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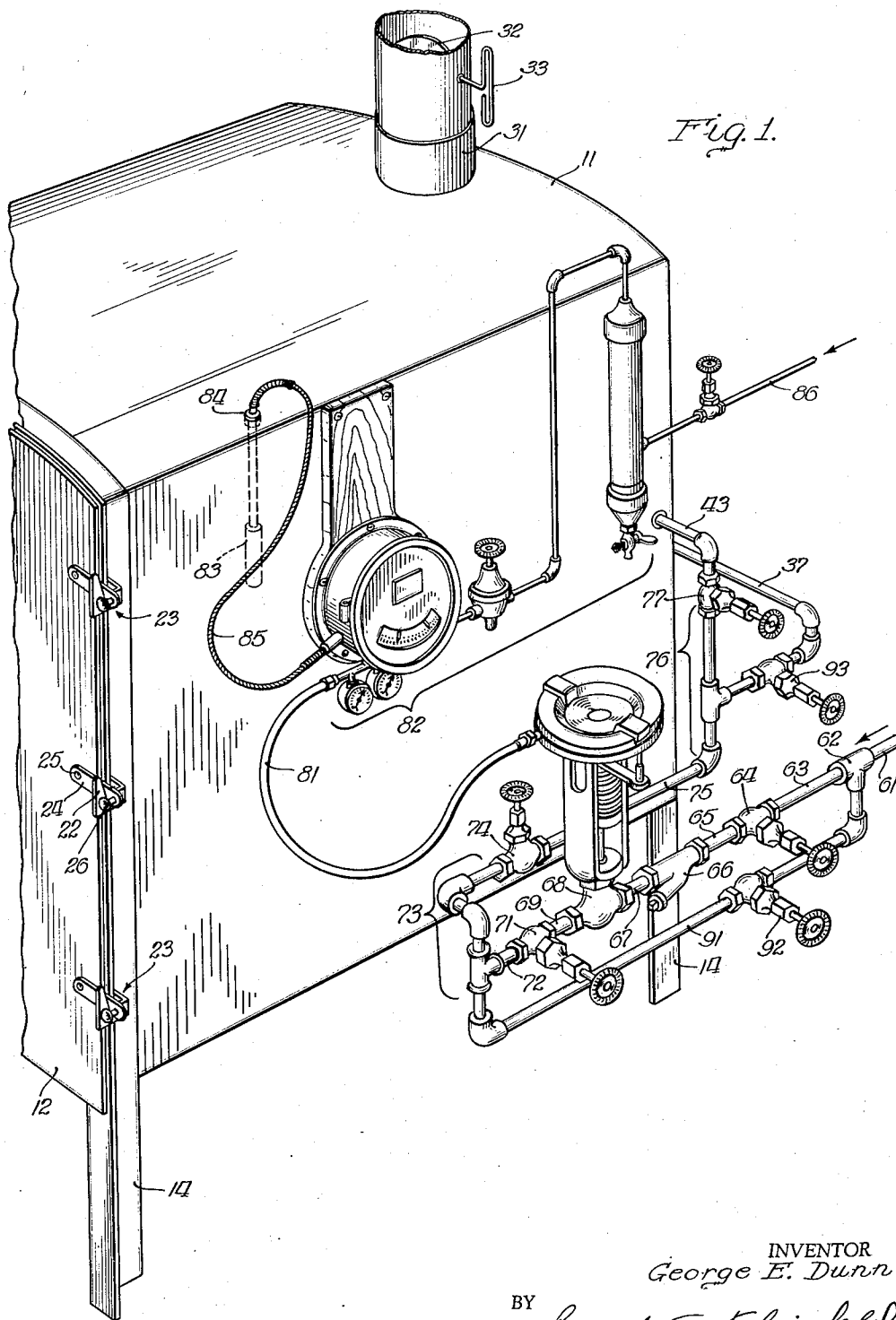
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METHOD OF TREATING TEXTILES

Filed Aug. 7, 1940

4 Sheets-Sheet 1



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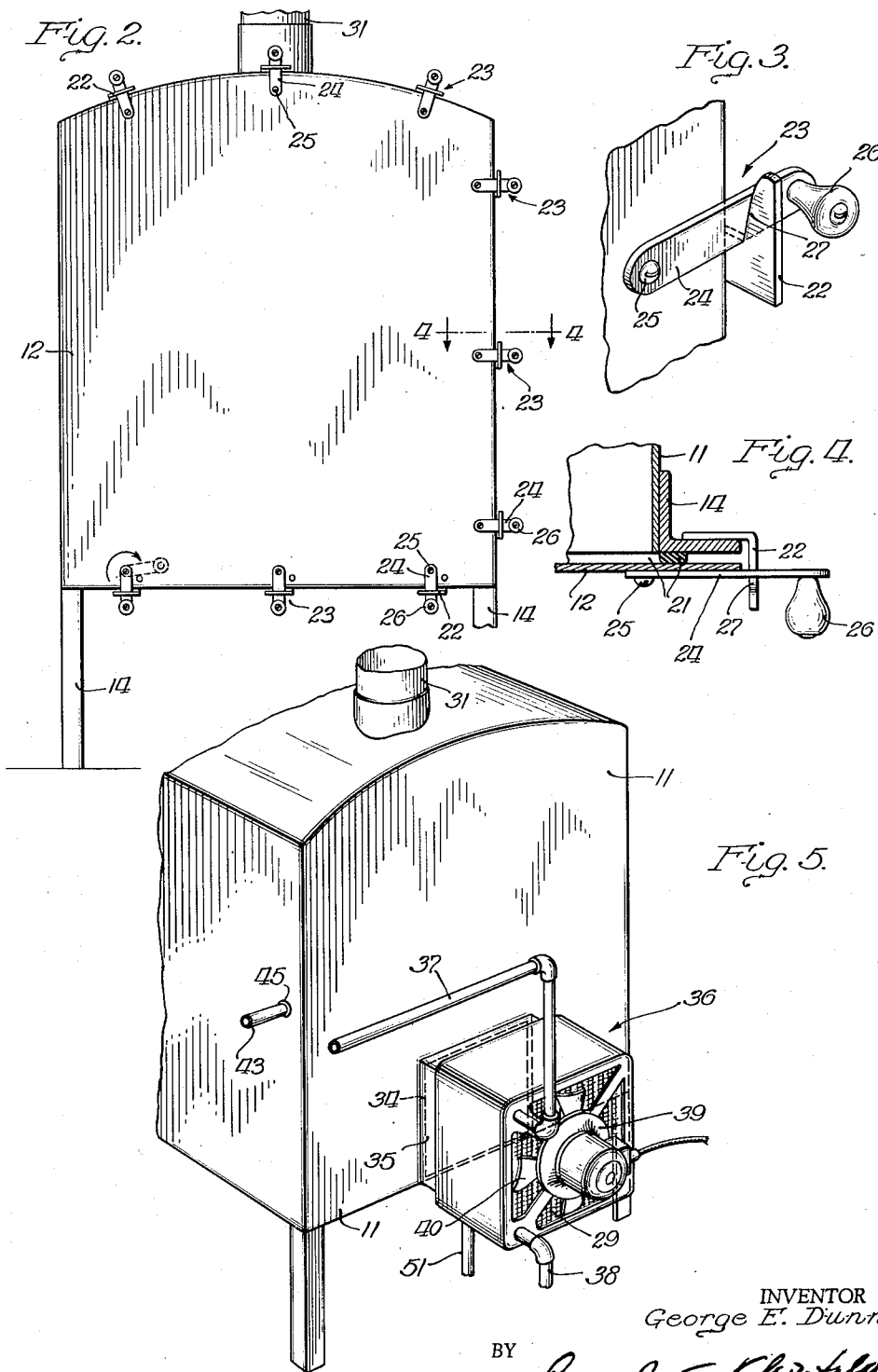
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4 Sheets-Sheet 2



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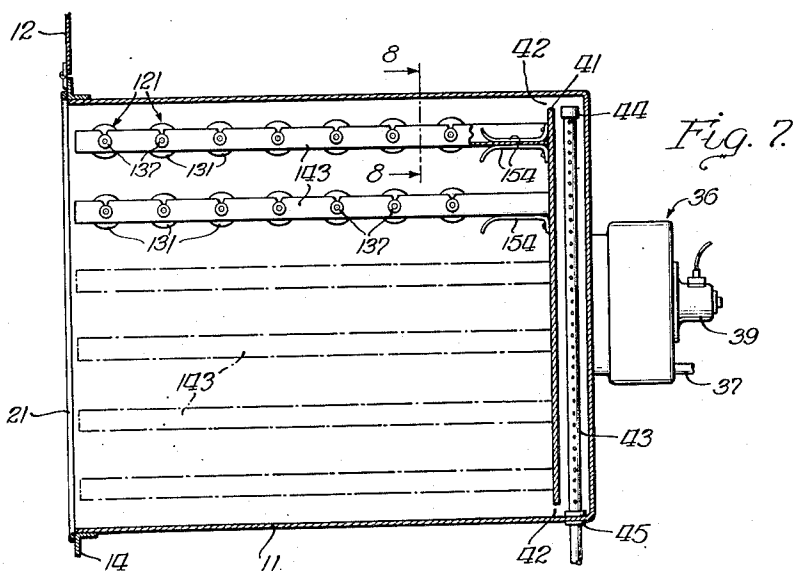
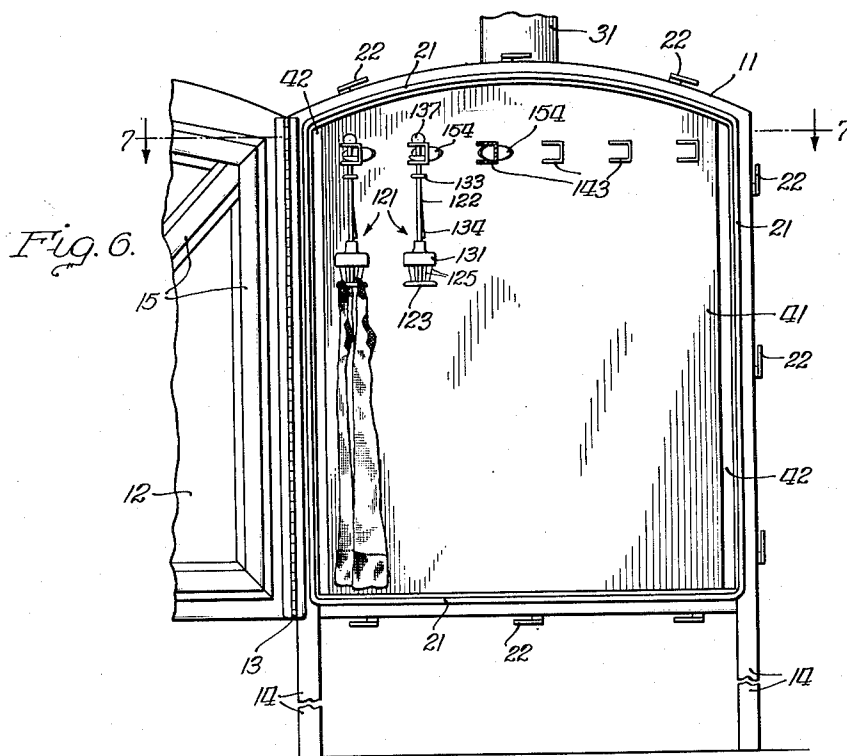
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METHOD OF TREATING TEXTILES

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4 Sheets-Sheet 3



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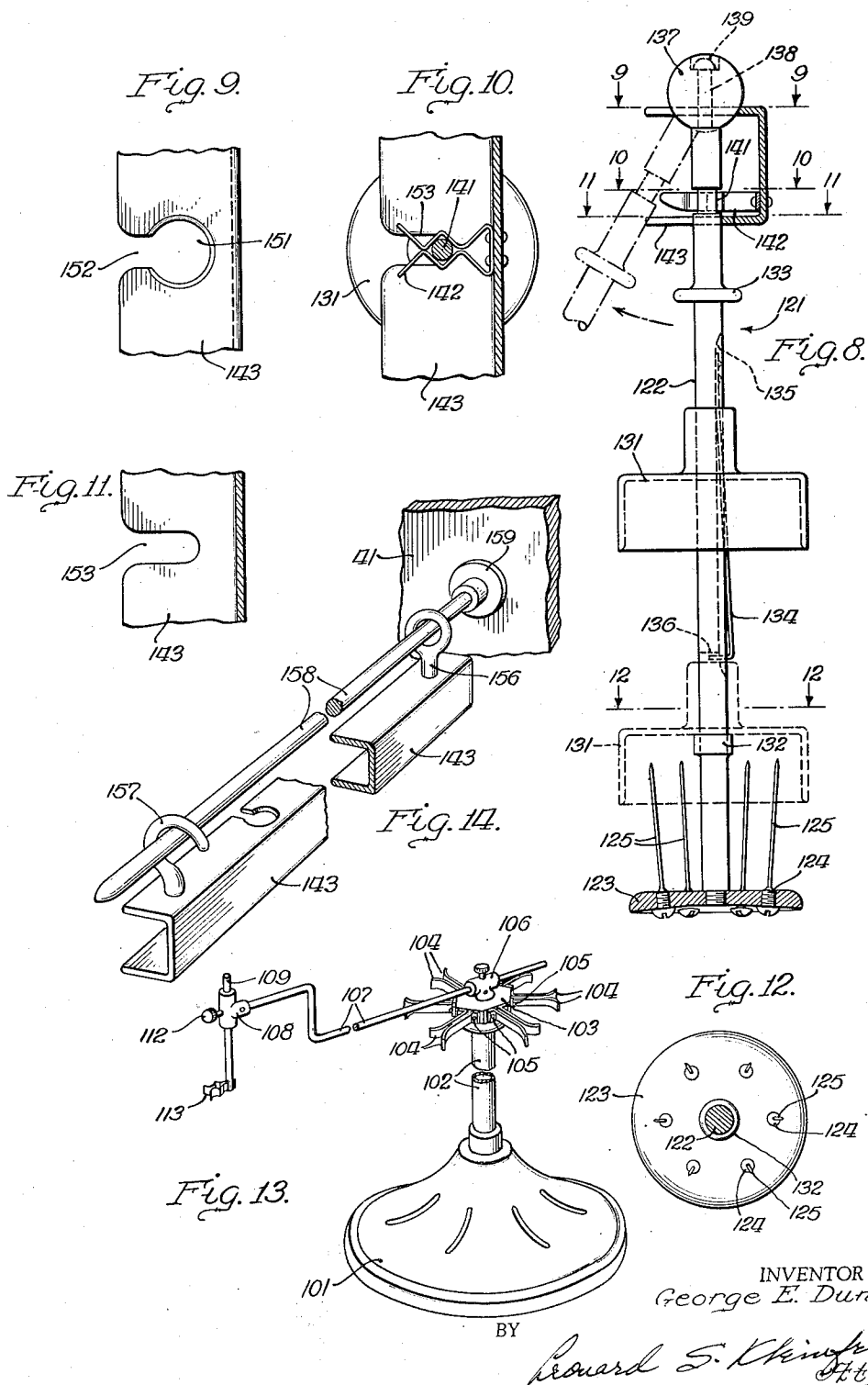
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METHOD OF TREATING TEXTILES

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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,350,021

METHOD OF TREATING TEXTILES

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6 Claims. (Cl. 18—54)

This invention relates to an apparatus and process for treating textile articles, particularly stockings, comprising yarns spun from thermoplastic substances, as for example, synthetic linear condensation polyamides, as disclosed in United States Letters Patent No. 2,157,116, granted to W. H. Carothers, Nos. 2,157,117 and 2,157,119, granted to John B. Miles, Jr., and No. 2,157,118, granted to W. H. Heckert. Those patents comprehend yarns formed from various polyamides as well as articles of wearing apparel fabricated therefrom, and refer particularly to polyhexamethylene adipamide as having the most desirable characteristics for the spinning of hosiery yarn. Such yarn is commonly termed "nylon" and for simplicity will be so referred to herein. However, it will be appreciated from what follows that the apparatus and/or method disclosed herein are not limited in their application to the outlined treatment of nylon particularly, but are capable of use in connection with textile articles comprising other yarns, thermoplastic or otherwise.

In United States Letters Patent No. 2,333,160, granted on November 2, 1943, there is disclosed a process for setting the shape of fabric articles constituted of nylon or other similar yarns comprising in essence pre-setting and re-setting phases. The present application, a continuation in part of said former application, relates to apparatus for conducting the presetting phase in the most expeditious manner, and a preferred method of accomplishing said phase. It was pointed out in the application just cited that the essence of the presetting phase, i. e. the setting of the knitted crimp in the case of knitted articles of apparel, for example, hosiery, is performed while the articles are in a relaxed or unstressed condition. That is to say, the stockings are not stretched over a shaped form but receive the treatment while in the inherently relaxed condition subsisting after the article has been knitted, looped and seamed.

After the stockings leave the knitting machine they are, for convenience in handling, loosely tied in bundles of, for example, one dozen pairs and sent to the inspection station thus arranged. After the inspection, which is performed by drawing each stocking over the customary form, the stocking is ready for charging into the presetting apparatus.

Inasmuch as it is essential that the goods not be stressed, crushed or wrinkled in any manner between the knitting operation and the presetting phase and that they be subjected to the

presetting treatment with the natural configurations and loose folds of the knitted article as undisturbed as possible, we prefer to suspend each stocking during presetting by means of a support which will be calculated to have the least disturbing effect on the fabric. Although this end can be accomplished in several ways, I prefer and disclose herein a method and apparatus by which the extreme tip of the stocking is placed over a needle and the entire article depends loosely therefrom during the presetting treatment. Alternatively, the suspension means could comprise a clamp to engage the tip of the toe with the least possible contact and will be almost as efficacious but not as expeditious. The suspension need not necessarily be from the toe as the welt may serve as well or the stocking could be draped in some other manner just so it is in a condition of minimum stress, as fabric wrinkles resulting from suspension in a crushed condition or a position likely to produce sharp fabric wrinkles or distorted stitches will cause such wrinkles or distortions to be set. Fabric wrinkles may be removed under a sufficiently high re-setting temperature, but stitch distortion is ordinarily irremediable. Furthermore, it is preferred not to suspend too many stockings from one support as thereby the upper ones are likely to exert wrinkling pressure on the underneath ones, and any such wrinkles existing while the treating proceeds can be removed, if at all, in the later re-setting treatment only with some difficulty.

In carrying out the presetting treatment, I prefer to use apparatus to be described and as shown in the appended drawings in which:

Figure 1 is a perspective view, looking from the right hand front corner, of a preferred form of presetting cabinet and showing particularly the automatic vapor controls therefor,

Figure 2 is a front elevation of the cabinet,

Figure 3 is a detail of one of the locking clamps for the cabinet door,

Figure 4 is a section on the line 4—4 of Figure 2, indicating the locking clamp and door sealing means,

Figure 5 is a perspective view looking from the right rear corner of the cabinet,

Figure 6 is a front elevation of the cabinet with the door open, and showing stockings suspended therein,

Figure 7 is a view on the line 7—7 of Figure 6.

Figure 8 is a view on enlarged scale on the line 8—8 of Figure 7 showing one of the stocking suspending units,

Figure 9 is a view on the line 9—9 of Figure 8, Figure 10 is a cross-sectional view on the line 10—10 of Figure 8,

Figure 11 is a cross-sectional view on the line 11—11 of Figure 8,

Figure 12 is a cross-sectional view on the line 12—12 of Figure 8,

Figure 13 is a perspective view of the auxiliary stand used for supporting the suspending unit magazine of Figure 7, and

Figure 14 is a perspective view of an alternative form of magazine supporting means.

In a number of figures inconsequential parts are shown broken away for clarity.

Referring first to Figures 1 and 2, 11 designates the cabinet proper which comprises a substantially rectangular chamber closed on the sides, roof, floor and rear, and arranged with a front closure 12 hinged to the cabinet 11 by the hinge 13. It will be observed that the roof is arched as shown to obviate dripping of condensate on the goods but to enable it to flow to the sides of the cabinet and downward thereover to the drain in the floor. The cabinet proper, including the closure, is constructed preferably of stainless steel, Monel metal or equivalent non-rusting metal fabricated by welding, riveting or other common expedient. Cabinet 11 is supported by legs 14 formed as a part thereof and the cabinet may be suitably reinforced where necessary with ribs (not shown). Closure 12 is stiffened by means of formed members 15, spot welded or otherwise fastened to the inner face thereof. A gasket 21 (Figure 4) extending peripherally of the front opening of the cabinet serves to seal the door with respect to the cabinet and prevent escape of the treating media. Arranged at spaced apart points around the top, bottom and right hand side of the closure 12 and affixed to the front leg member 14 is a plurality of lugs 22 (Figure 3) notched at 23 to receive the latch 24 pivoted at 25 to the closure 12. A non-heat conducting handle 26 is provided at the outer extremity of each latch 24 for manipulation thereof. It will be observed that the front face 27 of each notch 23 is tapered as shown to result in an inward wedging action of the latch 24 and hence suitable closing pressure of closure 12 against its gasket 21.

At the top rear of cabinet 11 is provided a flue 31 equipped with a damper 32 and controlling handle 33 therefor for the discharge of the treating media as desired. At the lower rear of the cabinet 11 is a rectangular opening 34 (Figure 5) extending outwardly as a sleeve 35 connecting with the heater unit 36. Said heater unit 36 comprises a substantially rectangular box containing a radiator coil 29 fed with steam through the inlet pipe 37, draining through the outlet 38 to a trap, and thence to any convenient sewer. An electric motor 39 drives a fan 40 integral therewith to propel air past the radiator 29 whereby it is heated and passes into the cabinet 11. Heater unit 36, just described, is a well-known standard assembly and is deemed to require no further elaboration. Toward the extreme inside rear of cabinet 11 is a flat baffle 41 (Figure 7) extending from the top to the bottom thereof but spaced away a short distance 42 at each side for a purpose to be described. Between the baffle 41 and the rear of cabinet 11 is provided a nozzle 43 comprising a pipe drilled along its axis with a plurality of holes, capped at its extreme end

44 and passing through bushing 45 in cabinet 11. Taking into the floor of cabinet 11 is the drain line 15 which may be carried to a trap and thence to any convenient drain in the usual manner and serves to eliminate condensate accumulating on the bottom of the cabinet as processing goes forward.

Alluding now to Figure 1, steam for the pre-setting operation first enters the pipe 61, thence through the T 62, nipple 63, valve 64, nipple 65, strainer 66, nipple 67, automatic flow regulating valve 68, nipple 69, valve 71, nipple 72, fittings designated as a group by 73, valve 74, pipe 75, fittings 76, valve 77 and thence to pipe 43.

Automatic regulating valve 68 is of a well-known type, comprising a piston, diaphragm and pressure chamber connected by means of the tube 81 with the regulator instrument 82, also of a well-known type and is adjustable to maintain any predetermined temperature of the water vapor or steam within the chamber. A control bulb 83 inserted through an opening 84 in the roof of the chamber acts as a pilot whereby temperature rise or drop within the cabinet respectively expands or contracts a fluid in the pilot 83 and its tube 85 to act in conjunction with a compressed air supply entering at 86 to operate the valve 68. A temperature rise within the cabinet over the predetermined setting will act through the control 82 and valve 68 to provide closing movement to valve 68 and interrupt the flow of steam to the nozzle 43, and vice versa, a temperature drop under the predetermined setting will provide opening movement to valve 68 and permit flow of steam to nozzle 43. By means of the aforesaid arrangement of apparatus a predetermined presetting temperature may be selected on the instrument 82 and the same maintained within extremely close limits. Such temperature controlling apparatus is not of itself any novel part of this invention as the same result may be obtained in a number of ways and by using other types of equipment well known in the art.

Strainer 66 serves to prevent foreign matter in the line from affecting the operation of the valve 68. Valves 64 and 71 may be used to isolate valve 68 for repairs in which event by-pass connection 91, including valve 92, is used to detour the steam entering at 61 around the valve 68 and into fittings 73. In such emergency, valve 92 must be controlled manually to regulate the interior cabinet temperature and a direct reading thermometer (not shown) used as a guide by the operator.

Valve 93 is employed to control the steam supply to heater unit 36 and a switch (not shown) is provided to operate manually the motor 39 at the desired times.

Steam entering the nozzle 43 is dissipated over the width of the cabinet, striking the rear wall, roof and floor thereof as well as baffle 41 and, completely diffused and decelerated in velocity, enters the main part of the chamber through openings 42. Thus, no part of the stockings, for example, those nearest the nozzle 43, are subjected to too vigorous a jet of water vapor or steam which may unevenly or excessively set them.

For suspending the stockings within the cabinet 11 there is provided a plurality of units 121 (Figures 6 and 7) shown in enlarged detail in Figure 8, each comprising a cylindrical stem 122 terminating at its lower extremity in a threaded

portion taking into the disc 123. Threadedly engaged at spaced apart intervals circumferentially of disc 123 are the needle holders 124 each consisting of a common screw drilled in the body to receive the butt of a needle 125, similar in most respects to an ordinary fine sewing needle. It will be observed that the needles are arranged with the pointed extremity slightly directed outwardly to facilitate their function, as will appear.

Slidably mounted on stem 122 is the cup-shaped needle guard 131 normally, i. e. during loading of the unit 121, at the full line position shown in Figure 8, and at the lower dotted line position after loading. A lower position stop 132 and an upper position stop 133 are provided integrally on the stem 122, these being attached thereto after assembly of said guard 131. A spring 134 located in a groove 135 in the stem 122 formed at its lower extremity at right angles to itself to enter a hole 136 in said stem maintains guard 131 in its proper position.

At the extreme upper end of stem 122 is the spherical member 137 drilled to fit over a reduced portion 138 of said stem, said reduced portion being peened over as shown at 139 to retain said member 137 fixedly with relation to stem 122. Said stem is also slightly reduced in diameter at 141 to engage with the bifurcated spring clip 142 acting to retain said unit 121 against vertical shifting, and in assembled relation with magazine 143 about to be described.

Each cabinet unit 11 has associated therewith a plurality of magazines 143, in this instance, six, formed in a channel shape (Figures 7 and 8) and extending substantially from baffle 41 to the front of the chamber, as shown. The upper leg of each magazine is provided with a plurality of slightly countersunk holes 151 (Figure 9), in this instance, seven, opening into a slot 152 having rounded entering corners, each said hole 151 acting as a seat for an individual member 137. Directly below each said hole 151 and slot 152 and in the lower leg of channel 143 is a slot 153 corresponding in contour and width substantially with slot 152 thereabove and serving to accommodate stem 122 (Figure 8). Clips 142 are riveted or otherwise fastened to the web of channel 143. It will be understood that the number of magazines 143 and units 121 associated therewith may be varied, depending upon the intended capacity of the pre-setting cabinet.

Fixed to the baffle 41 near the roof of the chamber (Figure 6) is the row of pairs of spring clips 154 of substantial tension adapted to receive magazines 143 by endwise engagement of the web thereof.

Now referring to Figure 13 there is depicted a loading unit comprising an auxiliary stand including a weighted base 101 carrying a central post 102 rigidly mounted therein. Rotatably mounted on a suitable collar on said post 102 is the octagonal hub 103 provided on each face thereof with a pair of spring clips 104 corresponding to clips 154 of Figure 7, rigidly fastened thereto by screws 105. Fixedly mounted on the post 102 over the hub 103 is the T-shaped collar 106 bearing an arm 107 terminating in a T-shaped connection 108 which slidably carries the rod 109 adjustable to a preferred fixed position therein by screw 112. Affixed to the lower extremity of said rod 109 is the bifurcated clip 113 identical with that shown in Figure 10. The loading unit may be located at any convenient place near the treating chamber and is preferably installed near the inspecting station.

If, by reason of increasing the number of units 121, magazines 143 are too long to warrant cantilever suspension by clips as in Figure 7, the construction may be modified as shown in Figure 14, wherein each magazine 143 is provided with an eyebolt 156 at the rear end thereof and a hook bolt 157 at the front end, adapted to fit over a rod 158 held in a bushing 159 attached to baffle 41. In the event this alternative is availed of then pairs of clips 104 (Figure 13) must be replaced with radially extending rods like 158, fitted into the facets of the hub 103, as will be obvious.

It is preferred to fabricate all interior parts of the apparatus that are likely to come into contact with the goods of non-rusting material since, at the present state of the art, rust spots are not removable from nylon.

Operation

Assuming that a batch of stockings has just been processed, closure 12 is opened by unlocking the latches 24. Magazines 143 are removed from the chamber by grasping each at its forward end and withdrawing the same from its clips 154 and inserting it in clips 104 on the stand of Figure 13. An operator lifts the guard 131 on all of the units 121 and the treated stockings impaled on needles 125 are stripped therefrom and thrown into any suitable container, as for example, the net bags used in the dyeing operation. It is not necessary to pile preset stockings or use any care different from that exercised with pre-boarded hose.

Thereupon the inspecting operator, seated at the inspection machine removes one of the units 121 from the magazine 143 by grasping the same near the lower part thereof and swinging the same outwardly (as indicated by the dotted lines in Figure 8) against the tension of the clip 142, using the member 137 and hole 151 as a ball and socket joint. The unit 121 is then snapped into the clip 113 at the neck portion 141. After each stocking is inspected it is impaled on a needle 125 at a place adjacent the extreme tip of the toe. The fineness of the needle cooperating with the loops of the stocking and the mass thereof render this impaling operation nothing more or less than a simple dropping of the stocking onto the needle. In other words, no definite manual pressure is entailed in the impalement, nor, as a result, is there any permanent marking of the goods, the point of the needle entering between the loop formation. Consequently, the stocking is suspended freely with all the loose folds and fabric configurations naturally present in the knitted fabric undisturbed.

It is preferred not to suspend more than four to six stockings on each needle 125 to forestall any tendency of the upper stockings pressing upon the underneath ones and shaping into them sharp wrinkles. Units 121 can be rotated in its clip 113 for accessibility to each of the several needles 125. Upon fully loading all needles of a unit 121 it is removed from clip 113 and replaced in its former location in its magazine by reversing the steps involved in its removal. When all units 121 of a magazine are loaded hub 103 is rotated manually to present another magazine and its associated needle units into position for loading.

After all the units are fully loaded and transferred to the magazines, the same are detached from clips 104 and reengaged with clips 154. Door 12 is closed and relocked by means of latches 24. At this juncture valve 93 is closed and valve 77 opened. Steam thereupon enters the cham-

ber to be controlled as to temperature in the manner already described. Depending upon the degree of pre-setting desired, said steam may be controlled at or above 212° F. or at or below 212° F. to yield water vapor. The treating interval may be timed by the operator or by other automatic timing means not shown or described herein. After pre-setting, valve 77 is closed.

Following the pre-setting operation proper it is preferred to evaporate moisture entrapped in the processed articles. Provided this is done the articles can be placed in bags immediately rather than delay the processing while natural evaporation occurs. If desired, a duplicate set of magazines 143 and their associated units 121 may be provided so that one set is being charged while the other is in the chamber, and inasmuch as loading the units 121 may take longer than the processing period, the set just removed from the cabinet may be air-drying naturally without impeding production. Furthermore, in the event loading time is equal to treating time, a third set of magazines 143 and units 121 may be employed so that one is being loaded, another is in the chamber for pre-setting and the third is air-drying naturally. Accelerated drying in the chamber is performed by opening valve 93 to admit steam through pipe 37, radiator 29 and out as condensate through conduit 51, to transfer heat to the air which is blown into the chamber by means of the impeller 40 on motor 39 and exhausted through flue 31 controlled by its damper 32. After drying, the heater unit 36 is turned off, valve 93 is closed, and the goods are ready to be removed from the chamber.

Having thus described my invention, I claim:

1. The method of setting a fabric article fabricated substantially from a yarn essentially a synthetic linear condensation polyamide following the primary fabrication of said article and prior to any subsequent hot, liquid treatment, which comprises supporting said article in such a manner as to retain therein the naturally occurring loose folds and configurations of the article resulting from the primary fabrication, and subjecting the article while so supported to the action of a vaporous setting medium.

2. The method of setting a fabric article fabricated substantially from a yarn essentially a synthetic linear condensation polyamide following the primary fabrication of said article and prior to any subsequent dyeing treatment, which comprises supporting said article in such a manner as to retain therein the naturally occurring loose folds and configurations of the article re-

sulting from the primary fabrication, and subjecting the article while so supported to the action of an aqueous setting medium.

3. The method of setting a fabric article fabricated substantially from a yarn essentially a synthetic linear condensation polyamide following the primary fabrication of said article and prior to any subsequent dyeing treatment, which comprises supporting said article on an impaling point and permitting said article to freely suspend therefrom so as to retain therein the naturally occurring loose folds and configurations of the article resulting from the primary fabrication, and subjecting the article while so supported to the action of an aqueous setting medium.

4. The method of setting a fabric article fabricated substantially from a yarn essentially a synthetic linear condensation polyamide following the primary fabrication of said article and prior to any subsequent hot, liquid treatment, which comprises supporting said article on an impaling point and permitting said article to freely suspend therefrom so as to retain therein the naturally occurring loose folds and configurations of the article resulting from the primary fabrication, and subjecting the article while so supported to the action of a vaporous setting medium.

5. The method of setting a fabric article fabricated substantially from a yarn essentially a synthetic linear condensation polyamide following the primary fabrication of said article and prior to any subsequent dyeing treatment, which comprises supporting said article by clamping means and permitting said article to freely suspend therefrom so as to retain therein the naturally occurring loose folds and configurations of the article resulting from the primary fabrication, and subjecting the article while so supported to the action of an aqueous setting medium.

6. The method of setting a fabric article fabricated substantially from a yarn essentially a synthetic linear condensation polyamide following the primary fabrication of said article and prior to any subsequent hot, liquid treatment, which comprises supporting said article by clamping means and permitting said article to freely suspend therefrom so as to retain therein the naturally occurring loose folds and configurations of the article resulting from the primary fabrication, and subjecting the article while so supported to the action of a vaporous setting medium.

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