Sept. 13, 1927. 1,642,017

A. C. ESTEY

SOLE LAYING MACHINE

Filed Jan. 26, 1922 4 Sheets-Sheet 1

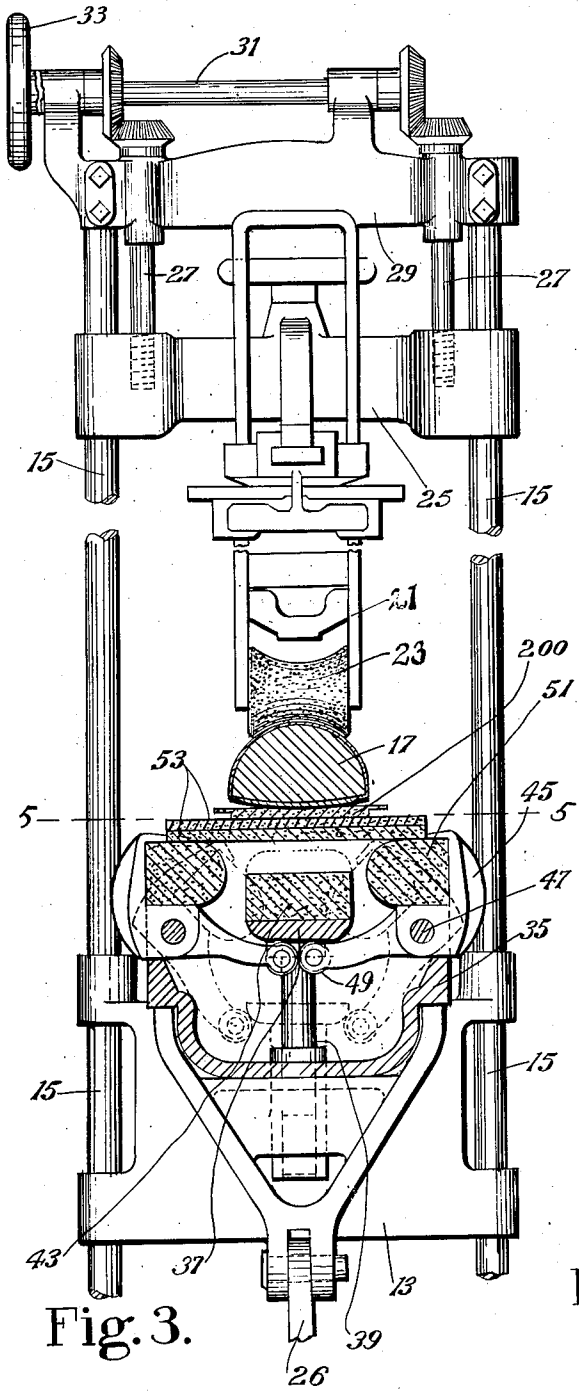


Fig. 3.

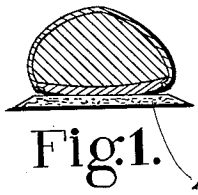


Fig. 1.



Fig. 2.

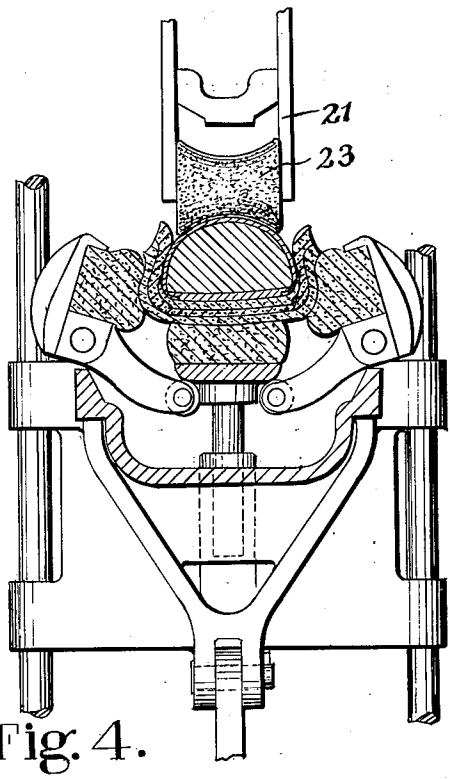


Fig. 4.

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SOLE LAYING MACHINE

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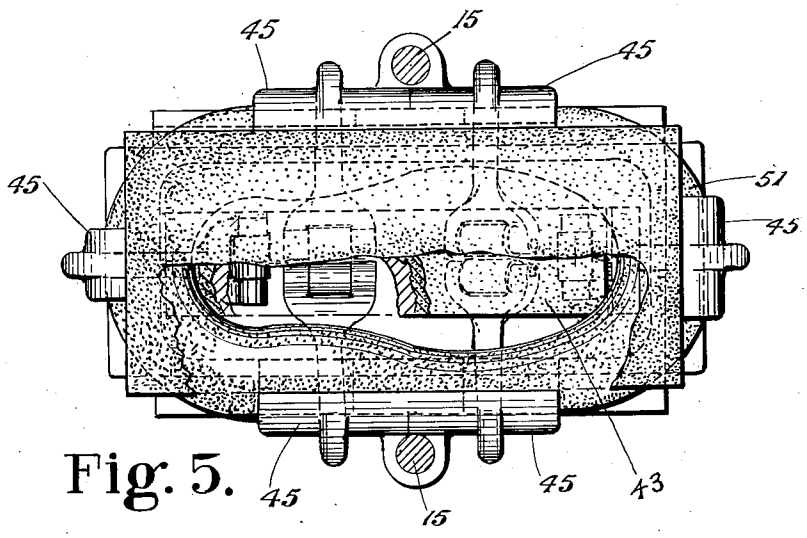


Fig. 5.

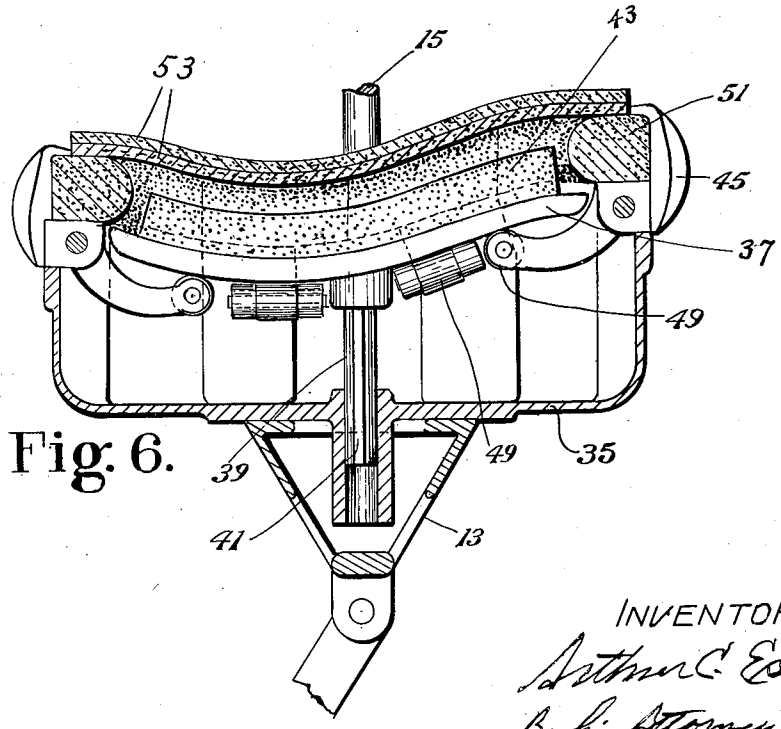


Fig. 6.

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SOLE LAYING MACHINE

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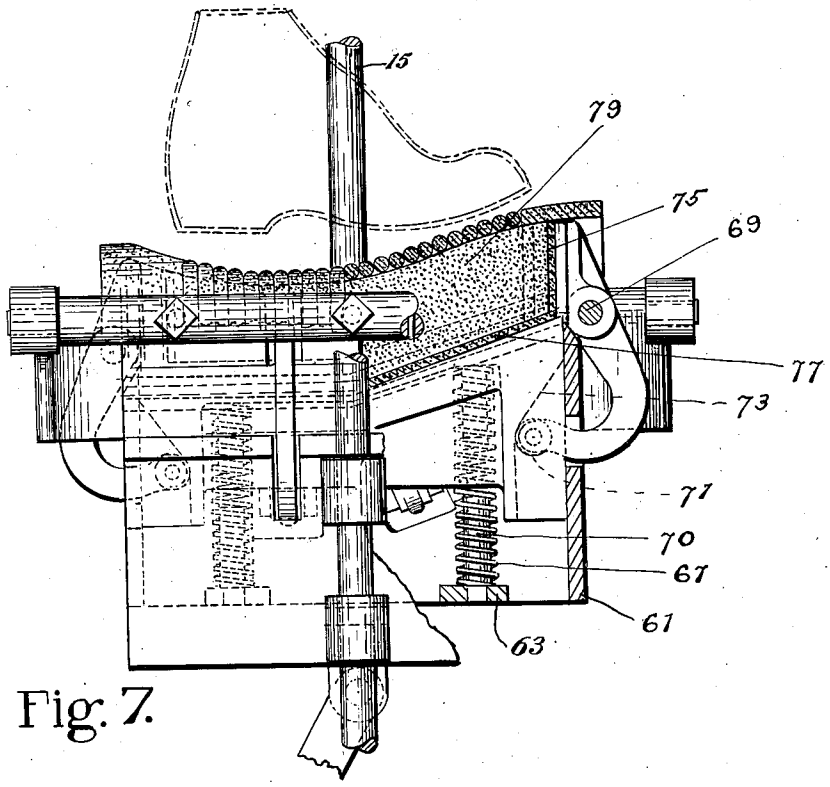


Fig. 7.

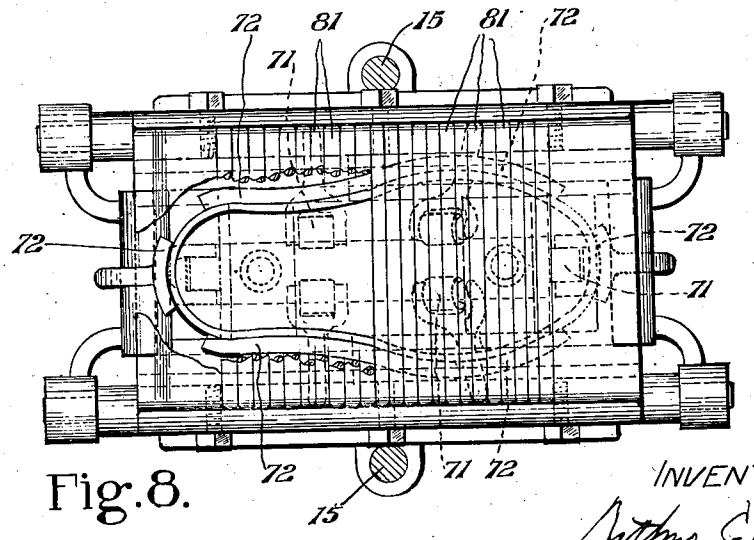


Fig. 8.

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SOLE LAYING MACHINE

Filed Jan. 26, 1922 4 Sheets-Sheet 4

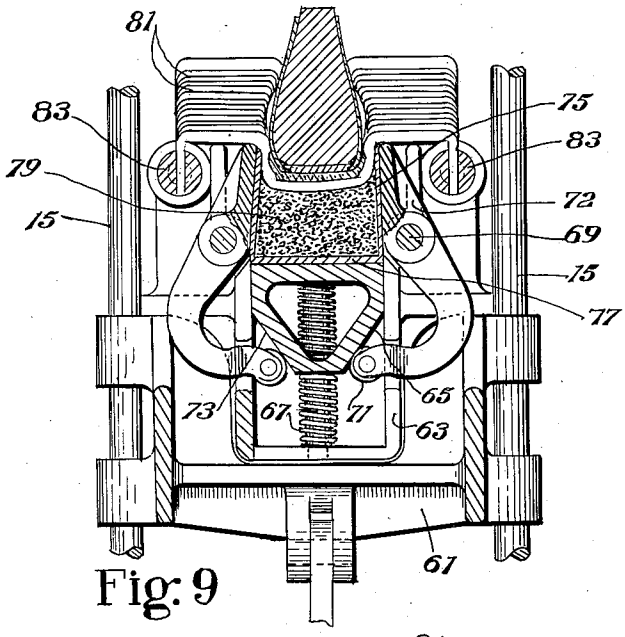


Fig: 9

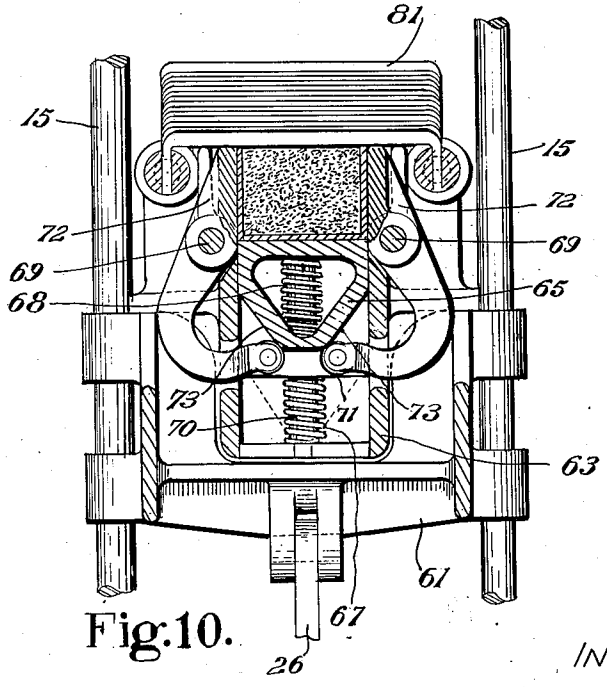


Fig:10.

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Patented Sept. 13, 1927. 1,642,017

UNITED STATES PATENT OFFICE.

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SOLE-LAYING MACHINE.

Application filed January 26, 1922. Serial No. 531,879.

This invention relates to machines for operating upon boots and shoes and is herein illustrated as embodied in a machine for laying unvulcanized soles of rubber, rubberized or similar material upon the bottoms of shoes.

In laying an unvulcanized rubber sole it is usually desirable not only to press the sole firmly against the bottom of the shoe, but also to bend the margin of the sole upwardly and to press it against the lower portions of the sides of the shoe. In some rubber-soled footwear, such as sneakers, the upward bending of the margin of the sole is comparatively slight; but in other types, such as arctics, the sole is sometimes rolled up around the sides of the shoe for half an inch or more.

The general object of the present invention is to provide a machine for laying all kinds of rubber or similar soles and particularly for laying rolled-edge soles, in the process of which pressure is applied both in a direction substantially perpendicular to the bottom of the shoe and in a direction substantially perpendicular to the sides of the shoe.

According to one feature of the present invention, there are provided a bottom pressing member or members and side pressing members together with means for causing the bottom-pressing member to press the sole against the bottom of the shoe and the side-pressing members to move inwardly and press against the sides of the shoe. Conveniently the machine may comprise a support for a lasted shoe, a box-like structure adapted to receive a shoe and having movable sides, means for causing relative movement of approach between the support and the box to cause the shoe to enter the box, and means for then moving the sides of the box inwardly so as to cause them to close about the shoe. With such a construction the body of the sole is pressed firmly against the bottom of the shoe and the sides of the box move inwardly to press the upturned margin of the sole against the lower portions of the sides of the shoe.

These and other features of the invention including certain details of construction and combinations of parts will be described as embodied in an illustrative machine and pointed out in the appended claims.

Referring to the accompanying drawings,

Fig. 1 is a cross section through the forepart of a lasted shoe with an uncured rubber cole adhering to its bottom and ready to be laid.

Fig. 2 is a similar cross section showing the position of the sole after the sole laying operation has been performed.

Fig. 3 is a view, partly in section and partly in elevation, showing a machine in which the present invention is embodied with a shoe and its sole in the positions which they occupy just prior to the sole laying operation. The sole shown in this figure is of a somewhat different shape from that shown in Figs. 1 and 2, and has a projecting flange which is designed to be turned up and pressed against the lower portion of the sides of the shoe.

Fig. 4 is a view, principally in cross section, of the same machine and shoe which are shown in Fig. 3, but with the parts in the positions which they occupy at the completion of the sole laying operation.

Fig. 5 is a cross-section of the machine on the line 5—5 of Fig. 3, a portion of the rubber blankets which cover the opening in the box having been broken away.

Fig. 6 is a vertical longitudinal cross section through the lower portion of the machine.

Fig. 7 is a view, partly in section and partly in side elevation of a portion of a machine embodying a modified form of the invention.

Fig. 8 is a plan of the parts which are shown in Fig. 7.

Fig. 9 is a vertical cross section of the machine shown in Fig. 7 with the parts in the positions which they occupy at the completion of the sole laying operation, a lasted shoe being shown with its lower portion extending into the box, and

Fig. 10 is a cross section, similar to Fig. 9, but showing the parts of the machine in their normal positions.

Referring first to Figs. 1 and 2, there is shown in Fig. 1 a lasted shoe having adhering to its bottom an unvulcanized rubber sole 100 of the so-called "roll-edge" type. In Fig. 2 this sole is shown in the position which it occupies after it has been laid. It will be noted that the main portion of the sole has been pressed firmly against

the bottom of the shoe and that the margin of the sole has been bent upwardly and pressed against the lower portions of the sides of the shoe. The sole 200 shown in Figs. 3 and 4 has a flange extending outwardly from a portion of its edge; and in the laying of this sole, this flange should be bent upwardly and pressed against the lower portions of the sides of the shoe. While therefore, the two soles which have been illustrated are of a somewhat different construction, they require practically the same treatment in order to be laid properly.

In the illustrated machine, the shoe is forced into a box-like structure, which, for convenience, will be referred to merely as "the box". The lower portion of the shoe is first moved into the box whereby the projecting margin of the sole is bent upwardly; and then the sole is pressed against the bottom of the box, and the sides of the box are caused to move inwardly so as to press the upturned margin of the sole against the sides of the shoe. In the machine shown in Figs. 3 to 6 inclusive, the carrier for the box is indicated at 13. This carrier is movable up and down, being guided in its movement by rods 15, and any suitable mechanism may be employed for moving it up to apply the sole laying pressure and for drawing it down after the sole has been laid, the duration of the application of pressure being very short owing to the nature of unvulcanized rubber. A lasted shoe is indicated at 17; and the last is supported against the sole laying pressure in the usual manner by a heel post and a toe post, the latter being indicated at 21. The heel post is provided with the usual last pin which is received in the usual socket in the last. The toe post 21 is provided with a toe rest in the form of a roll 23 composed of suitable resilient material such as rubber. The heel post and toe post are adjustably mounted upon an adjustable head 25; the latter being arranged to be adjusted up and down on the guide rods 15. The head is bored and tapped for the reception of adjusting screws 27 which are rotatably mounted in but held from longitudinal movement with respect to a stationary head 29. The adjusting screws have bevel gears at their upper ends which mesh respectively with bevel gears upon a horizontal rotary shaft 31, said shaft having a handle 33 by which it may be turned to raise and lower the adjustable head 25 and consequently the lasted shoe. The heel post and toe post are adjustable toward and from each other along a ledge formed on the head 25. The machine as thus far described, except the construction of the box, is, or may be, substantially the same as that shown and described in parent to Davenport No. 1,163,589, and no further description of its details will be given. The mechanism for causing the carrier 13 to be raised and lowered has not been shown since any suitable mechanism may be employed which will act rapidly so as not to prolong the pressure upon the uncured rubber sole. Conveniently toggle levers, one of which is shown as 26, may be employed.

Mounted upon the carrier 13 is a frame 35 which carries the parts of the collapsible box. This box comprises a bottom which is movable up and down, and sides which are movable inwardly and outwardly. In the illustrated machine, there are six of these side members, two at each side and one at each end. The bottom member comprises a plate 37 fast to the upper end of a plunger 39, said plunger being slidable in a vertical bore formed in the frame 35 and being prevented from rotating by means of a key 41 (Fig. 6). Mounted upon the plate 37 is a thick piece of rubber 43. Each side member is in the form of a lever 45 pivoted at 47 to the frame 35 and having an inwardly extending arm carrying at its extremity a roll 49 which is located in the path of movement of the plate 37 so that when a shoe is forced into the box and thereby pushes the plate 37 downwardly, the sides of the box will be rocked about their pivots 47 into the positions shown in Fig. 4. The levers 45 are formed with rectangular grooves and in these grooves is held a continuous thick piece of rubber 51. It will be noted by referring to Fig. 5 that the rubber is so shaped that it encloses a substantially sole-shaped opening the contour of which corresponds to that of the lower part of a shoe. This endless piece of rubber possesses sufficient elasticity to return the sides of the box from the positions which they occupy in Fig. 4 to their normal positions as shown in Fig. 3 as soon as pressure upon the bottom of the box has been released, but if desired, a coiled spring similar to that used in the modification shown in Figs. 7 to 10 may also be employed. Extending over the opening in the box is a resilient member herein shown as two thick sheets of rubber 53.

In the operation of this machine, a lasted shoe with an uncured sole adhering to its bottom is placed in position on the jack, and then the carrier 13 is caused to make a rapid reciprocation. As the shoe moves into the box the margin of the sole is bent upwardly by reason of the sole-shaped opening in the rubber member 51. Presently the sole encounters the movable bottom or seat and presses it downwardly. The downward movement of the bottom rocks the sides of the box inwardly and causes them to collapse in a direction to press the upturned margin of the sole against the sides of the shoe. It will be noted by referring to Fig. 4 that the pressure exerted by collapsing the sides of the box is proportional to the pres-

sure against the bottom of the sole so that the more pressure applied to the bottom of the sole, the more is applied to the upturned margin. In the illustrated machine, the bottom of the box has been utilized to serve as an actuating member for the collapsible sides, but it should be understood that it is not essential that the bottom of the box or any part of it should serve as such actuating member.

Referring now more particularly to Figs. 7 to 10, the machine, except for the construction of the box, is practically the same as that which has just been described. In the machine shown in these figures, the carrier 61, which is slidable on the rods 15, is shaped somewhat differently so as to receive a differently shaped frame 63. This frame provides a vertical guideway in which the bottom 65 of the box is slidable, said bottom being supported by coiled springs 67 which at their upper ends encircle guide pins 68 formed on the bottom of the box and at their lower ends encircle similar pins 70 formed on the frame 63. The collapsible sides 72 of the box are each pivoted at 69 to the frame, and each has an inwardly extending arm carrying at its extremity a roll 71 which co-operates with an inclined face 73 formed on the bottom 65. As shown best in Fig. 8, the sides of the box comprise six members or sections 72 two on each side of the box and one on each end; and the inner faces of these members have a combined contour which is substantially sole shaped. Fastened to the inner faces of the side members is an endless strip of rubber 75; and fast to the top of the bottom member 65 is an elastic strip 77. The box in this case is shown as practically filled with small pieces of rubber 79, these pieces of rubber serving as a cushion and taking the place of the single thick piece of rubber 43 shown in the machine of Figs. 1 to 7. Stretched across the opening of the box is a series of rubber cords 81 the opposite ends of which are firmly held in clamps 83.

The mode of operation of this modified machine is similar to that of the one which was first described. The carrier 61 is moved upwardly to cause the shoe to enter the box. As the shoe enters the box, the margin of the sole is bent upwardly; and then as the shoe moves farther into the box, the bottom 65 is depressed against the springs 67 and the sides of the box are rocked about their pivots 69 so as to exert pressure against the upwardly bent margin of the sole. The series of cords 81, like the sheets 53 of the machine which was first described, form a resilient cover for the box. Their purpose, like that of the sheets, is to insure that the margin of the sole shall be wiped upwardly and that there shall be pressure all along the lower portions of the sides of the shoe. It is of course impractical to make the sole-shaped opening in the top of the box correspond exactly to the outline of the bottom of each shoe. The rubber cords shown in Figs. 7 to 10 and the rubber sheets shown in the machine in Figs. 1 to 6 are resilient and deformable and consequently tend to make up for the difference between the outline of the opening in the top of the box and the outline of the bottom of the shoe. It should be understood, however, that the sheets or cords are not essential in the broader aspects of the invention.

Although the invention has been described as embodied in a particular machine in which the side-pressing members are connected with and operated by the bottom-pressing member, it should be understood that the invention is not limited in the scope of its application to the particular machine which has been shown and described.

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

1. A machine for laying an unvulcanized rubber sole on the bottom of a lasted shoe, having, in combination, a resilient member for pressing the sole against the bottom of the shoe, resilient members for pressing the upturned margin of the sole against the sides of the shoe, means for causing the sole to be forced against the bottom-pressing member, and means for moving the side-pressing members toward the shoe.

2. A machine for laying an unvulcanized rubber sole on a shoe, having, in combination, a box-like structure having collapsible sides and an opening through which the lower portion of the shoe may be caused to enter the box, a support for the shoe, means for causing relative movement between the support and the box to cause the shoe to enter the box, a member located in position to contact with, and be moved by, the shoe during such relative movement, and connections between said member and the sides such that movement of the member moves the sides of the box toward the shoe.

3. A machine of the class described having, in combination, a series of members enclosing a substantially sole-shaped opening, said members being movable inwardly and outwardly and being normally in their outward positions, a resilient cover located over the opening, means for causing the lower portion of a shoe having attached thereto an unvulcanized sole to move into the opening thereby carrying a portion of the resilient cover with it and turning upwardly the margin of the sole, and means other than the cover for moving the members inwardly so as to press the upturned margin of the sole against the sides of the shoe.

4. A machine for laying an unvulcanized rubber sole on a shoe comprising a box-like structure having collapsible sides and an opening through which the lower portion of the shoe may be caused to enter the box, and a single operating thrust member, movement of which causes the sides of the box to collapse against the sides of the shoe.

5. A machine for laying an unvulcanized rubber sole on a shoe comprising a box-like structure having collapsible sides and an opening through which the lower portion of the shoe may be caused to enter the box, a single operating thrust member positively connected to the side sections, and adapted when moved in one direction under pressure of the shoe to collapse the sides of the box against the lower side portions.

6. A device for laying an unvulcanized rubber sole on a shoe, comprising a box-like structure having side sections adapted to be collapsed, a member of resilient material through which the side sections act when collapsed, an opening through which the lower portion of a shoe may be caused to enter the box, and an operating member positively connected with the side sections and operating when moved in one direction to collapse the sections so as to cause them to exert pressure upon the lower side portions of the shoe and when moved in another direction to move the side sections outwardly so as to permit the shoe to be withdrawn.

7. A machine for laying an unvulcanized rubber sole on a shoe comprising a box-like structure having movable side sections including rigid portions and yielding portions, an actuating member located in the path of the shoe which is forced into the box, having rigid portions adapted to engage the rigid portions of the side sections, and means responsive to pressure exerted by the shoe upon the actuating member for causing the yielding portions to close about the shoe.

8. A machine for laying an unvulcanized rubber sole on a shoe comprising a box having a bottom including a portion of rigid material, and side sections movable inwardly and outwardly each side section including a portion of rigid material arranged to engage the rigid portion of the bottom, the bottom being normally in its inward position and the sides in their outward positions, the construction and arrangement being such that movement of the bottom, through the engagement of said rigid portions, causes the side sections to move inwardly.

9. A sole laying device comprising a box-like structure having movable side and bottom members, and unyielding connections between said members such that pressure upon a bottom member causes a side member to move inwardly.

10. A sole laying device comprising a box-like structure having movable side and bottom members and means whereby pressure exerted by the sole of a lasted shoe against a bottom member moves the side members positively toward the sides of the shoe.

11. A machine for laying an unvulcanized rubber sole on a shoe comprising a box-like structure having collapsible side sections and an opening through which the lower portion of the shoe may be caused to enter the lower portion of the box, a lining of resilient material for said sections and an operating member connected with the sides and movable to cause the sides of the box to collapse against the sides of the shoe.

12. A sole laying device comprising a box-like structure having movable side sections, a lining of resilient material for said sections, an actuating member for said sections located in the path of a shoe which is forced into said box, and means responsive to the pressure exerted by the bottom of the shoe upon the actuating member for causing the side sections to close about and exert pressure against the sides of the shoe.

13. A sole laying device comprising a box-like structure having movable side sections, a lining of resilient material for said sections, a bottom for the box, a lining of resilient material for said bottom, and means responsive to the pressure exerted by the bottom of the shoe upon the bottom of the box for causing the side sections to close about and exert pressure against the sides of the shoe.

14. A sole laying device comprising a box-like structure having movable side and bottom members, resilient material mounted on the operative faces of said members, and connections between said members such that pressure exerted upon a bottom member causes the side members to move inwardly.

15. A sole laying device comprising a box-like structure having movable side and bottom members, resilient material mounted on the operative faces of said members, and means whereby pressure exerted by a shoe upon a bottom member causes the side members to press against the sides of the shoe.

16. A sole laying device comprising a box-like structure having collapsible sides and an opening to receive the lower portion of a shoe, a resilient cover for the opening, an operating member for the sides, and connections between the member and the sides such that when the shoe is placed upon the resilient cover and forced into the box, the sides are collapsed to exert pressure upon the sides of the shoe.

17. A sole laying device comprising a box-like structure having movable bottom and side members, the side members enclosing an opening which is substantially sole-shaped, a thick body of resilient material supported upon the bottom, a resilient member extending across the opening, and means

for causing the bottom and side members to move in directions to exert pressure upon the bottom and lower side portions of a shoe.

18. A machine of the class described having, in combination, a series of pressers enclosing an opening, means for placing in the opening the lower portion of a shoe having attached thereto a rubber sole, the size of the opening being such that the margin of the sole is bent upwardly, and means for moving the pressers inwardly to press the upturned margin of the sole against the sides of the shoe.

19. A machine of the class described having, in combination, a series of pressers enclosing an opening, means for placing in the opening the lower portion of a shoe having attached thereto a rubber sole, the size of the opening being such that the margin of the sole is bent upwardly, and positively operated means for moving the pressers inwardly to press the upturned margin of the sole against the sides of the shoe.

20. A machine of the class described having, in combination, a series of pressers having faces of resilient material enclosing an opening, means for placing in the opening the lower portion of a shoe having attached thereto a rubber sole, the size of the opening being such that the margin of the sole is bent upwardly, and means for moving the pressers inwardly to press the upturned margin of the sole against the sides of the shoe.

21. A machine of the class described having, in combination, a box-like structure having collapsible side sections pivoted thereto, a movable bottom, and arms on the side sections having depending portions located in the path of movement of the bottom whereby when the bottom is moved downwardly the side sections are moved inwardly.

22. A machine of the character described having, in combination, a seat, a series of members surrounding said seat, a resilient lining surrounding said seat and supported by said members, and means to apply pressure to said members.

23. A machine of the character described comprising, in combination, a resilient bottom member, a series of presser members surrounding said bottom member, and a resilient lining for said presser members said members being so pivotally arranged as to rock upon force being applied to them.

24. A machine of the class described comprising, in combination, a bottom member, and a series of side members forming a box-like structure, said bottom member and side members being so co-operatively arranged that a pressure change in either the bottom member or the side members causes a corresponding relative pressure change in the other members or member.

25. A machine of the character described comprising a box-like structure, the bottom of the structure being composed of a resilient member, and the sides of the structure comprising a series of presser members, said members being capable of moving inwardly and outwardly and co-operating with the resilient bottom member so as to press the bottom and margin of an unvulcanized rubber sole firmly against the bottom and sides of a shoe.

26. A machine of the class described having, in combination, a bottom member and a series of side members surrounding said bottom member and forming with it a box-like structure, and means for causing the lower portion of a shoe having attached thereto an unvulcanized sole to move into the structure, said side members being so pivotally arranged as to rock downwardly and inwardly to bend the margin of the sole about the edge of the shoe and press it firmly against the side thereof.

In testimony whereof I have signed my name to this specification.

ARTHUR C. ESTEY.