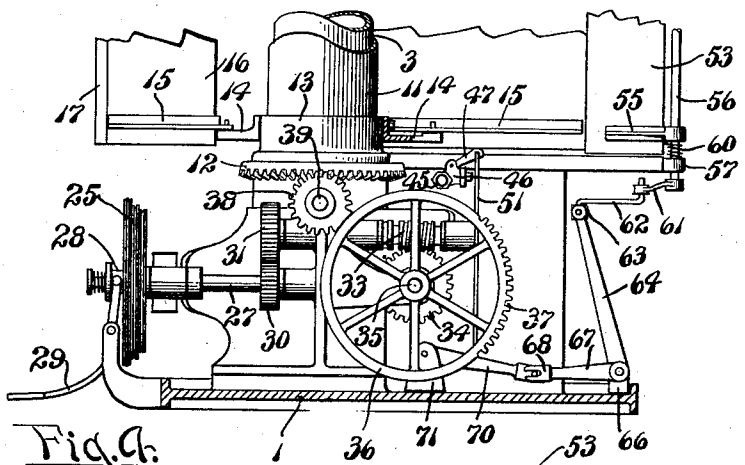


Fig. 4.

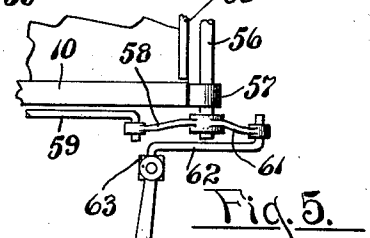
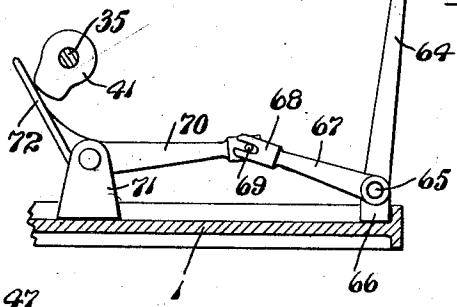


Fig. 5.



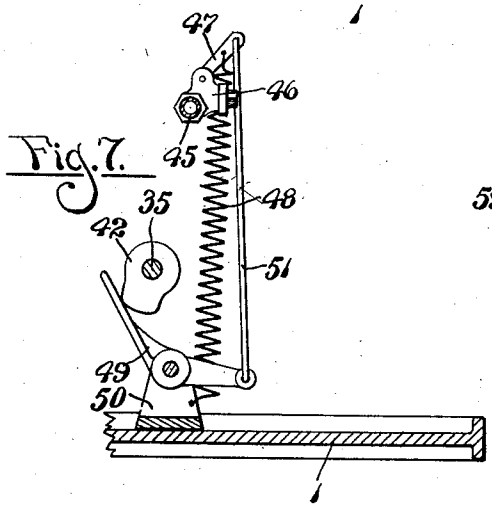


Fig. 7.

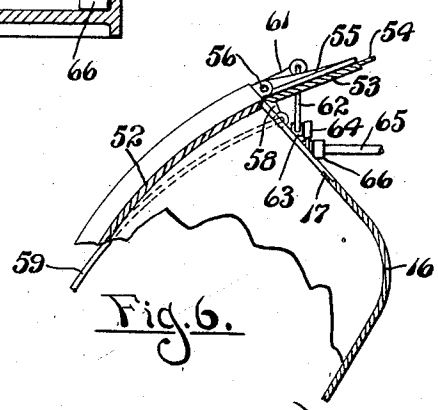


Fig. 6.

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Patented June 10, 1930

1,763,193

UNITED STATES PATENT OFFICE

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STEAMING AND DRYING MACHINE

Application filed January 28, 1929. Serial No. 335,483.

This invention relates to steaming and drying machines of particular utility in connection with garments made from knitted fabrics, though very useful in treating garments made from many other kinds of material. It is an object and purpose of the present invention to provide a mechanism which is operated by a step by step movement through three stages of movement for a complete cycle of the machine which rests or dwells between, the garment being put in place on the machine during one of the dwells, subjected to the action of steam at the next dwell in the operation, and completely dried by the action of warmed air blown therethrough at the succeeding dwell in the movement of the mechanism, the garment which has been treated being removed and replaced by another to be treated as the construction passes through a succeeding cycle of its operation.

In the manufacture of garments due to the handling of the materials used the garments when finished are full of wrinkles and creases which it has heretofore been considered necessary to remove by pressing or ironing. In factories manufacturing garments from knitted fabrics a considerable force of employees is required to place the garments in proper condition for merchandising. With my invention the wrinkles and creases are completely removed at the end of the steaming and drying process and the garments put in a better merchantable condition than if pressed or ironed. The employees required to operate machines made in accordance with my invention for the treating of a specified quantity of garments to remove the wrinkles and creases therein and place them in perfect condition is far less than is required for the same amount of garments under the old pressing or ironing method.

An understanding of the invention and the construction which I have made embodying the same for the attainment of the ends stated may be had from the following description, taken in connection with the accompanying drawings, in which,

Fig. 1 is a fragmentary partial vertical section and side elevation illustrating the machine of my invention.

Fig. 2 is a horizontal section through the machine, the section being taken at the upper end portion of the machine.

Fig. 3 is a horizontal section taken substantially on the plane of line 3—3 of Fig. 1, looking downwardly in the direction indicated by the arrows.

Fig. 4 is a fragmentary side elevation, with some of the parts illustrated in section, of the lower part of the machine.

Fig. 5 is a fragmentary elevation illustrating the mechanism used for automatically closing the doors of the steaming compartment.

Fig. 6 is a fragmentary vertical section through the steaming compartment at one side thereof, the doors being open, and,

Fig. 7 is a fragmentary elevation illustrating the mechanism used for automatically turning the steam on at proper times for introduction into the steaming compartment of the machine.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction of the machine a base 1 of metal is provided, integral with and extending upwardly from which is a housing 2 serving as a blower housing, as will later appear, extending above which is a hollow vertical post 3 which at its upper end is curved outwardly and downwardly in substantially semi-circular form, as indicated at 4, whereby the open end of the same will serve to project air in a downward direction. A second housing 5 is cast integral with the base to one side of the blower housing 2, from which a flue 6 leads to the blower housing (see Fig. 3) the inlet 7 for the air into the housing or chamber 5 extending to any desired distance from the machine to a place where clean and dry air can be obtained. The housing or chamber 5 is closed at its upper end by a depending conical partition 8, as shown in Fig. 1, from which vertical walls 9 extend upwardly, thence outwardly horizontally for a short distance, terminating in a vertical con-

tinuous lip 10 which is located around the bottom of the steaming chamber of the machine, as will hereafter appear.

An elongated sleeve 11 is rotatably mounted on and around the hollow post 3 at the lower part thereof and is provided at its lower end with a beveled annular gear 12, preferably formed integral with a collar 13 secured to the lower end of the sleeve 11. A second collar 13 is secured to the upper end of the sleeve 11 and from the collars 13, at equally spaced apart points, brackets 14 extend radially outward, as best shown in Fig. 2.

On the brackets 14 a plurality of substantially U-shaped bars 15 are adapted to be placed, the bars being attached at the rear or inner sides of U-shaped compartment members 16 of wood or other suitable material, which at their free vertical edges are reduced in thickness, making the lap joint members 17. There are three of the U-shaped compartment members 16 equally spaced around the sleeve 11. The bars 15 described are of angle form in cross section having vertical flanges attached to the members 16, while the horizontal flanges provided with suitable openings may engage with pins extending upwardly from the outer ends of the brackets 14. The upper ends of the compartment members 16 likewise are provided with very similar bars 15 for the purpose of strengthening and reinforcement.

An electric motor 18 is mounted at one side of and above the base, serving to continuously drive an endless belt 19 which passes around a pulley 20 on the motor shaft and also around a driven pulley 21 on a horizontal shaft 22, mounted in suitable bearings on the base, and extending through a side of the blower housing 2. A rotary blower 23 is permanently secured to the shaft 22 within the blower housing 2. It is evident that when the motor is operating the blower fan is continuously driven and draws air through the inlet flues 7 and 6 and through the chamber 5, which, as it will later appear, being located directly below the steaming compartment of the machine, is headed with a consequent warming of the air which is driven by the blower through the hollow column 3.

A cone drive pulley 24 is secured to the shaft of the motor 18, in alinement with a complementary cone pulley 25. An endless belt 26 passes around the two pulleys 24 and 25. The driven pulley 25 is clutch connected to a shaft 27 by means of a clutch 28 which normally is spring pressed into operative position but which can be released by stepping on a foot pedal 29 properly associated with the clutch 28 so as to withdraw it should it be desired any time to stop the machine from operating while the motor 18 is running.

A gear 30 on the shaft 27 lies below and meshes with a second gear 31 at the end of a horizontal shaft 32 mounted in suitable bearings, as shown in Fig. 3, and which carries a worm 33 between its ends in mesh with a worm or tangent wheel 34 below it fixed upon a shaft 35 located transverse to the shaft 32 and likewise mounted in suitable bearings, as shown in Fig. 3. At the outer end of the shaft 35 an intermittent gear 36 is secured having a part of its periphery equipped with outwardly extending gear teeth 37, the remainder being smooth, as shown. The intermittent gear 36 is designed to co-act with the second intermittent gear 38 secured at one end of the shaft 39 and turn said shaft with each complete rotation of the intermittent gear 36, the turning movement taking place during a portion only of the rotation of the gear 36. That is, the shaft 39 is periodically rotated with intervals of time or dwells between the periods of rotation. The shaft 39 is mounted above and transverse of the shaft 37 and has a beveled pinion 40 at its inner end, which is in mesh with the annular gear 12, previously described.

It is apparent from the foregoing description that when the electric motor 18 is operating and the clutch 28 is in operative condition, the sleeve 11, with the attached compartment members 16, is intermittently turned. The design of the gearing is such that the sleeve 11 makes a complete rotation with each three complete rotations of the intermittent gear 36 and the rotation of the sleeve 11 is a step by step rotation, each step being one third of a circumference with an interval of time between succeeding steps of rotation. At the inner end of the shaft 35 two cams 41 and 42 are attached, the purpose of which will hereafter be described.

Within the walls 9 and above the conical partition 8 a conically shaped steam outlet 43 is located, open at its upper side and covered by a fabric covering 44 which preferably is of felt and securely attached to the outlet member 43. Said outlet member is secured at the end of a length of steam carrying pipe 45 which is carried horizontally back of the central post 3 of the machine and thence outwardly to any suitable source of steam. A valve 46 is interposed in the length of the pipe 45 (see Figs. 2 and 7) which may be opened or closed by operation of a handle 47 normally acted upon by a tension spring 48 (Fig. 7) to hold the valve closed. A bell crank lever 49 is pivotally mounted between its ends on a bracket 50 fastened to the base 1, one arm of the lever being in the path of movement of the cam 42. A rod 51 connects the other

end of the bell crank lever with the valve operating handle 47 whereby, when the cam 42 rides against the bell crank lever 49, the valve is opened during the time that the cam is engaged with the bell crank lever and steam is passed through the pipe 47 to the outlet member 43 and upwardly through the felt cover 44.

At the front portions of the annular lip 10 at the upper end of the walls 9 of the steam outlet chamber, a vertical wall 52 for the steaming chamber is located and permanently secured in any suitable manner, at the vertical edges of which two pivotally mounted doors 53 are disposed having free edge lap joint extensions 54 to lap over the extensions 17 of the compartment members 16, previously described. The doors are carried on arms 55 which are secured to vertical rods 56 mounted for rotative movement about vertical axes in suitable journals 57 extending from lip 10 and also from reinforcing bars 52[a] located horizontally on the outer sides of the wall 52. To the lower ends of the two rods 56 arms 58 are secured which are connected by a connecting rod 59 so that outward or inward swinging movement of one of the doors is accompanied by simultaneous equal outward or inward swinging movement of the other. The doors have a normal tendency to swing to their closed position, as in Fig. 2, under the influence of the coiled spring 60, shown in Fig. 4.

One of the arms 58 at its end where it is secured to a rod 56 is equipped with a second arm 61 extending at an angle to the arm 58 (see Figs. 4 and 6), to which a link 62 is pivotally connected at one end, the other end having a pivotal connection to a block 63 to which the upper end of the arm 64 is pivotally connected, the axes of connection of the arm 64 and of the link 62 to said block being at right angles to each other. The arm 64 at its lower end is secured to a horizontal shaft 65 rotatably mounted on and extending between suitable brackets 66 fastened to the upper side of the base 1. An arm 67 is attached to and extends inwardly from the shaft 65 and has a forked head 68 at its inner end to pivotally and slidably engage the pins or trunnions 69 adjacent the end of one arm 70 of a bell crank lever pivotally mounted between its ends on a bracket 71 secured to the base 1, the other arm 72 of the bell crank lever extending into the path of movement of the cam 41 (see Fig. 5). A cover 73 for the steaming compartment is secured at the upper end of the wall 52 and extends inwardly so as to complete the closure of the steaming compartment when the compartment members 16 are brought into proper relation with the wall 52 and the doors 53 have been released to close thereagainst.

When, in the rotation of the shaft 35, the cam 41 comes to the arm 72 of the bell crank lever last described, the lever is turned about its pivot with a consequent operation of the arm 64 and link 62 which, acting upon the arm 61 turns one of the rods 56 in a direction to throw the door 53 mounted thereon outwardly; and as the other door 53 is connected therewith, as described, it likewise is swung outwardly into substantial alinement with the wall 52. It is designed that this outward swinging movement of the doors shall take place immediately before engagement of the teeth 37 of the intermittent gear 36 with the gear 38 whereby the doors will not be in the path of movement of the compartment members 16 as they are moved from one position to the next succeeding position.

At the upper end of each of the compartment members 16 and extending outwardly therefrom is a bar 74 terminating in a garment holder 75 having garment engaging fingers 75[a], as shown in Fig. 1. In substantially the same plane with the bars 74 and at each side thereof are other bars 76 the free outer ends of which are provided with laterally offset garment engaging fingers 77. These bars at their inner ends pass through slots in the rear of the compartment members 16 and are pivotally mounted at 78 back of said members 16 and connected by a link 79 in such manner that the bars move together inward or outward, normally tending to swing outwardly and away from each other by reason of the coiled spring 80 attached to the inner end of one of the bars and to a bracing bar 15, as shown in Fig. 2. It is evident that a garment, such as a skirt, may be held by and depend from the garment engaging fingers 75[a] and 77, the upper end of the skirt being held open by reason of such engagement. Various other forms of garment engaging members for different types of garments may be used, one for each of the compartment members 16 at the upper ends thereof.

Within the outlet end 4 of the hollow post 3 a thimble 81 is located and secured, comprising, an upwardly extending annular flange and a horizontal outwardly extending flange with a space 82 between said flanges and the walls of the outlet 4, and a circular plate 83 which is secured at the lower end of the outlet 4, as shown in Fig. 1.

In considering the operation of the machine, referring to Figs. 2 and 3, the front of the machine is at the lower sides of each of said figures. The operator of the machine stands at the front and engages a garment, indicated in dotted lines in Fig. 1, over the garment engaging fingers 77 and 75[a] during a period when the teeth 37 of the gear 36 are not in engagement with the gear 38, the garment being engaged with

the holders therefor, upon the succeeding meshing of the teeth 37 and gear 38 all of the compartment members 16 are turned in a clockwise direction (referring to Fig. 2) and moved through an arc of 120° bringing the member 16 in which the garment has been hung, to a position back of the wall 52. During this movement, as previously described, the doors 53 have been swung outwardly so as not to obstruct the movement of the compartment members 16; but immediately after the succeeding dwell in the operation of sleeve 11 takes place, the cam 41 disengages from the bell crank arm 72 and the doors are swung shut, as shown in Fig. 2, closing the compartment. And immediately afterward the cam 42 acts upon the bell crank lever 49 to open valve 46 for passage of steam into the lower end of the steaming compartment which is closed at all sides, and at its upper and lower ends, except for such openings as may exist at the upper and lower ends of the member 16. The steam passes upwardly through the passage 44 thoroughly steaming the garment during the interval or until the next engagement of teeth 37 and gear 38 takes place.

With the next engagement of teeth 37 with gear 38 the sleeve 11 and the attached devices are turned another 120°, bringing the garment which has been thoroughly steamed underneath the open end of the outlet section 4 of pipe 3 through which air is continuously blown. And such air, as previously stated, is warmed by reason of its passage underneath the partition 8 which forms the bottom of the steam compartment. The air blows on and through the garment during the third dwell and the garment is thoroughly dried during this time so that, upon the succeeding step of movement, bringing the garment back to the place from which it started, it has been steamed and dried, all wrinkles and creases removed and the garment is in condition for packing in boxes or otherwise, that is, it is in proper merchantable condition.

It is, of course, to be understood that with the presentation of each of the compartment members 16 to the front of the machine the garment which has been steamed and dried is removed from the holders and another put on; and that during the operation, at the dwell intervals, the operator removes one garment and puts another in place, another garment is in the steaming compartment receiving the steam treatment, and another is underneath the outlet section 4 of the pipe 3 being dried with the warm air.

The construction described at the end of the section 4 consisting of the thimble 81 and the plate 83 is to direct the air in a downward direction and at the same time shunt a small portion of the air through the passage at 82 outwardly against the under side of plate 83 to prevent collection of any condensation on the underside of said plate from which drops of water might fall on to the garments while they were being removed.

At a side of the conical partition 8 it is provided with a draining depression 84 from which a pipe 85 leads to carry away any water which may condense from the steam introduced into the steaming chamber.

The machine described is very practical and has proved its value in severe trials and tests. With different materials requiring different lengths of time for steaming and drying, the belt 26 may be changed on the pulleys 24 and 25 to either speed up or retard the movements of the machine, it being evident that in the position of the belt shown in Fig. 3 the mechanism is operated more slowly than if the belt was on a larger section of the cone pulley 24 and on a smaller section of the driven pulley 25. A knitted fabric garment particularly is very quickly and easily placed in a merchantable condition after its manufacture with elimination of all wrinkles and creases and with a much better appearance to the fabric of the garment than can be obtained by pressing or ironing. The felt covering at 44 for the steam outlet member 43 is very desirable as with it the effectiveness of the steam is increased and the quantity consumed greatly decreased over what is needed if no equivalent member like that shown by the felt 44 is used.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. A machine of the class described comprising, a vertically positioned rotatably mounted support, a plurality of vertically positioned substantially U-shaped compartment members located in equally spaced relation around said support, garment holding members carried at the upper portion of each compartment member, means for periodically rotating said support about a vertical axis with step by step movement, a substantially vertical outer wall back of which each of said compartment members is successively brought, swinging doors mounted at each edge of the wall to turn about vertical axes adapted to engage with said compartment members whereby a compartment member and the front wall and doors make a steaming chamber, a closure for the upper end of the chamber, and means for introducing steam into the lower end of the chamber.

2. A construction containing the elements in combination defined in claim 1 combined with a hollow vertical post about which

said support turns, said post at its upper end being curved to form a downwardly extending outlet portion beneath which said compartment members and garments carried thereby successively come and stop, and means for blowing heated air through said post and outlet thereto.

3. A machine of the class described comprising, a hollow vertical post having an outwardly and downwardly curved outlet, a vertical sleeve mounted for rotation around said post at the lower portion thereof, three equally spaced vertically positioned compartment members of substantially U-shaped form secured to said sleeve, garment holding members carried by each of the compartment members, means for periodically turning said support about the post through an arc of 120° with intervals of time between said movements during which said sleeve and compartment members are at rest, the outlet end to said hollow post being directly over the upper end of the garment holding members of one of said compartment members when the same are at rest, an outer stationary vertical wall behind which said compartment members come in succession, doors mounted to turn upon vertical axes, one at each vertical edge of said wall, means for swinging the doors outwardly during the times of movement of said sleeve, said means becoming ineffective and releasing the doors for inward swinging movement when the sleeve and attached compartment members are at rest, whereby the doors close the spaces between said wall and the vertical edges of the compartment members, a closing cover at the upper end of said wall, means for introducing steam within and at the lower end of said wall, and means for blowing warm air through said post out of the outlet end thereof.

4. A construction containing the elements in combination defined in claim 3, wherein said means for introducing the steam comprises a compartment at the lower end of and within the said stationary wall having a bottom, a steam carrying pipe extending into said compartment having a flaring outlet member open at its upper side, and a fabric cover over the upper side of the outlet member.

5. A construction containing the elements in combination defined in claim 3, wherein said means for introducing steam comprises a chamber at the lower end of and inside said stationary wall, and having a bottom, a steam carrying pipe extending into said chamber having an outlet opening at its upper side, a valve in said pipe, means for normally holding the valve in closed position when free to do so, and means for automatically opening the valve during the period that said doors are closed, said means releasing the valve for movement to closed position during the times that said sleeve is turning about the post.

6. In a machine of the class described, a hollow vertical post having a laterally and downwardly extending outlet end portion, a sleeve mounted for rotation about the lower portion of said post, a plurality of vertically positioned substantially U-shaped compartment members attached to and equally spaced around said sleeve and post, garment holders carried by said compartment members in front thereof, means for periodically turning said sleeve and compartment members predetermined distances about said post with intervals of time between movements, means for blowing warm air through said post and delivering it in a downward direction at the outlet end of the post, one of said compartment members and the garment carriers thereof being positioned, during the intervals of rest, under the outlet end of the post whereby garments on the garment carriers are dried by the air, an outer stationary chamber wall inside of which the compartment members rotate located so that one of the compartment members is associated with said wall during each period of rest of said compartment members, movable means for closing the spaces between said wall and the edges of the compartment members successively coming thereto, means for operating said closing means to open position during the times of movement of said sleeve and compartment members, an upper cover closing the space at the upper ends between said wall and the compartment members coming thereto, and means for projecting steam into the chamber formed by said wall and any compartment member associated therewith when said closing means are in closed position.

7. In a machine of the class described, a supporting base including a hollow blower chamber, a second chamber located to one side of the blower chamber having a top forming the bottom of a steaming chamber above the second chamber, a flue connecting the blower and second chambers and an air inlet flue from the outside to said second chamber, a hollow vertical post extending above and connected with said blower chamber having its upper end laterally extended and terminating in a downwardly extending outlet, a sleeve rotatably mounted around the lower end of the post, a plurality of spaced apart garment carriers carried by said sleeve around the same, means for periodically rotating said sleeve around said post through an arc of a circle with intervals of time between said rotative movements, the garment carriers being brought successively below the outlet to said post and positioned there beneath during the in-

tervals between movements, means for steaming garments carried by the garment carriers before the same are brought beneath said outlet, an electric motor, and means interposed between the electric motor and sleeve for effecting the step by step rotative movement of said sleeve described.

8. A construction containing the elements in combination defined in claim 7, said means for steaming garments including a steam outlet located directly above the upper side of said second chamber whereby said second chamber is heated and the air drawn therethrough to the blower chamber is heated when it is blown through said post.

9. In a machine of the class described comprising, a supporting base having a hollow blower chamber above the same, an air flue leading into said chamber, a hollow post communicating at its lower end with the blower chamber and extending upwardly therefrom, the upper end being laterally extended and terminating in a downwardly extending outlet, a rotary blower within the blower chamber, means for driving said blower to force air thru the post, a vertical sleeve rotatably mounted on said post, a plurality of garment carriers carried by and located around said post in spaced relation to each other, means interposed between the sleeve and said blower driving means for periodically turning the sleeve about said post through predetermined distances with intervals of time between successive turning movements, whereby said garment carriers and any garments thereon are successively brought beneath the outlet end of said post and stopped at such position during the times between successive rotary movements of the sleeve, and means for applying steam to garments carried by said garment carriers prior to bringing the same beneath said outlet end of the post.

10. A construction containing the elements in combination defined in claim 9 combined with a horizontal plate secured at the outlet end of said post, and a thimble secured at the outlet end of the post comprising a vertical circular flange located within the end of the post and spaced therefrom, and an outwardly extending horizontal flange extending under said plate and spaced therefrom, for the purposes described.

11. In a machine of the class described, a vertical post, a vertical sleeve rotatably mounted around said post, means for turning said sleeve about the post equal predetermined distances with intervals of time between successive turning movements, garment carrying members carried by and movable with said sleeve and spaced equally about said sleeve, means for directing steam against garments carried by one of said garment carrying members during a period between successive movements of the sleeve, means for turning off the steam during the times of movements of said sleeve, and means for drying the garments after they have been steamed and at the next succeeding period between the successive movements of the sleeve and garment carriers.

12. In a machine of the class described, a vertical post, a vertical sleeve mounted for rotation about the post, a plurality of compartment members carried by and positioned around the sleeve, a steam carrying pipe, an outlet opening at its upper side at the end of the pipe, a chamber open at its upper end within which said outlet member is located, a vertical outer wall permanently secured to and extending above the outer side of said chamber, means for rotating the sleeve and compartment members carried thereby to bring them successively inside of and opposed to said stationary wall, with intervals of time between movements, means for closing the spaces between the vertical edges of said wall and the vertical edges of said compartment members, a valve in said steam pipe, spring means normally holding the valve in closed position, and means for automatically opening said valve after said closing means has closed the spaces between said wall and the compartment members.

13. A construction containing the elements in combination defined in claim 12, said closing means comprising, vertical doors mounted for swinging movement about vertical axes, one at each edge of said stationary wall, means normally tending to swing the doors inwardly to closed position, and means for automatically swinging said doors outwardly and out of the path of movement of said compartment members during the times of rotative movement of said sleeve and attached compartment members.

14. In a machine of the class described, a carrier, a plurality of movable partial enclosures mounted on said carrier, a stationary partial enclosure shaped to associate with each of said movable partial enclosures to form a complete enclosure, means for intermittently moving said carrier to move each of said movable partial enclosures successively into association with said stationary partial enclosure and means for admitting steam into said stationary partial enclosure and the movable partial enclosure associated therewith.

15. The elements in combination defined in claim 7, combined with means for blowing air into said movable enclosures at a point removed from said stationary partial enclosure.

16. In a machine of the class described, a carrier, a plurality of movable partial enclosures mounted on said carrier, a stationary partial enclosure shaped to associate with each of said movable partial enclosures to form a complete enclosure, movable mem-

bers forming parts of the walls of said stationary partial enclosure, said movable members joining the walls of said movable partial enclosures, means for intermittently moving said carrier to move each of said movable partial enclosures successively into association with said stationary partial enclosure, means synchronized with said carrier moving means for moving said movable portions of the stationary partial enclosures away from the walls of the movable partial enclosures during movement thereof and for moving said movable portions into engagement with the walls of the movable partial enclosures during the pause of their intermittent movement and means for admitting steam into said stationary partial enclosure and the movable partial enclosure associated therewith.

17. The elements in combination defined in claim 16, combined with means for blowing air into said movable partial enclosures at a point removed from said stationary partial enclosure.

18. The elements in combination defined in claim 16, combined with means synchronized with the movement of said movable members for stopping the admission of steam when said movable members are out of contact with the walls of a movable partial enclosure.

19. In a device of the class described, a carrier, means for mounting garments at spaced apart locations on said carrier, a steaming device located to apply steam to said garments at one point in their path, means for supplying steam to said steaming device, an air conduit having an outlet opening located to direct air against said garments at a point in their path, means for moving air through said conduit, and means forming a portion of said conduit and associated with said steam supplying means whereby air passing through said conduit is heated by said steam supplying means.

In testimony whereof I affix my signature.

HARRY A. SHIELDS.