Aug. 27, 1946. W. H. DOHERTY 2,406,359

VACUUM LAST AND SOLE FORMING MACHINE

Filed Feb. 2, 1944 4 Sheets-Sheet 1

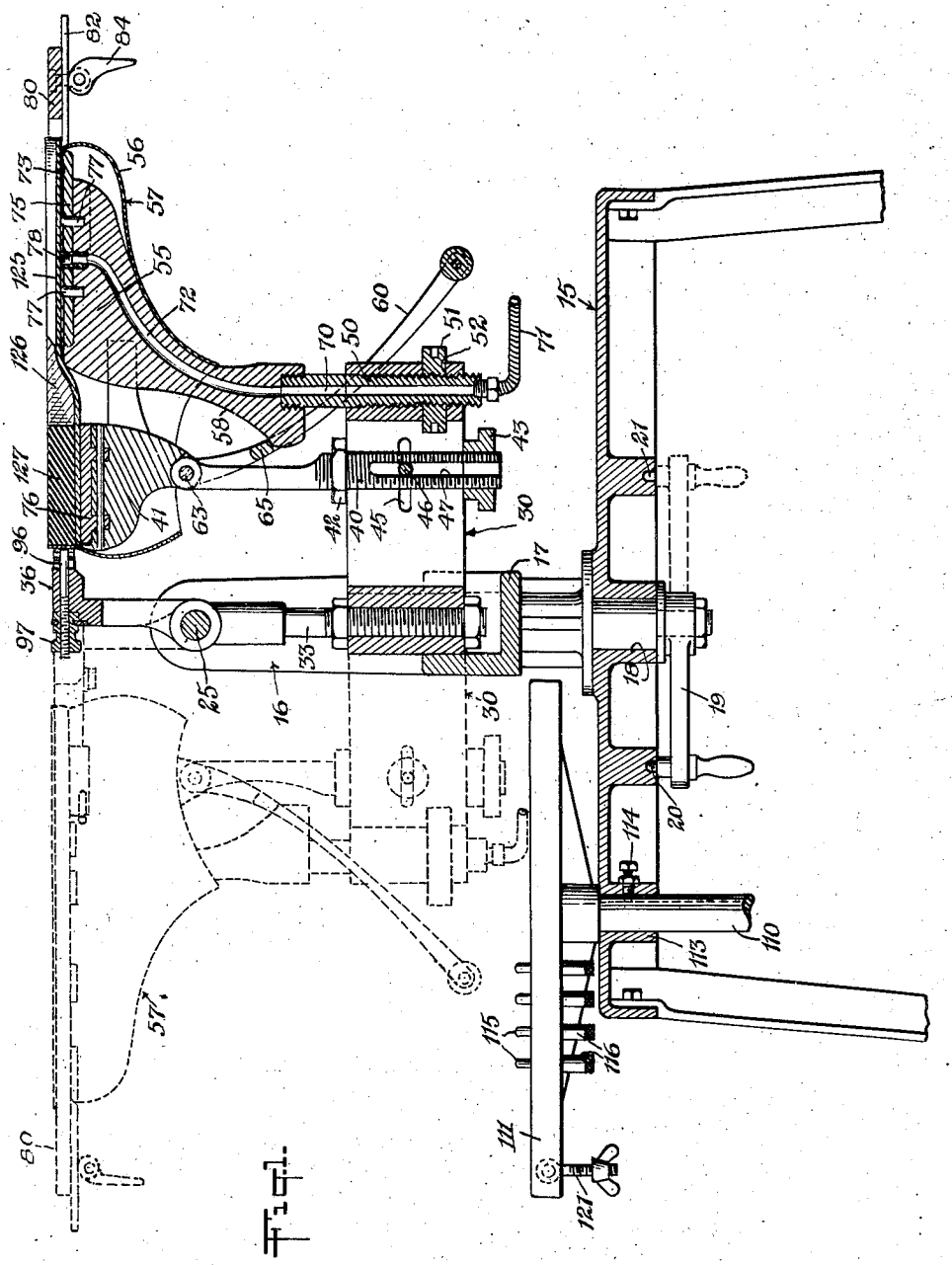


FIG. 1.

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Filed Feb. 2, 1944 4 Sheets-Sheet 2

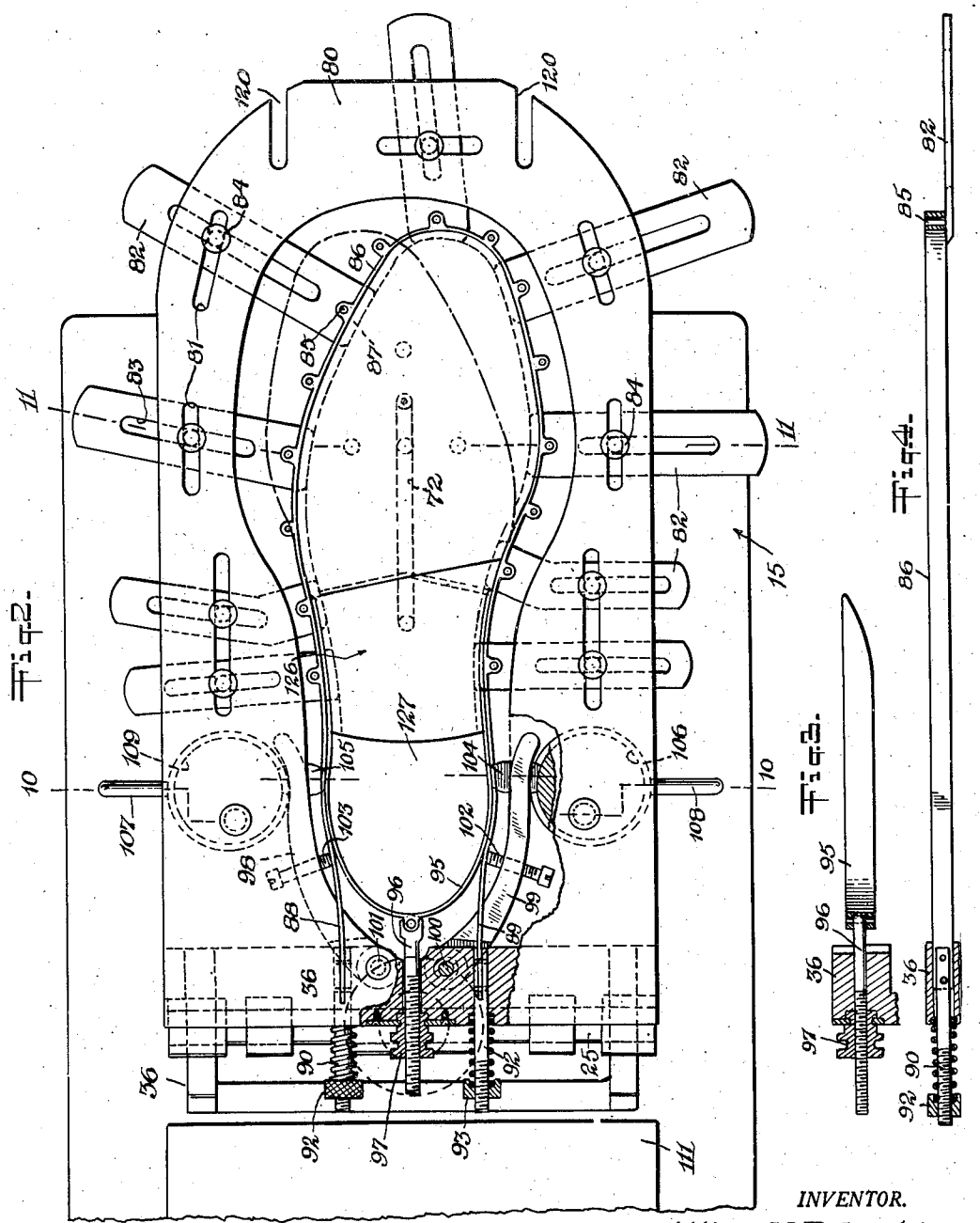


Fig. 2.

Fig. 4.

Fig. 3.

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Filed Feb. 2, 1944 4 Sheets-Sheet 3

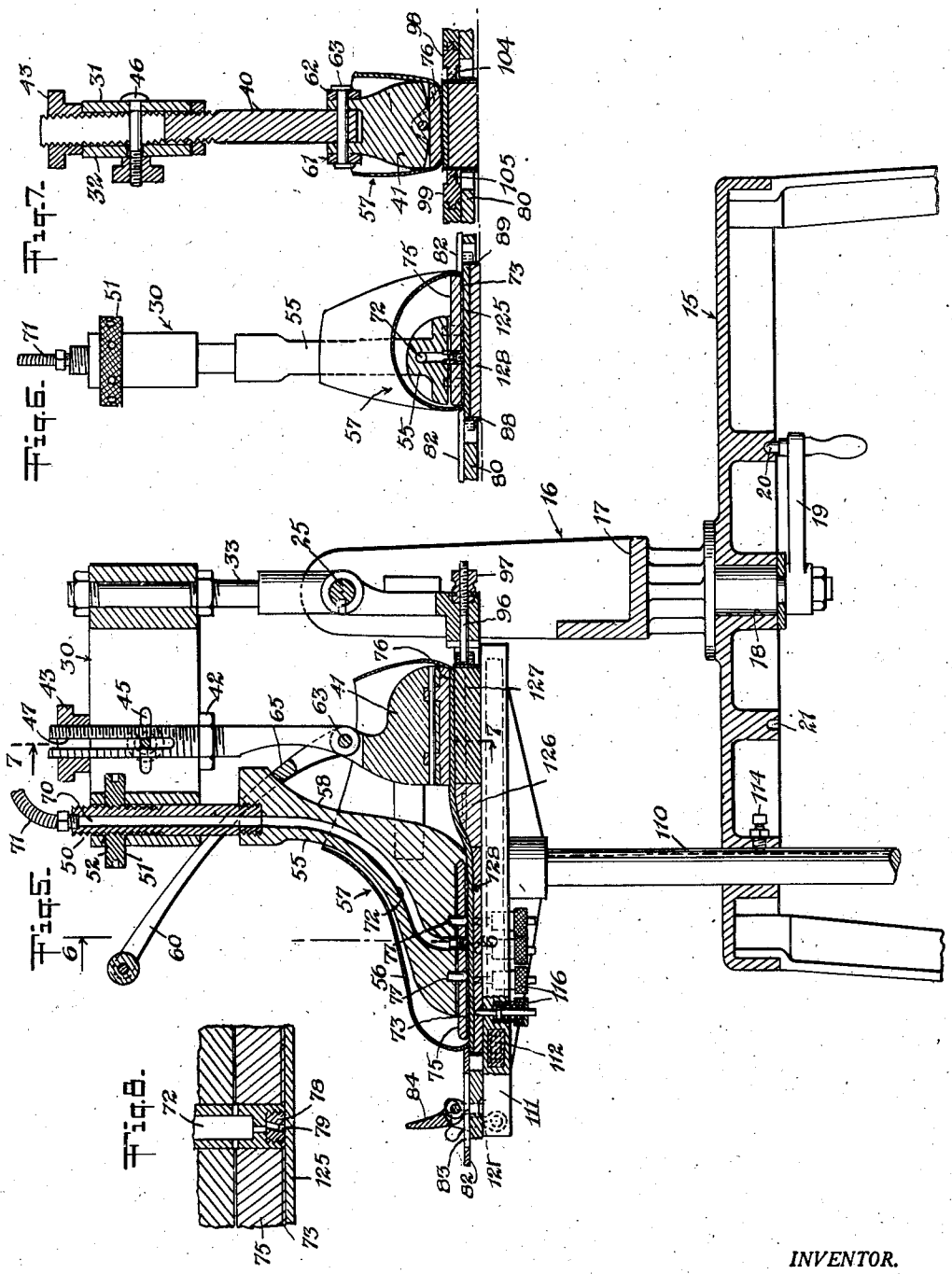


Fig. 7.

Fig. 6.

Fig. 5.

Fig. 8.

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Fig. 10.

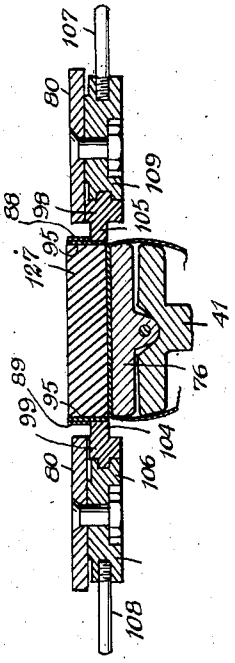


Fig. 11.

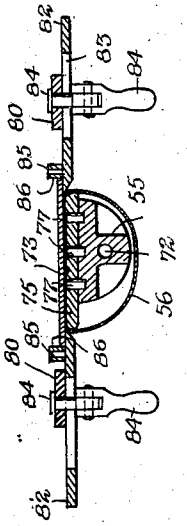
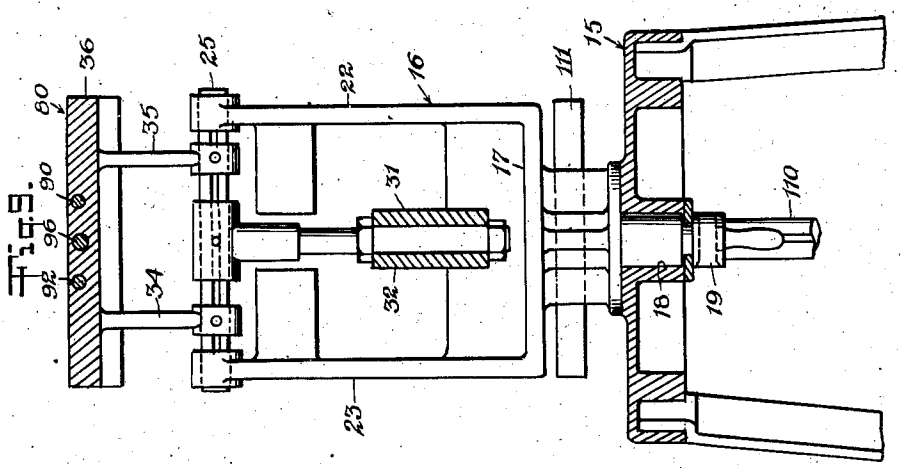


Fig. 9.



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Patented Aug. 27, 1946 2,406,359

UNITED STATES PATENT OFFICE

2,406,359

VACUUM LAST AND SOLE FORMING MACHINE

William H. Doherty, Elmhurst, N. Y.

Application February 2, 1944, Serial No. 520,731

4 Claims. (Cl. 18—34)

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This invention relates to shoe machinery and more particularly to a vacuum last and sole forming machine.

An object of this invention is to provide a machine with which new or replacement soles may be applied to shoes.

A further object is to provide a machine particularly adapted to apply plastic soles.

Another object of my invention is to provide a machine which is provided with a vacuum last to hold the shoe being soled or repaired in the proper position. This is particularly important when shoes are being resoled since to secure a proper resoling the inner sole must be flat and in position. As shoes are worn the inner portion of the shoe becomes depressed about the ball of the foot and it is important that this section be straightened to provide a level inner sole as in a new shoe.

My machine is adapted to handle shoes of various sizes and to fit the sole to conform with the original last. In order to accomplish this certain adjustments of size and contour are necessary. As will be seen from the drawings and the ensuing description I have provided means for adjusting my molding element to any desired shape. It will also be seen that I have provided means for switching the machine so that it is adapted to mold soles for either the left or the right shoe.

Other objects and advantages of my invention will appear in the ensuing description and accompanying drawings, in which

Figure 1 is a side elevation in section of a machine embodying my invention;

Fig. 2 is a plan view of the bed of my machine;

Fig. 3 is a detailed view partly in section of a heel-forming plate;

Fig. 4 is a detailed view partly in section of a sole-forming member;

Fig. 5 is a sectional view showing my machine in operating position;

Fig. 6 is a detailed view in section on the line 6—6 of Fig. 5;

Fig. 7 is a detailed view in cross section on the line 7—7 of Fig. 5;

Fig. 8 is a detailed view through the vacuum nozzle;

Fig. 9 is an end view in section of my machine;

Fig. 10 is a cross sectional view taken on the line 10—10 of Fig. 2;

Fig. 11 is a cross sectional view taken on the line 11—11 of Fig. 2.

Referring more particularly to the drawings I provide a table or casting 15 upon which is

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mounted a rotatable frame 16 having an L-shaped member 17 for strengthening purposes and for supporting the frame as hereinafter described. The frame 16 is rotatable within the opening 18 by means of the handle 19. The handle 19 is provided with a spring-pressed register pin 20 adapted to engage notches 21 in the underside of the table 15. As shown in Figure 1, by the operation of the handle 19 the frame may be swiveled from one position to another.

The frame 16 is formed with two members 22 and 23 forming a yoke as is clearly shown in Figure 9. The yoke is joined by the rod 25 on which is mounted the lasting frame 30.

The frame 30 is supported by means of the members 31 and 32 which engage the shaft 33 mounted on the shaft 25 by the members 34 and 35 which engage the frame 36. Mounted between the members 31 and 32 is an adjustable shaft 40 engaging the heel last 41. The upper portion of the shaft 40 is threaded and is engaged by the nuts 42 and 43 so that the position of the shaft 40 between the members 31 and 32 may be varied as to height. The members 31 and 32 are provided with slots 45 and a bolt 46 passes through said slots and through the slot 47 in the shaft 40 so that the position of the shaft 40 may be adjusted laterally as well as longitudinally with respect to the supporting members 31 and 32.

Mounted in the forward end of the supporting members 31 and 32 is an externally threaded shaft 50 surrounded by a threaded collar 51 mounted in the slot 52. The externally threaded shaft 50 may be moved upwardly and downwardly by turning the wheel 51. Shaft 50 supports at its lower end the foot part of the last 55 which extends within the toe 56 of a shoe 57. The rear surface 58 of the foot last is bevelled and is adapted to engage a bifurcated lever 60 having ends 61 and 62 fulcrumed through the bolt 63 to the heel last 41. A connecting cam 65 is adapted to engage the bevelled face 58 of the foot last to force the foot and heel lasts apart when pulled downwardly. The shaft 50 is hollow to provide a channel 70 to which may be connected the combination vacuum and steam hose 71. The channel 70 communicates with the channel 72 in the foot last to apply either steam or vacuum to the last. A rubber gasket 73 may be provided to insure the seal. As shown in Figure 6 and in Figure 2 a foot plate 75 is provided which is reversible for right and left shoes and which is adapted to be placed under the foot portion of the last 55. Pins 77 are provided to center the foot plate 75. An adjustable eccentric valve 78 having

a channel 79 is provided at the end of the channel 72 to vary the amount of suction which may be applied to the inner sole. It will be appreciated that by turning the valve 78 a greater area of the channel 79 will be brought into register with the opening to the channel 72. An interchangeable heel plate 76 is likewise provided for engagement with the heel portion 41 of the last. It will be appreciated that the heel plate may be varied for different size shoes.

Mounted on the frame 36 is a table 80 having a plurality of slots 81. A plurality of adjustment plates 82 having slots 83 are connected to the table 80 and may be fastened in place by means of cam levers 84 so that the position of the adjustment plates 82 with respect to the table 80 may be readily varied. The inner ends of the adjustment plates 82 are pivoted at 85 to a flexible sole forming band 86 but extended beyond said band at 87. The ends 88 and 89 of the flexible band 86 are set in the spring controlled studs 90 and 91 which are provided with nuts 92 and 93 so that the tension thereon may be adjusted.

A somewhat similar flexible heel forming member 95 is mounted on the table 80 through the frame 36 and is provided with a threaded stud 96 controlled by the nut 97 to position it in cooperation with the sole forming portion 86. A pair of arms 98 and 99 are pivoted at 100 and 101 to the frame 36 and bear adjustable screws 102 and 103 and pressure points 104 and 105. The outer edges of these arms are contacted by cam wheels 106 and 109 having operating handles 107 and 108. It will be readily seen that the shape of the heel forming section 95 may be controlled by the position of the screws 102 and 103 and by the cam wheels 106 and 109. Mounted in the frame 15 on the shaft 110 is a bed plate 111 which may be provided with heaters 112 of any conventional type or with radio frequency heating apparatus. The entire bed plate may be raised by moving the shaft 110 upwardly in the socket 113 and locked by means of the lock screw 114. It will be appreciated that a conventional foot lever may be placed below the shaft to raise and lower it if desired. Mounted in the bed plate 111 are a plurality of spring controlled pressure buttons 115, mounted in the conventional manner in casing 116 so as to resiliently push themselves above the surface of the bed plate 111. The table 80 is provided with slots 120 adapted to be engaged by the wing nuts 121 to clamp the table against the bed plate 111.

In operation the frame 30 may be pivoted on the shaft 25 to the position shown in Figure 1. The shoe to be soled is then placed upon the foot last 55 and the heel last 41 adjusted by means of the screw 42. The table 80 is then adjusted to the shoe with the extensions 87 of the adjustment plate 82 extending between the welt and the upper so that the flexible band 86 defines the contour of the sole and the flexible band of the sole 95 defines the contour of the desired heel. The foot plate 75 and the interchangeable heel plate 76 will of course be placed in register to accommodate either the left or right shoe, whichever is being worked on. The shoe may then be sterilized by the entry of steam through the hose 71 and the vacuum may then be applied to cause the inner sole to adhere flat against the foot plate 75. Plastic material may then be applied within the

flexible members 86 and 95 to cover the inner sole and the inner heel portions. An instep plate 126 is then inserted to form the edge of the heel and the heel member 127 is formed. As it may be desirable for the operator to work from side to side the entire frame may be shifted by operation of the handle 19. When this work is completed the frame is pivoted on the axle 25 onto the bed plate 111 and clamped into place. Heat may then be applied to set the plastic or composition material.

I claim:

1. A machine for applying soles to shoes including a frame, a support pivotally mounted on said frame, a table on said support, a last mounted on said support having foot and heel portions, means for adjusting said foot and heel portions to accommodate shoes of different sizes, an adjustable heel plate on said heel last, a reversible foot plate on said foot last, means for applying a vacuum into the inner sole of a shoe, a flexible member on said table defining the sole portion, means for adjusting said flexible member to conform it to the desired shape, a flexible member on said table defining a heel portion, each of said flexible members cooperating with the other to define the entire sole portion, and means for applying heat to said heel and sole portion.

2. A machine for applying soles and heels to shoes including a base, a member pivotally mounted in said base, a shaft in said member, a frame pivotally mounted on said shaft, a last comprising foot and heel portions supported by said frame, a reversible foot plate on said last, means for moving said foot and heel portions with relation to each other to engage a shoe, flexible heel and sole forming members adjustably mounted on said frame, said heel and sole forming members having adjustable means to conform them to the heel and welt of the shoe to be soled, a heating plate mounted on said base in position to be engaged by the heel and sole of a shoe and the sole and heel forming members in one position of the pivotal movement of said frame.

3. A machine for applying soles to shoes including a base, a member mounted on said base, a shaft in said member, a frame mounted on said shaft, heel and foot forming lasts mounted on said frame, a reversible foot plate on said lasts, means for adjusting said heel and foot forming lasts with respect to each other to fit the shoe to be soled, a heel and foot forming member mounted on said frame including flexible forming members, means pivotally connected to said flexible forming members for adjusting said flexible forming members to conform to the shoe, and means on said frame for adjusting said foot and heel forming members with relation to said foot and heel lasts.

4. A machine for applying soles to shoes including a base, a member pivotally mounted on said base, a shaft in said member, a frame mounted on said shaft, a last comprising heel and foot portions adjustably supported by said frame, a table mounted on said frame, flexible members defining heel and foot portions on said table, means pivotally connected to said flexible members for adjusting said flexible members to conform them to the desired shape, and a bed plate for supporting said table.

WILLIAM H. DOHERTY.