March 25, 1924. 1,488,433

D. B. MACDONALD

METHOD AND APPARATUS FOR DRYING THE TOES OF BOOTS AND SHOES

Filed July 7, 1919 5 Sheets-Sheet 1

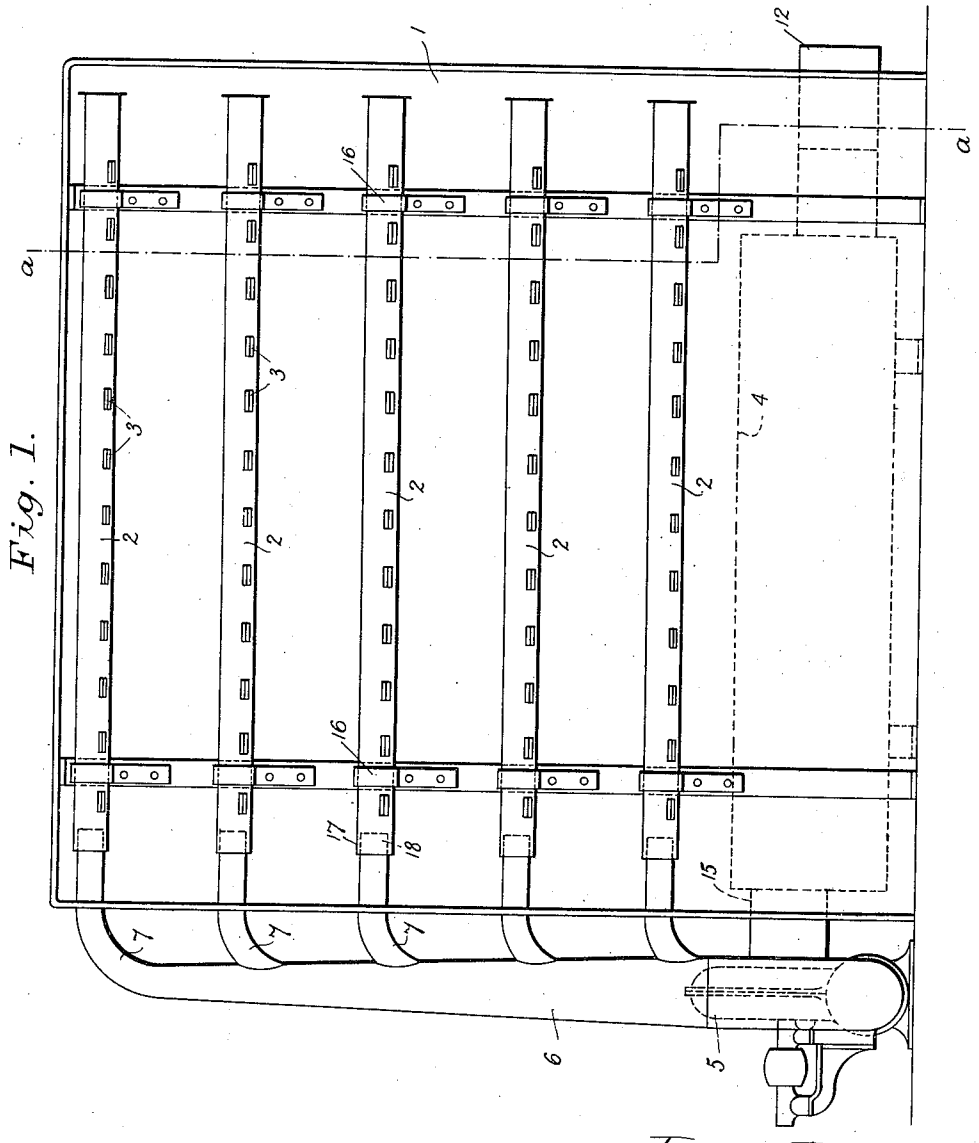


Fig. 1.

Inventor
David Baird Macdonald
by J. Connolly Bros
Attys

March 25, 1924. 1,488,433

D. B. MACDONALD

METHOD AND APPARATUS FOR DRYING THE TOES OF BOOTS AND SHOES

Filed July 7, 1919 5 Sheets-Sheet 2

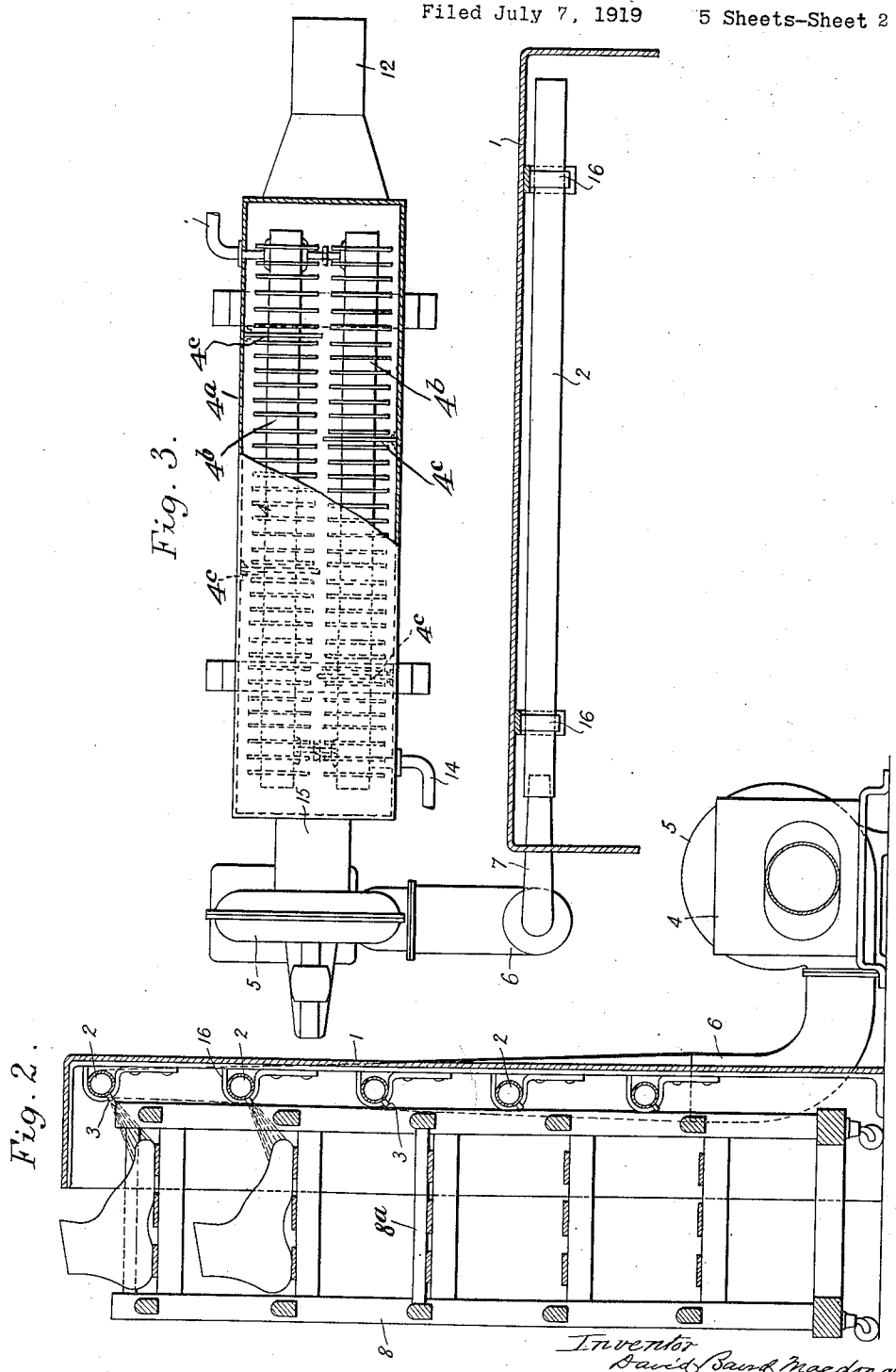


Fig. 3.

Fig. 2.

Inventor
David Baird Macdonald
by Connolly Bro
Atys

March 25, 1924. 1,488,433

D. B. MACDONALD

METHOD AND APPARATUS FOR DRYING THE TOES OF BOOTS AND SHOES

Filed July 7, 1919 5 Sheets-Sheet 3

Fig. 5.

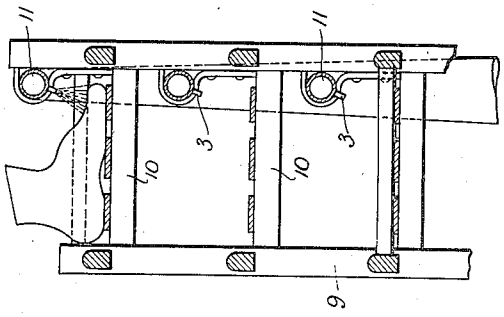
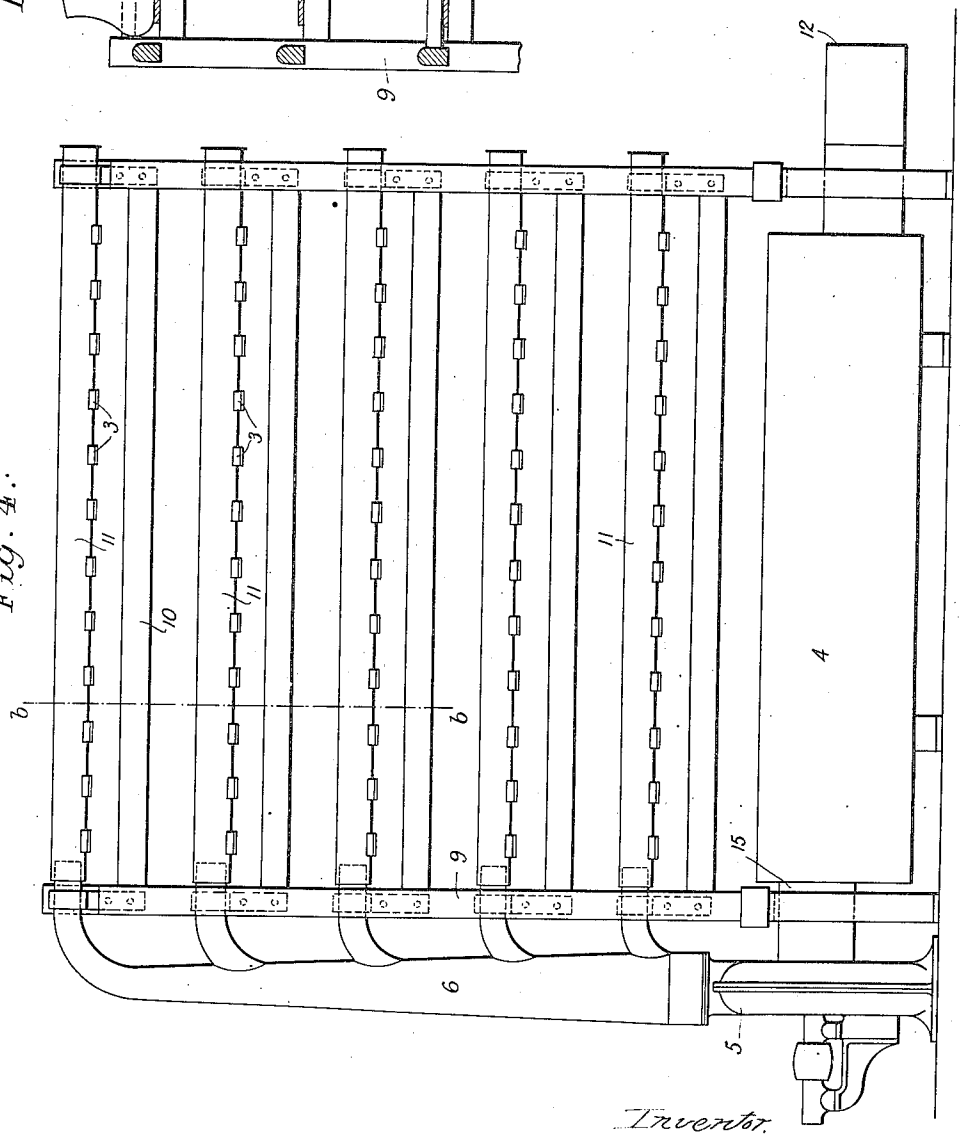


Fig. 4.



Inventor.
David Baird Macdonald
by Connolly Bros
Attys

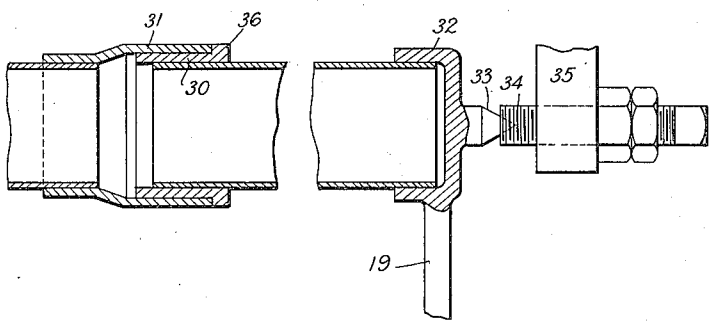
March 25, 1924. 1,488,433

D. B. MACDONALD

METHOD AND APPARATUS FOR DRYING THE TOES OF BOOTS AND SHOES

Filed July 7, 1919 5 Sheets-Sheet 4

Fig. 7.



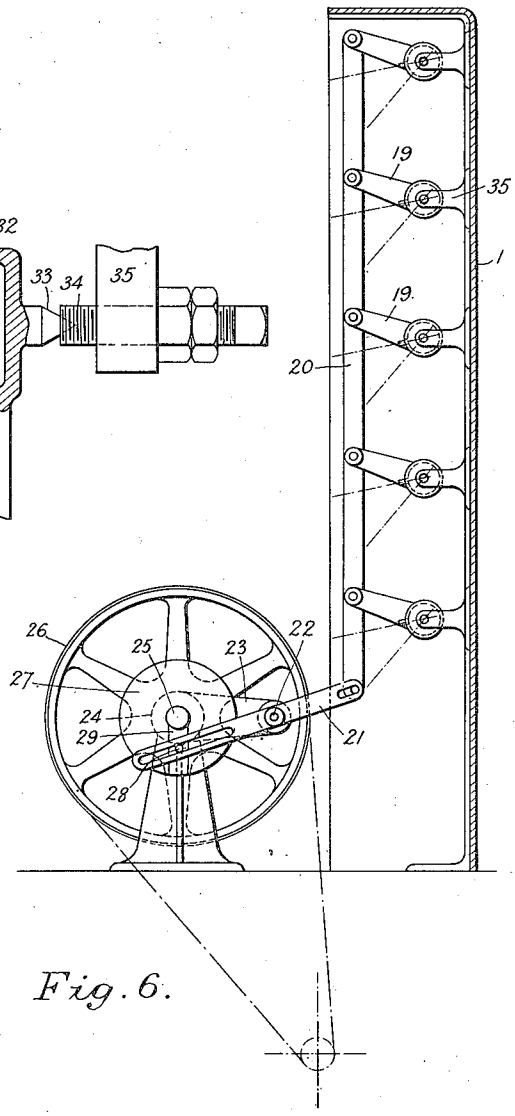


Fig. 6.

Inventor
David Baird Macdonald
by Connolly Bros
Atty

March 25, 1924. 1,488,433

D. B. MACDONALD

METHOD AND APPARATUS FOR DRYING THE TOES OF BOOTS AND SHOES

Filed July 7, 1919 5 Sheets-Sheet 5

Fig. 8.

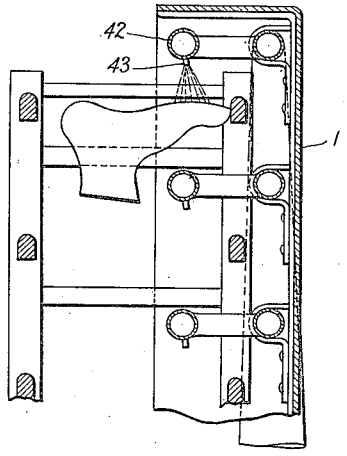


Fig. 9.

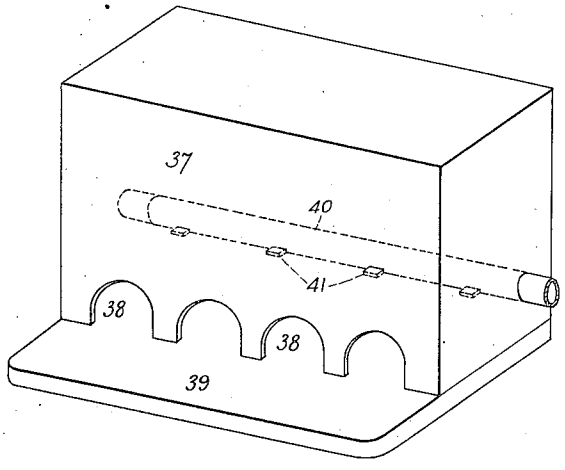
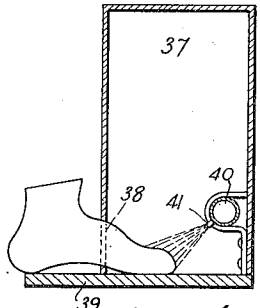


Fig. 10.



Inventor

David Baird Macdonald

by Connolly Bro.

Attys

Patented Mar. 25, 1924. 1,488,433

UNITED STATES PATENT OFFICE.

DAVID BAIRD MACDONALD, OF LEICESTER, ENGLAND.

METHOD AND APPARATUS FOR DRYING THE TOES OF BOOTS AND SHOES.

Application filed July 7, 1919. Serial No. 308,946.

To all whom it may concern:

Be it known that I, DAVID BAIRD MACDONALD, subject of the King of Great Britain, residing at Leicester, in the county of Leicester, England, have invented certain new and useful Improvements in Methods and Apparatus for Drying the Toes of Boots and Shoes, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to the manufacture of boots and shoes and to apparatus employed in connection therewith. The invention comprises an improved method of and apparatus for treating the toes of boots and shoes prior to lasting and for drying or setting the finished work.

The main purpose of the invention is to expedite the drying and setting of the work so that the lasts may be released for further use in the shortest possible time. Obviously by more quickly releasing the lasts after the work is finished a less number of lasts will be required for use.

The invention consists in treating (e. g. mellowing or drying) desired parts of boots and shoes by means of a current of heated air directed upon the part or parts to be treated.

The important feature of the invention is the employment of a directed current of heated air for the purpose of treating or drying the desired part, this method being in contradistinction to the employment, as hitherto, of a stationary volume of heated air such as in an oven or stove, the advantage of the present method being that moisture or spirituous substance absorbed by the heated air is carried away with the moving air, not only is a constant supply of dry air provided but this is directed and caused to impinge upon the particular part to be treated. This localization of the treating medium increases the effectiveness of the latter.

For instance, to rapidly dry a finished boot or shoe and expedite the final setting of the upper to the last, a current of dry heated air is directed upon the toe to carry away the moisture or spirituous substance from the toe case, and such current may be so directed as to cause it to pass over the instep or other surface of the upper to thoroughly dry the same.

A similar method may be employed in place of the present method for treating (e. g. mellowing) the toes prior to lasting. In this case the toe of the boot or shoe is subjected to a current of heated air which being suitably directed upon the part, acts upon and warms the toe case or preparation present in the toe case, to put the same into suitable condition to undergo the lasting process. The treatment is continued only long enough to effect the desired softening or in the case where a spirituous toe gum is used a partial drying of the toe case, and not long enough to evaporate and carry off the moisture or spirit as is effected by the subsequent drying process.

The drying and setting process by localized hot air current as herein described may be conveniently carried out by the use of an apparatus comprising a rack or other support for the work, one or more air pipes provided with orifices adapted to direct currents of air upon the work, means (such as a blower or pump) for creating a forced air supply to the air pipe or pipes, and means for heating the air before it impinges upon the work.

In the preferred form of the apparatus the air heating and disturbing means are independent of the rack which carries the work. In this case the air pipes having orifices or nozzles as already described are suitably supported (as for instance by means of brackets on a wall or a frame) in such a manner that the racks which have open sides, can be placed in position in relation to the pipes so that the boots and shoes supported by the shelves of the racks come under the influence of the air currents issuing from the nozzles therein. In this way a number of racks may be employed with the same air distributing means, said racks being movable individually to and from position in relation to the air pipes to enable the boots and shoes thereon to be treated.

According to a further arrangement contemplated by the invention the work is treated, more especially for the purpose of drying and setting the upper to the last, by means of currents or jets of warm air which are constantly changing their direction. That is to say, instead of the air jet playing upon the work in the same direction all the time as is the case when both the work and the air nozzle are relatively stationary, and in which case the effect of such air jets is very localized, by using a current or jet of air the direction of which is undergoing

variation, the said jet plays upon the work with a sweeping effect and consequently takes effect upon a larger area. While it is the purpose of the invention, as previously stated herein, to use a current of heated air which is so directed upon the work as to localize the treatment and thus increase the effectiveness of the said drying medium for treating desired parts, it is also intended that such current shall be caused to pass over the instep or other surface of the upper to thoroughly dry the same. By changing the direction of the air current this object is effectively achieved without eliminating the advantage of localization of said current as such variation in direction may be caused to take place within a limited area or region so that while the air, as it impinges upon the work, will be more widely dispersed over the upper for drying and setting the same, it will still be directed upon the part or parts of the work where treatment is most required.

In an apparatus such as herein before referred to the sweeping effect of the air currents or jets may be obtained in a practical manner by moving the air pipes in such a manner that the orifices or nozzles will change the direction of the issuing air jets relatively to the work. For instance the air pipes may be given an oscillatory movement whereby the air jets are caused to sweep to and fro or upwards and downwards over the work say in a direction from the toe to the vamp and reversely, or laterally of the work, so that the warmed air will play upon those parts or that region of the work where quick drying and setting of the work to the last is desired.

In carrying out the method for mellowing or conditioning toe cases prior to lasting, a box or other suitable device having apertures or other convenient guiding means into which the toe of the work may be introduced, is fitted with an air pipe having nozzles to direct a current of heated air (from a suitable source) upon the toes. The apertures or guiding means are adapted to enable the workman to properly position the work so that the air current is localized where required. The device may be attached to or be situated near the lasting machine.

In order that the invention may be clearly understood some practical examples of the same are shown in the accompanying drawings, wherein:—

Figure 1 is a front elevation of a form of the drying apparatus with which separate boot racks are used.

Figure 2 is a vertical section of same taken on the line *a*—*a* of Figure 1 and shows a rack in position for drying the work.

Figure 3 is a plan of the apparatus.

Figure 4 is a front elevation of a form of the apparatus wherein the air supplying and discharging means are combined with a rack.

Figure 5 is a section taken on the line *b*—*b* of Figure 4.

Figure 6 is a sectional view of a form of the apparatus wherein the air pipes are mechanically operated.

Figure 7 shows constructional details of the ends of the oscillating pipes.

Figure 8 illustrates the arrangement of the work and air pipes for drying the soles.

Figure 9 is a perspective view showing a form of apparatus for treating boot and shoe toes prior to lasting.

Figure 10 is a cross section of the apparatus shown in Figure 9.

In the form of apparatus shown in Figures 1 to 3, which is a convenient one in that it enables a number of racks to be employed in conjunction with a common air supplying means, an open-fronted structure 1 carries on the inside along the back a number of horizontal air pipes 2 each having thereon air discharge nozzles or orifices 3. The structure 1 is suitably fixed to the floor and stands in an upright position. Situated behind it is a heater 4 of any suitable form adapted to warm air as this is drawn through the same by a blower 5. The warmed air passes from the blower into a pipe 6 communicating with which are branches 7 to supply air to each of the pipes 2.

In using this apparatus a rack 8 (Figure 2) with the work arranged thereon is placed in position within the open front of the structure 1 so that the boots or shoes come within range of the jets of air issuing from the nozzles 3 on the pipes 2 as indicated. It will thus be seen that the air jets can be localized upon the work and that the work may be moved into and out of position in relation to the air jets in bulk and without disturbing its arrangement on the racks. In this manner the ordinary wheeled racks of the kind at present in use may be employed in conjunction with the air drying apparatus. It may however, be an advantage to divide the shelves of the racks by transverse partitions as indicated at 8^a, these being placed at intervals so as to determine the position of each boot or shoe on the shelves and ensure that when the rack is moved up to the air supplying apparatus, the boots or shoes will be situated in proper relation to the nozzles for the air jets to play upon the desired part or parts of the work.

The form of apparatus illustrated in Figures 4 and 5 constitutes what may be termed a self-contained unit, i. e. the air discharge pipes are combined with the rack which carries the work. In this case the rack may consist of a wooden structure 9 having a plurality of shelves 10 each capable of supporting a number of boots or shoes thereon. Situated over each shelf 10 is an air pipe

11 having nozzles or orifices 3 suitably positioned for directing air currents upon the work supported by the shelf. The air pipes 11 of the various shelves communicate with a main air trunk 6 arranged in connection with a blower 5 and heater 4 the rack being superimposed upon the heating chamber. In this apparatus the work to be treated is placed on the shelves 10 so as to bring the desired part or parts under the air jets issuing from the nozzles 3. The shelves may be partitioned or have transverse strips 9^a arranged in the manner already described to facilitate proper positioning of the work in relation to the jets.

In the forms of the invention already described the heater employed conveniently consists of a box or case 4 lined with asbestos, slag wool or equivalent material 4^a (Figure 3) and containing one or more steam radiator units 4^b and a series of baffle plates 4^c to respectively warm and deflect the air as it passes through the box the inlet to which is indicated at 12 in Figures 1, 3 and 5, while in Figure 3 the steam inlet and outlet connections of the radiator units 4^b are shown at 13 and 14 respectively.

The air supply pipes 2 and 11 may be suitably jointed to permit of their rotation by hand whereby the angle of the issuing air jets in relation to the work may be varied if necessary. In the apparatus illustrated in Figure 1, 2 and 3 each pipe 2 is supported by clips 16 in which it may be adjustably rotated, its end 17 being fitted to turn upon the end 18 the branch 7.

A convenient arrangement wherein the air pipes are given an oscillating motion is shown in Figures 6 and 7. In this case the pipes are mounted so as to be capable of turning and each has projecting rigidly therefrom an arm 19. Pivotally connected to each arm is a vertical bar 20 which at its lower end has connection with the slotted end of a rocklever 21 fulcrumed at 22 on the arm 23 of a standard 24. The standard carries a shaft 25 on one end of which is fixed a driving pulley 26 while on the opposite end is a crank disc 27 the pin 28 on which operates the adjacent slotted end of the rocklever 21 thereby imparting through the medium of the vertical bar 20 an oscillating movement to all the arms 19 so that the pipes are caused to oscillate and constantly vary the angle of discharge of the air. The range of the angular movement of the air jets is varied by adjusting the crank pin 28 along its slot 29. Each rotatable pipe may at one end be secured to a metal bush 30 (Figure 7) which fits within a metal socket 31 on the branch 7. The socket 31 constitutes a bearing for this end of the pipe. The opposite end of the pipe is fitted with a metal cap 32 having a centre 33 which bears in a screw 34 in the fixed bracket arm 35, the end thrust being taken at the opposite end by a flange 36 against the end of the socket 31.

In conjunction with the method of drying and setting the work by the employment of moving air jets it is found advantageous to moisten the upper (and particularly the vamp) as far as the last so that the subsequent drying of the work by the air jet causes the upper to set perfectly to the last. This may be done by hand or any convenient means.

One convenient form of apparatus for carrying out the air jet method for mellowing or conditioning toe cases prior to lasting is shown in Figures 9 and 10 and comprises a box-like structure 37 having apertures 38 in the front thereof into which the toes of the work may be introduced said work being supported by an external shelf 39. Inside the structure 37 an air pipe 40 is fitted having nozzles 41 each arranged to direct a current of heated air (from a suitable source) upon the toe situated in line with it. The apertures enable the workman to properly position the work so that the air current is localized where required.

The device for mellowing or conditioning the toes may be attached to or be situated near the lasting machine. The method and apparatus herein described are particularly advantageous when a spirituous toe gum is used and in such case enable the process of manufacture to be carried out very expeditiously. For instance, by means of the localized hot air current the toe of the work may be mellowed and partly dried so as to be in a good condition for lasting, after which by further treatment by the air jets on the drying rack, the drying process, which was started by the preliminary treatment, is completed and the work is rapidly set thus enabling it to be removed from the last.

The same principle may be employed for drying the soles of the work. For example, as shown in Figure 8 the work may be suitably supported sole upwards in a rack which is moved into position in relation to air pipes 42 having nozzles 43. The pipes are so arranged that they will be disposed approximately centrally over the sole and they are preferably oscillated in the manner already described so that the air jets issuing from the nozzles have a sweeping effect over the surface of the sole to dry the same.

What I claim then is:

1. The method of treating boots and shoes which consists in directing thereon currents or jets of warmed dry air which are so directed upon the work that their effect is localized said jets operating upon the work with a sweeping motion so as to cover the area desired.

2. An apparatus for treating boots and shoes by localized air currents comprising,

one or more air pipes each having one or more nozzles or orifices therein; means for supplying warmed air under pressure to said pipes, and an open fronted structure supporting said pipes adapted to receive a rack supporting the work.

3. An apparatus for treating boots and shoes by localized air currents comprising one or more air pipes each having one or more nozzles or orifices therein, means for supplying warmed air under pressure to said pipes, means to support said pipes, and means for moving said pipes to change the direction of the issuing air jets relatively to the work.

4. An apparatus for treating boots and shoes by localized air currents comprising one or more air pipes each having one or more nozzles or orifices therein, means for supplying warmed air under pressure to said pipes, means to support said pipes and mechanically operating means to oscillate said pipes to change the angularity of the issuing air jets relatively to the work.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID BAIRD MACDONALD.

Witnesses:

B. S. C. TAYLOR,

GEORGE LESTER.