

- [54] **DURABLE PRESS METHOD AND APPARATUS**
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 [73] Assignee: **McGraw-Edison Company**, Elgin, Ill.
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- [52] U.S. Cl. **34/210, 34/77, 34/105, 34/212, 34/225, 8/149.2, 55/442, 223/51**
 [51] Int. Cl. **F26b 19/00**
 [58] Field of Search **34/36, 37, 46, 72-79, 34/105, 216-219, 225; 223/51; 8/149.2; 55/442-446**

[56] **References Cited**

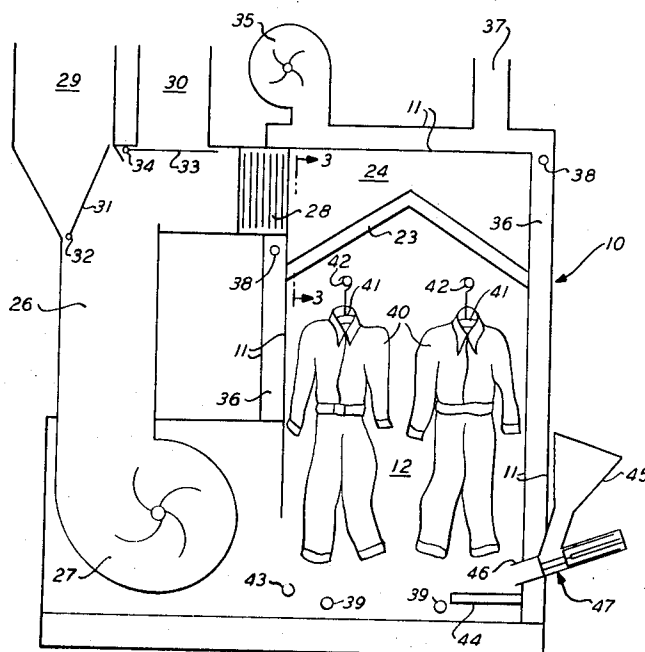
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[57] ABSTRACT

A method and apparatus for providing fabric articles with a durable press on a commercial scale comprises an elongate treating chamber with loading and unloading doors at the ends and with a circulating conduit leading from the bottom of the chamber to an overhead manifold separated from the chamber by a specially slotted ceiling. The conduit includes a blower, exhaust and air inlet ducts with dampers for either exhaust circulation or closed-circuit circulation, and a heat exchanger. Opening into the chamber are headers for injecting steam and sulphur dioxide gas, and a device for feeding formaldehyde to be vaporized into formaldehyde gas. Cool air and water spray are injected into hollow walls of the chamber to cool the same to room temperature after each treating cycle. A step in each treating cycle after the steam is cut off comprises an exhaust heating to rid the articles of free chemicals and steam and a closed-circuit heating to raise the temperature to at least 250°F.

5 Claims, 9 Drawing Figures



SHEET 1 OF 5

FIG. 1

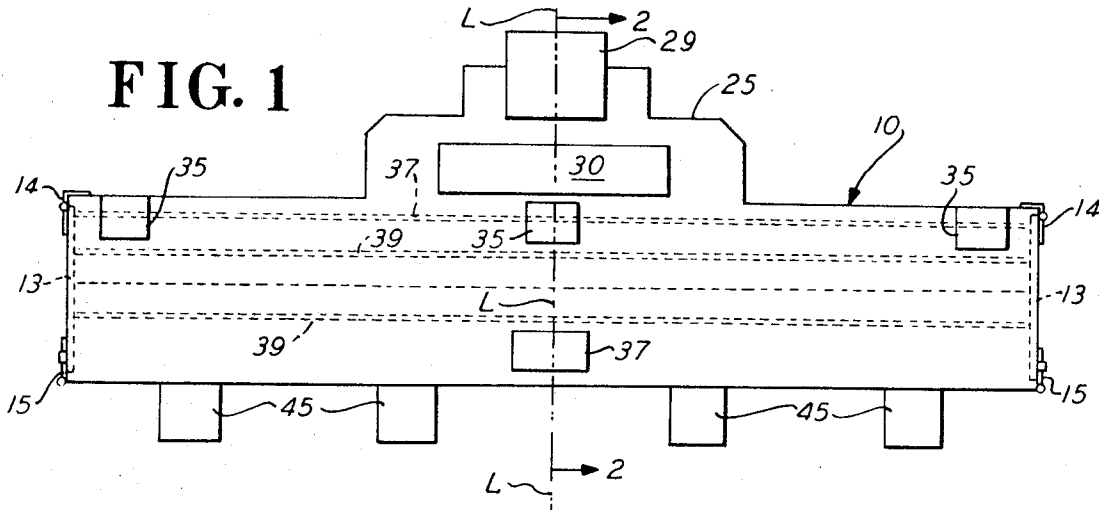
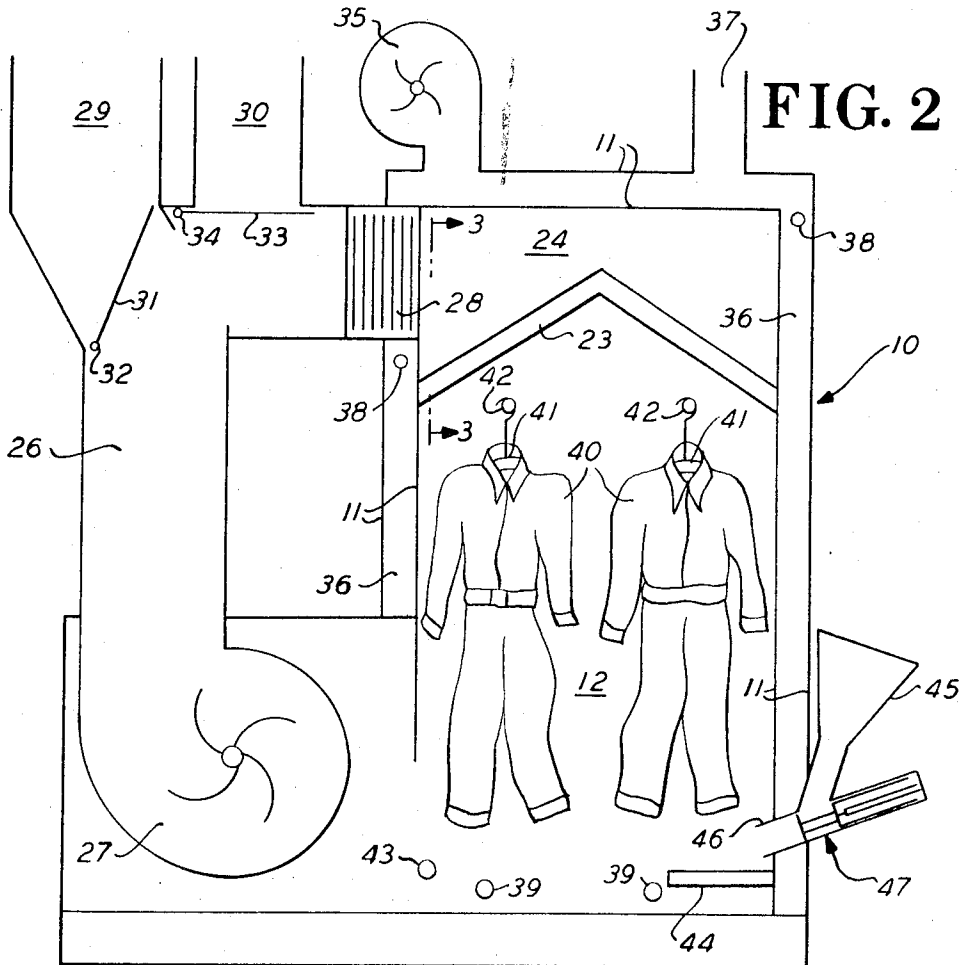


FIG. 2



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FIG. 3

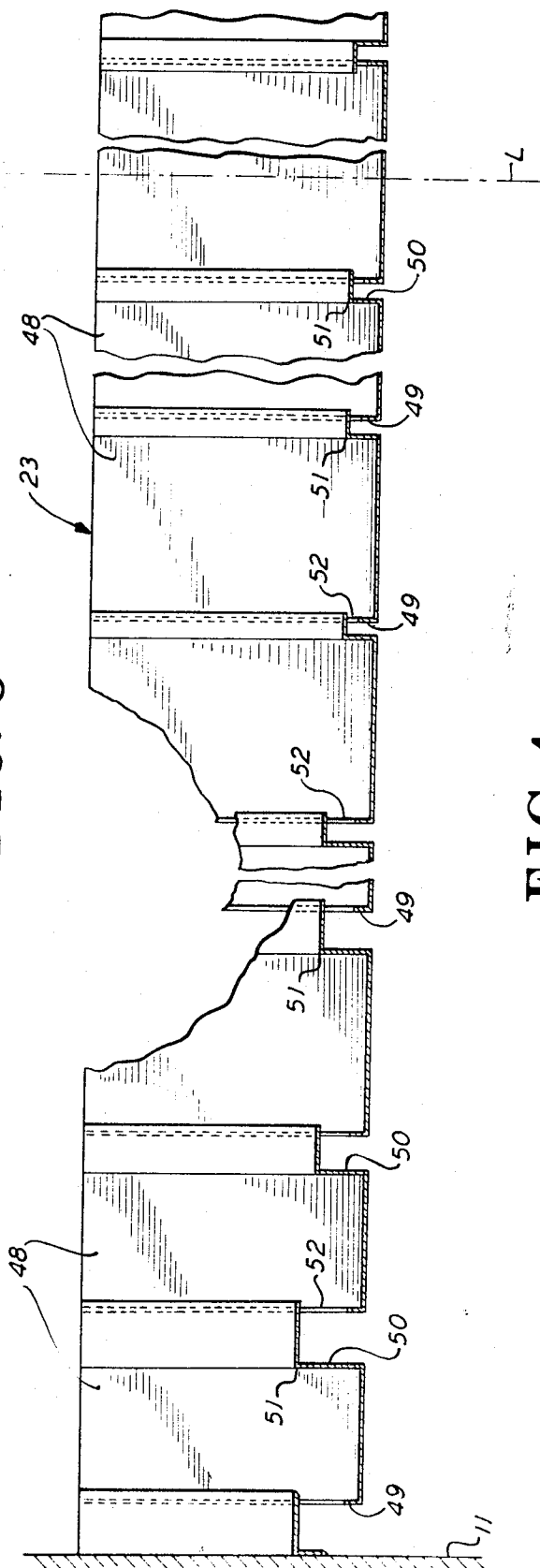
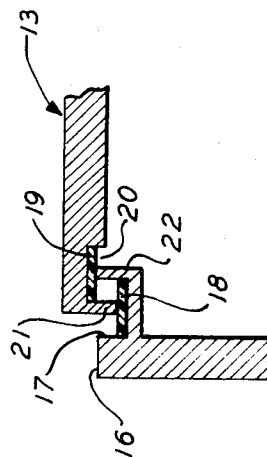


FIG. 4



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FIG. 5

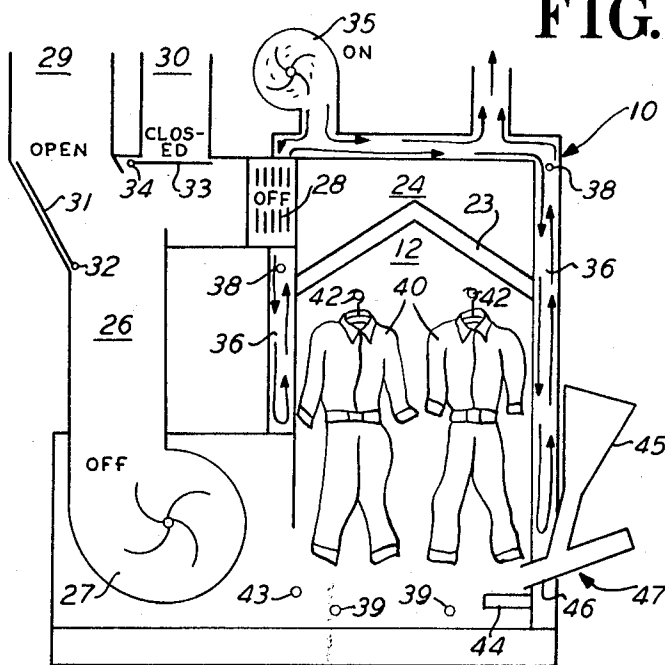
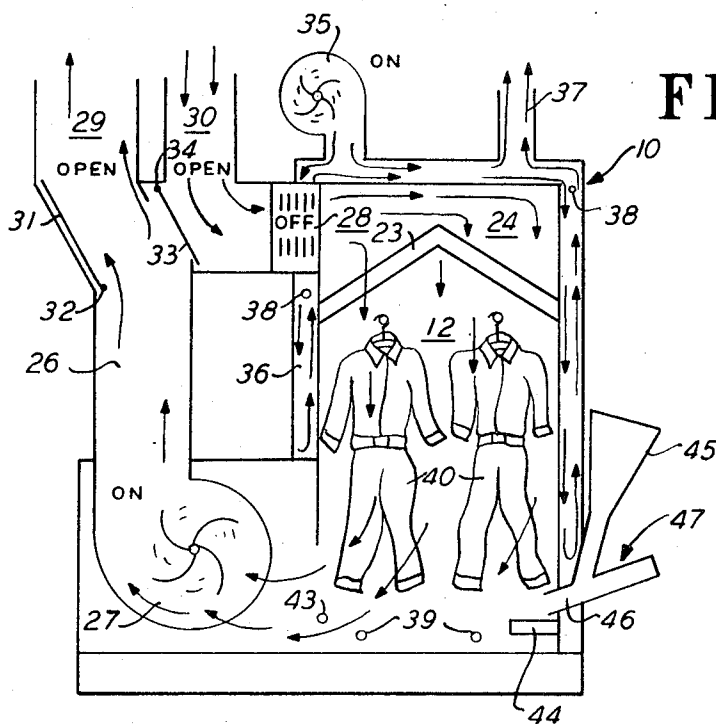


FIG. 6



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FIG. 7

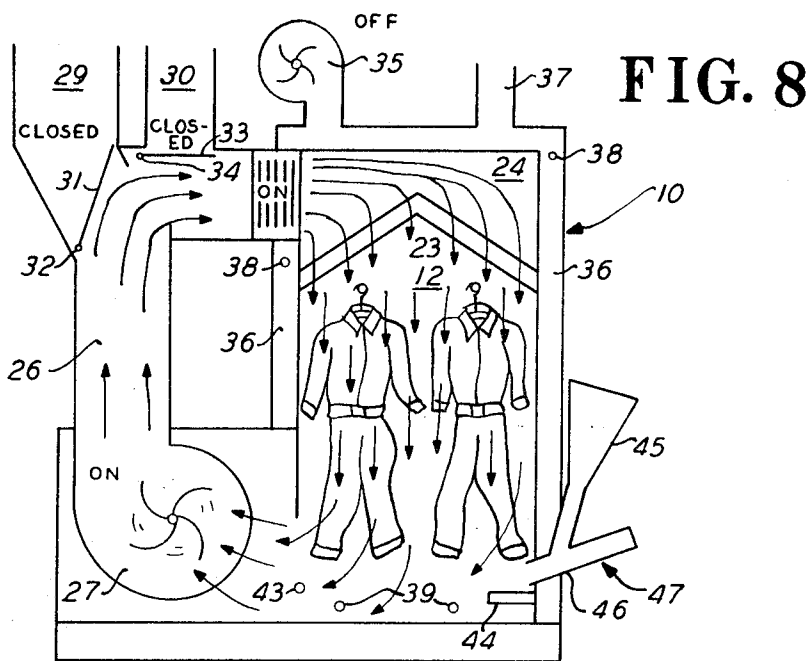
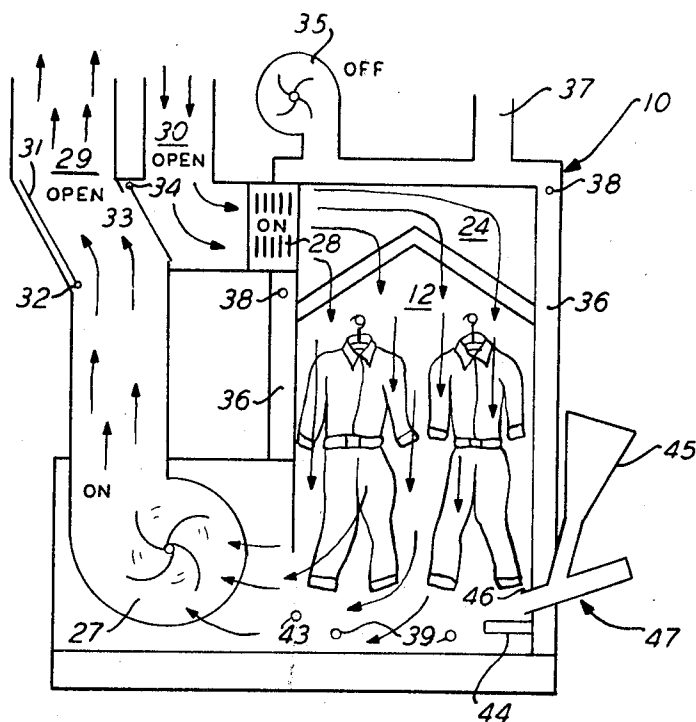
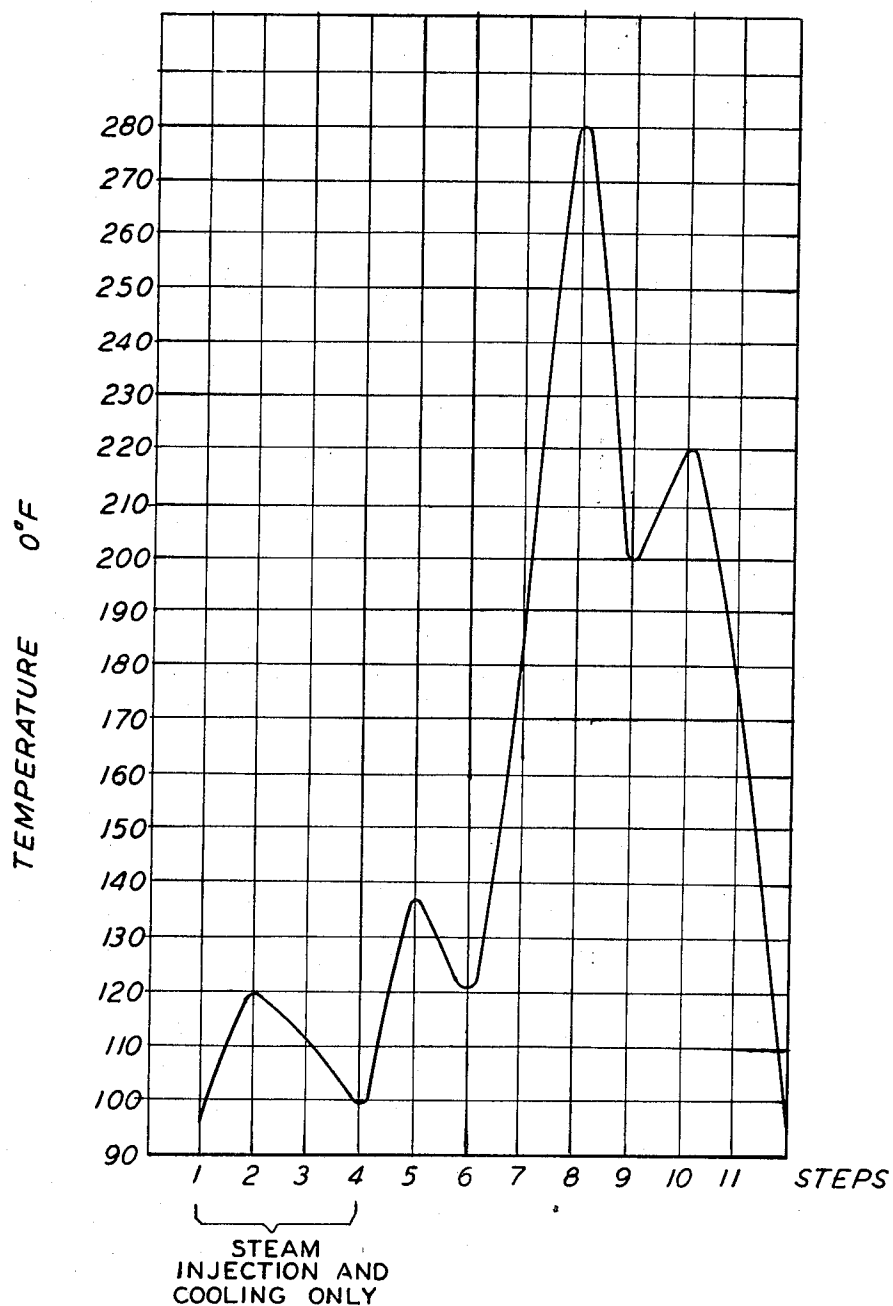


FIG. 8

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FIG. 9



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DURABLE PRESS METHOD AND APPARATUS

The present method and apparatus is an improvement on the method and apparatus described and claimed in our pending application Ser. No. 846,884, filed Aug. 1, 1969, now U.S. Pat. No. 3,660,013, and entitled METHOD AND APPARATUS FOR PRODUCING A DURABLE PRESS IN GARMENTS CONTAINING CELLULOSE AND CELLULOSIC DERIVATIVES.

An object of the invention is to provide an improved apparatus and method for treating fabric articles to provide the same with a durable press, which can be carried out efficiently and economically on a commercial scale and with consistently good results.

Another object is to provide an improved method of producing a durable press wherein after the fabric articles are treated with sulphur dioxide, formaldehyde gas and steam the treating chamber is first subjected to an exhaust heating to rid the atmosphere primarily of steam and then to a closed-circuit heating to bring the fabric articles to a temperature of at least 250°F.

Another object is to provide an improved method of producing a durable press wherein as a first step the articles are treated with steam in the treating chamber to provide them with the desired moisture content without affecting the original press of the articles.

These and other objects and features of our invention will be apparent from the following description and the appended claims.

In the description of our invention reference is had to the accompanying drawings of which:

FIG. 1 is a top plan diagram of a treating apparatus according to our invention;

FIG. 2 is a cross sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a fractional sectional view on line 3—3 of FIG. 2;

FIG. 4 is a fractional sectional view illustrating a double seal for the doors;

FIGS. 5-8 are diagrammatic cross sectional views similar to FIG. 2 illustrating different basic steps employed in the method of the invention for treating fabric articles to provide them with a durable press; and

FIG. 9 is a graph showing a typical temperature-time cycle of the present treating method.

The present apparatus comprises an oblong box 10 rectangular in cross section having double walls 11 (FIG. 2) for effective insulation enclosing an elongate treating chamber 12. At the opposite ends of the box (FIG. 1) are doors 13 mounted on hinges 14 and secured by suitable latches 15. The double-door arrangement is provided to permit loading of the chamber at one end and unloading of finished articles at the other end at the same time.

Each door 13 engages the rim 16 of the box around the door opening in a double seal arrangement, shown in FIG. 4, to prevent the escape of any gases during a press cycle. This double seal comprises a slot 17 in the rim 16 of the box in which is secured a strip of silicone sponge material 18. Along the border of each door is a similar slot 19 offset slightly from the slot 17 and in which is a strip 20 of silicone sponge material. When the door is closed the flange 21 at the outer side of the slot 19 of the door impinges against the silicone sponge strip 18 and the flange 22 of the box at the inner side of the slot 17 impinges against the silicone sponge strip 20 to provide a double seal with the capture of air

space between the flanges 21 and 22 and the sponge strips 18 and 19. This captured air space is effective in outside.

Spaced from the top of the box is a slotted ceiling 23 forming an air distributing chamber or manifold 24 running the length of the treating chamber 12. Midway the length of the box 10 is a side compartment 25 housing an air conduit 26 running from the bottom of the chamber 12 to the manifold 24. This air conduit has a blower 27 in its lower end portion and a heat exchanger 28 where it opens into the manifold 24. The blower circulates air through the chamber 12 from the top to the bottom thereof. Leading from the conduit 26 at points spaced in the direction of circulation are an exhaust duct 29 and an air inlet duct 30. The exhaust duct 29 has a damper 31 pivoted at 32 for opening and closing the duct (FIGS. 6 and 8). Also, the inlet duct 30 has a damper 33 hinged at 34 to the wall of the conduit between the two ducts for shiftable movement between a closed position (FIG. 5) and an open position (FIG. 6) wherein the damper closes the conduit 26 between the two ducts to force air circulation from the outside via the inlet duct 30, heat exchanger 28, manifold 24, treating chamber 12, blower 27 and exhaust duct 29 back to the outside atmosphere.

At the top of the box are three equally spaced panel blowers 35 (FIGS. 1 and 2) which circulate air through the space 36 between the double walls 11 and then out via a single centrally located exhaust duct 37 (FIG. 1). Between the double walls 11 there are also suitable spray headers 38 connectable to a source of cooling water (not shown) for directing the water against the walls of the treating chamber to reduce the temperature thereof to room temperature after each treating cycle.

At the bottom of the treating chamber 12 there are headers 39 for injecting steam upwardly onto garments 40 mounted on hangers 41 attached to top rails 42 running the length of the chamber. Also, at the bottom of the treating chamber 12 there is a header 43 for introducing sulphur dioxide gas. Still further, there is a heater plate 44 near the bottom of the chamber for receiving paraformaldehyde discharged from a hopper 45 by way of a tube 46 as by means of a ram, screw conveyor or stoker generally indicated at 47.

The slotted ceiling 23 comprises two rows of spaced panels 48 inclined from a plane midway the width of the chamber 12 to the opposite sides thereof. The panels 48 are of a U-channel form each having a relatively short upturned flange 49 along its edge farthest from the plane L midway the length of the chamber and a higher flange 50 along its opposite edge nearer the plane L of which the upper portion of the latter flange 50 is turned over horizontally at 51 towards the plane L to overlie the shorter flange 49 of the next adjacent panel nearer the plane L at a spacing therefrom equal to the spacing between the panel and the stated next adjacent panel. Further, the spacing between the panels is increased progressively proceeding from the center plane L to the ends of the chamber. In this way progressively larger louvers 52 are formed proceeding from the plane L to the ends of the chamber, which are directed to catch the air in the manifold 24 flowing from the central conduit 26 and to direct it downwardly into the chamber 12. Further, since each panel is inclined downwardly towards the sides and is of an upright U-channel form it catches the water of condensa-

tion and flows it down to the side walls of the chamber to lessen the chance of drippage on the garments 40 being processed.

In carrying out the treating method of our invention the garments 40 are equally spaced along the length of the treating chamber 12 and the doors 13 are closed. If the relative humidity of the outside atmosphere is below 20 percent, three preliminary steps are first carried out to introduce the proper amount of moisture into the garments without affecting the crease or finish with which the garments have been pre-pressed, by 1) injecting steam in the treating chamber 12 from the headers 39 for about 20 seconds while the circulating blower 27 is off, the exhaust damper 31 open, the inlet damper 33 closed and the heat exchanger 28 off to cause the temperature in the chamber to rise from about 95°F to about 120°F (FIG. 5); 2) cutting off the steam injection to allow the garments 40 to soak in the steam atmosphere for about 2 minutes while allowing the temperature to fall to about 110°F; and 3) circulating air from the outside via the inlet duct 30, treating chamber 12 and exhaust duct 29 for about three minutes while the inlet damper 33 is open (FIG. 6) to cause the temperature in the treating chamber to fall back to the starting point of about 95°F.

A next step (4) — which would be the initial step of the press cycle if the relative humidity of the outside atmosphere is above 20% — comprises injecting chemicals into the treating chamber 18 while the panel blowers 35 are still on, the exhaust damper 31 open, the inlet damper 33 closed and the blower 27 and heat exchanger 28 both off (FIG. 5) by a) heating paraformaldehyde fed onto the heating plate 44 until it is vaporized and diffused through the heating chamber 12, b) injecting steam by the headers 39, and c) injecting sulphur dioxide gas from the header 43 all for a duration of about 45 seconds causing the temperature in the chamber to rise to a temperature of from 120°F to 145°F. By way of preferred example, a measured amount of sulphur dioxide gas is injected by filling a tank, which would have the right amount of gas at atmospheric pressure, to a pressure of two atmospheres and bleeding off until the pressure falls to atmospheric. In a broader sense, the gas may be stored to a given higher pressure, so long as the vapor pressure is not reached, and is then bled off until a predetermined lower pressure is reached.

A next step (5) is carried out by cutting off the steam to allow the temperature to fall and by preferably continuing to inject sulphur dioxide gas and formaldehyde gas. Typically, the garments may thus be allowed to soak in the treating atmosphere for about 5 minutes until the temperature in the chamber falls at least 10°F and permissibly as much as 30°F depending on the temperature to which the chamber was heated by the steam (FIG. 5). This step (5) is a key step of the invention in enabling an effective durable press to be obtained in an efficient manner as is described in our pending application aforementioned.

An exhaust heating step (6) is next carried out with the panel blower 35 off, the main blower 27 on, the exhaust damper 31 open, the inlet damper 33 open and the heat exchanger 28 on, (FIG. 7) but with all injection of steam and chemicals to the chamber now turned off so as only to circulate heated air from the outside through the treating chamber to remove steam as well as any free chemicals from the garments for a period of

about 2 minutes; during this step the temperature may typically be raised to about 180°F (FIG. 9). Next, a closed-circuit heating step (7) is carried out for about 5 to 7 minutes which differs from the preceding heating step in that inlet damper 33 and exhaust damper 29 are closed (FIG. 8) to cause the air to circulate internally through the heat exchanger 28 to bring the temperature of the atmosphere typically to about 280° as shown in FIG. 9, the purpose being to heat the articles being treated to at least 250°F. A final step (8) of the treating cycle is to carry out an exhaust cooling (FIG. 6) for about thirty seconds to bring the temperature down to about 200°F.

Finally, the garments are subjected to a series of cleaning steps to rid the garments of residual odors and to bring the temperature down to about room temperature as follows: a first cleaning step (9) is carried out for about 3 to 7 minutes by injecting steam while the panel blower 35 is off, the heat exchanger 28 is off, the inlet damper 33 closed, the exhaust damper 31 open and the main blower 27 off (FIG. 5) until the internal temperature rises to about 220°F; a next cleaning step (10) is carried out for about 5 minutes by turning the panel blower 35 on, opening the inlet damper 33 and turning the main blower 27 on until the temperature is lowered to about 180°F and a final load-unload step (11) is carried out by continuing the preceding step for about 1½ minutes during which time water is also sprayed into interwall space 36 against the wall of the heating chamber 12 from the headers 38 to cool down the temperature of the walls of the treating chamber to about the starting temperature of 95°F.

The embodiment of our invention herein specifically described is intended to be illustrative and not necessarily limitative of our invention since the same is subject to changes and modifications without departure from the scope of our invention, which we endeavor to set forth by the following claims.

We claim:

1. An apparatus for treating fabric articles with treating agents to provide the articles with a durable press comprising a box having walls enclosing a treating chamber, means for supporting articles in said chamber at intervals along the length thereof, an air conduit leading from the bottom of said chamber to the top of said chamber, a blower in said conduit for circulating air through said chamber via said conduit, said treating chamber being of an elongate character extending the length of said box and said conduit being located midway the length of said box, including a slotted ceiling for said chamber spaced from the top of said box to provide an air manifold above said ceiling into which said conduit leads for distributing the return flow of air lengthwise of said box for even circulation through said ceiling into said chamber, said slotted ceiling comprising a series of inclined panels transverse to said box and spaced lengthwise of the box from each other, each panel having turned-up flanges at the sides forming a channel for catching water condensation and flowing it to the side walls of said chamber to mitigate drippage of water on said articles.

2. The apparatus set forth in claim 1 wherein the flange at the side of each panel farthest from the center of the box has a shorter height than the flange at the side of the same panel nearer the center of the box, and wherein the latter flange of each panel has the upper portion thereof turned towards the center of the box to

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overhang the shorter flange of the next adjacent panel at a distance therefrom forming louvers for catching the flow of air from said central conduit and directing the air downwardly into the treating chamber.

3. The apparatus set forth in claim 2 wherein the spacing between successive panels and the spacing between said overhanging flanges and the adjacent shorter flanges are increased proceeding from the center of the box to each end thereof.

4. An apparatus for treating fabric articles with treating agents to provide the articles with a durable press comprising a box having hollow walls enclosing a treating chamber, means for supporting articles from the top of said chamber along the length thereof, said box having an air conduit leading from the bottom of said chamber to the top thereof including a blower for circulating air through said chamber via said conduit, said conduit having a heat exchanger therein for heating the air which is blown into said chamber, and means for spraying water into said hollow walls against the wall of said treating chamber for cooling said chamber after the heat exchanger is turned off.

5. An apparatus for treating fabric articles with treat-

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ing agents to provide the articles with a durable press comprising an elongate box having hollow walls enclosing a treating chamber along the length of said box, said box having doors at the opposite ends thereof for transporting hangered articles into and from the box at the opposite ends thereof, means for introducing steam and chemical treating gases into said chamber, means for circulating both hot and cool air through said chamber, and a double seal along the edges of each door including a groove in the rim of each door-opening facing outwardly of the box and a groove in the rim of each door facing inwardly of the box when the door is closed, said grooves being offset laterally of each other when the doors are closed and being provided with sponge padding on the inside walls thereof, and at least one of said grooves having a flange along the inner side thereof to engage the sponge padding in the other groove while the flange at the outer side of the other groove engages the sponge padding in said one groove to enclose an air pocket and provide a double seal against the escape of gases from said treating chamber when the doors are closed.

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