

**June 25, 1963**

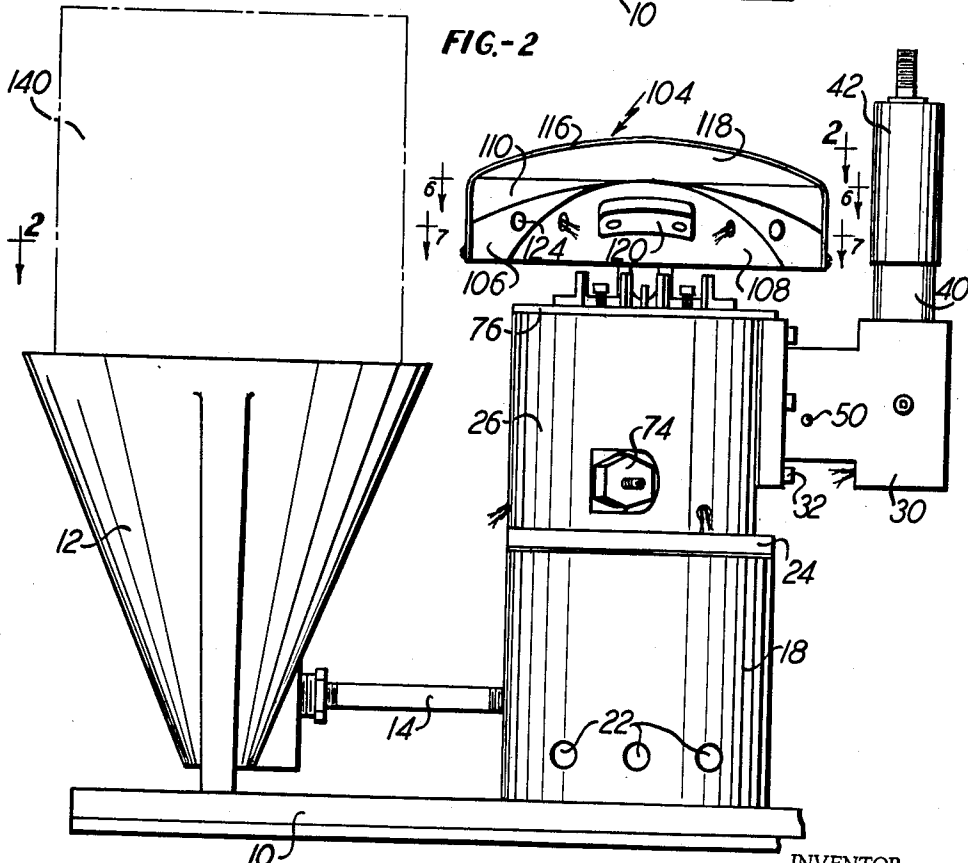
**J. S. KAMBORIAN**

**3,094,726**

APPARATUS FOR PREPARING A SHOE FOR LASTING

Original Filed Sept. 14, 1961

4 Sheets-Sheet 1



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APPARATUS FOR PREPARING A SHOE FOR LASTING

Original Filed Sept. 14, 1961

4 Sheets-Sheet 2

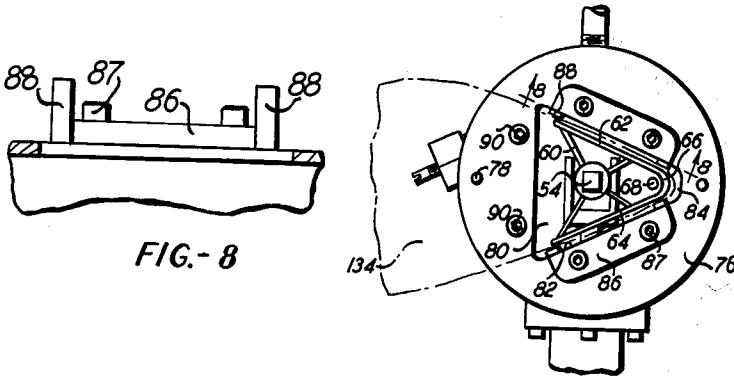


FIG.- 8

FIG.- 4

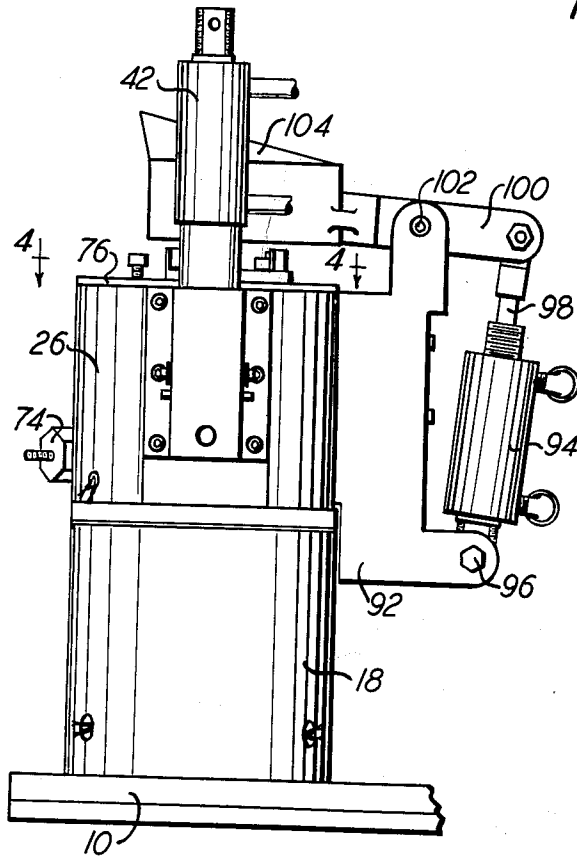


FIG.- 3

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APPARATUS FOR PREPARING A SHOE FOR LASTING

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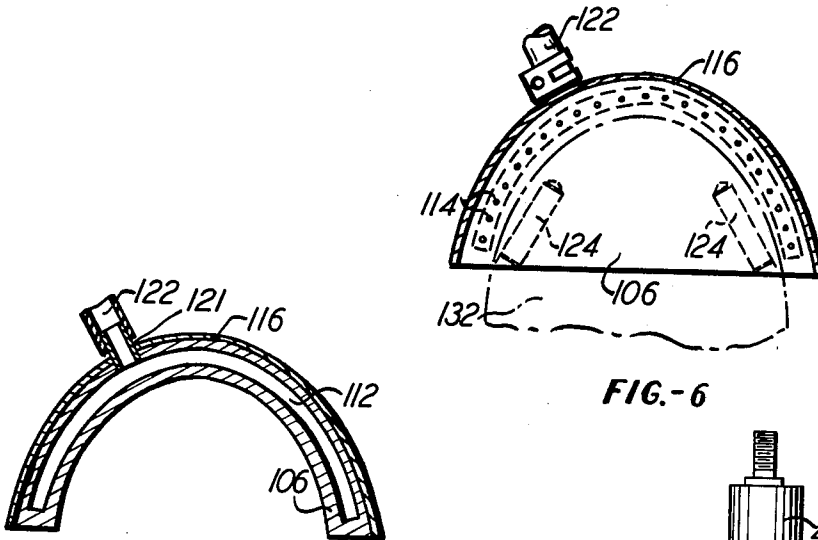


FIG.-6

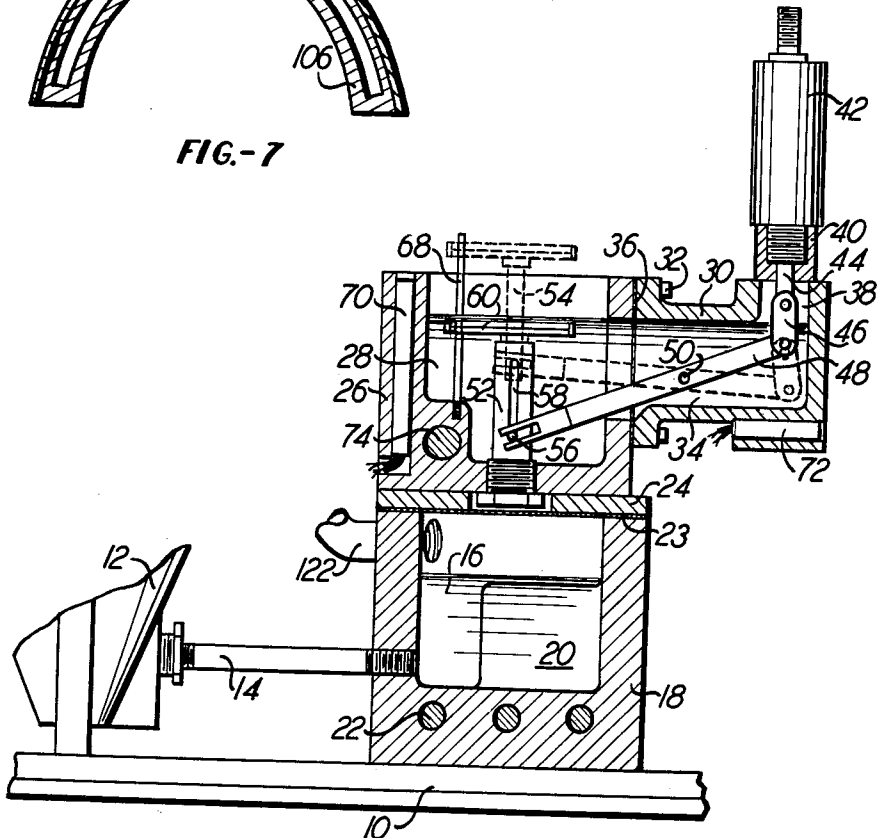


FIG.-5

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APPARATUS FOR PREPARING A SHOE FOR LASTING

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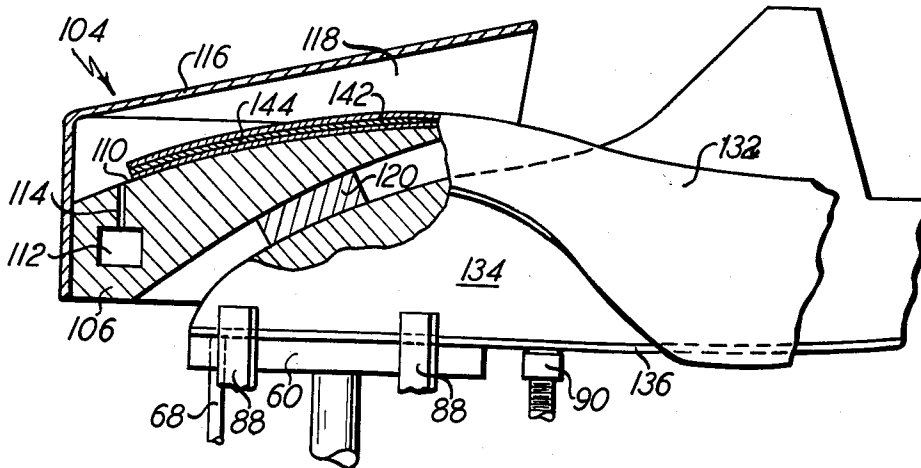


FIG. - 9

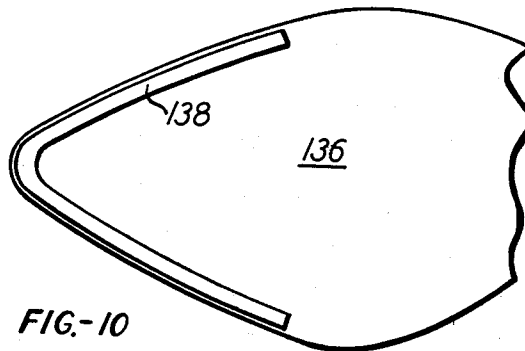


FIG. - 10

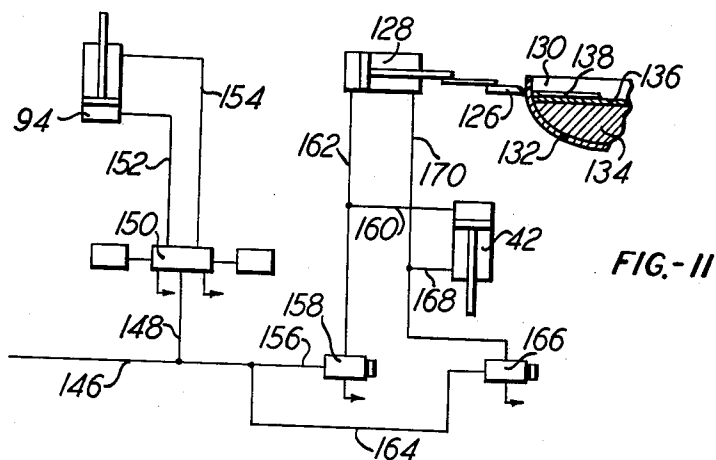


FIG. - 11

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3,094,726

## APPARATUS FOR PREPARING A SHOE FOR LASTING

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Original application Sept. 14, 1961, Ser. No. 138,135, now  
Patent No. 3,079,618, dated Mar. 5, 1963. Divided  
and this application June 13, 1962, Ser. No. 209,808  
19 Claims. (Cl. 12-4.1)

This invention is a division of pending application Serial  
No. 138,135 filed September 14, 1961, now Patent No.  
3,079,618.

This invention relates to an apparatus for applying  
steam to a shoe upper and depositing cement on the shoe  
insole prior to lasting the shoe in an apparatus such as  
that disclosed in pending application Serial No. 100,979  
filed April 5, 1961. In the lasting machine, cement is  
deposited in the angle formed between the lasting margin  
of shoe upper and the shoe insole and wipers are moved  
across the insole to wipe the lasting margin upon the  
insole and adhesively bond the upper to the insole.

Prior to performing a toe lasting operation on a shoe,  
it is conventional practice to apply steam to the toe of  
the upper to soften the upper leather and render it pliable.  
It has been found desirable to apply thermoplastic cement  
to the insole shortly before the shoe is inserted in the toe  
lasting machine, as the thermoplastic cements now used  
are applied in liquid form and tend to harden quickly,  
so that the wiping must take place soon after the cement  
has been applied to the insole.

The method practiced by the apparatus of this inven-  
tion relates to the deposition of the cement on the insole  
while the upper is being steamed to thereby prepare a  
shoe for lasting. This is done while a previously pre-  
pared shoe is being lasted, and the cement is deposited  
on the insole concomitantly with the operation of the  
lasting machine. Preferably, the cement is deposited on  
the insole at the same time as the wipers of the lasting  
machine are actuated to perform a wiping operation for  
the reason that the wiper movement takes place towards  
the end of the cycle of the lasting machine, and thus the  
cement is deposited on the insole of a shoe shortly before  
the shoe is transferred to the lasting machine.

The apparatus includes a cement pot having a cement  
well that holds a quantity of molten cement. Support-  
ing devices are provided on the cement pot to support  
bottom-down a last having an upper mounted thereon  
and an insole located on its bottom. An applying tool  
is immersed in the cement in the well and is movable  
upwardly to apply cement to the insole. A steam cham-  
ber is positioned above the last and has a cavity that  
receives the toe portion of the upper. A water pot is  
located below the cement pot. The water pot has a  
water well therein that is heated to convert the water to  
steam. The steam travels from the water pot through a  
tube to the steam chamber.

The steam chamber is swingably mounted on the ce-  
ment pot for movement in a vertical plane and has a  
hold-down pad on its lower surface. A motor is pro-  
vided to move the steam chamber downwardly to thereby  
clamp the last between the supporting devices and hold-  
down pad. A motor is provided to move the applying  
tool upwardly against the insole and to withdraw it back  
into the molten cement while the last is clamped. The  
applying tool motor is connected in parallel with a  
motor that drives the wipers of the lasting machine so  
that the applying tool is raised and the wipers are  
moved forwardly to wipe a shoe at the same time, and  
the applying tool is lowered and the wipers are retracted  
at the same time.

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In the accompanying drawings:

FIG. 1 is a front elevation of the steamer-applicator;  
FIG. 2 is a plan view taken along the line 2-2 of  
FIG. 1;

FIG. 3 is a side elevation of the steamer-applicator;  
FIG. 4 is a plan view taken on the line 4-4 of FIG. 3;  
FIG. 5 is an elevation in section of the cement pot,  
water pot and applying tool;

FIG. 6 is a detail of the steam chamber taken on the  
line 6-6 of FIG. 1;

FIG. 7 is a detail of the steam chamber taken on the  
line 7-7 of FIG. 1;

FIG. 8 is a detail of a gage taken on the line 8-8 of  
FIG. 4;

FIG. 9 is a representation of a shoe located in the  
steamer-applicator;

FIG. 10 is a view of an insole that has had cement  
deposited thereon; and

FIG. 11 is a diagrammatic representation of a control  
system.

The device includes a base 10 on which is mounted a  
funnel 12 adapted to contain a supply of water and con-  
duct it by a conduit 14 into a water well 16 located in a  
water pot 18. The water pot is also located on the base  
10. The well 16 includes a plurality of radiator fins 20  
(FIG. 5). Three electric heating cartridges 22 are  
located in holes in the pot 18 beneath the well 16 and are  
connected to a source of power (not shown). The water  
pot is made of a heat conductive material such as alumi-  
num and is covered with an aluminum plate 23. A  
sheet 24 of thermally insulative material such as pressed  
asbestos is located above the plate 23 and a cement pot  
26 is located above the sheet 24. The cement pot 26  
is made of a heat conductive material such as aluminum.  
Conventional means, such as bolts extending through  
the cement pot 26, sheet 23 and plate 22 and threaded  
into the water pot 18, are used to rigidly connect these  
members.

The cement pot 26 has a cement well 28 located therein.  
A flange 30, which is secured to the cement pot 26 by  
bolts 32, has a hole 34 in communication with the cement  
pot well 28. A seal 36 is interposed between the cement  
pot 26 and the flange 30 to provide a liquid-tight con-  
nection therebetween. A passage 38 extends upwardly  
of the hole 34 to the top of the flange 30 and a sleeve  
40 is secured, as by welding or brazing, to the projection  
30 above the passage 38. A double acting air operated  
motor 42 is threaded into the sleeve 40. The piston rod  
44 of the motor 42 is pivoted to a link 46 and the link  
46 is pivoted to a lever 48. The lever 48 is fulcrumed  
to swing about a pin 50 that is secured in the walls of  
the flange 30.

A hollow post 52 is threaded into the bottom of the  
cement pot 26 to extend upwardly into the well 28. A  
spindle 54 is slidably mounted in the post 52 and has a  
lug 56 extending radially thereof that is slidable in a longi-  
tudinally extending radial groove 58 in the post 52 and  
is embraced by the forked end of the lever 48 that is  
remote from the link 46. A cement applying tool 60,  
is secured to the upper end of the spindle 54. The ap-  
plying tool has a cement applying rib 62 that is  
contoured to the shape of the bottom of a last at the toe.  
The rib (see FIG. 4) has a pair of sides 64 that converge  
and meet at an end 66 and is made of a heat conductive  
material such as brass. A pin 68 is threaded into the  
cement pot 26 and extends upwardly of the cement pot,  
between the rib sides 64 and adjacent the rib end 66.

A plurality of electric heating cartridges 70 are mounted  
in holes in the cement pot 26 and an electric heating car-  
tridge 72 is mounted in a hole in the flange 30. The car-  
tridges 70 and 72 are connected to a source of power

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(not shown) and are controlled by a thermostat 74 mounted in a hole in the cement pot 26.

A cover 76 is secured to the top of the cement pot 26 by fasteners 78. The cover 76 has an opening 80 large enough to allow the applying tool 60 to move there-through, the opening having converging sides 82 meeting at an end 84 that form a contour similar to the contour of the rib 62. A pair of gage plates 86 are secured to the cover 76 by bolts 87, each gage plate extending along a side 82 and having an upwardly extending gage finger 88 at each of its ends (FIGS. 4 and 8). A pair of studs 90 are threaded into the cover 76 rearwardly of the opening 80.

A bracket 92, secured to the cement pot 26, has a double acting air actuated motor 94 pivoted thereon by a pivot 96 (FIG. 3). The piston rod 98 of the motor 94 is pivoted to an end of a lever 100, and the lever 100 is fulcrummed to the bracket by a pivot 102. The other end of the lever 100 is secured to a steam chamber 104 that extends above the cover opening 80. The steam chamber includes a deck 106, made of a heat conductive material such as brass, whose bottom has a concavity 108 and whose top 110 is convexly arched. The deck 106 is substantially semi-circular in section with the lever 100 secured thereto at the midpoint of the circular segment. An arcuate channel 112 is provided within the deck 106, and a plurality of ports 114 extend upwardly of the channel 112 to intersect the top surface 110 of the deck. A cover 116 is secured to the semi-circular edge of the deck 106, and extends upwardly of the deck and over the deck to form a cavity 118. A hold-down pad 120, made of a flexible material such as leather or Teflon, is secured to and extends downwardly of the deck 106. An orificed nipple 121 extends laterally from the channel 112 to intersect the front surface of the deck 106. A flexible tube 122 connects the water well 16 to the nipple 121. A pair of electric cartridge heaters 124 are mounted in holes in the deck 106 and are connected to a source of power (not shown).

As aforesaid, the steamer-applicator is intended to be used with a toe lasting apparatus such as that disclosed in the aforementioned pending application Serial No. 100,979 filed April 5, 1961. The toe lasting apparatus comprises wipers 126 (FIG. 11), connected to an air operated motor 128, which are intended to wipe the lasting margin 130 of an upper 132 mounted on a last 134 upon an insole 136 located on the last bottom. A ribbon of cement 138 located in the angle formed between the lasting margin and insole serves to adhesively bond the wiped lasting margin to the insole upon actuation of the motor 128 to move the wipers 126 forwardly across the insole. Preparatory to lasting the shoe, it is desirable that heat and steam be applied to the toe of the upper and to the box toe, if a box toe is secured to the upper, whereby the upper and box toe become conditioned and softened so that they can be readily worked during the lasting. It is preferred that the cement 138 be thermoplastic. The thermoplastic cements now in general use are deposited on the work in liquid form, become tacky and adhere to the work when deposited thereon, and rigidify to a non-tacky condition in a relatively short time. It therefore becomes highly desirable to last the shoe shortly after the cement has been deposited thereon. The instant invention performs this function while, at the same time, conditioning the upper and box toe.

In setting up the steamer-applicator, it is placed near the toe lasting machine. A jug of water 140, shown in phantom in FIG. 1, is up-ended into the funnel 12 and travels through the conduit 14 into the water well 16. The water is converted by the heat supplied by the heaters 22 into steam and the steam travels through the tube 122, the nipple 121, the channel 112 and the ports 114 into the cavity 118. Thermoplastic cement is placed in the cement well 28, is melted by the heat supplied by the heaters 70 and 72 and fills up the well 28 and the hole 34 to the level shown in FIG. 5. At this time the applying

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tool 60 is immersed in the molten cement as indicated by the solid line position in FIG. 5 and the piston 98 is retracted within the motor 94 so that the steam chamber 104 is in an elevated position. A last 134 having an insole 136 secured to its bottom is placed over the cover 76 with the insole resting on the pin 68 and the studs 90 and the sides of the last engaging the gage fingers 88 as indicated in FIG. 9 and also in FIG. 4 where the outline of the last is shown in phantom. The last 134 has an upper 132 draped loosely over the toe end, which upper may have previously been heel seat lasted by an apparatus similar to that disclosed in application Serial No. 107,156 filed May 2, 1961. The upper may have a lining 142 (FIG. 9) secured to its toe portion and a box toe 144 may be interposed between the upper and lining. The upper, box toe and lining are supported on the upper surface 110 of the deck 106 without covering the ports 114, as shown in FIG. 9 and also shown in phantom in FIG. 6. The motor 94 is now actuated to lower the steam chamber 104 until the hold-down pad 120 engages the last to clamp the last and insole against the support pin 68 and the support studs 90 and thus hold the last and insole against movement. The combination of the steam emanating from the ports 114 and swirling about the upper 132 due to its confinement within the cavity 118 by the cover 116 and the heat conducted against the box toe 144 and the upper 132 from the heated deck 106 serves to condition the upper and box toe. The upper leather is conditioned primarily by the action of the steam thereon while the box toe is conditioned primarily by the heat conducted thereagainst from the heated deck 106. The heat emanating from the deck 106 also serves to super-heat the steam in the steam chamber 104 and prevent the condensation thereof. Shortly before the shoe is to be removed from the steamer-applicator and placed in the toe lasting machine, the motor 42 is actuated to cause the applying tool 60 to rise from its immersed position in the well of cement, indicated in solid lines in FIG. 5, to the dotted line position of FIG. 5. In so rising, the rib 64 carries a ribbon of cement upwardly against the insole. This is followed by an actuation of the motor 42 to return the applying tool to its immersed position leaving the ribbon of cement 138 deposited on the insole 136 as indicated in FIG. 10. The motor 94 is now actuated to release the shoe and the shoe is brought to the toe lasting machine.

The control system shown in FIG. 11 may be used to operate the steamer-applicator. The system includes a line 146 emanating from a source of air pressure (not shown). A line 148 extends from the line 146 to a manually actuated 4 way valve 150, and lines 152 and 154 extend from the valve 150 to the motor 94. A line 156 extends from the line 146 to a solenoid controlled 3 way valve 158 and lines 160 and 162 extend from the valve 158 to one end of the motors 42 and 128. A line 164 extends from the line 146 to a solenoid controlled 3 way valve 166 and lines 168 and 170 extend from the valve 166 to the other ends of the motors 42 and 128.

Assuming that a first shoe that has had its upper steamed and has had cement applied to its insole by the steamer-applicator has been removed from the steamer-applicator and has been placed in the toe lasting machine, a second shoe is now taken off a supply rack and placed in the steamer-applicator and the valve 150 is manually actuated to cause air to go through the line 152 into the motor 94 to cause the hold-down pad 120 to press the last and insole against the support members 68 and 90. The operator then causes the toe lasting machine to go through its cycle which includes the actuation of the valve 158 to cause the motor 128 to move the wipers 126 forwardly and wipe the lasting margin of the upper upon the insole, at which time the valve 166 is in venting position, followed by a movement of the valve 158 to venting position and an actuation of the valve 166 to cause the motor 128 to retract the wipers. When the wipers are caused to move forwardly, the motor 42 is actuated to raise the applicat-

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ing tool 60 against the insole. When the wipers are retracted the motor 42 is actuated to lower the applying tool and thereby leave a ribbon of cement on the insole. At the completion of the operation of the toe lasting machine, the first shoe is placed on a delivery rack, the manually actuated valve 150 is actuated to raise hold-down pad 120 away from the last, the second shoe is removed from the steamer-applicator and is placed in the toe lasting machine and a third shoe is taken from the supply rack and placed in the steamer-applicator.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims. It should be further understood that terms such as "above," "downward" and "forward" merely define the relative movements and locations of the various parts and should be so construed.

I claim:

1. An apparatus for preparing a shoe for a lasting operation that includes wiping a portion of the lasting margin of an upper against a corresponding portion of an insole and adhesively uniting said lasting margin and insole portions comprising: support means for supporting a last having said upper mounted thereon and said insole located on its bottom; a steam chamber for receiving the said portion of the upper; means for supplying steam to said chamber; and cement applying means mounted for engagement with the said portion of the insole.

2. An apparatus for preparing a shoe for a lasting operation that includes wiping a portion of the lasting margin of an upper against a corresponding portion of an insole and adhesively uniting said lasting margin and insole portions comprising: support means for supporting a last having said upper mounted thereon and said insole located on its bottom; a steam chamber located above said support means for receiving the said portion of the upper; means for supplying steam to the steam chamber; hold-down means mounted on the bottom of the steam chamber; means for moving the steam chamber downwardly to cause the hold-down means to engage the last and clamp the last between the hold-down means and the support means; cement applying means located below the support means; and means for moving the cement applying means upwardly into engagement with the said portion of the insole.

3. A shoe treating mechanism comprising: shoe working means for performing a lasting operation that includes wiping a portion of the lasting margin of a shoe upper mounted on a last against a corresponding portion of a shoe insole located on the last bottom and adhesively uniting said lasting margin and insole portions; means for actuating the shoe working means to perform the lasting operation on a first last-mounted shoe that has been prepared by the application of steam to its said upper portion and the deposition of cement on its said insole portion; means for supporting a second last having a second upper mounted thereon and a second insole located on its bottom; a steam chamber for receiving the said portion of the second upper; means for supplying steam to said chamber; cement applying means mounted for movement into and out of engagement with the said portion of the second insole; and control means operatively connected to the shoe working means and the cement applying means to bring the cement applying means into and out of engagement with the said portion of the second insole during the performance of the lasting operation on the first shoe.

4. A shoe treating mechanism comprising: shoe working means for performing a lasting operation that includes wiping a portion of the lasting margin of a shoe upper mounted on a last against a corresponding portion of a shoe insole located on the last bottom and adhesively uniting said lasting margin and insole portions; means for actuating the shoe working means to perform the lasting operation on a first last-mounted shoe that has been prepared by the deposition of cement on its said insole portion; means for supporting a second last hav-

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ing a second insole located on its bottom; cement applying means mounted for movement into and out of engagement with the said portion of the second insole; and control means operatively connected to the shoe working means and the cement applying means to bring the cement applying means into and out of engagement with the said portion of the second insole during the performance of the lasting operation on the first shoe.

5. An apparatus for preparing a shoe for lasting comprising: a cement pot; a well in said cement pot for containing a pool of molten cement; an applying tool located in said well and mounted for movement from a position wherein it is immersed in the pool to a position above the pool; support means for supporting a last bottom-down above the well and applying tool, said last having an upper mounted thereon and in insole located on its bottom; a steam chamber located above the toe of the last for receiving the toe portion of the upper; means for supplying steam to said steam chamber; and means for reciprocating the applying tool to raise it from its immersed position in the pool into engagement with the toe portion of the insole and to lower it back into the pool.

6. An apparatus for preparing a shoe for lasting comprising: a cement pot; a well in said cement pot for containing a pool of molten cement; an applying tool located in said well and mounted for movement from a position wherein it is immersed in the pool to a position above the pool; support means mounted on the cement pot for supporting a last bottom-down above the well and applying tool, said last having an upper mounted thereon and an insole located on its bottom; a steam chamber located above the toe of the last for receiving the toe portion of the upper, said steam chamber being mounted for movement toward and away from the last; hold-down means located on the bottom of the steam chamber; means for supplying steam to the steam chamber; means for moving the steam chamber downwardly to bring the hold-down means into engagement with the last and thereby clamp the last between the support means and the hold-down means; and means for reciprocating the applying tool to raise it from its immersed position in the pool into engagement with the toe portion of the insole and to lower it back into the pool.

7. An apparatus for preparing a shoe for lasting comprising: a water pot; a water well in said water pot for containing a quantity of water; means for supplying heat to said water well to convert the water contained therein into steam; a cement pot mounted on said water pot; a cement well in said cement pot for containing a pool of molten cement; means for supplying heat to said cement well to maintain the cement contained therein molten; an applying tool located in said cement well and mounted for movement from a position where it is immersed in the pool to a position above the pool; support means mounted on the cement pot for supporting a last bottom-down above the pool and the applying tool, said last having an upper mounted thereon and an insole located on its bottom; a steam chamber located above the toe of the last for receiving the toe portion of the upper, said steam chamber being mounted for movement toward and away from the last; hold-down means located on the bottom of the steam chamber; a tube interconnecting the water pot and the steam chamber for supplying steam to the steam chamber; means for moving the steam chamber downwardly to bring the hold-down means into engagement with the last and thereby clamp the last between the support means and the hold-down means; and means for reciprocating the applying tool to raise it from its immersed position in the pool into engagement with the toe portion of the insole and to lower it back into the pool.

8. A device for applying cement to a work piece comprising: a cement pot; a well in said pot for containing a pool of molten cement; a cover on said pot overlying

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said well; an opening extending through said cover; means on said cover for supporting the work piece above the well; an applying tool mounted in the well for reciprocation from a position where it is immersed in the pool, through the cover opening, to a position for depositing cement on the work piece and back to its immersed position; drive means connected to the applying tool to effect such reciprocation; and gauge means located above the cover contiguous to said cover opening for properly locating the work piece in position above the applying tool.

9. The device according to claim 8 wherein said gauge means comprises: a gauge finger upstanding from said cover along a side of said opening.

10. A device for applying cement to a work piece comprising: a cement pot; a well in said pot for containing a pool of molten cement; a cover on said pot overlying said well; an opening extending through said cover; support means extending upwardly of the cover for supporting the work piece above the pool; an applying tool mounted in said well for reciprocation from a position where it is immersed in the pool, through the cover opening, to a position of engagement with the work piece and back to its immersed position; drive means connected to the applying tool to effect such reciprocation; and gauge means mounted on the cover contiguous to said cover opening for properly locating the work piece in position above the applying tool.

11. The cement applying device according to claim 10 further comprising: a hold-down located above the well; means mounting the hold-down on the cement pot for reciprocating movement toward and away from the well; and second drive means connected to the hold-down to effect its movement.

12. The cement applying device according to claim 10 further comprising: a support pin mounted in the well and extending upwardly thereof.

13. A shoe conditioning apparatus comprising: support means for supporting a last having an upper mounted thereon; a deck located above said support means; a channel within the deck; at least one port extending from the channel to the top surface of the deck; a source of steam; and means interconnecting the source of steam and the channel.

14. A shoe conditioning apparatus comprising: support means for supporting a last having an upper mounted thereon; a deck located above said support means; a channel within the deck; at least one port extending from the channel to the top surface of the deck; a source of steam; a tube interconnecting the source of steam and the channel; and a cover connected to said deck and extending thereover.

15. A shoe conditioner comprising: a deck; a channel within the deck; a tube, adapted to be connected to a source of steam, in communication with the channel; at least one port extending from the channel to the top surface of the deck; at least one electric heating cartridge embedded in the deck; a cover connected to the deck and extending thereover; and a hold-down pad secured to the bottom surface of the deck.

16. In combination with a lasting machine having

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wiping means and first drive means for effecting forward movement of the wiping means to wipe the lasting margin of a shoe upper upon a shoe insole and rearward movement of the wiping means to withdraw the wiping means from the shoe; a cement applying device comprising: a cement pot; a well in said pot for containing a pool of molten cement; support means mounted on said cement pot for supporting bottom-down a last having an insole located on its bottom; an applying tool mounted in said well for upward movement from a position where it is immersed in the pool to a position of engagement with the insole and for downward movement back to its immersed position; second drive means for effecting such movement of the applying tool; and control means connected to the first and second drive means operative to concomitantly effect forward movement of the wiping means and upward movement of the applying tool and for concomitantly effecting rearward movement of the wiping means and downward movement of the applying tool.

17. The combination according to claim 16 wherein said last also has an upper mounted thereon and further comprising: a steam chamber located above said cement pot adapted to receive said upper; and means for supplying steam to said steam chamber.

18. An apparatus for preparing a shoe for a lasting operation that includes wiping a portion of the lasting margin of an upper against a corresponding portion of an insole and adhesively uniting said lasting margin and insole portions comprising: support means for supporting a last having said upper mounted thereon and said insole located on its bottom; a steam chamber located above said support means for receiving the said portion of the upper; means for supplying steam to the steam chamber; cement applying means located below the support means; and means for moving the cement applying means upwardly to deposit cement on the said portion of the insole.

19. An apparatus for preparing a shoe for lasting comprising: a cement pot; a well in said cement pot for containing a pool of molten cement; an applying tool located in said well and mounted for movement from a position wherein it is immersed in the pool to a position above the pool; support means for supporting a last bottom-down above the well and applying tool, said last having an upper mounted thereon and an insole located on its bottom; a steam chamber located above the support means for receiving the toe portion of the upper; means for supplying steam to said steam chamber; and means for reciprocating the applying tool to raise it from its immersed position in the pool to deposit cement on the toe portion of the insole and to lower it back into the pool.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |        |               |
|-----------|--------|---------------|
| 425,544   | Lake   | Apr. 15, 1890 |
| 1,341,183 | Lee    | May 25, 1920  |
| 1,371,942 | Sorci  | Mar. 15, 1921 |
| 1,678,140 | Furber | July 24, 1928 |
| 2,460,940 | Maeser | Feb. 8, 1949  |