United States Patent [19]

Garner et al.

[11] **3,840,929**

[45] **Oct. 15, 1974**

[54] **PULLING AND LASTING MACHINES**

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[73] Assignee: **USM Corporation,** Boston, Mass.

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **12/10.1**

[51] **Int. Cl.** **A43d 21/00**

[58] **Field of Search** 12/10.1, 10.5, 14.5

[56] **References Cited**

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3,025,541 3/1962 Weinschenk 12/14.5

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Attorney, Agent, or Firm—Vincent A. White; Richard B. Megley

[57] **ABSTRACT**

A machine for pulling and lasting a shoe upper has a knurled insole engaging surface on a plate for applying cement to an insole which rocks into insole engagement from a toe-down position after initially engaging a heelward portion of a forepart of the insole. The machine also has grippers adjacent the heelward portion of the insole forepart which grip the upper and then move downwardly to tension the gripped upper over a last, inwardly of the last to draw the upper toward edges of an insole on the last and pivotally of the last to twist and further draw the upper toward the edges of the insole.

3 Claims, 7 Drawing Figures

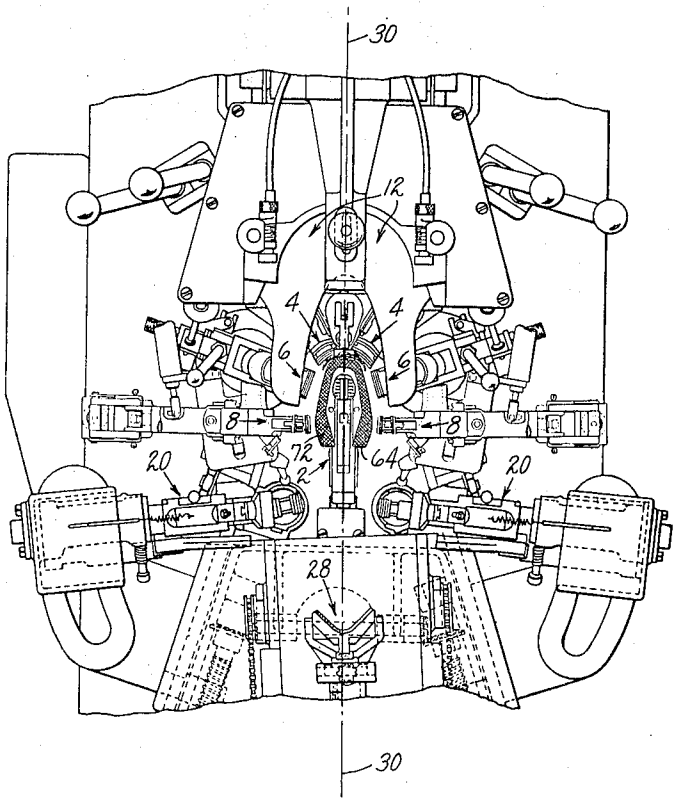

Fig. 1

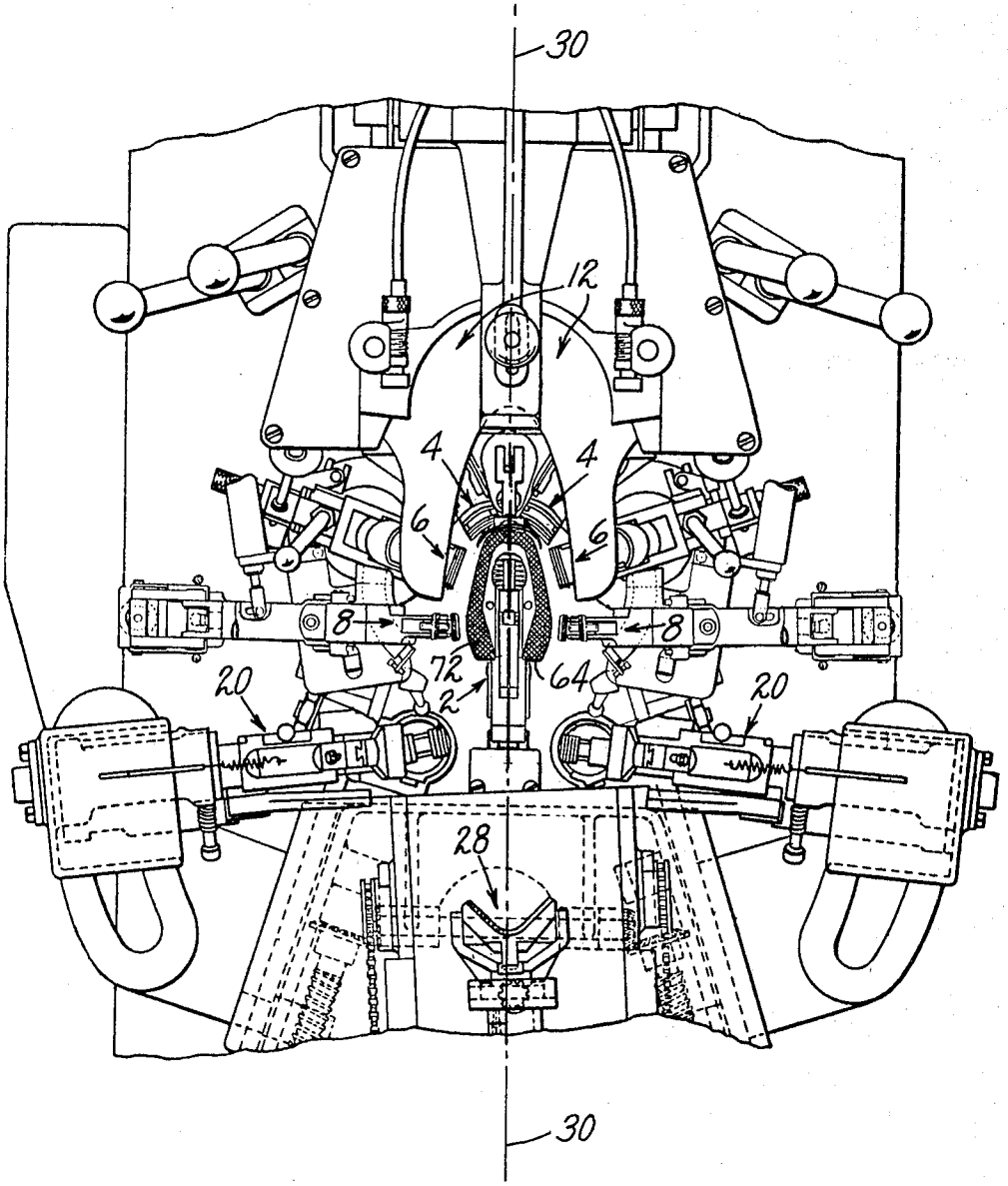

Fig. 2

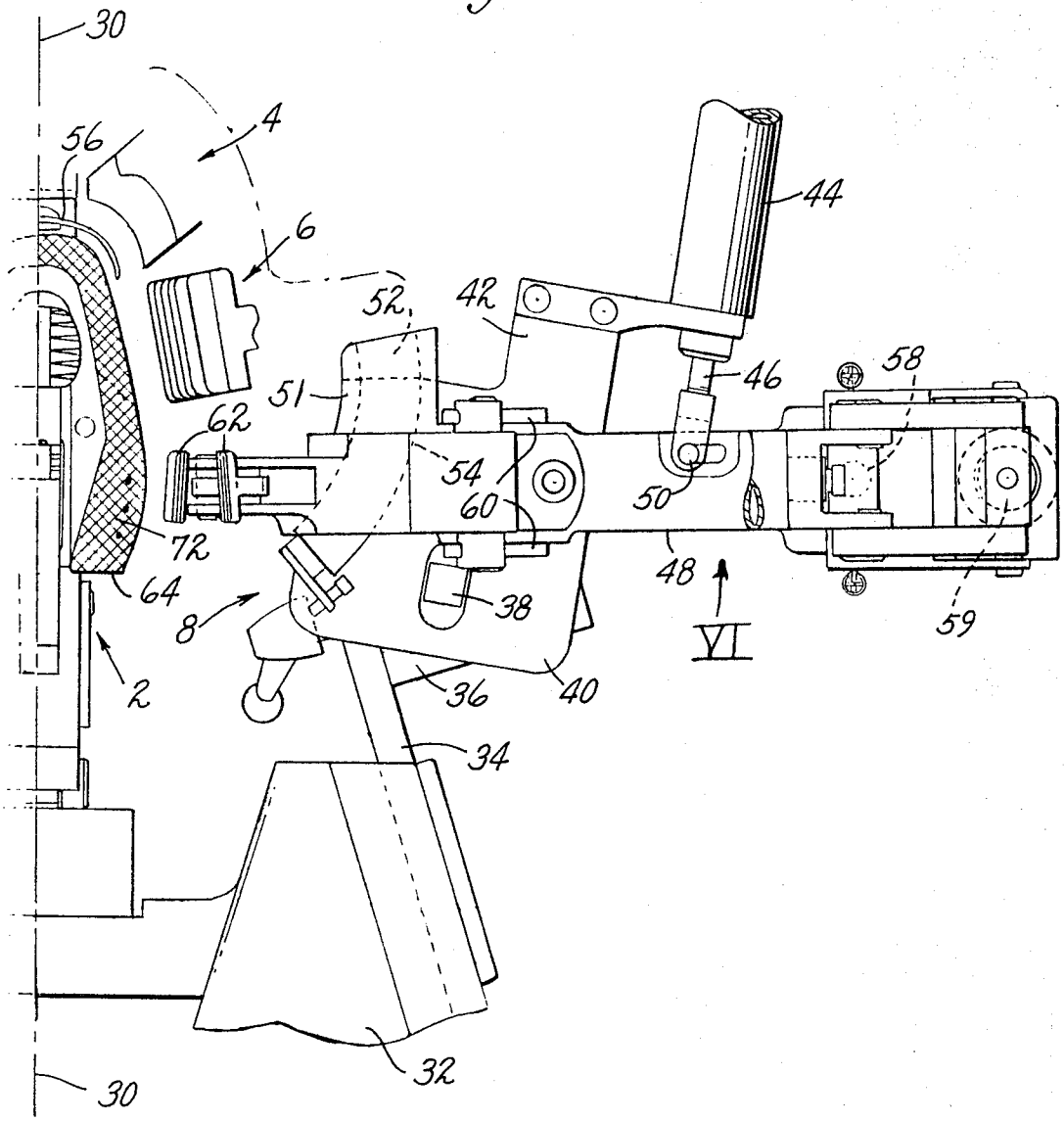
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Fig. 3

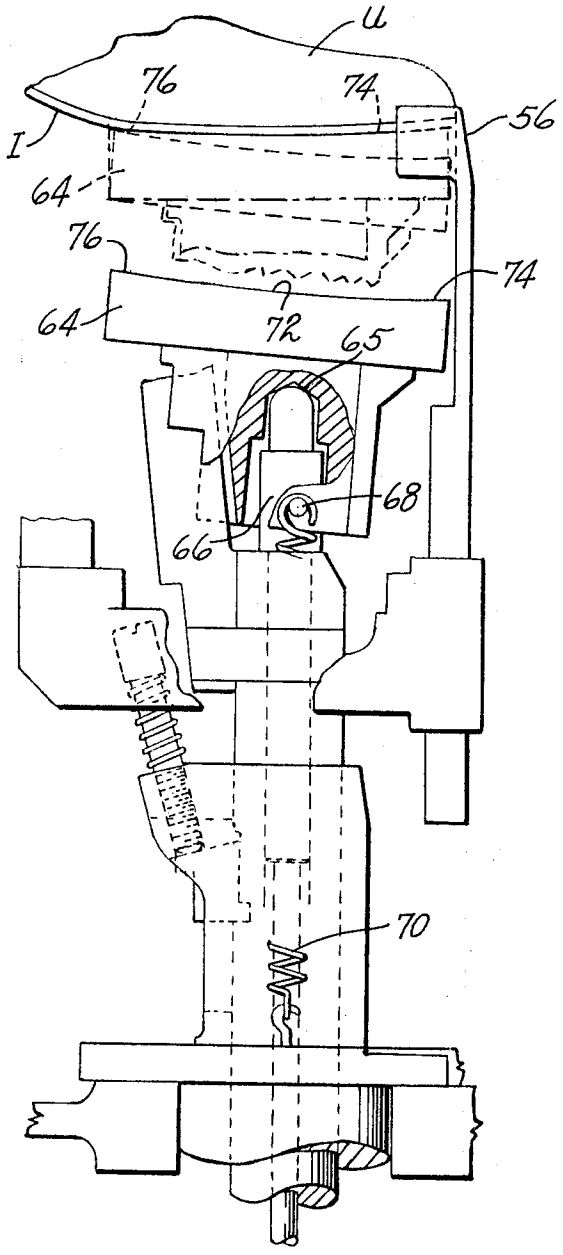


Fig. 4

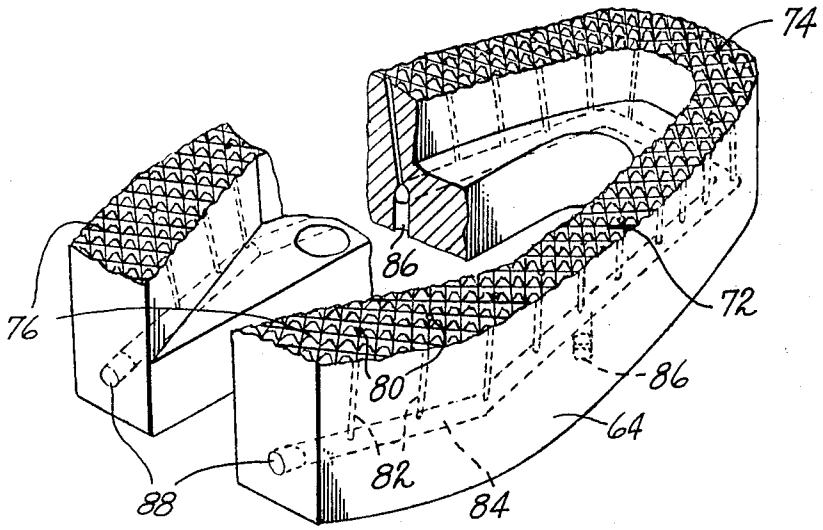


Fig. 5

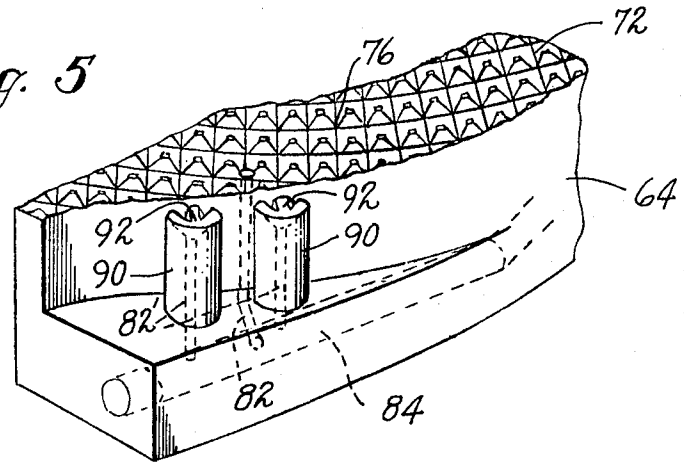


Fig. 6

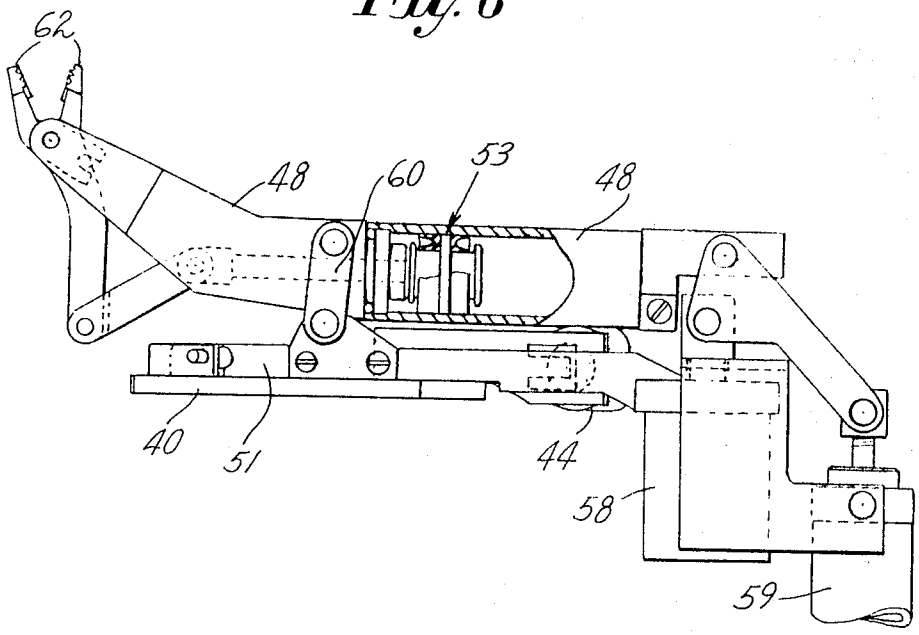
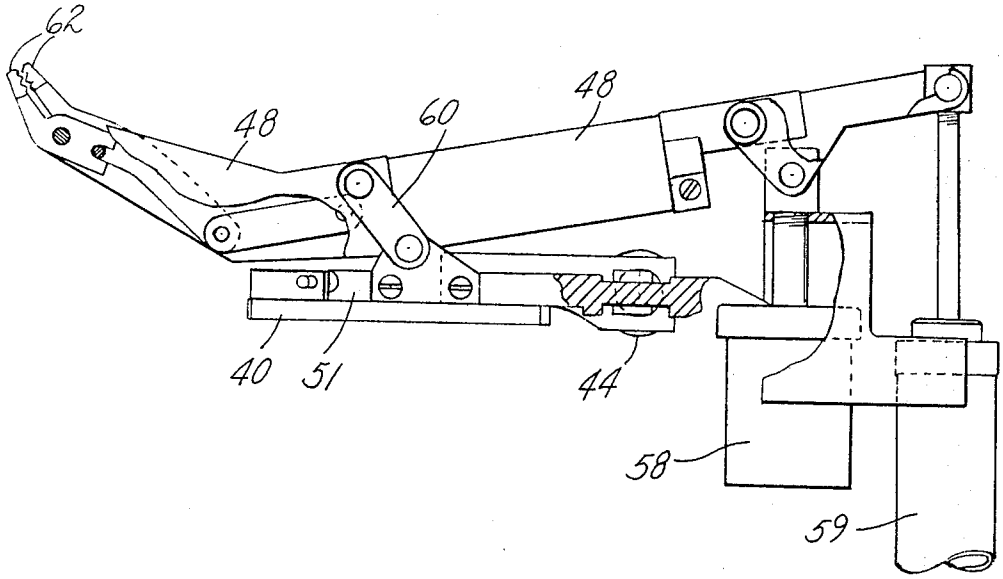


Fig. 7



PULLING AND LASTING MACHINES

BACKGROUND OF THE INVENTION

This invention relates generally to shoe upper forming machines and, more particularly, is directed to a machine for performing a pulling and lasting operation in the toe, forepart and ball regions of a shoe.

Until recently, machines for lasting shoes have been limited in operation to a particular portion of the shoe. Early efforts to combine the functions of various of these lasting machines led to complex and expensive machines.

U.S. Letters Pat. No. 3,099,846 issued Aug. 6, 1963 in the names of H. Lane et al. describes a prior effort at simplifying the design and reducing the cost of a machine for lasting toe, forepart and ball regions of a shoe. In the machine described in the patent an upper and an insole are positioned on a last and supported at the forepart of the insole on a support of the machine. Grippers positioned about the supported last grip the upper and pull it over the last and toward edges of the last adjacent the insole.

A cement applying plate having a surface conforming to the shape of the insole on the last in both the peripheral outline of the insole and the surface or planar configuration of the insole on the last was later added to the machine. The conformed surface of the insole engaging plate was positioned to have its insole engaging surface parallel to the insole at each point corresponding to the insole on the last. The plate was then moved toward the insole to simultaneously engage the insole over the entire insole engaging surface of the plate. A single channel formed about peripheral portions of the insole engaging surface and having an open side in the surface was then supplied with cement to form a bead of cement about the peripheral portions of the insole engaged with the open side of the channel. The cement applying plate was then withdrawn and wipers engaged marginal portions of the upper with the adhesive bead on the marginal portions of the insole to secure the upper to the insole.

While the machine described above has been satisfactory, it has been desired to improve the application of cement to the insole, particularly at the heelward portion of the forepart of the insole. At the heelward portion of the insole forepart, the insole curves sharply away from a generally planar portion of the insole at the toe and ball regions of the insole. In addition, the insole narrows significantly from a widest point in the forepart toward the heelward portion of the insole forepart. The curved, narrowed, heelward portion of the insole extends in a heelward direction to the shank portion of the insole. These changes are particularly pronounced in shoes having high heels. Still further, it is particularly necessary to have adequate adhesive at the heelward portion of the forepart of the insole as a joint in the insole is often used in this portion.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide improved cement application and lasting action at the heelward portion of an insole forepart.

To this end, a machine for pulling and lasting a shoe upper about a last is provided with a cement applying plate having an insole engaging surface which rocks into engagement with an insole from a toe-down position after initially engaging the heelward portion of the forepart of the insole. The insole engaging surface is preferably knurled. The machine additionally has grippers located at the heelward end of the insole forepart which grip an upper and twist the upper toward edges of the insole in the heelward portion of the insole forepart. The grippers additionally tension the gripped upper over the last and draw the upper inwardly of the last. Preferably, the upper twisting and drawing inwardly occur simultaneously.

DESCRIPTION OF THE DRAWINGS

A preferred embodiment which is intended to illustrate and not to limit the invention will now be described with reference to the drawings, in which:

FIG. **1** is a plan view of a portion of a pulling and lasting machine including the embodiment;

FIG. **2** is an enlarged view of a portion of the machine shown in FIG. **1**;

FIG. **3** is a side view of a portion of the machine shown in FIG. **1**;

FIG. **4** is a perspective view of a portion of the machine shown in FIG. **1**;

FIG. **5** is a perspective view of an alternative embodiment of the portion of the machine shown in FIG. **4**;

FIG. **6** is a side view taken in the direction of arrow VI of FIG. **2** of a gripper arrangement with the jaws in open condition; and

FIG. **7** is a view generally similar to FIG. **6** with the jaws closed and various parts in different positions.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The illustrative machine including the preferred embodiment of the invention as shown in FIG. **1** is a shoe upper conforming machine suitable for use in both pulling and lasting a shoe upper in the toe and ball regions and forepart portion of a shoe, i.e., that part of an insole extending from the toe to the part where the shoe bottom curves heightwise of the generally flat portion of the forepart into the shank portion. The machine has a support generally at **2** for supporting the forepart of an insole positioned on the bottom of a last having an upper mounted over the last. For tensioning the upper about the last, the machine has a plurality of upper forepart grippers generally designated **4, 6** and **8** disposed around the shoe support means. After tensioning the upper with the grippers, a pair of toe embracing wipers generally designated **12** move from the illustrated spaced apart position toward each other to wipe marginal portions of the upper inwardly across edges of the insole. Additional ball region wipers are each mounted on a ball lasting unit generally designated **20.** Finally, a heel support generally designated **28** restrains the shoe and last against a heelward thrust imparted by the action of the toe-embracing wipers. As so far described, the machine is generally similar to that disclosed in the above identified U.S. Pat. No. 3,099,846.

As further seen in FIG. **1,** the machine is substantially symmetrical about a center line **30** extending substantially midway through the machine from top to bottom. The operation of each element in each symmetrical portion of the machine is similar to the operation of the corresponding element in the other portion of the machine. Accordingly, only elements on one side of the machine need be described.

Referring now to FIG. 2, a gripper generally at 8 on one side of the machine has been selected to illustrate an aspect of the invention. This gripper is commonly called the No. 2 forepart gripper and has been selected as the preferred embodiment by its location adjacent a heelward portion of a shoe last and insole forepart positioned on the shoe support generally at 2 in the machine. It is initially noted, however, that this aspect of the invention may also be provided for the grippers generally at 4 and 6 and commonly called the toe and No. 1 grippers, respectively,

A portion 32 of the machine frame slidingly receives a member 34 attached to a plate member 36 for supporting the gripper generally at 8. Sliding movement of the member 34 relative to the machine frame portion 32 adjusts the position of the gripper lengthwise of a shoe positioned in the machine. The gripper generally at 8 is positioned according to the size of the shoe to be engaged by the gripper to a location adjacent the heelward portion of the shoe insole forepart. Once the gripper 8 is positioned for a particular shoe size, the member 34 may be secured relative to the frame 32 by securing means (not shown).

The plate 36 has an upstanding lug 38 projecting through an oversize slot in a second plate member 40 slidingly supported on the first plate 36. The plate 40 has a tab portion 42 to which a pneumatic cylinder 44 is secured. A rod 46 extending from a piston in the cylinder is slidingly and pivotally connected to a gripper body member 48 by a bracket having a pin 50 received a slot in the member 48.

The member 48 is mounted on a third plate member 51 having a curved, dependent lug 52 slidingly received in a correspondingly curved channel 54 in the plate 40. The curve of the slidingly engaged lug 52 and channel 54 is circular and has a center (not shown) of curvature located toeward of the grippers 8. Accordingly, air supplied to the cylinder 44 moves the piston and piston rod 46 generally downwardly as seen in FIG. 2 and slides the depending lug 52 of the plate 51 in the channel 54 clockwise about the center of curvature of the lug and channel. The member 48 and the gripper 8 is correspondingly rotated generally clockwise about the center of curvature.

The member 48 is additionally mounted for movement downwardly heightwise of the shoe support generally at 2 and toward the shoe support in a manner generally shown in FIGS. 6 and 7. In general, a pair of fluid piston and cylinders 58 and 59 provide the downward and inward movement, respectively, to the member 48 as permitted by a pair of links 60 connecting the member 48 to the plate 51. Finally, a further fluid piston and cylinder 53 is connected to a pair of gripper members 62 pivotally mounted on an end of the member 48 adjacent the support for movement from an open position shown in FIGS. 2 and 6 to a closed position (FIG. 7) engaging a marginal portion of the shoe upper between the grippers.

In operation, a shoe upper and insole positioned on a last are located in the machine relative to the toe guide 56. Marginal portions of the upper then extend toward the grippers generally at 4, 6 and 8 and particularly between the gripper members 62. The gripper members 62 are then closed to firmly grip the upper by activating piston and cylinder 53. The piston and cylinder 58 is then activated to tension the upper about the last by moving the grippers downwardly or into the plane of FIG. 2. Piston and cylinder 59 is then activated to move the grippers inwardly toward the shoe support generally at 2 to draw the upper toward the edge of the insole positioned on the last. Preferably, the piston and cylinder 44 is activated simultaneously with the piston and cylinder 59 to rotate the grippers 62 on the member 48 relative to the center of curvature of the lug 52 in channel 54. Rotation of the gripper members 62 twists the gripped upper clockwise or inwardly to further move the upper into parallel arrangement with the peripheral edge of the insole which curves inwardly adjacent the gripper located near the junction of the forepart portion of the insole with the shank portion of the insole. The more closely corresponding position of the upper relative to the insole after twisting the upper permits the wipers to more accurately wipe the upper marginal portions over corresponding marginal portions of the insole.

As seen in FIG. 3, a shoe upper U and insole I positioned on a last are located relative to the toe guide 56 and shoe support generally at 2 shown in FIGS. 1 and 2. As further seen in FIG. 1, a generally horseshoe-shaped cement applying plate 64 substantially surrounds the shoe support and has a shape generally corresponding to that of a shoe insole. Returning to FIG. 3, it is seen that the plate 64 is initially spaced from the insole on the last as located in the machine. The plate has a socket portion 65 receiving in an interior socket a domed shaft 66 connected to a fluid piston and cylinder (not shown). The socket portion has an exterior lug 68 located toewardly of a centerline of the socket and to which an end of a spring 70 is connected. The other end of the spring 70 is connected to the machine frame.

The plate 64 has an insole engaging surface 72 generally configured to conform to both the heightwise curvature of an insole and peripheral edges of an insole. The conformity of the curvature of the surface 72 to that of the insole need only be general for reasons later described. Because of the misalignment of the lug 68 and the socket center, the spring 70 is effective to tilt the plate 64 downwardly at the toe end so that a portion 74 of the surface 72 corresponding to the toe of the insole is more spaced from the insole than a portion 76 of the surface 72 corresponding to a heelward portion of the insole forepart.

In operation, the piston and cylinder (not shown) pushes the shaft 66 toward the shoe until the plate 64 on the shaft engages the insole with the heelward portion 76 of the insole engaging surface 72. Continued movement of the shaft 66 then forces the plate 64 to rock on the domed end of the shaft 66 into a final position substantially parallel to the insole. The shoe does not move relative to the then stationary toe guide 56 while the plate 64 rocks into engagement with the insole. Accordingly, failure of the insole engaging surface 72 to correspond with the surface curvature of the insole in the heelward portion of the insole forepart does not prevent the entire surface 72 from at least momentarily engaging the insole and does not disturb the position of the shoe in the machine.

As seen in FIG. 4, the insole engaging surface of the plate 64 has a knurled appearance provided by a waffle iron-like series of generally orthogonal, v-shaped grooves forming frustrated, substantially square-based pyramids between the grooves. At intervals along the surface 72 and generally midway across the surface are

a succession of small ports **80** located in the grooves of the surface **72.** Each port is connected by a passageway **82** to an artery duct **84** extending through the interior of the plate **64.** A pair of ports **86** on opposite sides of the plate **64** are adapted to receive substantially liquid cement while a pair of ports **88** at an end of the plate **64** have plugs removable for cleaning the duct **84** and connected passageways **82.** Adhesive supplied to the duct **84** is conducted by the passageways **82** to the ports **80** to flow along the grooves in the surface **72.** Engagement of the surface **72** with an insole is then effective to spread the cement over the insole along that portion of the insole engaging substantially the entire surface **72.** Such an arrangement improves the application of adhesive to the insole over that obtained by discrete channels in the surface **72.**

FIG. **5** shows an alternative embodiment of one portion **76** of the insole engaging surface **72.** In this embodiment, a portion of the surface **72** on the outside of the plate **64** is cut away. A pair of cement applying nozzles **90** project from the plate **64** to a cement applying surface **92** of each nozzle **90** disposed in the general plane of the surface portion **76** adjacent the nozzles. Each nozzle has a passageway **82'** connecting the cement applying surface **92** to the duct **84** to provide cement from the duct to the surface **92.**

The alternative embodiment illustrated in FIG. **5** is particularly useful for applying cement to insoles of both right and left shoes. It will be appreciated that the facing peripheral edges of insoles for a right and a left shoe when the insoles are located as worn in shoes curve inwardly much more sharply than the opposite peripheral edges of the insoles. Accordingly, when a left insole is engaged by the alternative embodiment of the plate **64** the nozzles **90** on the right side of the plate illustrated in FIG. **5** will not be covered by the insole which will curve inward in substantial correspondence with the edge of the surface **76.** Cement provided to the nozzle **90** will then not be used and may be conducted away by a convenient drain (not shown). On the other hand, when a right shoe insole is placed on the surface **72,** the less curved outer peripheral edge of the insole will extend over the cement applying surfaces **92** of the nozzles **90** to receive cement, the advantage of the nozzles **90** being to avoid buildup of cement on the surface **76** where the surface does not engage both right and left insoles.

Of course, similarly disposed nozzles on the symmetrically opposite portion **76** of the surface **72** will provide the same advantage for right shoe insoles as the nozzles illustrated in FIG. **5** provide for left insoles. One or more nozzles **90** may replace those shown in FIG. **5** in a further alternative embodiment.

Having thus described our invention, what we claim is:

1. In a machine for forming a shoe upper about a last having means for tensioning the upper heightwise over the last, said tensioning means including grippers for gripping the side margin of the upper, means for moving the grippers heightwise to tension the upper, means for moving the grippers inwardly widthwise of the last, and means for swinging the grippers about an axis extending substantially heightwise of the shoe for twisting the tensioned upper as it is moved inwardly to conform the tensioned upper generally with a peripheral edge contour of the last.

2. A machine according to claim **1** in which the grippers are located to tension the upper adjacent the ball region of the shoe and said axis is located toewardly of said ball region for causing the tensioned upper to be twisted inwardly and heelwardly around the peripheral edge contour of the ball region of the last.

3. A machine according to claim **1** in which the tensioning means include a body member carrying the grippers and said body member is mounted for movement heightwise and widthwise of the last and for bodily swinging movement about a heightwise extending axis located toewardly of the body member.

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