May 19, 1942. I. B. ANDREWS 2,283,306

SHOE-TREADING APPARATUS

Filed April 29, 1939

3 Sheets-Sheet 1

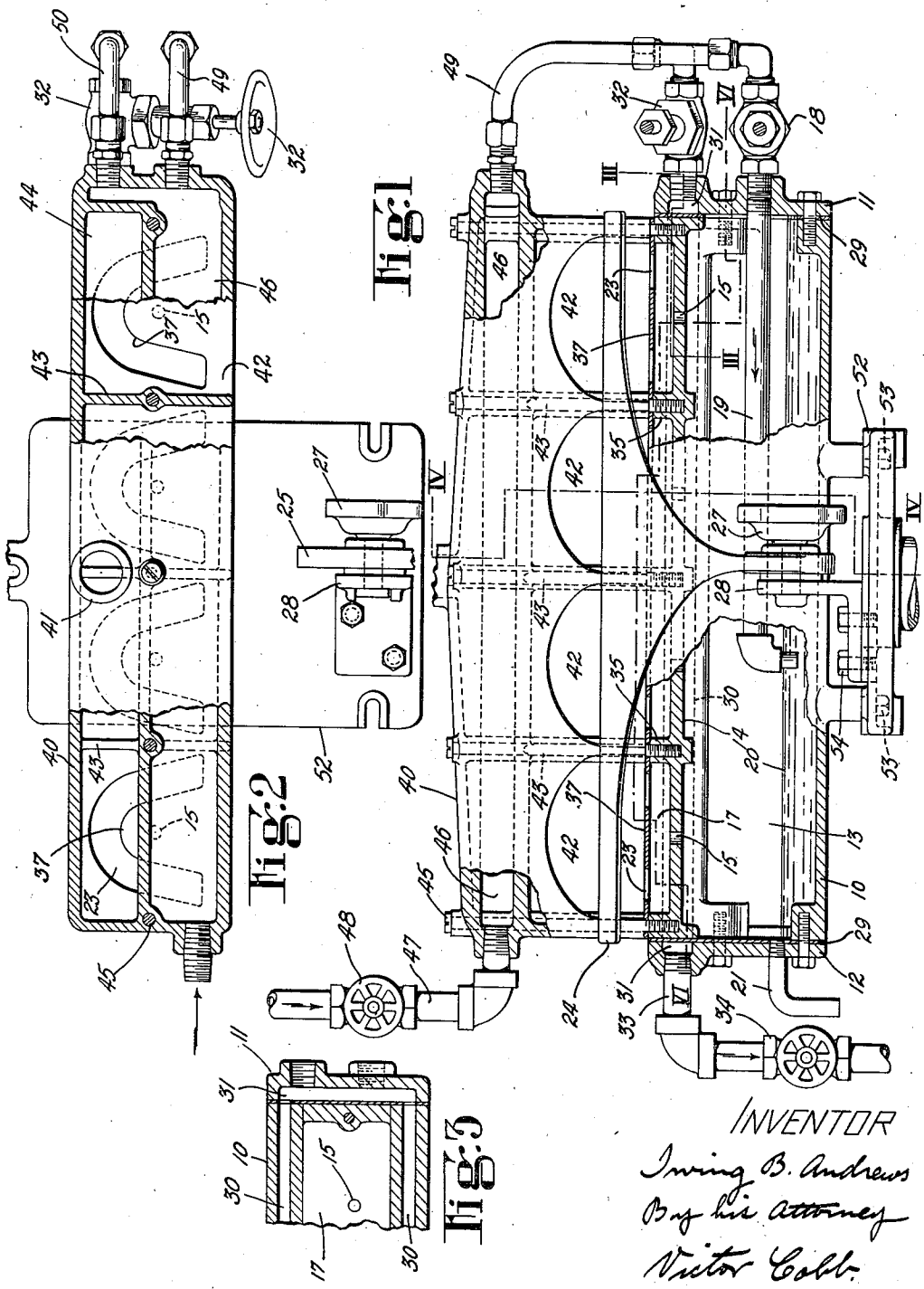


Fig. 1

Fig. 2

Fig. 3

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Fig. 4

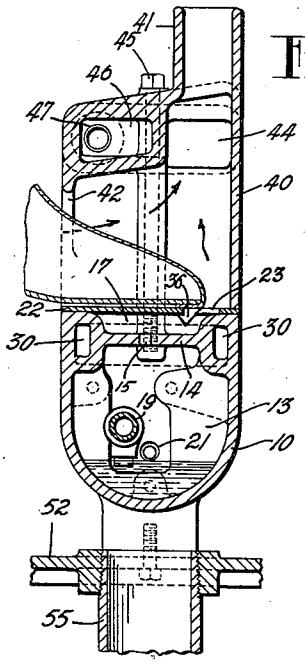


Fig. 5

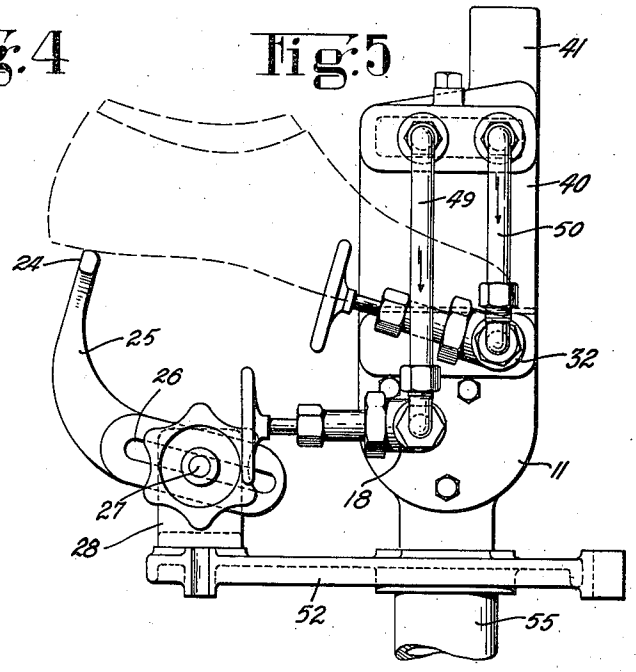


Fig. 6

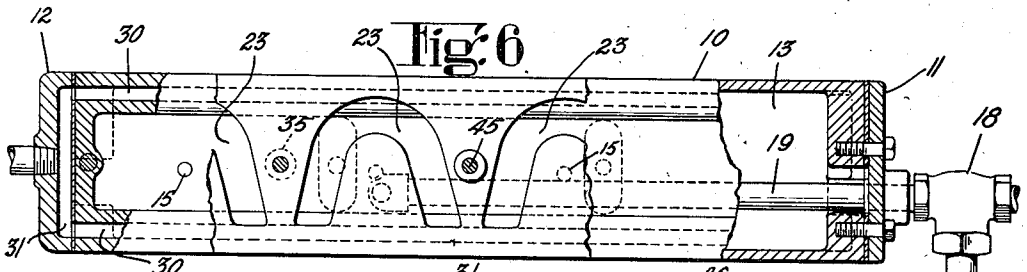


Fig. 7

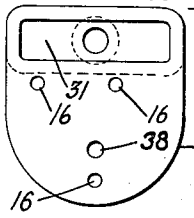


Fig. 8

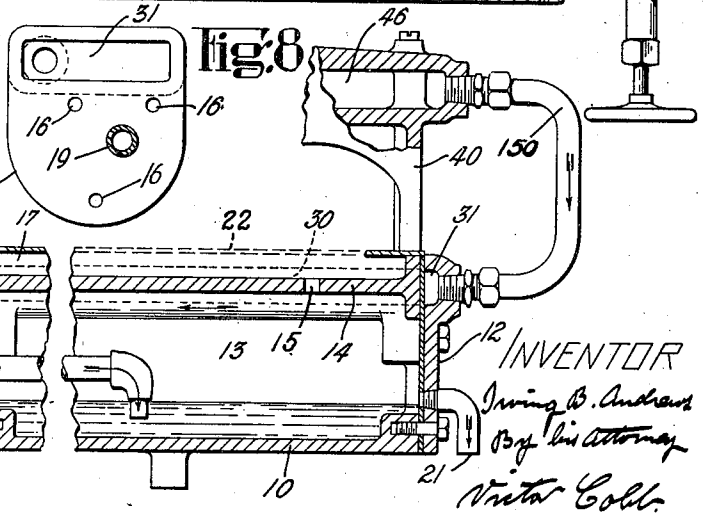


Fig. 9

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SHOE-TREADING APPARATUS

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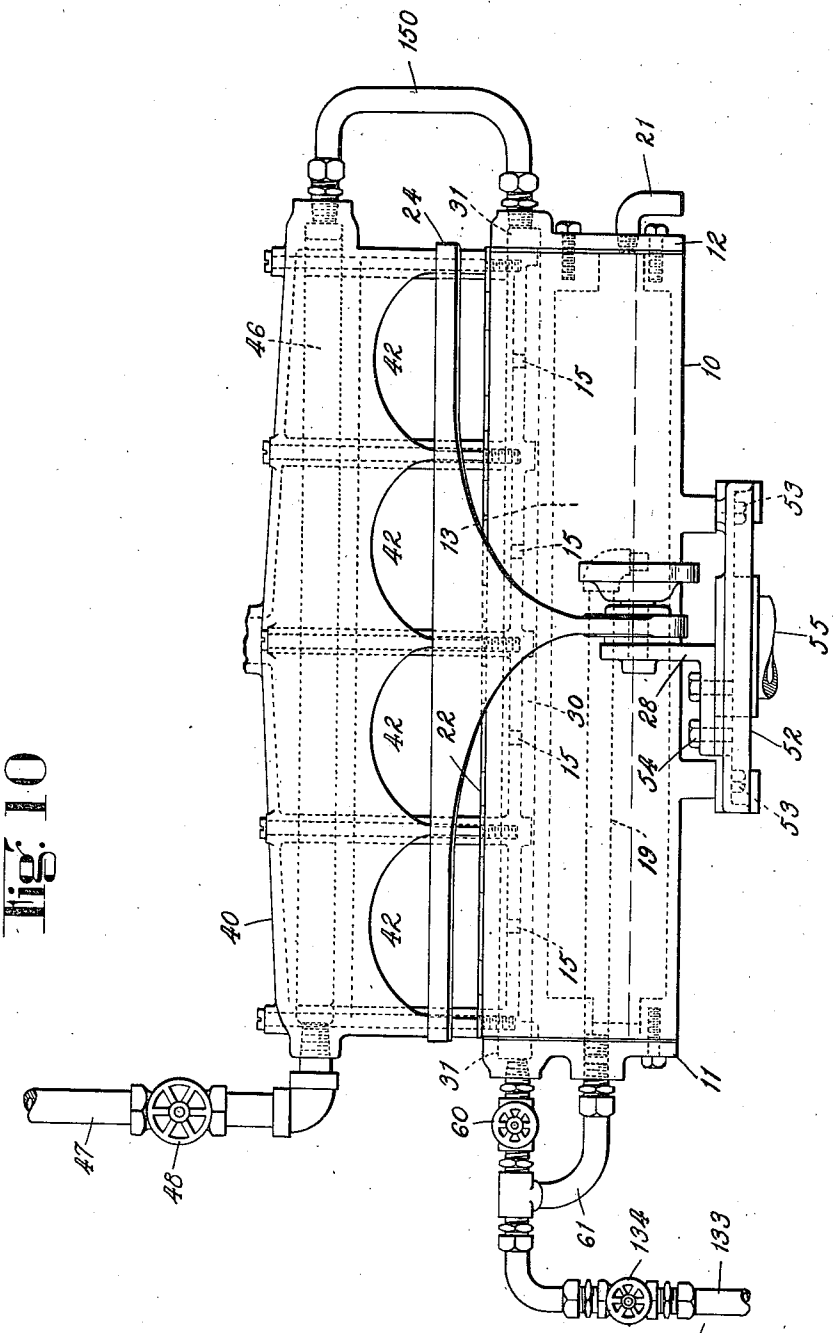


Fig. 10

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Patented May 19, 1942 2,283,306

UNITED STATES PATENT OFFICE

2,283,306

SHOE-TREATING APPARATUS

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Application April 29, 1939, Serial No. 270,847

8 Claims. (Cl. 12—1)

This invention relates to apparatus for heating and moistening parts of shoes in process of manufacture, and is herein illustrated as embodied in an apparatus designed to include a cowl when used to condition the foreparts of shoes for lasting, and to be used without the cowl when used to condition the counter portions of shoes for heel-seat lasting or to soften unattached thermoplastic stiffening parts such as toe-boxes and counter-stiffeners.

An object of the invention is to provide an improved heating and vapor-supplying unit in which much or little vapor without excessive heat, and much or little heat without excessive vapor may be supplied to the work and easily regulated, as conditions may require.

Another object is to provide an improved cowl which, while effective to conserve the heat at the bottoms of foreparts of shoes, will dissipate the heat at the sides and tops of the foreparts and at the same time prevent condensation of vapor on the walls that enclose the work.

One of the features of the invention is improved means for supplying undiluted moist vapor at high temperature and atmospheric pressure. For this purpose the illustrated apparatus includes a hollow unit forming an expansion chamber and a superheating chamber both of which exclude air. Steam supplied to the expansion chamber is condensed therein to furnish moist vapor at atmospheric pressure and rises therefrom to flow through the superheating chamber from which it is emitted in contact with the work before being diluted with air.

As herein shown, the top wall of the superheating chamber is used to support the work by direct contact therewith, thereby avoiding the diluting and chilling effects of air before the moist vapor has done its work. Moreover, the upstanding walls of the superheating chamber are hollow and supply radiant heat to the vapor in that chamber. Pressure steam flowing through these hollow walls will maintain their temperature above that of the enclosed vapor and may be condensed thereafter in the expansion chamber to supply the moist vapor.

Referring to the drawings,

Fig. 1 is a front elevation of an apparatus embodying the invention, portions of which are broken away to disclose details of interior construction;

Fig. 2 is a top-plan view thereof in which portions are otherwise broken away to disclose details of construction;

Fig. 3 is a horizontal section through one end of the vapor-supplying unit (see line III—III in Fig. 1);

Fig. 4 is a vertical section indicated by line IV—IV in Fig. 1;

Fig. 5 is an end elevation of the apparatus as viewed from right to left;

Fig. 6 is a top-plan view partly in horizontal section of the vapor-supplying unit (see broken line VI—VI in Fig. 1);

Fig. 7 is an elevation of a header that forms the left-end wall of the vapor-supplying unit;

Fig. 8 is an elevation of a corresponding header that forms the right-end wall of the vapor-supplying unit;

Figs. 9 and 10 represent respectively a vertical section and a front elevation of a modification in which the piping is arranged to conduct all the steam through the cowl and thence through a superheater of the moistening unit before any of it may be delivered to the vapor chamber of the moistening unit.

The vapor-supplying unit is a hollow closed casing comprising a cast-iron body **10**, cast-iron headers **11** and **12** fastened thereto by screws, and a flat plate **22** of non-rusting sheet metal such as brass also fastened by screws to the body **10** and forming the top thereof. The front and rear upright walls of the body **10** are connected by a partition web **14** that underlies the plate **22** and is spaced therefrom to divide the interior into a shallow upper chamber **17** and a comparatively deep sub-chamber **13**. Hot moist vapor supplied in the chamber **13** flows thence into the chamber **17** through small holes **15** in the partition web **14** and is emitted through U-shaped slots **23** in the plate **22**. This plate is a part of a superheater and also serves to support the work to be treated. The slots **23** are of a shape and size to receive the pulled-over lasting margin at the toe end of a shoe, or the unfastened lasting margin at the heel end, as the case may be. The vapor-supplying unit is oblong in plan and has a capacity for a row of four shoes arranged side by side.

The headers **11** and **12** (Figs. 7 and 8) have holes **16** to receive the screws by which they are fastened to the body **10** and clamped tightly against leak-proof gaskets **29**. With the piping arranged as in Figs. 1, 2 and 5 pressure-steam is admitted to the chamber **13** through a regulating valve **18**, the header **11** and a pipe **19**, the delivery end of the latter being usually submerbed in a body of water **20** that accumulates in the chamber as a result of condensation of steam. Surplus water runs out through a drain

pipe 21 screwed into a tapped hole 38 in the header 12. The steam may have an initial pressure of five pounds or more per square inch, but when discharged into the chamber 13 it expands to atmospheric pressure and supplies moist vapor for treating the work.

The vapor-supplying unit comprises improved means for superheating the vapor in the upper chamber 17 and in the upper part of the subchamber 13. In the apparatus shown, the superheater is a pressure-sustaining steam-conduit comprising ducts 30, 30 cast in the front and rear walls of the body 10, and ducts 31, 31 cast in the headers 11 and 12. These ducts form an endless loop that surrounds the upper chamber 17 to superheat the vapor therein, but they also extend below the partition web 14 to supply some heat to the water and the vapor in the chamber 13. All the walls of the chamber 17 may be maintained at temperatures above that of the vapor, according to the pressure of steam in this loop. Consequently, in flowing on the partition 14, through the chamber 17 and on the plate 22 the vapor may be superheated to the most desirable temperature when it reaches the ports 23 in which the work is exposed for treatment. The plate 22 is heated and supported by its contact with the walls of the ducts 30 and 31 and bosses 35 formed on the partition web 14.

The routine of pulling over the toe of a vamp includes the driving of a tack in the middle of the toe, in consequence of which two ears are formed in the lasting margin. These ears, one of which is indicated at 36 in Fig. 4, may enter the superheating chamber 17 through a slot 23 to receive the full effect of the heat and vapor in the chamber. Each slot 23 provides a work-supporting tongue 37 (Figs. 1, 2 and 6) of a shape and size to mask the insole of a shoe, and the holes 15 in the partition 14 are located in register with the tongues respectively. Consequently, the streams of vapor issuing from the holes 15 are deflected horizontally against the lasting margins of the uppers without wetting the insoles which are protected by the tongues.

When a forepart is located for treatment, the heel-seat portion of the shoe is supported by a bar 24 having a capacity for four shoes side by side. This bar has an arm 25 in which a slot 26 is formed to receive a clamping screw 27 provided with a hand-nut. The screw extends through the slot 26 and is screwed into a stationary supporting bracket 28. This connection provides for adjusting the work-supporting bar 24 up and down as well as toward and from the work-supporting plate 22.

Pressure-steam is admitted into the duct 31 of the header 11 through a regulating valve 32, and the steam, divided into two streams in this header, flows through both ducts 30 and is reunited in the duct 31 in the header 12, from which it is conducted by an exhaust pipe 33, preferably provided with a regulating valve 34. The heat thus supplied to the walls of the ducts 30 and 31 may be regulated in part by the inlet valve 32 and in part by the exhaust valve 34 which, for the sake of efficiency, should be nearly closed to maintain some pressure in the ducts. Since these ducts are in contiguous thermal relation to the web 14 and surround it, this web may be maintained at a higher temperature than the vapor flowing through it.

No pressure is developed in the superheating chamber 17 because the aggregate area of the holes 15 is less than that of the drain pipe 21 and the unobstructed portions of the emission ports 23 even when the plate 22 is loaded with a full complement of shoes. Consequently, the vapor in the superheating chamber flows slowly and remains in the chamber long enough to be superheated by the radiant heat from the walls of the chamber.

To insure the desired localization of heat and moisture supplied to the foreparts of pulled-over shoes, and especially shoes provided with thermoplastic toe-boxes, the present invention also includes an improved cowl 40 to enclose the foreparts while they are undergoing treatment. This cowl not only conserves the heat adjacent to the plate 22 but also comprises a feature that prevents excessive heating and moistening of the sides and top of the foreparts. It does this by inducing streams of outside air to flow into the front of the cowl and along the sides and over the insteps of the shoes and thence to an outlet at the top of the cowl, thereby bathing the sides and tops of the vamps in comparatively cool air in which the used vapor is entrained and removed from the shoes after doing its work on their bottoms. This same feature, by preventing condensation of used vapor on the walls of the cowl, avoids a common cause of staining the shoes, namely, drops of water.

The cowl, see Figs. 1, 2, 4, and 5, is an iron-casting of oblong shape corresponding to the plan of the casting 10. It is open at the bottom but comprises front and rear walls, end walls, and a top wall, the latter being preferably pitched in the manner of a roof from the middle toward both ends and provided with an outlet stack 41. If desired, an exhaust pipe may be connected to the stack to discharge the used vapor outdoors. The front wall of the cowl is provided with four openings 42 through which the foreparts may be inserted into individual nests or treating stations separated from each other by partitions 43. These partitions do not extend quite to the top of the cowl but leave a communicating passageway 44 through which the used vapor from all the nests may flow to the stack 41. The partitions and the end walls are cored or bored vertically to receive long screws 45 by which the cowl may be secured to the lower casting 10, the bosses 35 of the latter being bored and tapped to receive the screws.

A pressure-sustaining steam-duct 46 cast in the cowl extends from end to end thereof across all the nests and is located wholly above the treating stations. Steam supplied to this duct heats the walls and partitions of the cowl enough to prevent condensation of the used vapor on them. The duct is preferably located in or next to the front wall and is so shaped that it presents a large area of heating surface to the air and vapor flowing on its bottom and on its rear side in the manifold passageway 44.

Pressure-steam is supplied to one end of the duct 46 and discharged from the opposite end, and the steam so used, or some of it, may be used thereafter to heat the lower casting 10 with or without furnishing vapor in the chamber 13. So far as economy of steam is concerned, the steam may flow through the duct 46 before or after flowing through the ducts 30 and 31, but the piping herein shown is arranged to supply the steam first to the duct 46 and thereafter to the ducts 30 and 31. This provides for draining the products of condensation from the duct 46 into the chamber 13 after a period of non-use.

Proceeding on this basis, pressure-steam is

supplied to the left-hand end of the duct 46 by a pipe 47 provided with a regulating valve 48 and is conducted from the right-hand end of the duct. As shown in Figs. 1, 2, and 5 a pipe 49 forms connection between the discharge end of the duct 46 and the valve 18, while a pipe 50 forms connection between the duct 46 and the valve 32. High temperature is desirable to soften the lasting margins of thermoplastic toe-boxes and hot moist vapor is desirable to soften the lasting margins of the uppers, but neither high temperature nor much moisture is desirable at other portions of the foreparts. These conditions are satisfied by the described apparatus in which copious supplies of comparatively cool outside air are induced to enter the treating stations through the openings 42 and flow along the sides of the foreparts to protect them, while the lasting margins receive the effects of the radiant heat and moist vapor below the streams of the inflowing air, but the used vapor and heat that rise around the foreparts become mingled immediately with the streams of air and are carried rapidly away to the passageway 44 and thence to the stack 41.

The arrangement of piping shown in Fig. 9 and Fig. 10 provides for flowing all the steam through the cowl duct 46 and the superheating ducts 30, 31 before any of it may enter the expansion chamber 13. Consequently, greater efficiency in the use of steam is possible with this arrangement, since the steam that has passed through the ducts 30, 31 to satisfy the requirements of the superheater has sufficient residual heat to satisfy the requirements of the expansion chamber 13.

As shown in Fig. 9 and Fig. 10 the headers 11 and 12 are interchanged with respect to their locations shown in Fig. 1, the pipe 49 is omitted, and both valves 18 and 32 are omitted. All the steam from the discharge end of the duct 46 in the cowl flows through the pipe 150, the duct 31 in the header 12, the ducts 30, 30 in the body 10, the duct 31 in the header 11, and thence through a throttle-valve 60 by which the pressure in the superheater 17 and in the cowl-duct 46 may be regulated. From the throttle-valve 60 the steam, now considerably reduced in pressure and temperature, may flow through an exhaust-valve 134 and a pipe 133, or, if the exhaust-valve is closed, it will enter the expansion chamber 13 through pipes 61 and 19 and carry with it the condensate from the upper levels. The body of water in the expansion chamber 13 will thus be replenished and heated with steam and water that have passed through the ducts 30, 31 of the superheater.

As shown in Figs. 1, 4 and 10, the casting 10 is mounted on a table 52 to which it is secured by screws 53. This table also supports the bracket 28 which is affixed thereto by screws 54. The table 52 is mounted on the upper end of a supporting column 55 represented as an iron pipe of large diameter. The lower end of this pipe is provided with a pedestal (not shown) designed to stand on the floor.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A shoe-treating apparatus comprising a hollow body forming an expansion chamber and for maintaining a body of water to supply vapor, the top wall of said chamber having one or more openings through which limited quantities of vapor may flow to shoes stationed above it, a steam-heated heat-radiating element forming a superheating chamber to enclose the vapor between said wall and the work, means for supplying pressure-steam to said heat-radiating element, and means arranged to conduct the used steam from said heat-radiating element and discharge it in the water in said expansion chamber to supply the vapor.

2. A shoe-treating apparatus comprising a steam-heated heat-radiating element forming a superheating chamber and having a port to emit superheated vapor from said chamber to a work station, means for supplying pressure steam to said heat-radiating element, means forming an expansion chamber, means arranged to conduct used steam from said heat-radiating element into said expansion chamber, a valve in said conducting means to regulate the pressure of steam in said heat-radiating element and the quantity of used steam supplied to said expansion chamber, and means for conducting vapor from said expansion chamber into said superheating chamber.

3. A shoe-treating apparatus comprising a steam-heated heat-radiating element forming a superheating chamber and having a port to emit superheated vapor to a work station, a steam-heated heat-radiating element located above said port and forming a chamber for the work, means for supplying pressure steam to one of said heat-radiating elements, means for conducting the used steam from that heat-radiating element to the other, means forming an expansion chamber, a conduit arranged to conduct the used steam from said other heat-radiating element to said expansion chamber, a valve in said conduit to regulate the pressure of the steam in both of said heat-radiating elements and the quantity of used steam supplied to said expansion chamber, and means for conducting vapor from said expansion chamber into said superheating chamber.

4. A shoe-treating apparatus comprising a hollow metal structure forming a chamber for vapor, the top wall of said chamber having one or more ports for emitting vapor in contact with the work standing thereon and the upper portions of the outer walls of said structure being hollow to form a pressure-sustaining heat-radiator surrounding said chamber, means for circulating pressure steam through said heat-radiator, a valve at the exhaust side of said heat-radiator to regulate the pressure of steam therein, and means for conducting steam from said valve and for supplying the aqueous vapor product thereof at atmospheric pressure to the chamber surrounded by said heat-radiator.

5. A shoe-treating apparatus comprising a work-supporting plate having an opening through which moist vapor may flow to a shoe standing thereon, means forming an expansion chamber below and spaced from said plate, heat-radiating means contiguous to said plate and said expansion chamber and forming an intermediate chamber to conduct moist vapor from said expansion chamber to the work, said heat-radiating means having a pressure-sustaining steam-duct surrounding said intermediate chamber, and means for supplying pressure steam to said duct and said expansion chamber.

6. A shoe-conditioning apparatus comprising a casing having walls enclosing an upper chamber and a contiguous lower chamber in communication therewith, heating means localized in the walls enclosing said upper chamber, means for

supplying pressure-steam to said lower chamber, and means for converting the steam in said lower chamber into moist vapor, the upper wall of said upper chamber having a port to emit such vapor to the work located adjacent thereto.

7. A shoe-conditioning apparatus comprising a casing having walls enclosing an upper chamber and a contiguous lower chamber in communication therewith, one or more of the walls enclosing said upper chamber having pressure-sustaining steam ducts, means including said steam ducts for supplying pressure-steam to said lower chamber, and means for converting the steam in said lower chamber into moist vapor, the upper wall of said upper chamber having a port to emit such vapor to the work located adjacent thereto.

8. A shoe-treating apparatus comprising a hollow heat-radiating unit having walls enclosing a heating chamber and also having a port in the upper one of said walls to emit moist vapor to the work located adjacent thereto, means for heating said hollow unit, means inside said unit and below said chamber to convert pressure-steam into moist vapor and supply undiluted vapor to said chamber, and means for supplying pressure-steam to said converting means.

IRVING B. ANDREWS.

CERTIFICATE OF CORRECTION.

Patent No. 2,283,306. May 19, 1942.

IRVING B. ANDREWS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 72, claim 1, after the word "supply" insert --moist--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of July, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)