Feb. 17, 1942. E. E. LICHTERMAN 2,273,119

STEAMING AND DRYING APPARATUS

Filed Dec. 19, 1938 4 Sheets-Sheet 1

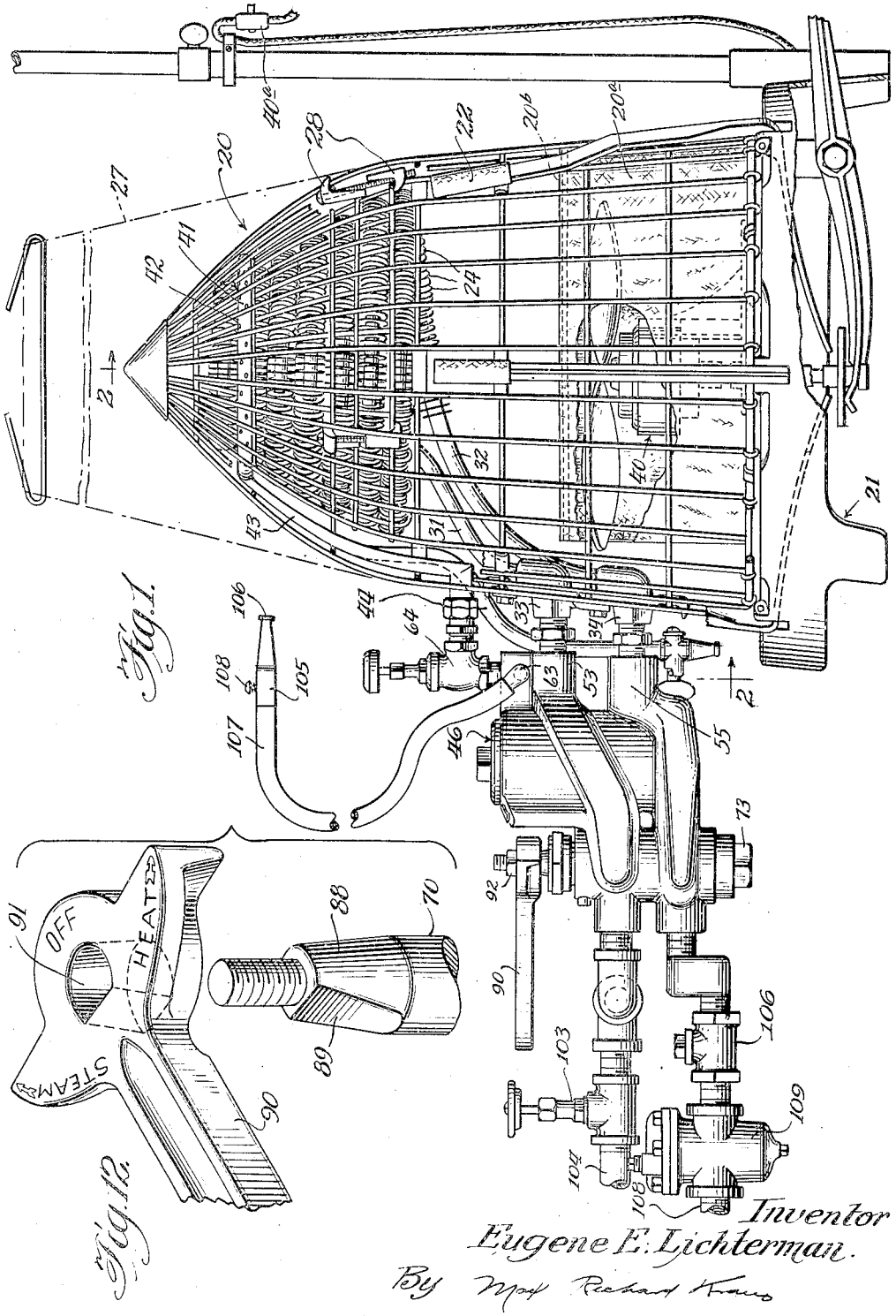


Fig. 1.

Fig. 12.

Inventor
Eugene E. Lichterman.
By Mott Richard Evans
Atty.

Feb. 17, 1942. E. E. LICHTERMAN 2,273,119

STEAMING AND DRYING APPARATUS

Filed Dec. 19, 1938 4 Sheets-Sheet 2

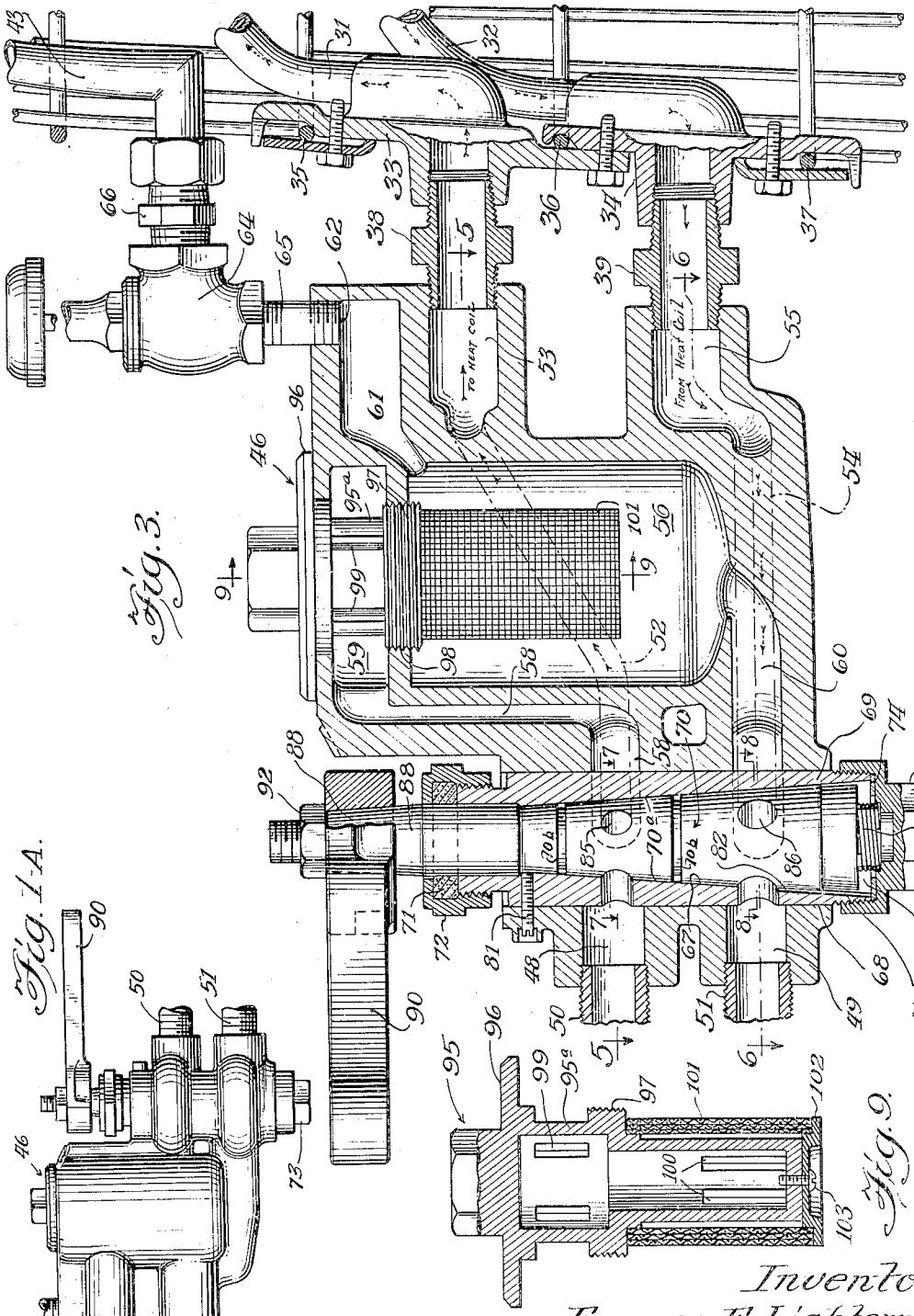


Fig. 3.

Fig. 1-A.

Fig. 9.

Inventor
Eugene E. Lichterman
By Mary Rachael Lichterman
Atty

Feb. 17, 1942. E. E. LICHTERMAN 2,273,119

STEAMING AND DRYING APPARATUS

Filed Dec. 19, 1938 4 Sheets-Sheet 3

Fig. 10.

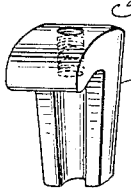


Fig. 11.

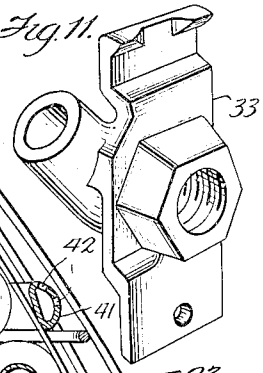


Fig. 2

Inventor
Eugene E. Lichterman
By Mast Reichard Frau
Atty.

Feb. 17, 1942. E. E. LICHTERMAN 2,273,119

STEAMING AND DRYING APPARATUS

Filed Dec. 19, 1938 4 Sheets-Sheet 4

Fig. 4.

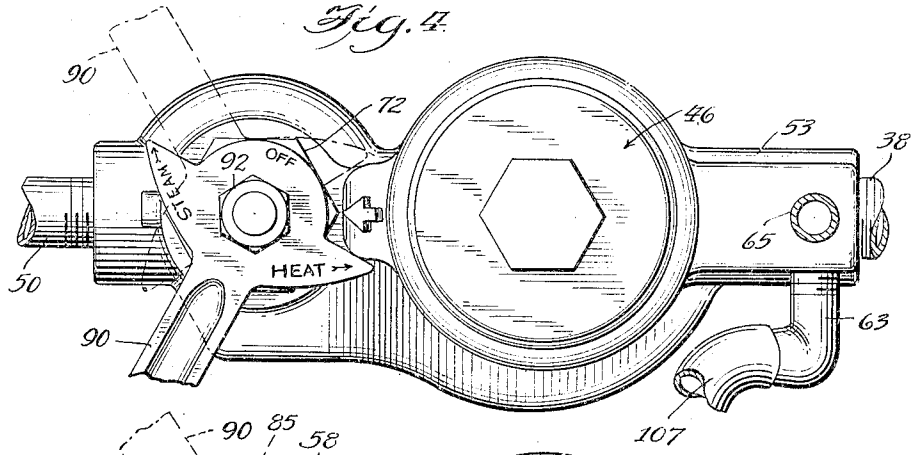


Fig. 5.

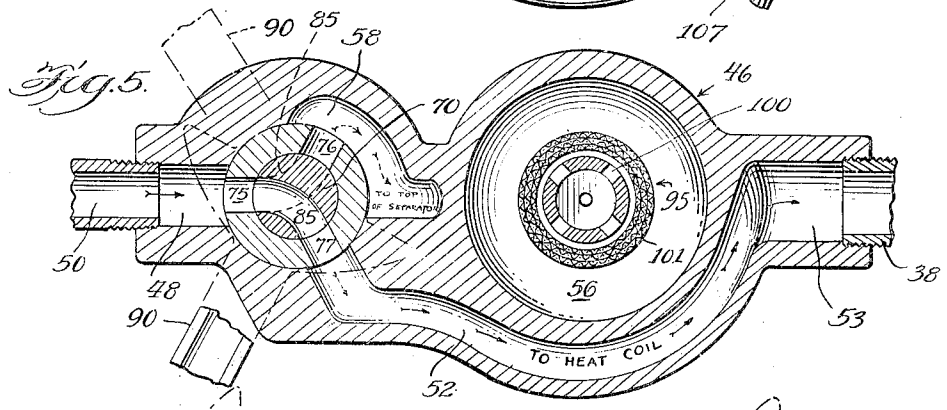


Fig. 7.

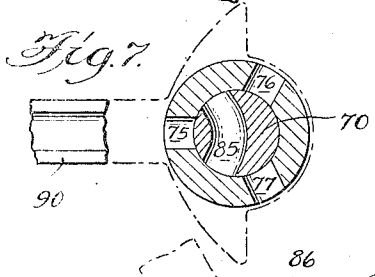


Fig. 8.

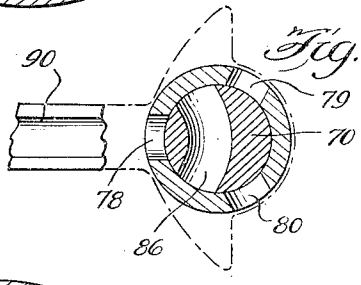
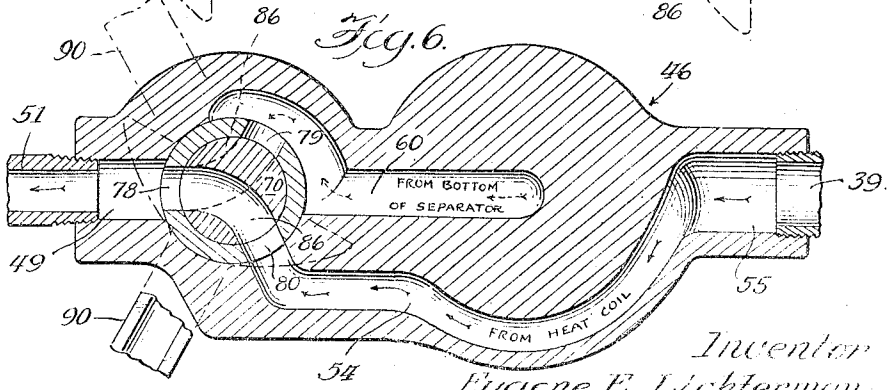


Fig. 6.



Inventor
Eugene E. Lichterman
By May Richard Kraus
Atty.

Patented Feb. 17, 1942

2,273,119

UNITED STATES PATENT OFFICE

2,273,119

STEAMING AND DRYING APPARATUS

Eugene E. Lichterman, Chicago, Ill.

Application December 19, 1938, Serial No. 246,599

2 Claims. (Cl. 223—70)

The invention relates to improvements in steaming and drying apparatus and more particularly to such as are used for steaming and drying garments and the like.

One of the objects of this invention is the provision of a combined steaming and drying apparatus wherein a garment is subjected to diffused steam and then dried.

Another object of this invention is the provision of a steaming and drying apparatus in which a large volume of steam heated air is directed against a garment to effect an immediate drying thereof.

A further object of this invention is the provision of a unit valve construction wherein a single movement of the valve lever serves to admit steam into a diffusing ring for purposes of dampening a garment, and a similar reverse movement of the lever serves to shut off the admission of steam to the diffusing ring and to admit steam to the heating coils for purposes of drying said garment.

A still further object of this invention is the provision of a device of the character described wherein a minimum of effort and manipulation is required for operation.

A still further object of this invention is the provision of a combined steaming and drying apparatus which is simple in construction and highly efficient in operation.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts, as hereinafter more specifically described and illustrated in the accompanying drawings wherein is shown a device in accordance with this invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the appended claims.

In the drawings wherein like reference characters denote corresponding parts through the several views:

Fig. 1 is an elevational view showing an embodiment of my invention and a preferred manner of connecting same to a source of steam supply.

Fig. 1A is a rear elevational view of the valve structure shown in Fig. 1.

Fig. 2 is an enlarged sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged vertical longitudinal cross sectional view of the valve structure shown in Fig. 1.

Fig. 4 is an enlarged plan view of the valve structure shown in Fig. 1.

Fig. 5 is a horizontal cross sectional view taken on line 5—5 of Fig. 3.

Fig. 6 is a similar view taken on line 6—6 of Fig. 3.

Fig. 7 is a horizontal sectional view taken on line 7—7 of Fig. 3 showing the valve in normal off position.

Fig. 8 is a similar view taken on line 8—8 of Fig. 3.

Fig. 9 is a vertical sectional view taken on line 9—9 of Fig. 3.

Fig. 10 is an enlarged perspective view of a clamping lug.

Fig. 11 is a similar view of another combined lug and coupling.

Fig. 12 is a fragmentary perspective view of the valve control handle and mounting.

In the drawings, wherein for purposes of illustration is shown a preferred embodiment of my invention, the numeral 20 designates a guard cage supported on a base 21, and provided with clamping arms 22, reference being directed to applicant's Patent No. 2,094,042, issued September 28, 1937, in which the construction is described in detail. A spiraled coil 23 provided with annular fins 24, integrally formed therewith, is mounted within the cage 20 and is supported by stirrups 25 which depend from the annular rib 26 of the cage 20. Cooperating lugs 28, engaging the stirrup bracing rib 29 and the cage bracing rib 30, serve to secure the coil 23 rigidly in the cage 20. The terminal portions of the coil 23 are coupled to conduit tubes 31 and 32 which lead to lug couplings 33 and 34, respectively, shown in detail in Figs. 3 and 11. Said lug couplings are adapted to be mounted on the annular bracing ribs 35, 36 and 37 of the cage 20 and are drilled for engagement with the conduit tubes 31 and 32, and for threaded engagement with the couplings 38 and 39 respectively. An electric fan 40 mounted on the base 21 and actuated by a suitable switch 40a is adapted to direct a large volume of air upwardly over the coil 23 and fins 24 to cause the air to be heated when steam is circulated through said coils in a manner presently to be described.

A canvas hood 20a is arranged to enclose the lower portion of the cage structure 20 and is provided with annular spring means 20b which serve to support said hood on the cage. The hood is adapted to be adjustable so that the air intake area which is substantially the entire lower portion of the cage can be varied. When the hood 20a substantially encloses the lower cage portion the air intake area is reduced and consequently a smaller volume of air is blown by the fan 40.

As more of the intake area is exposed a greater volume of air is correspondingly blown by the fan. It is particularly necessary to be able to vary the air pressure produced by the fan because garments of different materials will be positioned over the machine for drying. It will be obvious that if a garment of fine dainty material were subjected to a strong blast of air the garment would be irreparably damaged. It will thus be seen that by the use of a simple hood a control of air pressure is effectively accomplished without the use of expensive electrical equipment to control the speed of the motor.

A steam ring 41 comprising a tube provided with apertures 42, positioned so that steam is directed upwardly and outwardly, is mounted on the interior at the cage 20 and serves to diffuse the steam uniformly in a garment 27 placed over the cage 20. One end of said steam ring is connected by a conduit pipe 43 to a valve 64, presently to be described, and the other end is provided with an extension 44 and a pet cock 45 which serves to permit the escape of water which may be in the ring 41. It will be seen that by forming the apertures 42, in the top of the ring 41, a channel is provided in the lower portion of said ring wherein condensate might flow. In this manner, the danger of the condensate being forced through the steam apertures 42 and being splashed on a garment is minimized.

The valve housing structure indicated generally at 46 is provided with a plurality of ports and channels presently to be described, through which steam is arranged to flow.

Referring to Fig. 3, steam inlet and outlet return ports 48 and 49, respectively, are provided in the housing 46 and are tapped to receive couplings 50 and 51 for conduit pipes and other necessary equipment subsequently to be described. Positioned in a horizontal plane of alignment with the inlet port 48 is a channel 52 shown in Fig. 5, and by the dotted lines in Fig. 3. Said channel leads to the outlet port 53 of the housing 46 and connects to a coupling 38 which is connected to the conduit 31 of the heating coil 23. Positioned in similar alignment with the outlet return port 49 is a channel 54 shown in Fig. 6, and by the dotted line in Fig. 3. Said channel leads to the inlet return port 55 of the housing and connects to a coupling 39 which is connected to the return conduit 32 of the heating coil 23. It will be seen by reference to Figs. 5 and 6 that the channels 52 and 54 by-pass the steam separating chamber 56 formed in the housing 46.

Positioned in the same horizontal plane as the channel 52, but apart therefrom, is a channel 58 which turns upwardly and leads to a chamber 59 above the steam separating chamber 56. A return channel 60 leads from the bottom of the steam separating chamber 56. Leading from the top of said separating chamber is a channel 61 which leads to a steam outlet port 62. An angle valve 64 is secured to said steam outlet port by a nipple 65 and to the conduit 43 by a coupling 66.

Referring to Fig. 3, the valve housing 46 is provided with a vertical bore 68 in which is fitted a cylindrical bushing 69 having a tapering internal bore 67 which serves as a seat for a correspondingly shaped valve core 70. The bushing 69 is threaded at the top and is provided with a packing 71 and a packing nut 72. The bottom of the bushing 69 is provided with a cap 73 and packing washer 74. A spring 77 abuts the inner side of the cap 73 and the bottom of the valve core 70 and serves to maintain said core firmly in its seat. Apertures which are adapted to serve as port openings are formed in the bushing in a horizontal plane 120° apart. Referring to Figs. 7 and 8, it will be seen that two sets of port openings are provided. The upper set comprising the ports 75, 76 and 77 are arranged to be in horizontal alignment with the intake port 48 of the valve and the lower set of ports 78, 79 and 80 are arranged to be in horizontal alignment with the outlet return port 49. A set screw 81 serves to hold the bushing 69 in fixed immovable position in the valve housing 46. A channel 82 formed in the inner wall of the bushing 69 and extending from the port 78 to the edge of said bushing serves to permit the entrance of steam into the chamber 83 formed between the cap 73 and the bottom side of the valve core 70. As the steam pressure becomes greater a tighter fit between the valve core 70 and the seat becomes necessary. By permitting the steam to enter the chamber 83 the pressure on the bottom of the valve core 70 is equalized with that in the steam line and consequently the fit between the valve core and its seat is automatically self adjusted to conform to the changing conditions of steam pressure.

The valve core 70 is provided with a tapering portion 70*a* which is adapted to cooperate with the tapering internal bore 67 of the bushing 69 which serves as a valve seat for said valve core. Substantially V shaped conduits 85 and 86 having their ports 120° apart are provided in the tapered portion 70*a* and are arranged to be in a horizontal plane of alignment with the apertures 75, 76, 77 and 78, 79 and 80 respectively of the bushing 69. As will be seen by reference to Figs. 5 and 6, the conduits 85 and 86 are arranged to register with any two adjoining apertures of the bushing which are in the same horizontal plane. Annular channels 70*b* are provided in the tapering portion 70*a* and are adapted to be filled with lubricant for lubricating the valve seat in the bushing 69. The upper portion 88 of the valve core 70 is tapered and is provided with a flat portion 89 as shown in Fig. 12. A valve control handle 90 having a correspondingly shaped bore 91 is adapted to be positioned on said upper portion 88 and is secured thereon by a nut 92.

A conventional steam separator 95 shown in detail in Fig. 9, is adapted to be fitted in the chamber 56 provided in the housing 46. The steam separator comprises a tubular member 95*a* having an enlarged cover portion 96 and a threaded portion 97 adapted to engage threads 98 in the top portion of the chamber 56. A plurality of longitudinal slots 99 are provided in the top portion of the member 95 for the admission of steam therein and similar slots 100 are provided in the lower portion for the exit of the steam. Several layers of wire gauze 101 are wrapped around the lower portion of the member 95 and are held in position by a flanged disc 102 secured by a suitable bolt 103.

In Fig. 1 is shown a preferred manner of connecting the device to a source of steam supply. A globe valve 103 is mounted in the steam inlet pipe 104 while a check valve 106 and water trap 107 are mounted in the steam return pipe 108.

In operation a garment 27 is positioned over the cage 20 and secured thereon by the clamping members 22 in a manner as described in Patent No. 2,094,042, issued September 28, 1937. To steam the garment 27, the valve handle 90 is

moved in a clockwise direction to the limit of its travel. In this position the conduits **85** and **86** of the valve core **70** register with the apertures **75**, **76** and **78**, **79** respectively of the bushings **69**, as shown by the dotted lines in Figs. 5 and 6. Steam from the inlet pipe **104** will then enter the conduit **85**, pass through the aperture **76** into the channel **58**, and then will pass into the upper chamber **59** where it will enter the inlet slots **99** of the separator **95**. In the separator **95** the water will be removed from the steam and fall to the bottom of the chamber **56** and flow through the channel **60** into the port **79** through the conduit **86** and out through the return port **78** of the valve housing **46**. When the device has not been used for some time it is desirable to permit steam to circulate for a short time before opening the angle valve **64** so that all condensate in the steam will be carried out through the trap **109** and the lines will be freed of water. When the valve **64** is opened, dry steam in the chamber **56** will pass through the channel **61**, through the valve **64**, through the conduit pipe **43**, and into the steam ring **41** where it will be diffused upwardly and outwardly through the apertures **42** in the general direction of the garment **27**. Since the apertures **42** are positioned in the upper portion of the ring **41**, a channel is provided in the lower portion for draining off condensate which might gather in the ring **41**. In this way only steam escapes through the apertures **42** while the condensate with some steam is drained off through the conduit extension **44**.

To dry the garment the steam is adapted to be passed through the heating coils and the same is effected in the following manner. The valve control handle **90** is moved in a counterclockwise direction so that the conduits **85** and **86** of the valve core **70** register with the ports **75**, **77** and **78**, **80** respectively of the bushing **69**, as shown by the solid lines in Figs. 5 and 6.

Steam from the inlet pipes **104** will enter the conduit **85** and will necessarily flow through the port **77**, through the chamber **52**, through the conduit pipe **31**, into the heating coils **23** and in returning will flow through the conduit pipe **32**, through channel **54**, through the conduit **86** and into the return pipe **108**.

The fan **40** is operated by actuating the switch **40***a* and is maintained in continuous operation during the time that steam is passing through the steam coil **23**. The high speed at which the fan operates causes a large volume of air to pass over the steam coil **23** and be heated, the heated air passing upwardly and into the garment suspended over the cage to dry the garment. In normal off position, the lever **90** is positioned, as shown in Figs. 7 and 8 so that the apertures **75**, **76**, **77** and **78**, **79** and **80** of the bushing **68** are not in registering alignment with the conduits **85** and **86** of the valve core, respectively.

As shown in Fig. 1, a nozzle **105** having a discharge aperture **106** is coupled to a flexible hose **107** which is connected to the port **63**. Said nozzle is provided with a valve control **108** for opening and closing the discharge aperture **106** of the nozzle **105**. The means above described permit an operator to direct a stream of steam against a particular section of the garment **27**. The steam treatment is thus localized and concentrated for more efficient action.

While it is particularly desirable to use a unit valve structure combining the features hereinbefore described, it will be understood that valve constructions operating independently of each other can be used to control the flow of steam into the steam coil and the steam diffusing ring.

It will be seen that I have provided a machine for efficiently steaming and drying garments and requiring a minimum of effort in the operation thereof. By a simple movement of a control, steam is admitted to a diffusing element for steaming the garment and by a similar reverse movement the control shuts off the steam to the diffusing element and admits steam to a coil which serves to heat a large volume of air directed over said coil by a fan, the heated air effecting a drying of the garment.

It is to be understood that the form of my invention herein shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the appended claims.

I claim:

1. In a machine of the character described a cage structure, means for securing a garment thereover in an open position, a heat exchanger mounted in the upper portion of said cage structure, said heat exchanger formed of a continuous coil arranged substantially in conical form, means for discharging steam upwardly into the interior of said garment, said means comprising a tubular ring having a plurality of upwardly directed apertures and being disposed proximate to said heat exchanger and adapted to be heated thereby whereby condensation of steam in said steam discharging means is substantially eliminated and condensation initially present in said tubular ring is conducted away, and means for directing a current of air over said heat exchanger and into said garment to dry same.

2. In a machine of the character described, a cage structure, means for securing a garment thereover in an open position, a heat exchanger mounted in said cage structure, means comprising an annular perforated tube with the perforations in the upper portion of said tube for diffusing steam in the direction of said garment, and for conducting away condensation in said tube, said means being disposed proximate to said heat exchanger and adapted to be heated thereby whereby condensation of steam in said steam diffusing means is substantially eliminated, an upwardly delivering fan arranged to direct a current of air over said heat exchanger and into said garment to dry same.

EUGENE E. LICHTERMAN.