

Oct. 23, 1956

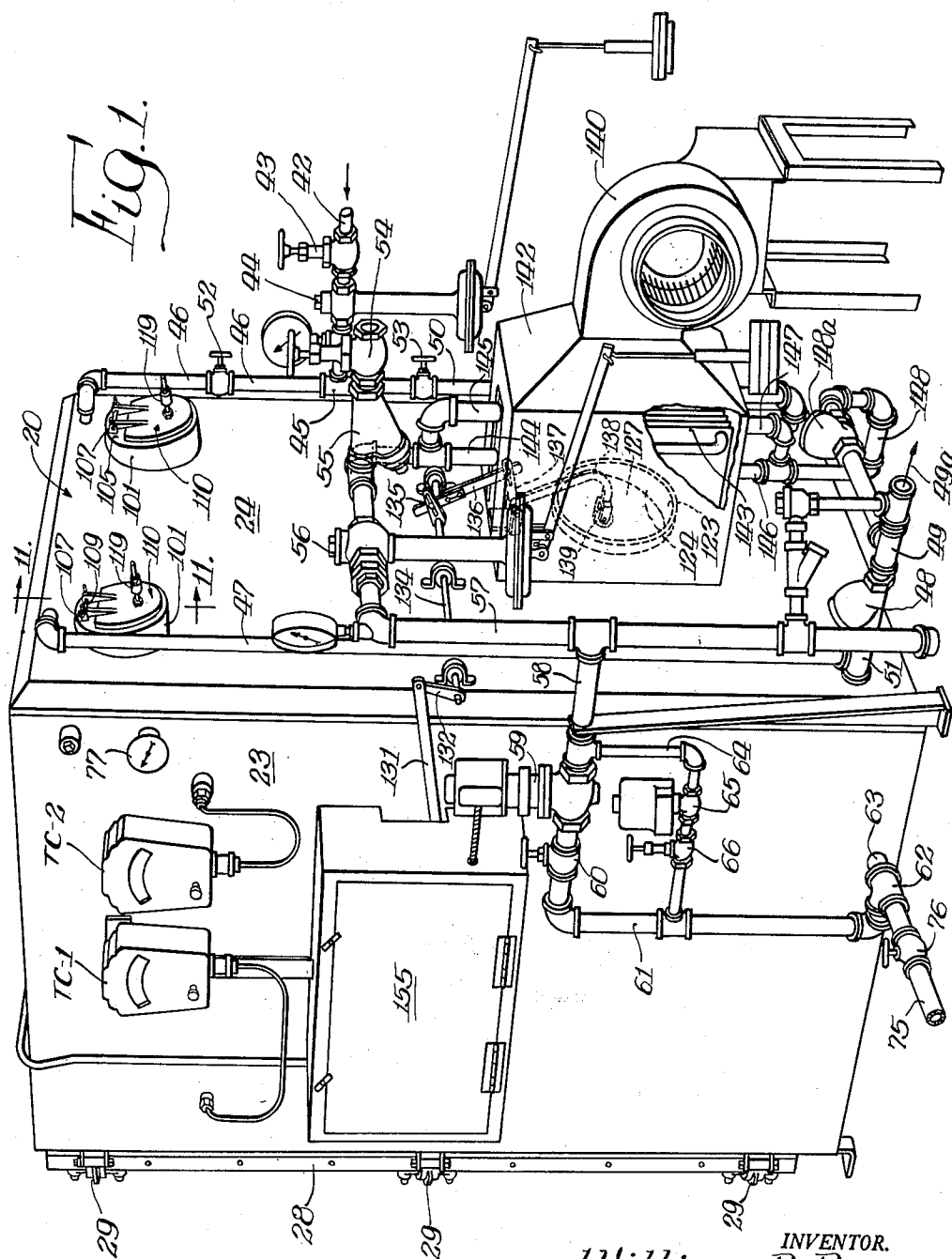
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2,767,568

FABRIC-TREATING CABINET

Filed Oct. 26, 1951

7 Sheets-Sheet 1



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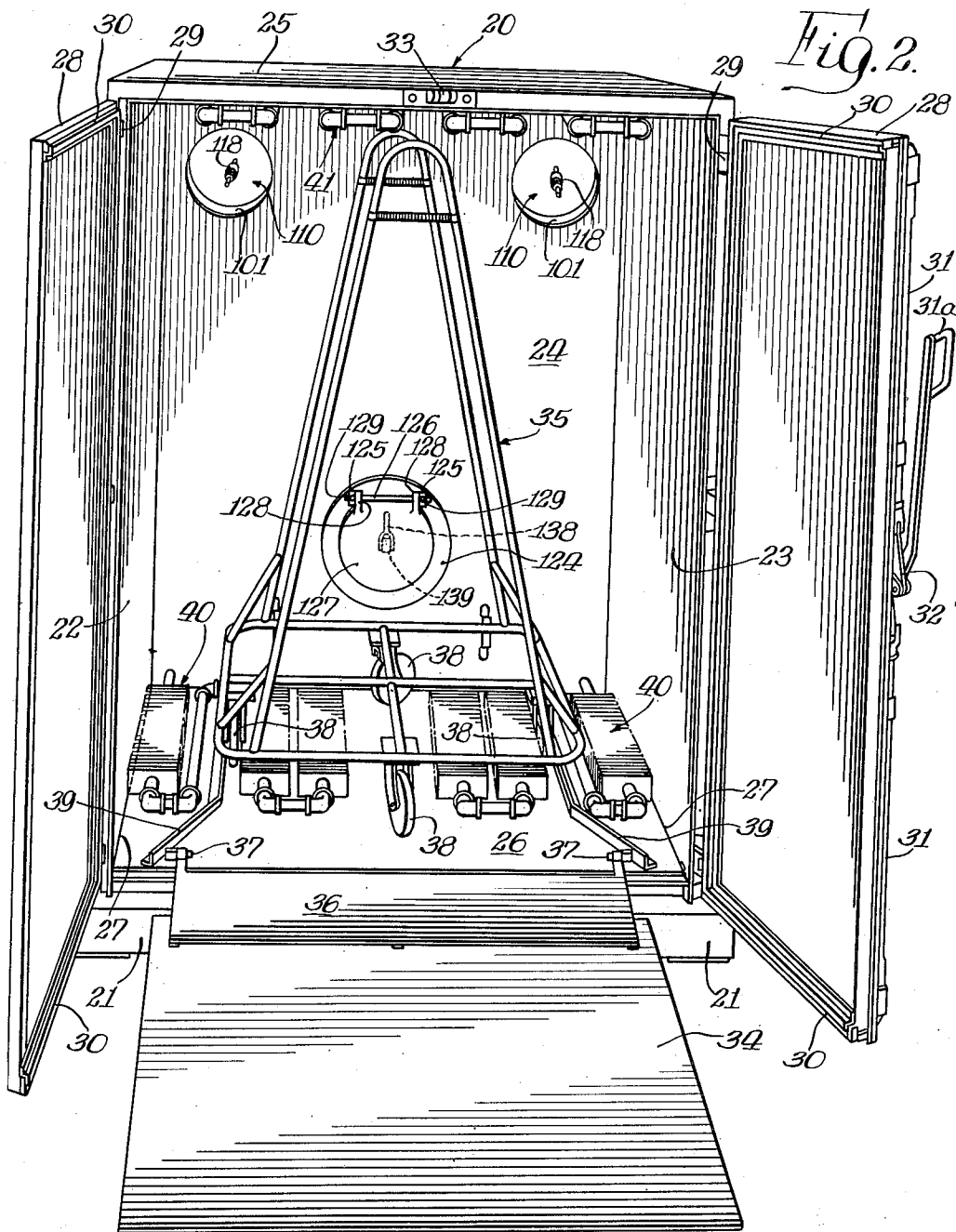
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FABRIC-TREATING CABINET

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7 Sheets-Sheet 2



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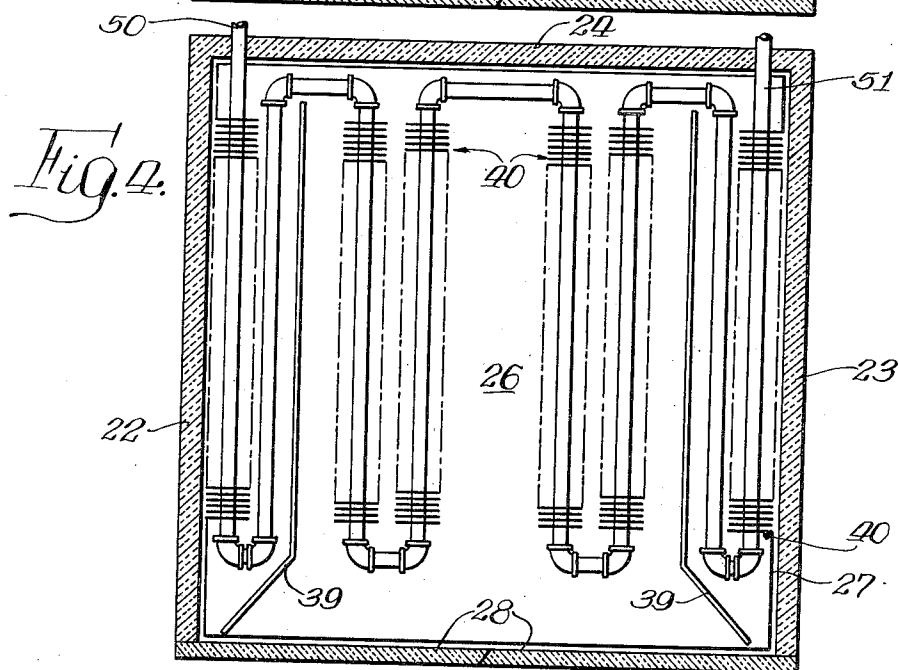
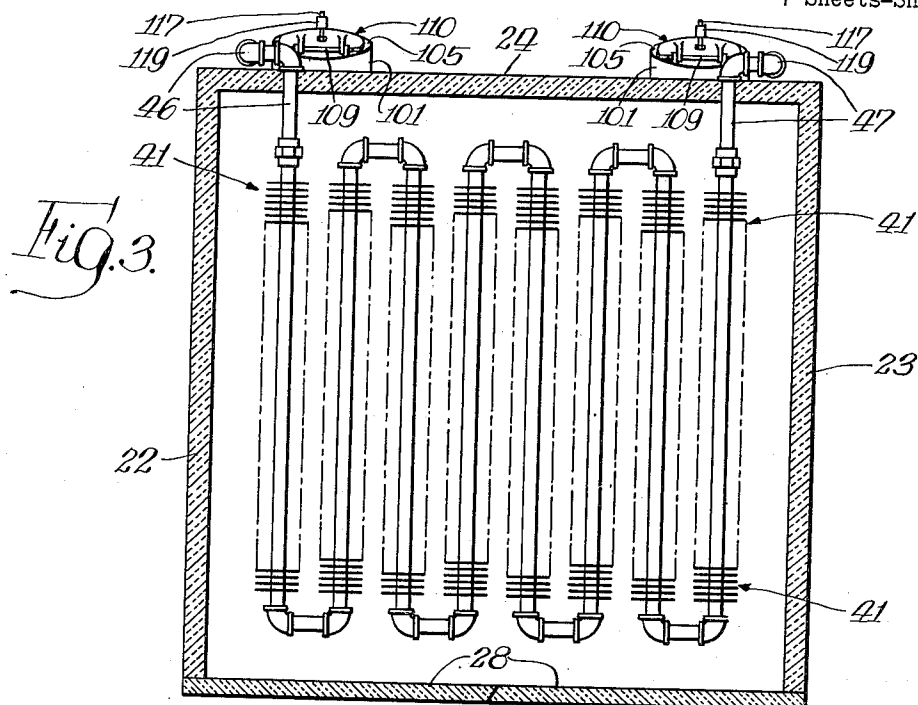
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FABRIC-TREATING CABINET

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7 Sheets-Sheet 3



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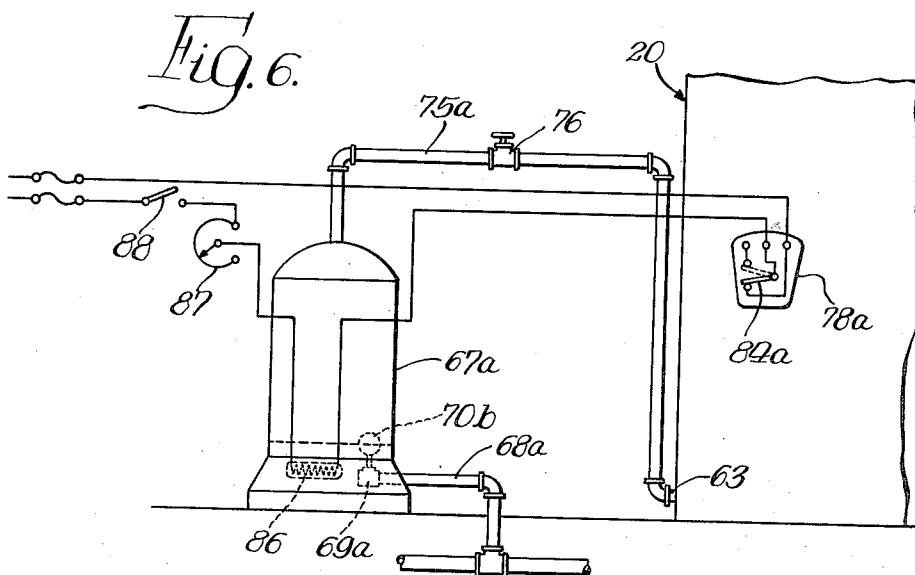
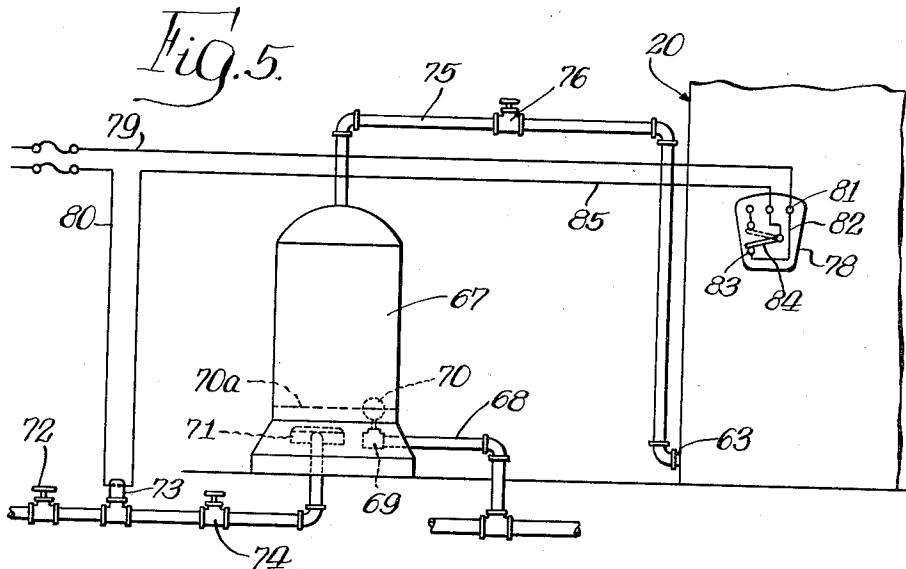
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FABRIC-TREATING CABINET

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7 Sheets-Sheet 4



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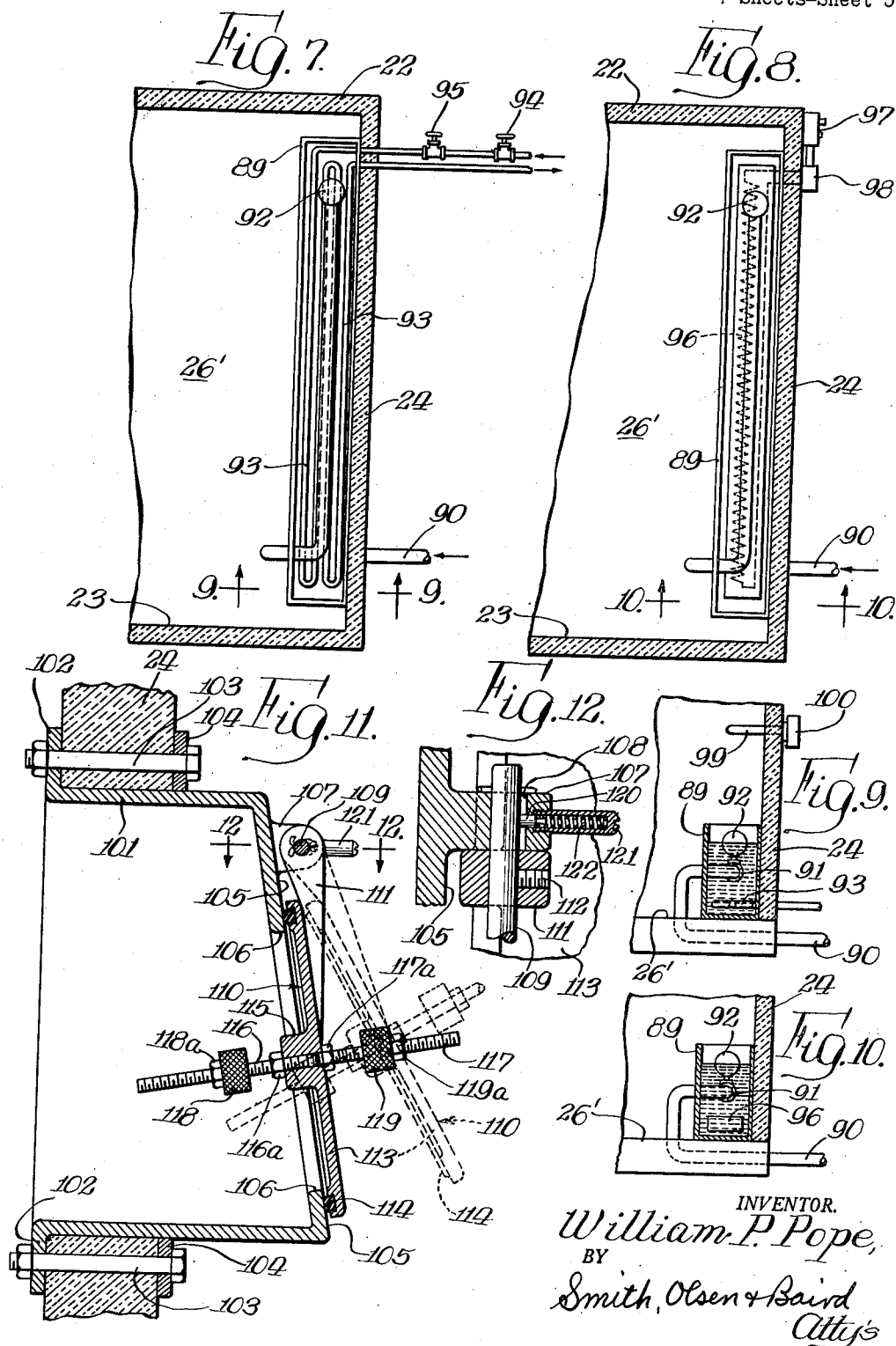
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FABRIC-TREATING CABINET

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7 Sheets-Sheet 5



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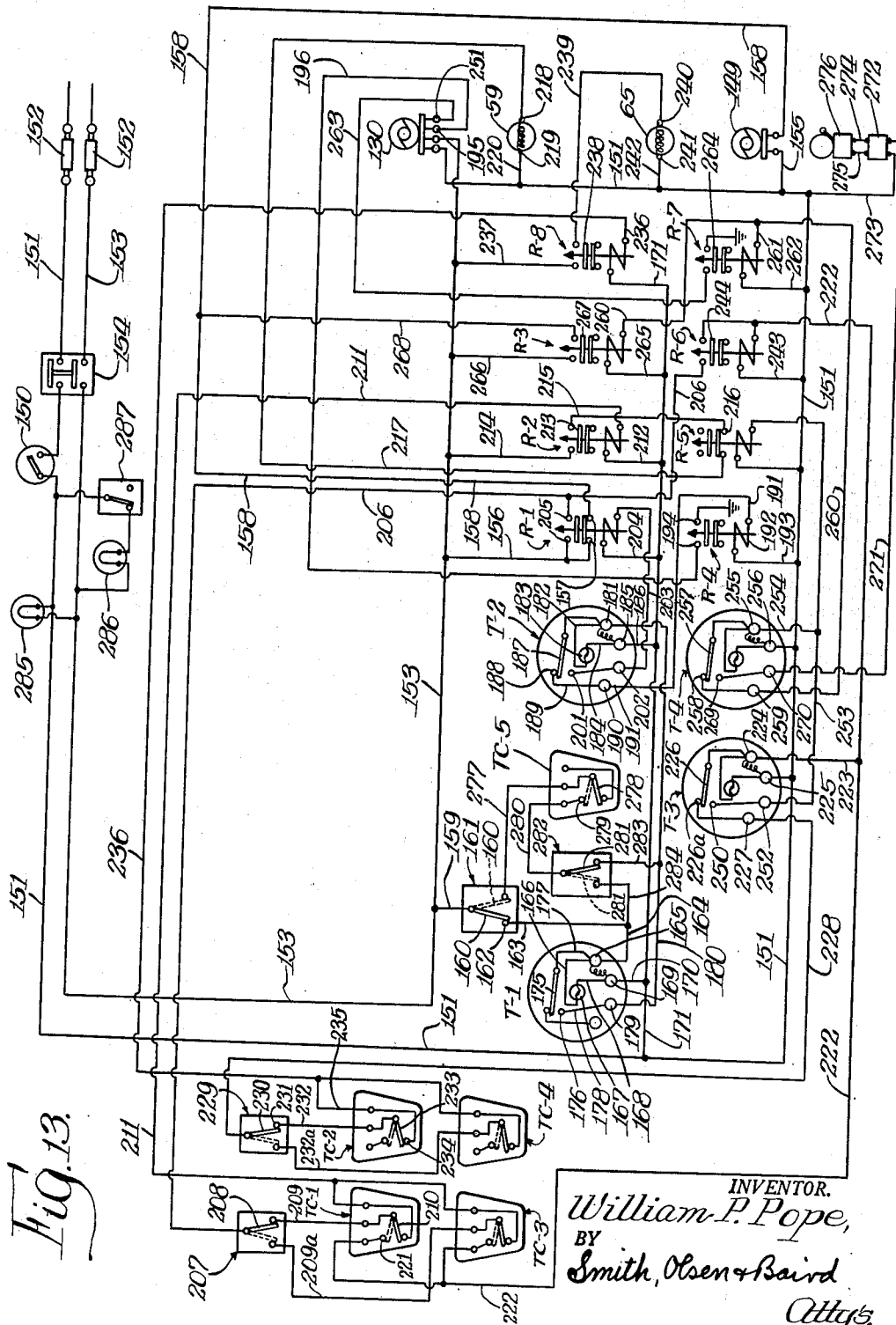
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FABRIC-TREATING CABINET

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7 Sheets-Sheet 6



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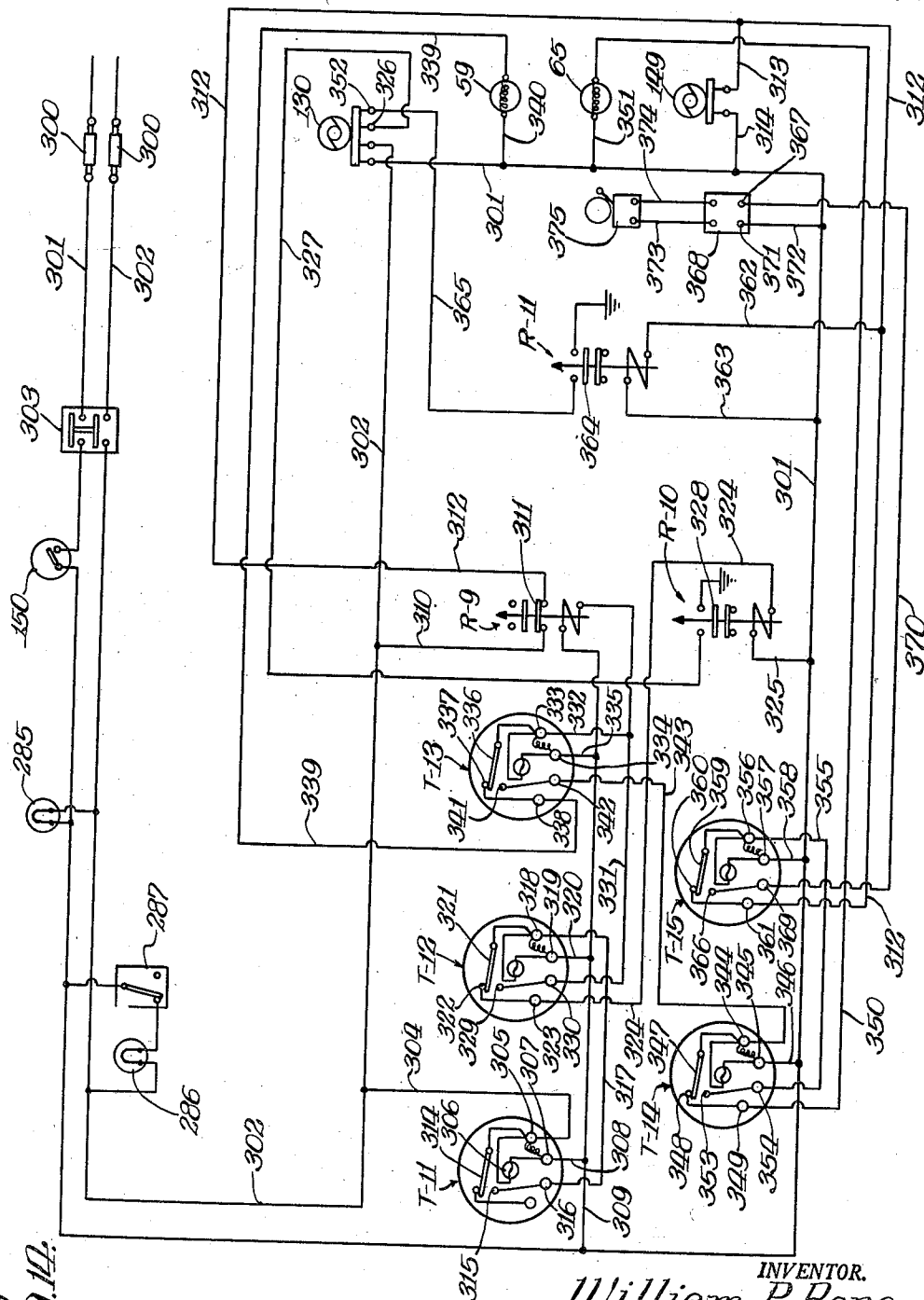
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FABRIC-TREATING CABINET

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7 Sheets-Sheet 7



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FABRIC-TREATING CABINET

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Application October 26, 1951, Serial No. 253,331

26 Claims. (Cl. 68—5)

The present invention relates to apparatus for treating textile articles and more particularly to an improved cabinet for use in subjecting textile fabrics, such as stockings knitted from synthetic linear polyamide fibers commonly known as nylon, to processes of treatment with aqueous vapors.

It has become a widespread practice in the manufacture of fabric articles, and particularly in the manufacture of nylon hosiery, to preset and set the articles at certain stages in the processes of their manufacture by subjecting them to atmospheres of hot water vapor or steam. For this purpose vapor cabinets or steam retorts have previously been suggested having chambers into which batches or lots of the articles may be introduced, one batch after another, and steam or hot water vapor there after fed into the chambers to treat the articles. The treatment of fabric articles in this manner has not been completely satisfactory in all respects, however, largely because of performance limitations inherent in the structures employed in previously known treating cabinets. For example, it has been very difficult in the use of prior treating cabinets, and particularly in those cabinets adapted to treat fabric articles in a highly saturated atmosphere only slightly below the boiling point of water, to reproduce in the cabinets, time after time, substantially the same atmospheric conditions. As a result, the batches of fabric articles successively introduced into the earlier cabinets have been subjected to treatments that have differed one from the other in certain respects. While the differences between the atmospheres successively produced in these earlier cabinets in series of supposedly identical treatment operations have seemed to be rather small and insignificant in some cases, these differences have often been sufficient to cause noticeable differences in the finished articles. In the presetting of nylon stockings, for example, seemingly small differences in the relative humidities and temperatures of the vaporous setting medium successively produced in a series of operations of a treating cabinet will subsequently cause the stockings treated therein to take dye differently and finish in slightly different color shades. The presence of relatively dry air currents and a substantial amount of free oxygen in these earlier cabinets during the treatment operations also have contributed to the inferior results obtained.

Earlier efforts to overcome the difficulties referred to above have for the most part involved the use of delicate and expensive equipment not suitable for that purpose and not suitable to the needs of manufacturers of fabric articles. The earlier treating cabinets have also been inflexible in their operation in that the operators of the cabinets have not been able quickly or conveniently to change the humidities or temperatures of the atmospheres produced inside the cabinets or change the operation of the cabinets from one type operation to another. For example, those earlier cabinets adapted for use as steam retorts for treating fabric articles in a pressure atmosphere of steam could not readily be adjusted to

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treat the articles in an atmosphere having a high relative humidity and a temperature slightly below the boiling point of water. Neither have such cabinets been readily adjustable for use as drying cabinets. Such earlier cabinets, furthermore, have not embodied satisfactory means for avoiding undesirable accumulations of condensate on the interior walls of the cabinets and on the articles treated therein.

The present invention serves to overcome and avoid the above mentioned difficulties and has as one of its principal objects the provision of a treating cabinet for receiving large batches of hosiery or other fabric articles, one batch after another, and having selective cycles of operation wherein aqueous vapor-treating conditions produced within the cabinet are selectively and accurately controlled either manually or automatically. Another object of the invention is to provide, in combination with the aforementioned cabinet, simple and self-contained, gravity-operated means for selectively controlling the maximum pressure, and thus the maximum aqueous vapor temperature, attainable within the cabinet. A further object of the invention is to provide in the cabinet improved and automatically controlled means for introducing hot aqueous vapor into the interior of the cabinet to subject fabric articles therein to treatment and to raise and accurately maintain the temperature in the cabinet at a predetermined temperature level during the treating period. Still another object of the invention is to provide in the cabinet means for preventing the formation of undesirable condensate on the interior walls of the cabinet and on the fabric articles treated in the cabinet.

These and other objects and advantages of the present invention will be more fully understood from the following description of a preferred embodiment thereof, taken with the accompanying drawings in which:

Fig. 1 is a perspective view of the rear and one side of a hosiery or fabric-treating cabinet incorporating the invention;

Fig. 2 is a perspective view of the front of the cabinet showing a pair of doors thereon in open position and showing within the cabinet a truck adapted to support hosiery or other fabric to be treated;

Fig. 3 is a plan view in horizontal cross section taken through the cabinet immediately below the top wall thereof;

Fig. 4 is a similar horizontal cross section taken through the lower portion of the cabinet showing in detail the floor plan of the cabinet;

Fig. 5 is a schematic view of an automatic, gas-operated means for supplying aqueous vapor to the interior of the cabinet;

Fig. 6 is a similar view showing an automatic, electrically operated means that may be employed in lieu of the apparatus of Fig. 5 for supplying aqueous vapor to the interior of the cabinet;

Fig. 7 is a fragmentary sectional view taken on a horizontal plane through one side of the cabinet, showing steam heated means located within the cabinet that may be used for producing aqueous vapor therein in lieu of the devices shown in Figs. 5 and 6;

Fig. 8 is a view similar to Fig. 7, but showing an electrically heated means within the cabinet for producing aqueous vapor therein;

Fig. 9 is a fragmentary vertical section taken substantially on the line 9—9 in Fig. 7;

Fig. 10 is a view similar to Fig. 9 but taken on the line 10—10 in Fig. 8;

Fig. 11 is a vertical cross section taken on the line 11—11 in Fig. 1, showing the structural details of means for controlling the passage of aqueous vapor and air through an exhaust port in the cabinet;

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Fig. 12 is a fragmentary sectional view taken on line 12-12 in Fig. 11 showing further details of the structure illustrated in Fig. 11;

Fig. 13 is a diagrammatic view of an electrical circuit for automatically controlling the operation of the cabinet; and

Fig. 14 is a diagrammatic view of an alternate electric circuit adapted for controlling the operation of the cabinet.

In the drawings the numeral 20 designates generally a cabinet having a base 21, upstanding side walls 22 and 23, a rear wall 24, and a top wall 25. These walls are preferably of hollow construction and are filled with heat-insulating material of any suitable kind. The base 21 of the cabinet is constructed in the manner shown and claimed in a patent application of Henry Richter, entitled "Presetting Cabinet," Serial No. 770,826, filed August 27, 1947, now Patent No. 2,572,893. In this construction the base 21 of the cabinet comprises a bottom plate located within the base, the bottom plate having mounted above it an upper bottom shell or baffle plate 26 which extends across the lowermost interior of the cabinet to provide a floor therein and has its lateral edges spaced slightly inwardly from the side walls 22 and 23 and the rear wall 24 of the cabinet, as shown at 27 in Fig. 2. The bottom plate and the baffle plate 26 are vertically spaced and means hereinafter described are provided for introducing aqueous vapor, such as steam or water vapor, into the space. From this space the steam or water vapor rises upwardly around the lateral edges of the baffle plate 26 and into the interior of the cabinet.

As shown particularly in Fig. 2, the front of the cabinet is provided with a pair of doors 28 adapted to close and seal the front opening of the cabinet. These doors are supported by hinges 29 on the side walls 22 and 23 and are provided on their inner faces with strips 30 of soft rubber or the like adapted to engage the edges of the front opening when the doors are closed so as to substantially hermetically seal the cabinet. Any suitable means may be employed to lock the doors in closed position. In Fig. 2 this means is shown as a pair of locking bolts 31 carried by one of the doors which overlaps the other door along its inner edge. The bolts 31 are adapted to be actuated by a handle 31a through a toggle 32 so that the bolts 31 may be moved vertically for engagement with apertured lugs 33 mounted on the upper and lower edges of the door opening. The doors 28, like the side walls 22 and 23 and the top wall 25, are preferably of hollow construction and are filled with heat-insulating material.

At the front of the cabinet is an inclined ramp 34 up which a truck 35 may be rolled onto a plate 36 that is hinged at 37 to the upper surface of the baffle plate 26, and thence into the cabinet. This truck 35 may be of the construction shown and described in the above identified application of Henry Richter. The truck is preferably provided with a plurality of wheels 38 for ease of movement into and out of the cabinet over the hinged plate 36 and the inclined ramp 34 and is adapted to carry plate 36 and the inclined ramp 34 and is adapted to carry a plurality of fabric articles such as hosiery or support a plurality of fabric articles such as hosiery or the like. The side wheels 38 of the truck are guided into place upon the baffle plate 26 by means of two guide tracks 39 that are fixed to the upper surface of the baffle plate in spaces provided between a bank of finned radiant-heating coils 40 which rest on the baffle plate and occupy a substantial portion of the area of the floor of the cabinet. A similar bank of finned radiant-heating coils 41 is secured by any suitable means to the under side of the top wall 25 of the cabinet or, if desired, the heating coils 41 may be mounted within the top wall 25 immediately adjacent the lower surface thereof.

In the normal operation of the cabinet in the treatment of hosiery and the like, the vertically spaced and opposed banks of radiant-heating coils 40 and 41 are heated by a flow of steam or other hot fluid led to the cabinet,

from a source not shown, by a pipe 42 and thence through a valve 43 and a pressure regulator 44 to a T fitting 45. From this T fitting 45 a portion of the hot steam or other fluid enters a pipe 46 extending upwardly along the outside of the rear wall 24 of the cabinet and then through the rear wall into one end of the upper bank 41 of the radiant-heating coils. The steam or fluid emerges from the upper heating coils 41 through an outlet pipe 47 that extends outwardly through the rear wall 24 of the cabinet and then downwardly to a trap 48 from which the fluid passes through a T fitting 49 and is returned to the source of supply in the direction shown by the arrow 49a in Fig. 1. Steam or other hot fluid is similarly supplied to the lower bank of radiant-heating coils 40 from the T fitting 45 by means of a pipe 50 that extends downwardly along the outer surface of the back wall 24 of the cabinet and thence through the back wall and into one end of the coils. The fluid emerges from the coils 40 through a pipe 51 which extends through the rear wall 24 of the cabinet and conducts the fluid to the trap 48 from which it is returned to the source of supply in the manner just stated.

The radiant-heating coils 40 and 41 may be heated separately or simultaneously, as the need for radiant heating within the cabinet may dictate. For accomplishing this control, the pipe 46 leading to the upper bank of coils 41 is provided with a hand-operated valve 52 and the pipe 50 leading to the lower bank of coils 40 is provided with a similar valve 53. When both of these valves are open, hot fluid will be fed to both the upper and lower banks of coils 41 and 40. By manipulation of the valves 52 and 53, however, heat may be supplied to either one bank of the coils or the other, and by closing both valves 52 and 53 the heat may be cut off entirely to render the radiant-heating coils inoperative.

In the drawings, a plurality of different means are shown for supplying and introducing aqueous vapor into the interior of the cabinet in contact with hosiery or other fabric articles supported by the truck 35. The means employed in any particular case is dependent upon the facilities available for use with the cabinet and the atmospheric conditions desired within the cabinet for treating the articles. When a source of pressure steam is available, the steam may be led from the source (not shown) to a hand-operated feed valve 54 and thence through a strainer steam trap 55 and a pressure regulator 56 to a pipe 57 which, in Fig. 1, is shown extending downwardly along the outer surface of the back wall 24 of the cabinet. From the pipe 57 the steam passes through a joining pipe 58, through a main solenoid-operated valve 59, and then through a hand-operated needle valve 60 to a pipe 61 that extends downwardly along the outside of the side wall 23 to a T-fitting 62. From this T-fitting 62, a steam-inlet pipe 63 extends inwardly through the lower portion of the side wall 23 to discharge the steam in the space between the bottom plate in the cabinet base 21 and the baffle plate 26. The steam then passes upwardly through the spaces 27 between the lateral edges of the baffle plate 26 and the side walls 22 and 23 into the interior of the cabinet occupied by the truck 35 and the fabric articles supported thereby.

For purposes hereinafter explained in detail, a steam bypass is provided around the solenoid-operated valve 59 and the needle valve 60. This steam bypass comprises a pipe 64 that extends downwardly from the intake side of the solenoid valve 59 and conducts steam to a bypass solenoid-operated valve 65. From this bypass solenoid valve 65 the bypassed steam passes through a hand-operated needle valve 66 and thence into the pipe 61 and into the interior of the cabinet as previously described.

In Figs. 5 and 6 there are schematically shown two alternate means for providing and introducing aqueous vapor, such as steam or water vapor, or a mixture of the two, into the cabinet. The means shown in Fig. 5 comprises a closed vessel 67 disposed on the exterior of the

cabinet. Water is automatically supplied to the vessel through an intake pipe 68 and through a water-outlet valve 69 automatically operated in the usual manner by a float 70 to provide a constant water level 70a in the vessel. A gas burner 71 is arranged under the vessel 67 for heating and boiling the water, gas being supplied to this burner through a hand-operated shut-off valve 72, a solenoid-operated valve 73, and thence through a needle valve 74 to the burner. The heating of the water within the vessel 67 causes aqueous vapors, in the form of water vapor or steam, to rise in the interior of the vessel, from whence the vapors are led through a pipe 75 of relatively large diameter, and through a shutoff valve 76, to the T-fitting 62 and into the steam-inlet pipe 63 of the cabinet.

The operation of the aqueous vapor generator illustrated in Fig. 5 is either manually or automatically controlled. In the manual control of the generator, the gas shutoff valve is opened, the solenoid valve 73 is blocked in open position, and the needle valve 74 is set to permit a flame to burn at the burner 71 of a size such as to cause generation and passage of aqueous vapor from the vessel 67 into the cabinet at a rate sufficient to raise and maintain the temperature within the cabinet at a predetermined degree. The temperature in the cabinet may be indicated by any suitable thermometer having an indicating dial 77 (Fig. 1) on an exterior wall of the cabinet in a position visible to the operator. The operation of the aqueous vapor generator also may be automatically controlled by means of a thermostatic switch 78 that is responsive to the temperature within the cabinet. In using this automatic control arrangement, the gas shutoff valve 72 and the needle valve 74 are set in a full-open position, and the solenoid valve 73 is employed to control the admission of gas to burner 71 in response to the temperature in the cabinet. The electric circuit for operating the solenoid valve 73 may comprise two electric conductors 79 and 80, the conductor 80 being connected to one terminal of the solenoid valve 73 and the conductor 79 being connected to a terminal 81 of the thermostatic switch 78, as shown in Fig. 5. When the temperature in the cabinet is sufficiently low to cause the thermostatic switch 78 to be in closed position, electric current from the conductor 79 passes from the terminal 81 through a conductor 82 in the thermostatic switch to a contact 83 engaged by a switch bar 84 that has connected to it a lead 85 which extends to the second terminal of the solenoid valve 73. Thus, when the thermostatic switch 78 is in closed condition, the solenoid valve 73 will be electrically energized to open the valve and permit the passage of the gas to the burner 71 to boil or heat the water in the vessel 67 and cause aqueous vapors to pass into the cabinet. When the temperature within the cabinet has been raised to a predetermined degree by the passage of hot vapors into the cabinet from the vessel 67, the switch bar 84 in the thermostatic switch 78 will automatically move to the open position shown by broken lines in Fig. 5 to break the circuit to the solenoid valve 73 and thus cause the valve 73 to move to a closed position and shut off the flow of gas to the burner 71.

The aqueous vapor generator shown in Fig. 6 is similar to that illustrated in Fig. 5, but is arranged for electrically heating the water contained within a closed vessel 67a. The aqueous vapors generated within the vessel 67a pass upwardly through a pipe 75a and the shutoff valve 76 to the inlet pipe 63 which conducts the aqueous vapors into the space between the bottom plate and the baffle plate 26 in the base 21 of the cabinet and thence into the interior of the cabinet. The water level within the vessel 67a is automatically maintained by means of an inlet valve 69a operated by a float 70b, the water being fed to the valve through a water-inlet pipe 68a. Under the vessel is an electric-heating element 86 arranged in electric series with a rheostat 87, a main switch 88, and a

thermostatically operated switch 78a. In the automatic operation of this electrically heated aqueous vapor generator, the switch 88 is manually moved to closed position and the rheostat 87 is adjusted to a position to permit a maximum flow of electric current through the heating element 86 to cause the water within the vessel to be heated or boiled. When the temperature within the cabinet has been raised to a predetermined degree by the passage of hot aqueous vapors from the vessel 67a into the cabinet, a switch bar 84a in the thermostatic switch 78a moves to open position to break the circuit to the heating element 86 and interrupt the supply of heat to the water contained in the vessel. On the other hand, when the temperature falls below the predetermined level within the cabinet the switch bar 84a will move to close position to again complete the circuit to the heating element 86 and cause further heating of the water within the vessel. In the manual operation of the electrically heated aqueous vapor generator shown in Fig. 6, the thermostatically operated switch 78a is blocked in closed position and the supply of electric energy to the heating element 86 is controlled through manual operation of the main switch 88 and the rheostat 87.

Further alternate manually operated means for supplying hot aqueous vapor to the interior of the cabinet are shown in Figs. 7, 8, 9, and 10. The means there shown comprise an open-top vessel 89 supported by the baffle plate 26' within the cabinet in position against the back wall 24 of the cabinet. Water is fed to the vessel 89 by a water-inlet pipe 90 through an intake valve 91, the operation of the valve 91 being controlled by a float 92 so as to maintain a constant water level in the vessel. In the structure shown in Figs. 7 and 9, steam is employed to heat and boil the water in the open vessel 89. As best illustrated in Fig. 7, the steam is supplied to a steam coil 93 that is submerged within the vessel, a gate valve 94 and a needle valve 95 being provided for manually controlling the rate of flow of the steam through the coil and thus controlling the rate at which the water is boiled in the vessel 89 to supply hot aqueous vapor to the interior of the cabinet. The arrangement shown in Figs. 8 and 10 is like that shown in Figs. 7 and 9, except that the water within the vessel 89 is heated electrically by means of a heating element 96 submerged in the water in the vessel, electric current being supplied to the heating element 96 through a manually operated switch 97 and a rheostat 98. By observing the temperature within the cabinet, which may be indicated by a thermometer 99 having an indicating face 100 on the exterior of the cabinet (Fig. 9), the operator may manipulate the needle valve 95 (Fig. 7) or the rheostat 98 (Fig. 8) to control the rate at which the water is boiled within the vessel 89 and thus control the temperature and humidity within the cabinet. It will be noted that inasmuch as steam is produced within the cabinet in the open vessel 89 in the modified embodiments shown in Figs. 7 and 9 and in Figs. 8 and 10, the floor 26' in these embodiments need not be spaced from the walls 22, 23 and 24 as is the case in Fig. 2 where steam is introduced into the cabinet beneath the floor.

Two exhaust ports are provided in the upper portion of the rear wall 24, and associated with these ports are gravity-operated, one-way structures adapted automatically to control the passage of aqueous vapor and air through the exhaust ports to the outside of the cabinet and, in this way, automatically control the maximum pressure attainable in the cabinet. Inasmuch as the maximum aqueous vapor temperature maintainable in the cabinet is a direct function of the maximum pressure attainable therein, the one-way valve structures also serve automatically to control the maximum temperature attainable in the cabinet during its normal operation, as will be more fully explained below.

The valve structures associated with the two exhaust ports are duplicates and each comprises a cylindrical vent

member 101 which is open at each of its ends and extends through the rear wall 24 of the cabinet. The inner end of each vent member is provided with an outwardly extending annular flange 102 which is held in tight engagement with the inner surface of the back wall 24 of the cabinet by means of a plurality of evenly spaced rivets or bolts 103 that extend through the flange 102 and the wall 24 and through an annular outer ring 104 which is disposed around the vent member and in engagement with the outer surface of the wall 24. Suitable gasket material, not shown, may be placed between the flange 102 and the inner surface of the wall 24 and also between the ring 104 and the outer surface of the wall 24, so as to insure against the escape of aqueous vapor from the interior of the cabinet around the outside of the vent members 101.

The outer end of each cylindrical vent member 101 has an inclined planar facing 105 formed thereon, each of the facings being provided with a generally circular opening 106 therein. Above each opening 106 a pair of outwardly extending ears 107 are formed on the outer surface of each inclined facing. These pairs of ears 107 are each provided with aligned apertures 108 (Fig. 12) of generally flattened elliptic cross-section adapted to receive and rotatably retain a horizontally disposed, round pivot pin 109, from which a door assembly 110 is suspended. Each of these door assemblies 110 is provided on its upper edge with a pair of apertured ears 111 arranged to be received by one of the pivot pins 109, setscrews 112 (Fig. 12) being provided for securing the ears 111 to the pin.

The main portion of each door assembly 110 comprises a generally circular flat metal disk element 113 having a rubber gasket 114 provided on its inner face around its periphery, the rubber gasket being adapted to engage and be seated upon the outer surface of the opposed corresponding inclined facing 105. A boss 115 is formed on the inner face of each disk element 113 and each boss and disk element is apertured and threaded through to receive one end of each of two threaded counterweight shafts 116 and 117. As will best be seen in Fig. 11, the shaft 116 extends inwardly from the boss 115 and the inner surface of the disk element 113, while the shaft 117 extends outwardly from the opposite or outer surface of the disk, the two shafts having a common axis substantially normal to the plane of the disk element 113 and being threadedly secured in place by locknuts 116a and 117a. The counterweight shafts 116 and 117 are adapted, respectively, to receive threaded counterweights 118 and 119 which are adjustable upon the shafts and are arranged to be held or retained in adjusted position by means of locknuts 118a and 119a.

Disregarding for the moment the balancing effect that the counterweights 118 and 119 have upon the door assemblies 110, it will be observed in Fig. 11 that the disposition of the pivot pins 109, from which the door assemblies are suspended, is such with respect to the inclined faces 105 that the disk elements 113 of the door assemblies will normally rest by gravity upon the facings to cover the openings 106 therein, the rubber gaskets 114 being seated upon the facings effectively to seal the exhaust ports. It will also be observed from Fig. 11, however, that by selectively adjusting the counterweights 118 and 119 on their respective supporting shafts 116 and 117, the center of gravity of the door assemblies may be shifted either toward or away from an imaginary vertical plane passed through the axis of the door-supporting pivot pins 109. Thus it will be understood that, by adjustment of the counterweights 118 and 119 on the threaded shafts 116 and 117, the effective weight of the door assemblies upon their corresponding facings 105 may be very materially, and very accurately, increased or decreased. For example, the counterweights may be adjusted so that the disk elements 113 of the door assemblies will rest very lightly and delicately upon the inclined facings 105. In this balanced condition, the door

assemblies not only prevent the passage of air from the outside of the cabinet to the interior thereof through the exhaust ports, and thus prevent the formation of undesirable condensate on the interior of the cabinet and on the fabric articles being subjected therein to hot aqueous vapor treatment, but the door assemblies also prevent the pressure within the cabinet from exceeding atmospheric pressure, for any pressure build-up in the cabinet in excess of atmospheric pressure will automatically lift the door assemblies slightly from their seated position on the inclined facings and relieve the excess pressure. Furthermore, because this particular balanced condition of the door assemblies will maintain the pressure in the cabinet at atmospheric pressure, the temperature of the aqueous vapor within the cabinet will never exceed the boiling point of the aqueous medium so long as hot aqueous vapor is not fed into the cabinet at a rate faster than it can be exhausted through the exhaust ports. Thus, even a relatively inexperienced operator, using any one of the manually or automatically operated means hereinbefore described for generating and/or introducing aqueous vapor into the cabinet, may easily reproduce time after time within the cabinet practically equivalent atmospheric conditions under which hosiery or other fabric articles supported by the truck 35 may be treated by the aqueous vapor.

By further adjustment of the counterweights 118 and 119, the effective weight of the door assemblies 110 upon the facings 105 may be selectively increased so as to maintain the maximum pressure attainable in the cabinet at a selected value greater than atmospheric pressure. With this latter adjustment of the counterweights a selected steam condition may be maintained in the cabinet at a very accurately controlled selective pressure and at the corresponding temperature above the boiling point of the aqueous medium. Again, the selected steam condition may be very easily and accurately reproduced in the cabinet, time after time, for treating successive batches of hosiery or other fabric articles, inasmuch as the adjustably balanced door assemblies 110 will not permit the desired temperature and pressure conditions to be exceeded.

In order to insure accurate seating of the rubber gaskets 114 upon the surfaces of the inclined facings 105, or to insure accurate seating of the disk elements 113 upon the facings when the gaskets are not employed, means are provided to permit the pivot pins 109 to move or float laterally within the generally elliptical apertures 108 in the mounting ears 107 on the facings. To this end, each of the ears 107 is provided with a round passage which horizontally intersects the aperture 108 at right angles. This opening is adapted slidably to retain a pin 120 having its innermost end normally extending into the aperture 108 and bearing against the side of the floating pivot pin 109 (Fig. 12). The outer end of the passage opens to the front of the ear 107 and is internally threaded to receive an externally threaded open end of a hollow nipple 121 which contains a compression spring 122 that bears against shoulder formed on the outer end of the slidable pin 120, thus tending to force the pin 120 inwardly against the pivot pin 109. This force urges the pivot pin laterally against the inner side wall of the generally elliptical aperture 108, toward the facing 105. As the rubber gasket 114 seats upon the facing 105, or as the disk portion 113 seats upon the facing when gaskets are not used, any differences existing between the mating surfaces of the facing 105 and the door assembly 110 will tend to cause the pivot pin 109 to shift outwardly laterally within the aperture 108 and overcome the compressive forces exerted by the spring 122, those compressive forces being made adjustable in magnitude by rotating the hollow nipple 121 clockwise or counterclockwise. This floating lateral movement of the pivot pin 109 will permit the door assembly to seat accurately upon the facing 105 even through there may be minor

inaccuracies in the mating surfaces, and the exhaust port will thus be effectively sealed.

An air-inlet port is provided in the lower portion of the rear wall 24 of the cabinet. Although the size of this air-inlet port is larger than that of the two exhaust ports just described, its construction substantially corresponds to that employed in the exhaust ports. The air-inlet port comprises a cylindrical vent element 123 (Fig. 1) having formed on its inner end an inclined facing 124 (Fig. 2) similar in all respects to the inclined facings 105 provided on the outer ends of the exhaust vent units 101. A pair of ears 125 (Fig. 2) are formed on the upper portion of the inclined facing 124 and are adapted to retain a floating pivot pin 126 from which there is suspended a door element 127 substantially corresponding to the door assemblies 110 employed on the exhaust ports. This door element 127 is secured to the pivot pin 126 by a pair of ears 128, and the under-side of the door element 127 is provided with a circular rubber gasket, not shown, adapted to seat upon the facing 124. The ears 125 are provided with spring-loaded slidable pin-retaining means 129 for urging the pivot pin 126 outwardly toward the facing 124 and their construction and purpose correspond to that previously described with respect to the exhaust vents. The air-intake door 127 normally rests by gravity in closed position upon the inclined facing 124 and is arranged to be moved to open position by means of mechanical linkage operated by a reversible control motor 130 (Figs. 13 and 14). This control motor, by means of a crank arm 131 and crank 132 (Fig. 1), is arranged to partially rotate a shaft 134 mounted upon the exterior surface of the rear wall 24 of the cabinet. Secured to the shaft 134 is another crank 135 which, by means of a connecting link 136, is adapted to move a bell crank 137 that is pivotally mounted upon the rear wall 24 of the cabinet directly above the air-inlet port. The bell crank 137 has an arm 138 that extends downwardly and is curved inwardly toward the pivotally suspended air-inlet door 127, the arm 138 being provided on its extremity with a roller 139 which is adapted to engage the surface of the door 127 and move and swing the door inwardly to open position about the pivot pin 126 upon energization of the control motor 130.

An air blower 140 driven by an electric motor 149 (Figs. 13 and 14) is arranged on the exterior of the cabinet and is adapted to blow air under pressure through a shell or casing 142 containing a steam-heated radiator 143, and thence into the cabinet through the open air-inlet port. Steam may be supplied to the radiator 143 by means of steam-inlet pipes 144 and 145 that are connected to the outlet side of the steam trap 55 previously mentioned. Spent steam or water emerges from the radiator 143 through outlet pipes 146 and 147 which join with a pipe 148 that conducts the spent steam or water through a trap 148a and to the steam-return line 49 described earlier herein.

When one of the aqueous vapor-generating means shown in Figs. 5, 6, 7, and 8 are employed in conjunction with the cabinet, the truck 35, carrying hosiery or other fabric articles to be treated in the cabinet, is rolled up the ramp 34 and across the hinged plate 36 into position within the cabinet. The hinged plate 36 is then pivoted upwardly to a position inside the cabinet and the doors 28 are closed and latched. Steam is then admitted to either one or both of the radiant-heating coils 40 and 41 by operating the hand valves 52 and 53, provided those valves have not previously been opened or left in an open position. The radiant-heating coils heat the interior surfaces of the cabinet and tend to preheat the fabric articles so as to avoid the formation of excessive condensate thereon when aqueous vapor is introduced into the cabinet in contact with the articles. With the valve 76 open and the valves 60 and 66 closed, the gas burner 71 is lighted, or if the electric heating element 86 of Fig. 6 is employed,

the switch 88 is closed, to provide heat for boiling the water contained in the vessel 67 or 67a. Aqueous vapor then arises from the water and passes from the vessel 67 or 67a into the pipes 75 or 75a and through the pipe 63 into the interior of the cabinet in contact with the hosiery or other articles supported by the truck 35. The maximum pressure and temperature attainable in the cabinet will be automatically controlled by the door assemblies 110 at the exhaust ports, as previously described. When the articles have been subjected to treatment by the aqueous vapor for a desired period, the flame in the burner 71 is shut off either manually by the valve 72 or automatically by the solenoid valve 73, or the flow of electric current to the heating element 86 is manually or automatically cut off in the way earlier described. The blower-fan motor 149 may then be energized to force air under pressure through the hot radiator 143 within the shell 142 and into the interior of the cabinet through the air-inlet port to dry the hosiery, the forcing of the air into the cabinet causing the door assemblies 110 at the exhaust ports to swing open and permit the aqueous vapor and the air laden with moisture acquired from the hosiery, to pass out of the cabinet and be discharged into the atmosphere. When the hosiery or other articles have been sufficiently dried, the circuit to the blower-fan motor is broken, the doors 28 are opened, and the hosiery truck 35 and the articles thereon are removed from the cabinet. The operation may then be repeated with another batch of fabric articles, the atmospheric conditions produced within the cabinet upon each operation thereof substantially duplicating the conditions produced during the next preceding operation, largely because of the uniform controlling action of the door assemblies 110 on the exhaust ports described earlier herein. The operation of the modified aqueous vapor-generating structures illustrated in Figs. 7 to 10 is manually carried out in the treatment of fabric articles in the cabinet in the same manner as that just described with reference to the structures shown in Figs. 5 and 6.

The fabric-treating cabinet of the present invention also embodies fully automatic control circuits, shown in Figs. 13 and 14, by which the complete cycle of operation of the cabinet may be carried out entirely automatically, the sequence of operation and the time duration and conditions produced within the cabinet during each phase of the operation being selectively predetermined and thereafter being automatically controlled without further attention by the operator. This fully automatic cycle of operation of the cabinet includes, first, a preheating phase wherein the interior of the cabinet and the fabric articles therein are heated not only by the radiant-heating coils 40 and 41 but also by hot air blown into the cabinet through the air-inlet port, a delay period during which the door 127 at the air-inlet port is automatically closed following the termination of the preheating phase, a treating phase automatically started upon the expiration of the delay period and during which hot aqueous vapor is introduced into the cabinet in contact with the fabric articles therein, and a drying phase which automatically follows the treating phase. Selectively adjustable controls are included in the automatic control circuits whereby any one of the phases may be timed for any desired period or eliminated entirely and whereby the conditions produced within the cabinet during any one phase may be predetermined and automatically attained by adjustment of the controls and the counterweights 118 and 119 on the exhaust-port door assemblies 110. Assuming that these controls, which are more fully described below, have been set to the selective positions desired, the valve 76 is closed and the main steam shutoff valve 54 is opened in preparation for the fully automatic operation. The truck 35, laden with hosiery or other articles to be treated in the cabinet, is moved up the ramp 34 and across the pivoted

sill plate 36 into the interior of the cabinet where it is properly positioned between the guide tracks 39. With the truck 35 thus positioned, as illustrated in Fig. 2, the fabric articles supported by the truck are disposed on the interior of the cabinet between the upper bank of radiant-heating coils 41 and the lower bank of coils 40. The valves 52 and 53 previously will have been opened to admit hot steam or other fluid into the coils, and the heat from the coils will have raised the temperature of the interior walls of the cabinet and will immediately begin to preheat the fabric articles. The hinged sill plate is then pivoted upwardly into the cabinet and the doors 28 are moved to closed position and locked by the latch bars 30 engaging the apertured lugs 33 provided on the upper and lower edges of the front opening of the cabinet.

When the automatic control circuit of Fig. 13 is used, the closing of the doors 28 automatically closes a switch 150 in a main electric cable 151 which is connected through a fuse 152 to one terminal of a source of electric energy (not shown), another main electric cable 153 being connected through another fuse 152 to the other terminal of the source of electric energy. A safety switch 154 is then manually closed to energize the control circuit of Fig. 13 which thereafter functions automatically to carry out the sequence of operation about to be described. The control circuit of Fig. 13, as well as that of Fig. 14, is largely contained in a cabinet 155 (Fig. 1) mounted on the exterior of the cabinet, but the circuit also includes the air-intake door-control motor 130, the two solenoid-operated steam valves 59 and 65 and the blower motor 149, all of which have previously been referred to.

Upon the closing of the door-operated switch 150 and the manually operated switch 154, a circuit is immediately completed, through normally closed contacts of a relay R-1, to the air-blower motor 149 to start a major preheating cycle wherein air is blown under pressure through the shell 142, and the steam-heated radiator 143, and the normally open inlet door 127 into the interior of the cabinet to elevate the temperature of the cabinet and its contents above the temperature produced by the heat radiated from the heating coils 40 and 41. This circuit completed to the blower motor 149 comprises the cable 151 which, by means of an intermediate conductor 155, is connected to one terminal of the motor, the cable 153, a line 156 extending from the cable 153 to one side of normally closed contacts 157 of the relay R-1, and a lead 158 extending from the other side of the contacts 157 of relay R-1 to the other terminal of the blower motor. When a selector switch 161 in the circuit of Fig. 13 is in the position shown by the solid lines, a motor-driven preheating timer T-1 is energized simultaneously with the starting of the blower motor. This circuit completed to start the timer T-1 comprises the cable 153, a short lead 159, a switch bar 160 of the previously mentioned selector switch 161, a contact 162 in the switch 161, a lead 163, a conductor 164, terminal 165 of the timer T-1, a conductor 166 within the timer T-1, the rotor 167 of the timer, a conductor 168 and another terminal 169 of the timer, a lead 170, and a line 171 connected to the cable 151.

During this initial preheating operation of the blower motor 149 and the timer T-1, the air blower 140 forces air under pressure through the heated radiator 143 in the shell 142, and through the air-inlet port past the pivotally suspended air-inlet door 127 which near the end of the preceding cycle had been moved to its normally open position by the control motor 130 through its operation of the crank arm 131, the crank 132, the shaft 134, the crank 135, the connecting link 136, and the bell crank 137, 138. The heated air enters the interior of the cabinet and moves upwardly through the hosiery or other fabric articles supported by the truck 35 to preheat the articles and the interior of the cabinet, thus avoiding an accumulation of excessive condensate in the cabinet when hot

aqueous vapors are later introduced therein. The forcing of the air into the cabinet creates a pressure condition therein which exerts force against the inner side of the door assemblies 110 at the exhaust ports sufficient to displace these door assemblies from seated position on the facings 105, and relieve the pressure in the cabinet and permit the heated air to pass upwardly and out of the exhaust ports. This preheating operation continues until the timer T-1 times out, the timer being previously adjusted to run for a predetermined time before timing out.

Upon the timing out of the preheating timer T-1, a switch bar 175 in the timer drops down into contact with a contact 176, completing a circuit to start a motor-driven delaying timer T-2 which delays further operation within the cabinet until the air-inlet door 127 can be closed. This activating circuit to the timer T-2 comprises the cable 153, the short conductor 159 extending to the switch 161, the switch bar 160 in switch 161, the contact 162, lead 163, conductor 164, the terminal 165 of the timer T-1, a lead 177 extending from the terminal 165 to the switch bar 175 in the timer T-1, the contact 176, a conductor 178, another terminal 179 of the timer T-1, a lead 180 extending from the terminal 179 to a terminal 181 of the timer T-2, a conductor 182 within the timer T-2, the rotor 183 of the timer T-2, a conductor 184 extending to a terminal 185, and a lead 186 extending to the line 171 which is connected to the main cable 151.

At the same time that the delaying timer T-2 is energized, a circuit is made through the delaying timer T-2 and a relay R-4 to ground out one of the terminals of the control motor 130 to start the control motor and cause the linkage operated thereby to move to retracted position to permit the air-inlet door 127 to swing downwardly by gravity to a closed position in seated engagement with the facing 124 about the inner side of the air-inlet port to close the port. This circuit to the relay R-4 extends from the terminal 181 of the delaying timer T-2, through a switch bar 187 in the timer and comprises a contact 188, a conductor 189, a terminal 190 on the timer T-2, a lead 191 extending to one side of an energizing coil 192 of the relay R-4, and a short lead 193 extending to the cable 151 from the other side of the relay coil 192. This circuit energizes the coil 192 of the relay R-4, causing the normally open upper contacts 194 thereof to be closed, grounding out a terminal 195 of the control motor 130 through a conductor 196. The control motor 130 thereupon operates to permit the closing of the air-intake port as described above.

When the delaying timer T-2 times out, a circuit is completed through the timer T-2 to energize the relay R-1 to break the circuit to the air blower motor 149 and stop its operation. Simultaneously, a circuit is completed through the relay R-1 and a first thermostat-controlled switch TC-1 to energize a relay R-2, causing normally open contacts of the relay R-2 to be closed and complete a circuit therethrough, and through normally closed contacts of a relay R-5, to energize and open the solenoid steam valve 59 to introduce steam into the cabinet. The circuit through the delaying timer T-2 energizing the relay R-1 includes the terminal 181 of the timer, the switch bar 187 thereof, a contact 201 connected to a terminal 202 of the timer, a lead 203 extending to one side of the coil of the relay R-1, and an intermediate conductor 204 extending from the other side of the coil to the conductor 171 which, in turn, is connected to the main electric cable 151. The energization of the relay R-1 opens its contacts 157 to break the circuit to the blower motor 149 and stop its operation, and closes a pair of contacts 205 on the relay. The circuit thereupon completed through the relay R-1 and the thermostat switch TC-1 to energize relay R-2, includes the main

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electric cable 153, the lead 156, the normally open but now closed contacts 205 of the relay R-1, a lead 206 extending from these contacts 205 to a selector switch 207, a switch bar 208 of the selector switch 207, a lead 209, a switch bar 210 of the thermostat TC-1, a conductor 211 extending from a contact at the closed end of the switch bar 210 to one side of the exciting coil of the relay R-2, and an intermediate conductor 212 extending from the other side of the coil of the relay R-2 to the conductor 171 which leads to the main electric cable 151.

Upon the energizing of the relay R-2 through the relay R-1 and the thermostat TC-1 as explained above, normally open contacts 213 of the relay R-2 are closed and a circuit is completed therethrough to energize the solenoid steam valve 59. This latter circuit includes the main electric cable 153, an intermediate lead 214 extending from the cable 153 to one side of the normally open, but now closed, upper contacts 213 of the relay R-2, a conductor 215 extending from the other side of the contacts 213 to the normally closed contacts 216 of the relay R-5, and a conductor 217 extending from the other side of the closed contacts 216 of the relay R-5 to a terminal 218 of the solenoid steam valve 59. The other terminal 219 of the solenoid valve 59 is connected, by means of an intermediate conductor 220, to the other main electric cable 151.

The solenoid steam valve 59 remains open to permit the rapid introduction of steam through the valve into the interior of the cabinet until the temperature in the cabinet is raised to a point at which the switch bar 210 of the thermostat TC-1, which is responsive to the temperature in the cabinet, moves to the position shown by the broken lines in the switch in Fig. 13. Upon this movement of the switch bar 210 of the thermostat TC-1, the circuit through the thermostat energizing the relay R-2, to activate and open the solenoid steam valve 59, is broken, and a circuit is thereupon made through the thermostat to a motor-driven treatment timer T-3 to start the operation of this timer and complete another circuit through the timer to a second thermostat TC-2, and through that second thermostat to energize a relay R-8 to open the smaller steam solenoid valve 65. The circuit energizing and starting the treatment timer T-3, includes the switch bar 210 of the thermostat TC-1, a contact 221 in the thermostat, a lead 222, an intermediate conductor 223, and a terminal 224 of the timer T-3 which is connected through the rotor of the timer to another terminal 225 of the timer, the latter terminal being connected to the electric cable 151. The circuit through the timer T-3 and through the second thermostat TC-2 to actuate the relay R-8 and thereupon cause the energizing and opening of the small solenoid steam valve 65, includes the terminal 224 of the timer T-3, a switch bar 226 in the timer, a contact 226a, a terminal 227 on the timer, a conductor 228 extending to a selector switch 229, a switch bar 230 in the switch 229 in contact with a contact 231 therein, a conductor 232 extending from the contact 231 to a switch bar 233 in the thermostat TC-2, a contact 234 in the thermostat engaged by the bar 233, a lead 235, and line 236 extending to one side of the actuating coil of the relay R-8, the other side of the coil being connected to the line 171 which extends to the main electric cable 151. The circuit completed through the relay R-8, upon its energization, to open the solenoid valve 65, includes the electric cable 153, an intermediate lead 237 extending from the cable 153 to one side of normally open, but now closed, contacts 238 of the relay R-8, and a lead 239 extending from the other side of these contacts 238 to a terminal 240 on one side of the coil of the solenoid valve 65. A terminal 241 on the other side of the coil of the solenoid valve 65 is connected, by means of an intermediate lead 242, to the other main electric cable 151.

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It will be understood that so long as the treatment timer T-3 continues to remain in a timing condition supplying electric current to the thermostat TC-2, the thermostat TC-2, which is responsive to the temperature in the cabinet, will control the operation of the relay R-8 to open and close the solenoid valve 65 and bleed steam through the valve into the cabinet to maintain the interior of the cabinet during the treating period at a temperature condition corresponding to the temperature at which the thermostat TC-2 is set. The small solenoid-operated steam valve 65 in the steam-bypass arrangement described earlier herein may thus be used to control very accurately the temperature and, consequently, the relative humidity of the aqueous vapor atmosphere to which the hosiery or other articles within the cabinet are subjected for treatment. The larger solenoid-operated steam valve 59, on the other hand, is used automatically quickly to raise the temperature and humidity within the cabinet substantially to the desired level at the beginning of the aqueous vapor treatment.

During the alternate opening and closing of the solenoid steam valve 65 during the treating period, any opening or closing of the first thermostat TC-1 that may then or thereafter take place by reason of changes in temperature in the interior of the cabinet, will have no effect upon the supply of current to the treatment timer T-3, or the supply of current through that timer to the second thermostat TC-2, because of the use of a holding circuit to the timer T-3 that is completed through a relay R-6 at the time the timer T-3 is first energized. The conductor 222 that extends from the contact 221 of the thermostat TC-1 to the conductor 223 that leads to the timer T-3, also extends to one side of the energizing coil of the relay R-6, the other side of the coil being connected, by means of conductor 243, to the main electric cable 151. Thus, when the timer T-3 is first energized, the relay R-6 is simultaneously activated, closing a holding circuit through its normally open upper contacts 244. This holding circuit includes the main electric cable 153, the intermediate lead 156 extending to one side of the normally open, but now closed, upper contacts 205 of the relay R-1, the lead 206 connected to the other side of these contacts 205 and extending to one side of the normally opened, but now closed, upper contacts 244 of the relay R-6, the lead 222 extending from the other side of these contacts 244, and the lead 223 that connects the lead 222 to the terminal 224 of the timer T-3.

Upon the timing out of the treatment timer T-3, the switch arm 226 therein moves out of contact with the contact 226a, thus breaking the circuit to the thermostat TC-2 and its control circuit to the small solenoid steam valve 65, closing the valve 65 and interrupting the bleeding of aqueous vapor into the cabinet. At the same time, the switch bar 226 moves downwardly into contact with a contact 250, starting a drying timer T-4 and completing a circuit, through the timer T-4, to a relay R-7 and a relay R-3. The operation of the relay R-7 grounds out another terminal 251 of the control motor 130, to start the operation of the control motor in a reverse direction so as to move the crank arm 131, the crank 132, the shaft 134, crank arm 135, the link 136, and the bell crank 137, 138 and swing the door 127 at the air-inlet port to open position. At the same time, the operation of the relay R-3 completes a circuit to the air-blower motor 149 to again force air under pressure through the heated radiator 143 in the shell 142 and into interior of the cabinet, where the heated air passes upwardly through the cabinet, past the hosiery or other articles supported by the truck 35 to dry the same, and out of the exhaust ports, lifting the door assemblies 110 from their normally seated positions against the facings 105. The circuit completed through the operating timer T-3, upon its timing out, to start the drying timer T-4, includes the switch bar 226 of the timer T-3, the

contact 250 connected to a terminal 252 of the timer T-3, a line 253, and an intermediate conductor 254 extending to a terminal 255 on the timer T-4 which is connected, through the rotor of the timer T-4, to a terminal 256 thereof connected to the main electric cable 151. This circuit starts the timer T-4, as previously described. The circuit completed through the timer T-4 at this time to energize the relay R-7, includes the terminal 255 of the timer T-4, a switch bar 257 in the timer, a contact 258 engaged by one end of the switch bar 257, a terminal 259 to which the contact 258 is connected, and a line 260 extending from the terminal 259 and connected, by means of an intermediate conductor 261, to one side of the energizing coil of the relay R-7, the other side of the energizing coil being connected to the main electric cable 151 by means of a conductor 262. The energization of the relay R-7 grounds out the terminal 251 of the control motor 130, as previously explained, through a lead 263 and the normally open, but now closed, upper contacts 264 of the relay R-7. The circuit completed through the timer T-4 to operate the relay R-3 to complete a further circuit to the air-blower fan motor 149, includes the switch bar 257 of the timer T-4, the contact 258, the terminal 259, and the lead 260 that extends from the terminal 259 to one side of the energizing coil of the relay R-3, the other side of the coil being connected to the conductor 171, and thus to the main electric cable 151, by means of an intermediate conductor 265. The circuit completed through the relay R-3 to the blower motor 149, comprises the main electric cable 153, a conductor 266 that extends from the cable 153 to one side of the normally open, but now closed, upper contacts 267 of the relay R-3, and a conductor 268 that extends from the other side of the contacts to the lead 158 which extends to one terminal of the blower motor 149, the other terminal thereof being connected to the main electric cable lead 151 through the previously mentioned intermediate conductor 155.

The blower motor 149 continues to operate to blow hot air through the interior of the cabinet to dry the hosiery or other fabric supported therein until the timer T-4 times out, whereupon the switch bar 257 of the timer moves out of contact with the contact 258, breaking the energizing circuits to the relay R-7 and the relay R-3 de-energizing the blower motor 149, and breaking the grounding circuit to the control motor 130. At the same time, the switch bar 257 of the timer T-4 moves downwardly into contact with a contact 269, completing a circuit through a terminal 270 and lead 271, to a terminal on one side of a transformer 272, the other terminal of which is connected to the main electric lead 151 by means of a secondary lead 273. The other side of the transformer 272 is connected by leads 274 and 275 to a bell 276. Thus when the drying timer T-4 times out, a circuit is made to the bell 276 to ring the same and inform the operator that the complete operating cycle of the cabinet has reached its end. The operator may then open the doors 28 at the front of the cabinet, pivot the hinged sill plate 36 downwardly onto the inclined ramp 34, and remove the truck 35 and the fully treated hosiery or other fabric articles supported thereon, from the interior of the cabinet.

Means are provided in the circuit illustrated in Fig. 13, whereby the automatic preheating cycle in the cabinet may be selectively controlled either by the timer T-1, in the manner described above, or by a thermostat TC-5, or by the thermostat TC-5 in combination with the timer T-1. By manually moving the switch bar 160 of the selector switch 161 to the position shown by the broken lines in Fig. 13, the closing of the door switch 150 and the safety switch 154 will supply current to the thermostat TC-5 through the switch bar 160 of the switch 161, and through a lead 277, to a normally open switch bar 278 of the thermostat TC-5. At that time, as previously explained, a circuit will have been completed, through

the normally closed contacts 157 of the relay R-1, to the blower motor 149 which will operate to blow hot air into the interior of the cabinet. When the passage of this hot air into the cabinet has preheated the interior of the cabinet and its contents and has raised the temperature of the inside of the cabinet to a desired degree, the switch bar 278 of the thermostat TC-5, which is responsive to temperature in the cabinet, will move to the position shown by the broken lines in Fig. 13 and will thereupon complete the starting circuit to the delaying timer T-2 through a contact 279, a lead 280, a switch bar 281 of another selector switch 282, and an intermediate conductor 283 that is connected to the lead 180 which extends to the terminal 181 of the delaying timer T-2. Thus by selective setting of the selector switches 161 and 282, the thermostat TC-5 may be utilized alone automatically to terminate the preheating period and start the operation of the delaying timer T-2 in response to a predetermined temperature condition reached in the cabinet as a result of the preheating operation of the blower motor 149. On the other hand, the thermostat TC-5 may be used to energize the preheating timer T-1 when the temperature in the cabinet has reached a desired level. When this latter operation is desired, the switch bar 281 of the selector switch 282 is moved into the position shown by the broken lines in the switch in Fig. 13, so that when the switch bar 278 of the thermostat TC-5 moves into engagement with the contact 279, a circuit will be completed through the switch bar 278, the contact 279, the lead 280, and the switch bar 281 through an intermediate lead 284, to the lead 164, and thence to the terminal 165 of the preheating timer T-1 to start the timer and cause it to operate in the manner described above in detail.

If desired, wet-bulb thermostats TC-3 and TC-4 may be included in the fully automatic operating circuit for the cabinet, as illustrated in Fig. 13, so as to be selectively usable in place of the dry-bulb thermostats TC-1 and TC-2 respectively. The substitution of the wet-bulb thermostat TC-3 for the dry-bulb thermostat TC-1 is accomplished by moving the switch arm 208 of the selector switch 207 to the position shown by the broken lines in the switch in Fig. 13, thus completing the circuit to the thermostat TC-3 through a lead 209a. The thermostat TC-3 will then operate in the manner previously described with respect to the thermostat TC-1. Similarly, the wet-bulb thermostat TC-4 may be substituted in the circuit for the dry-bulb thermostat TC-2 to control the operation of the small solenoid steam valve 65. This latter selective substitution may be made by moving the switch bar 230 of the selector switch 229 to the position shown by the broken lines in the switch in Fig. 13, whereupon the circuit to the wet-bulb thermostat TC-4 will be made through a lead 232a and the thermostat TC-4 will then operate in the manner previously described with respect to the thermostat TC-2.

If desired, a signal lamp 285 may be electrically placed across the cables 151 and 153 to provide a visual signal to the operator of the fact that the door switch 150 and the safety switch 154 have been closed and that the automatic operation of the treating cabinet is in progress. Means may also be connected across the cables 151 and 153 to indicate to the operator when the door assemblies 110 at the exhaust ports are moved to open position by the pressure of air or the aqueous vapor within the cabinet. This means may include a lamp 286 and a switch 287 connected in series between the cables 151 and 153, the switch 287 being closed by opening movement of either of the door assemblies 110. This signalling means is particularly useful to the operator when the cabinet of the present invention is being operated manually.

In Fig. 14 there is shown a somewhat simplified alternate electric circuit by which the fully automatic control of the cabinet of the present invention may be accomplished entirely without the use of thermostats or thermo-

statically operated devices that may prove to be inaccurate at certain desirable critical temperatures and humidity conditions within the cabinet. In the circuit shown in Fig. 14, current is supplied from a source, not shown, through fuses 300 to two main electric cables 301 and 302. Across these two cables there is a manually operated safety switch 303, and in the cable 301 there is a door-operated switch 150 that is moved to closed position by the closing of the doors 28 on the front of the cabinet. Upon the closing of the switches 150 and 303, circuits are immediately completed to start the operation of a preheating timer T-11 and the operation of the blower motor 149. The circuit starting the preheating timer T-11 includes the main cable 302, a conductor 304, a terminal 305 on the timer T-11, the rotor 306 of the timer, a terminal 307, an intermediate conductor 308, a line 309, and the other main cable 301. The circuit established at the same time to the blower motor 149, includes the main cable 302, a lead 310 extending to one side of normally closed contacts 311 of a relay R-9, a lead 312, and an intermediate conductor 313 extending from the lead 312 to one terminal of the motor 149, the other terminal of the motor being connected by a lead 314 to the other main cable 301.

During the operation of the timer T-11 and the blower motor 149, hot air is forced under pressure by the blower 140 through the casing 142 and the steam-heated radiator 143, through the air-inlet port of the cabinet, and upwardly through the cabinet to be expelled therefrom through the exhaust ports, the pressure of the air within the cabinet causing the door assemblies 110 on the exhaust ports to be moved to open position. In this operation, the interior of the cabinet and its contents are preheated preparatory to further treatment upon the admission of aqueous vapors into the cabinet.

Upon the timing out of the preheating timer T-11, a switch arm 314 therein moves downwardly into contact with a contact 315 to complete a circuit to a delaying timer T-12 to start the operation of the timer T-12 and also complete a circuit through that timer to energize a relay R-10, grounding one terminal of the control motor 130 and causing the motor to move the operating linkage controlled thereby to permit the weight of the door 127 at the air-inlet port to cause the door to move to closed position in seated engagement with the facing 124. The circuit completed to the timer T-12 to start the operation of that timer, includes the switch bar 314 of the timer T-11, the contact 315, a terminal 316 on the timer T-11, a lead 317 extending from the terminal 316 to a terminal 318 on the timer T-12, the rotor circuit of the timer T-12, a terminal 319, and an intermediate lead 320 extending from the terminal 319 to the conductor 309. At the same time, the operating circuit to the relay R-10 is completed through the timer T-12, as stated above. This latter circuit includes the terminal 318 of the timer T-12, a switch bar 321 in the timer, a contact 322 engaged by the switch bar 321, a terminal 323, and a conductor 324 extending from the terminal 323 to one side of the coil of the relay R-10, the other side of the coil being connected to the main electric cable 301 by means of an intermediate conductor 325. The energization of the relay R-10 grounds a terminal 326 of the control motor 130 through a lead 327 and through the normally open, but now closed, upper contacts 328 of the relay R-10. The grounding of the terminal 326 of the control motor 130, and the consequent operation of the motor, permits the door 127 at the air intake port to be moved by gravity to closed position, as described above.

Upon the timing out of the timer T-12, a circuit is completed through the timer T-12 to start the operation of a timer T-13. A circuit is simultaneously completed to energize the relay R-9 and break the circuit to the blower motor 149, and another circuit is completed at the same time through the timer T-13 to energize and

open the main solenoid valve 59. The first of these circuits, that is, the circuit starting the operation of the timer T-13, includes the switch bar 321 in the timer T-12, a contact 329 engaged by the switch bar 321, a terminal 330, a lead 331, a conductor 332 that extends from the lead 331 to a terminal 333 on the timer T-13, the rotor circuit of the timer T-13, a terminal 334 on the timer T-13, and an intermediate conductor 335 electrically connected to the lead 309. The conductor 331 also extends to one side of the energizing coil of the relay R-9, the other side of this coil being connected to the line 309. The coil of the relay R-9 is thus energized simultaneously with the starting of the operation of the timer T-13, and the normally closed contacts 311 of the relay R-9 are opened to break the previously described circuit to the blower motor 149 and stop its operation. The circuit completed at this time through the timer T-13 to the solenoid-operated steam valve 59 includes the terminal 333 of the timer T-13, a switch bar 336 in the timer, a contact 337 engaged by the switch bar 336, a terminal 338, and a conductor 339 extending from the terminal 338 to one side of the coil of the solenoid valve 59, the other side of the solenoid coil being connected to the main cable 301 by means of an intermediate conductor 340. In this condition of the circuit, the large solenoid operated valve 59 is held open to introduce hot aqueous vapors rapidly into the interior of the cabinet to raise the temperature and humidity inside the cabinet to a desired predetermined level to subject the hosiery or other fabric articles therein to treatment.

Upon the timing out of the timer T-13, the circuit to the solenoid-operated valve 59 is broken and the valve automatically moves to a closed position to interrupt the rapid passage of vapors therethrough into the cabinet. At the same time, a timer T-14 is energized to begin its operation, and a circuit is completed through the timer T-14 to open the smaller solenoid valve 65. When the timer T-13 times out, the switch arm 336 therein moves downwardly into contact with a contact 341, completing the operating circuit to the timer T-14 which includes, the switch arm 336, the contact 341, a terminal 342 on the timer T-13, a lead 343 extending from the terminal 342 to a terminal 344 on the timer T-14, the rotor circuit of the timer T-14, and a terminal 345 on the latter timer that is connected by an intermediate conductor 346 to the main electric cable 301. The circuit that is completed at this same time through the timer T-14 to the solenoid-operated valve 65, includes the terminal 344 of the timer T-14, a switch bar 347 of the timer T-14, a contact 348 engaged by the switch bar 347, a terminal 349 connected to the contact 348, and a lead 350 that extends from the terminal 349 to one side of the solenoid valve 65. The other side of the solenoid valve 65 is connected, by means of an intermediate conductor 351, to the main electric cable 301. It will be understood that by means of the last circuit described, the solenoid valve 65 will remain open to bleed aqueous vapors slowly into the cabinet to maintain the temperature and humidity therein for so long as the timer T-14 remains in operation.

When the timer T-14 times out, it automatically starts the operation of a drying timer T-15 and breaks the circuit to the solenoid valve 65 to stop the bleeding of aqueous vapors into the cabinet. At the same time, a circuit is completed through the timer T-15 to a relay R-11 to ground out a terminal 352 of the control motor 130 to cause the motor to rotate and cause the door 127 at the air-intake port of the cabinet to be moved to open position. Simultaneously, the blower motor 149 is again started to force hot air into the cabinet for drying purposes in the same manner as that previously described. When the timer T-14 times out, the switch bar 347 therein drops down into contact with a contact 353 and completes a circuit to the rotor circuit of the timer T-15. This circuit includes the switch arm 347, the contact 353,

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a terminal 354 on the timer T-14, a lead 355 extending from the terminal 354 to a terminal 356 to which one side of the rotor circuit of the timer T-15 is connected, this rotor circuit being connected on its other side to the electric cable 301 by means of a terminal 357 and an intermediate lead 358. At this time the circuit to the relay R-11 is completed through the timer T-15 and another circuit is completed to the blower motor 149. The circuit to the blower motor includes the terminal 356 on the timer T-15, a switch arm 359 in the timer T-15, a contact 360 engaged by the switch arm 359, and a terminal 361 on the timer T-15, to which the conductor 312 leading to the motor 149 is attached. The circuit to the relay R-11 is made through a lead 362 that extends from the conductor 312 to one side of the energizing coil of the solenoid, the other side of the coil being connected to the main electric cable 301 by means of a conductor 363. The energization of the relay R-11 grounds the terminal 352 of the control motor 130, through normally opened, but now closed, contacts 364 of the relay, to which a conductor 365 extending from the motor terminal 352 is connected.

When the timer T-15 times out, its switch arm 359 moves out of contact with the contact 360 to break the circuit to the relay R-11 and the blower motor 149, the switch arm moving into engagement with a contact 366 from which a circuit is completed to one primary terminal 367 of a transformer 368, this circuit including a terminal 369 on the timer T-15, and a conductor 370 extending from the terminal 369 to the primary terminal 367 of the transformer. Another terminal 371, on the primary side of the transformer 368, is connected to the main electric cable lead 301 by means of a conductor 372. The secondary side of the transformer 368 is connected, by means of leads 373 and 374, to an electric bell 375 that is adapted to ring and inform the operator of the cabinet that the entire automatic cycle of operation has been completed and the doors 28 of the cabinets may be opened and the treated and dried hosiery or other fabric articles removed.

All of the motor-driven timers referred to above may be set for any desired time duration. Thus, it will be understood that the duration of any particular phase of the automatic operation of the cabinet may be predetermined and selectively set on the control devices so as to cause the particular condition desired in the cabinet to be automatically produced and accurately reproduced time after time. If desired, any particular timer may be set for a zero time duration so as to eliminate entirely the phase of the operation controlled by it. For example, merely by turning the timers T-1, T-2 and T-3 in the control circuit of Fig. 13 to zero, or the timers T-11, T-12, T-13 and T-14 in Fig. 14 to zero, the treating cabinet of the present invention quickly becomes an automatically operated drying cabinet. A wide variety of other individual operations may be performed in the cabinet, all of which will be readily apparent to those skilled in the art, and all of which may be accomplished as a result of the structure and the numerous adjustments and adjustable features associated with the cabinet.

Although one form of the invention has been shown and described by way of illustration, with modifications of certain portions thereof, it will be understood that it may be constructed in various other embodiments which come within the scope of the appended claims. It will also be understood that the apparatus of the present invention may be employed in the treatment of yarns and textile fibers prior to their fabrication into specific articles and that the terms "fabric" and "fabric articles" used in the appended claims are intended to include such yarns and fibers as well as hosiery and other goods manufactured therefrom.

I claim:

1. The combination in fabric-treating apparatus of the class described, of a cabinet having a port in a wall

thereof, means for introducing aqueous vapor into the interior of said cabinet, and one-way valve means for closing said port, said last-mentioned means including a facing about said port, a movable door pivotally mounted about an axis and normally resting by gravity in seated position upon said facing covering said port, the weight of said door upon said facing tending to retain said door in said seated position, and a counterweight movably mounted on said door and adjustable in position with respect thereto for selectively varying the effective weight of said door upon said facing, said counterweight and the principal mass of said door being disposed below the level of said axis.

2. The combination in fabric-treating apparatus as recited in claim 4, means in said cabinet for supporting fabric articles; and said means for introducing aqueous vapor into the interior of said cabinet comprising a vessel having its interior in unobstructed communication with the interior of said cabinet, and means for boiling water in said vessel to thereby introduce aqueous vapor into said cabinet in contact with said articles; whereby said one-way valve means will serve to control the maximum temperature of said aqueous vapor and the maximum pressure attainable in said cabinet, the pressure in said cabinet tending to unseat said door from said facing to open said port and relieve said pressure, and the effective weight of said door upon said facing being varied so as to vary the maximum pressure attainable in said cabinet.

3. The combination in fabric-treating apparatus of the class described, of a cabinet having a port in a wall thereof, means for introducing aqueous vapor into the interior of said cabinet, and one-way valve means for closing said port, said last-mentioned means including a facing about said port, a movable door pivotally mounted about an axis and normally resting by gravity in seated position upon said facing to close said port, the weight of said door upon said facing tending to retain said door in said seated position, and counterweights movably mounted on opposite sides of said door, each of said counterweights being adjustable in position with respect to said door for selectively varying the effective weight of said door upon said facing, said counterweights and the principal mass of said door being disposed below the level of said axis.

4. The combination in fabric-treating apparatus of the class described, of a cabinet having a port in a wall thereof, means for introducing aqueous vapor into said cabinet, and one-way valve means for closing said port, said last-mentioned means including a facing about said port, a floating pivot pin movably supported adjacent said facing, and a door assembly pivotally suspended from said pin and normally resting by gravity upon said facing in seated engagement therewith to close said port, the weight of said door assembly upon said facing tending to retain said door in seated position thereon and said floating pivot pin tending when said door is in said seated position to compensate for differences that may exist between the contours of the mutually engaged surfaces of said facing and said door assembly.

5. The combination in fabric-treating apparatus of the class described, of a cabinet having a port in a wall thereof, means for introducing aqueous vapor into said cabinet, and one-way valve means for closing said port, said last-mentioned means including a facing about said port, a floating pivot pin movably supported adjacent said facing, spring means in engagement with said pivot pin tending to retain said pin in predetermined position with respect to said facing, and a door assembly pivotally suspended from said pin and normally resting by gravity upon said facing in seated engagement therewith to close said port, the weight of said door assembly upon said facing tending to retain said door in seated position thereon and said floating pivot pin tending when said door is in said seated position to compensate for differences

that may exist between the contours of the mutually engaged surfaces of said facing and said door assembly.

6. The combination in fabric-treating apparatus of the class described, of a cabinet having a port in a wall thereof, means for introducing aqueous vapor into said cabinet, and one-way valve means for closing said port, said last-mentioned means including a facing about said port, a floating pivot pin movably supported adjacent said facing, a door element pivotally suspended from said pin and normally resting upon said facing in seated engagement therewith to close said port, the weight of said door element upon said facing tending to retain said door element in seated position thereon and said floating pin tending when said door element is in said seated position to compensate for differences that may exist between the contours of the mutually engaged surfaces of said facing and said door element, and a counterweight movably mounted upon said door element and adjustable in position with respect thereto for selectively varying the effective weight of said door element upon said facing.

7. The combination in fabric-treating apparatus of the class described, of a cabinet having a port in a wall thereof, means for introducing aqueous vapor into said cabinet, and one-way valve means for closing said port, said last-mentioned means including a facing about said port, a floating pivot pin movably supported adjacent said facing, a door element pivotally suspended from said pin and normally resting upon said facing in seated engagement therewith to close said port, the weight of said door element upon said facing tending to retain said door element in seated position thereon and said floating pin tending when said door element is in said seated position to compensate for differences that may exist between the contours of the mutually engaged surfaces of said facing and said door element, and counterweights movably mounted on opposite sides of said door element, each of said counterweights being adjustable in position with respect to said door element for selectively varying the effective weight of said door upon said facing.

8. The combination in fabric-treating apparatus of the class described, of a cabinet having an air-inlet port and an exhaust port, an inclined facing around an exterior opening of said exhaust port, a pivotally mounted outer door movable on the exterior of said cabinet and normally resting by gravity in seated position on said facing, the weight of said outer door upon said facing tending to retain said outer door in said seated position to close said exhaust port, a second inclined facing around an inner opening of said air-inlet port, a pivotally mounted inner door movable within said cabinet and normally resting by gravity in seated position on said second facing to close said inlet port, and means for admitting aqueous vapor into said cabinet, the pressure of said vapor in said cabinet tending to hold said inner door in seated position on said second facing and to lift said outer door off said first-mentioned facing to open said exhaust port and relieve said pressure.

9. The combination in fabric-treating apparatus of the class described, of a cabinet having an air-inlet port and an exhaust port, an inclined facing around an exterior opening of said exhaust port, a pivotally mounted outer door movable on the exterior of said cabinet and normally resting by gravity in seated position on said facing, the weight of said outer door upon said facing tending to retain said outer door in said seated position to close said exhaust port, a second facing around an inner opening of said air-inlet port, an inner door movable within said cabinet against said second facing to close said inlet port, means for admitting aqueous vapor into said cabinet, the pressure of said vapor in said cabinet tending to hold said inner door in seated position against said second facing and to lift said outer door off said first mentioned facing to open said exhaust port and relieve said pressure, and a counterweight movably mounted on said outer door and adjustable in position with respect thereto for selectively varying the effective

weight of said outer door upon said first-mentioned facing and thereby varying the maximum pressure attainable in said cabinet.

10. The combination in fabric-treating apparatus of the class described, of a cabinet having an air-inlet port and an exhaust port, an inclined facing around an exterior opening of said exhaust port, a pivotally mounted outer door movable on the exterior of said cabinet and normally resting by gravity in seated position on said facing, the weight of said outer door upon said facing tending to retain said outer door in said seated position to close said exhaust port, a second inclined facing around an inner opening of said air-inlet port, a pivotally mounted inner door movable within said cabinet and normally resting by gravity in seated position on said second facing, the weight of said inner door upon said second facing tending to retain said inner door in seated position thereon to close said air-inlet port, motor-driven means for lifting said inner door from said second inclined facing to open said inlet port, and means for forcing air through said inlet port and into said cabinet, the pressure of said air in said cabinet being adapted to lift said outer door off said first-mentioned facing to open said exhaust port and permit passage of said air through said cabinet.

11. The combination in fabric-treating apparatus of the class described, of a cabinet having an exhaust port in a wall thereof, means in said cabinet for supporting fabric articles, means including a first valve for admitting hot aqueous vapor at a rapid rate into said cabinet in contact with said articles quickly to raise the temperature in said cabinet to a predetermined temperature and to subject said articles to treatment by said vapor, means including a second valve smaller than said first valve for thereafter bleeding hot aqueous vapor at a lesser rate into said cabinet to maintain said predetermined temperature during said treatment, and one-way valve means in association with said exhaust port for controlling the maximum pressure and vapor temperature attainable in said cabinet, said last-mentioned means including a facing about the exterior opening of said exhaust port, a pivotally mounted door movable on the exterior of said cabinet and normally resting by gravity in seated position on said facing, the weight of said door upon said facing tending to retain said door in said seated position to close said exhaust port and excessive pressure in said cabinet being adapted to lift said door off said facing to thereby open said exhaust port and relieve said pressure.

12. The combination in fabric-treating apparatus of the class described, of a cabinet having an air-inlet port and an exhaust port, means in said cabinet for supporting fabric articles, means including a first valve for introducing hot aqueous vapor at a rapid rate into said cabinet in contact with said articles quickly to raise the temperature in said cabinet to a predetermined temperature and to subject said articles to treatment by said vapor, means including a second valve automatically operative thereafter to bleed hot aqueous vapor at a lesser rate into said cabinet to maintain said predetermined temperature during said treatment, and means for introducing air under pressure through said inlet port and exhausting said aqueous vapor and air through said outlet port upon termination of said treatment.

13. The combination in fabric-treating apparatus of the class described, of a cabinet having an air-inlet port and an exhaust port, means in said cabinet for supporting fabric articles, means including a thermostatically operated first valve for admitting hot aqueous vapor at a rapid rate into said cabinet in contact with said articles quickly to raise the temperature in said cabinet to a predetermined temperature and to subject said articles to treatment by said vapor, means including a second thermostatically operated valve for thereafter bleeding hot aqueous vapor at a lesser rate into said cabinet to maintain said predetermined temperature during said treatment, and means for introducing air under pressure

through said inlet port and exhausting said aqueous vapor and air through said exhaust port upon termination of said treatment.

14. The combination in fabric-treating apparatus of the class described, of a substantially vapor-tight cabinet, means in said cabinet for supporting fabric articles, a first thermostat responsive to temperature in said cabinet, means including a valve operated by said first thermostat for introducing hot aqueous vapor at a rapid rate into said cabinet in contact with said articles to raise the temperature in said cabinet to a predetermined temperature and to subject said articles to treatment by said vapor, a second thermostat responsive to temperature in said cabinet, and means including a second valve operated by said second thermostat for bleeding hot aqueous vapor at a lesser rate into said cabinet to maintain said predetermined temperature during said treatment.

15. The combination in fabric-treating apparatus of the class described, of a substantially vapor-tight cabinet having an air-inlet port and an exhaust port, a pair of radiant-heating coils in said cabinet in spaced and opposed position, means in said cabinet for supporting fabric articles between said radiant-heating coils, means for introducing hot fluid through said heating coils independently to heat the interior of said cabinet and said articles, means including a first valve for introducing hot aqueous vapor at a rapid rate into said cabinet in contact with said articles quickly to raise the temperature in said cabinet to an elevated predetermined temperature and to subject said articles to treatment by said vapor, means including a second valve for thereafter bleeding hot aqueous vapor at a lesser rate into said cabinet to maintain said predetermined temperature during said treatment, and means for introducing air under pressure through said inlet port and exhausting said aqueous vapor and air through said outlet port upon termination of said treatment.

16. The combination in fabric-treating apparatus of the class described, of a substantially vapor-tight cabinet having an air-inlet port and an exhaust port, a radiant-heating coil within said cabinet in the upper portion thereof, means in said cabinet for supporting fabric articles beneath said radiant-heating coil, means for introducing hot fluid through said coil to heat the interior of said cabinet and said articles, means including a first valve for introducing hot aqueous vapor at a rapid rate into said cabinet in contact with said articles quickly to raise the temperature in said cabinet to an elevated predetermined temperature and to subject said articles to treatment by said vapor, means including a second valve for thereafter bleeding hot aqueous vapor into said cabinet at a lesser rate to maintain said predetermined temperature during said treatment, and means for introducing air under pressure through said inlet port and exhausting said aqueous vapor and air through said outlet port upon termination of said treatment.

17. The combination in fabric-treating apparatus of the class described, of a substantially vapor-tight cabinet having an air-inlet port and an exhaust port, a radiant-heating coil within said cabinet in the upper portion thereof, means in said cabinet for supporting fabric articles beneath said radiant-heating coil, means for introducing hot fluid through said coil to heat the interior of said cabinet and said articles, means including a first valve for introducing hot aqueous vapor at a rapid rate into said cabinet in contact with said articles quickly to raise the temperature in said cabinet to an elevated predetermined temperature and to subject said articles to treatment by said vapor, means including a second valve for thereafter bleeding hot aqueous vapor into said cabinet at a lesser rate to maintain said predetermined temperature during said treatment, means for introducing air under pressure through said inlet port and exhausting said aqueous vapor and air through said outlet port upon termination of said treatment, and one-way valve means

in association with said exhaust port for controlling the maximum pressure and vapor temperature attainable in said cabinet, said last-mentioned means including a facing about an exterior opening of said exhaust port, a pivotally mounted door movable on the exterior of said cabinet and normally resting by gravity in seated position on said facing, the weight of said door upon said facing tending to retain said door in said seated position to close said exhaust port and excessive pressure in said cabinet being adapted to lift said door off said facing and thereby open said exhaust port and relieve said pressure.

18. The combination in fabric-treating apparatus of the class described, of a cabinet having an exhaust port, means in said cabinet for supporting fabric articles, means for introducing aqueous vapor into said cabinet in contact with said articles, means for preheating the interior of said cabinet prior to the introduction of said aqueous vapor, means for automatically determining the duration of the preheating period, the duration of the introduction of aqueous vapor and the interval between said preheating period and the introduction of said aqueous vapor, and means including a valve in association with said exhaust port for automatically controlling the maximum pressure and vapor temperature attainable in said cabinet.

19. The combination in fabric-treating apparatus of the class described, of a cabinet, means in said cabinet for supporting fabric articles, means for introducing aqueous vapor into said cabinet in contact with said articles, means for preheating the interior of said cabinet and said articles prior to the introduction of said aqueous vapor, and means for automatically determining the time duration of the preheating period, the time duration of the introduction of aqueous vapor and the time interval between said preheating period and the introduction of said aqueous vapor.

20. The combination in fabric-treating apparatus of the class described, of a cabinet, means in said cabinet for supporting fabric articles, means for introducing aqueous vapor into said cabinet in contact with said articles, preheating means for heating the interior of said cabinet and said articles prior to the introduction of said aqueous vapor, thermostatic means responsive to temperature in said cabinet for controlling the duration of the operation of said preheating means, and means actuated in response to operation of said thermostatic means for automatically determining the time duration of the introduction of said aqueous vapor.

21. The combination in fabric-treating apparatus of the class described, of a cabinet, means in said cabinet for supporting fabric articles, means for introducing aqueous vapor into said cabinet in contact with said articles, preheating means for heating the interior of said cabinet and said articles prior to the introduction of said aqueous vapor, a timer operative to control the duration of the operation of said preheating means, thermostatic means responsive to the temperature in said cabinet for starting the operation of said timer, and means actuated in response to the timing-out of said timer for automatically starting and determining the duration of the introduction of said aqueous vapor.

22. The combination in apparatus of the class described, of a cabinet, means in said cabinet for supporting fabric articles, preheating means for heating the interior of said cabinet and said articles, a preheat timer for controlling the duration of operation of said preheating means, a delaying timer actuated in response to the timing out of said preheat timer, and means actuated in response to the timing out of said delaying timer for introducing aqueous vapor into said cabinet in contact with said articles and for automatically determining the duration of the introduction of said aqueous vapor.

23. The combination in fabric-treating apparatus of the class described, of a cabinet having a door opening through which fabric articles may be introduced into said

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cabinet, means in said cabinet for supporting said articles, doors for closing said opening, means for supplying heat to the interior of said cabinet, a timer for determining the duration of operation of said heat-supplying means, means actuated by the closing of said doors for starting the operation of said timer and said operation of said heat-supplying means, a delaying timer actuated in response to the timing out of said first-mentioned timer, means including a first valve automatically opened in response to the timing out of said delaying timer for introducing aqueous vapor into said cabinet in contact with said articles, means including a thermostat responsive to temperature in said cabinet for closing said first valve, a second thermostat responsive to temperature in said cabinet rendered operative by said first-mentioned thermostat, means including a second valve operated by said second thermostat for bleeding aqueous vapor into said cabinet, a third timer actuated by said first-mentioned thermostat for determining the operative period of said second valve, and means actuated in response to the timing out of said third timer for starting a second operation of said heat-supplying means.

24. The combination in fabric-treating apparatus of the class described, of a cabinet having a door opening through which fabric articles may be introduced into said cabinet, means in said cabinet for supporting said articles, doors for closing said opening, means for supplying heat to the interior of said cabinet, a preheat timer for determining the duration of a first operation of said heat-supplying means, means actuated by the closing of said doors for starting the operation of said preheat timer and said first operation of said heat-supplying means, a delaying timer actuated in response to the timing out of said preheat timer, and means including a valve automatically opened in response to the timing out of said delaying timer for introducing aqueous vapor into said cabinet in contact with said articles.

25. The combination in fabric-treating apparatus of the class described, of a substantially vapor-tight cabinet, means in said cabinet for supporting fabric articles, a motor-driven timer, means including a valve controlled by said timer for introducing aqueous vapor into said cabinet to elevate the temperature therein and subject said articles to treatment by said vapor, a second motor-driven timer actuated in response to the timing out of said first-men-

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tioned timer, and means including a second valve controlled by said second timer for bleeding hot aqueous vapor into said cabinet to maintain the elevated temperature in said cabinet.

26. The combination in fabric-treating apparatus of the class described, of a substantially vapor-tight cabinet, means in said cabinet for supporting fabric articles, means for supplying heat to the interior of said cabinet, a timer for determining the duration of operation of said heat-supplying means, a delaying timer actuated in response to the timing out of said first-mentioned timer, a third timer actuated in response to the timing out of said delaying timer, means including a valve controlled by said third timer for introducing hot aqueous vapor into said cabinet to further elevate the temperature therein and subject said articles to treatment by said vapor, a fourth timer actuated in response to the timing out of said third timer, and means including a second valve controlled by said fourth timer for bleeding hot aqueous vapor into said cabinet to maintain the elevated temperature in said cabinet.

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