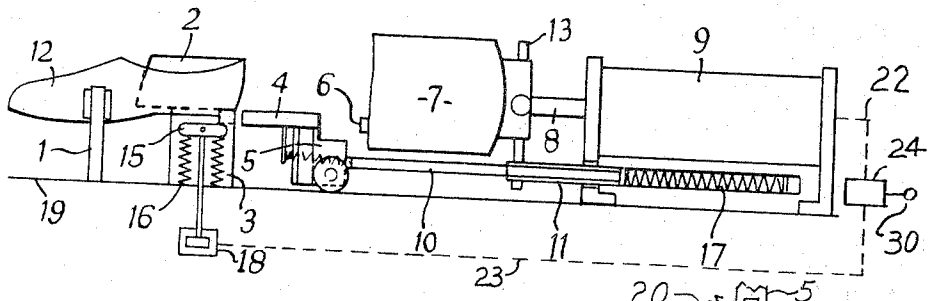
Oct. 10, 1967 H. WILISCH 3,345,661

SHOE-HEEL UPPER FORMING APPARATUS

Filed May 10, 1966

Fig. 1.



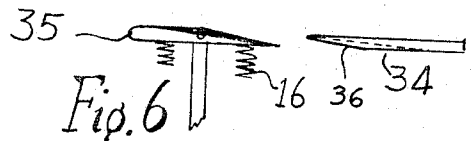


Fig. 6

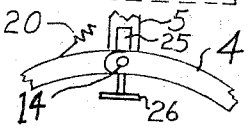


Fig. 7

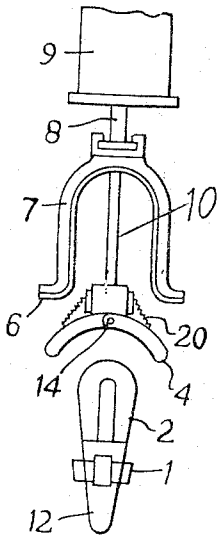


Fig. 2.

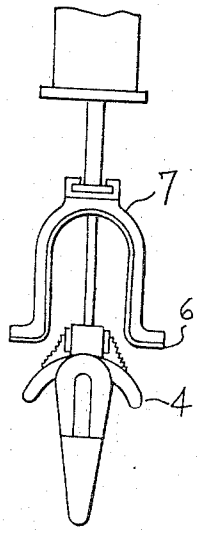


Fig. 3.

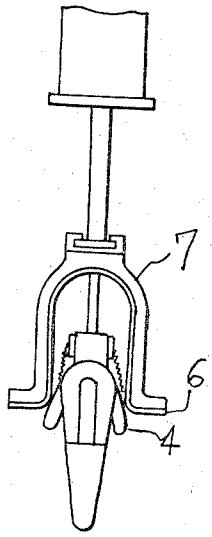


Fig. 4.

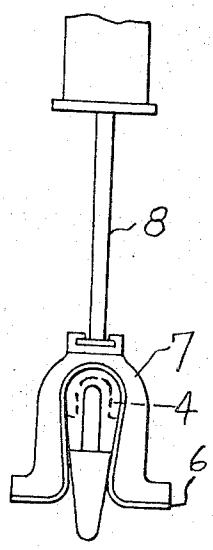


Fig. 5.

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SHOE-HEEL UPPER FORMING APPARATUS

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The present invention relates to shoe machinery, and more particularly to a forming apparatus for a heel upper which includes a press to form a heel upper about a heel-shaping die operating in conjunction with forming arms to form the heel upper snugly about the die.

When forming the uppers of heels, it is desirable to utilize a forming cushion, which is preferably inflatable. Such cushions, when formed in the shape of a U can snugly fit around the heel. Difficulties, however, have been experienced in folding the bottom portion of the heel upper around the heel die, because the inflatable cushion interferes with operation of pincers or folding arms to fold the leather smoothly inwardly over the heel die.

It is an object of the present invention to provide an apparatus in which a resilient heel-shaping form, preferably utilizing a pressure cushion, can be used to shape the upper of the heel around a die, while simultaneously providing for forming of the bottom portion of the heel upper around the lower part of the heel die, and in a simple and effective manner without complicated mechanisms.

Briefly, in accordance with the present invention, a pair of folding arms or pincers are located below the die. They are movable from an open position to a closed position; in the open position the arms are spread apart. When moving to a closed position the arms swing below the die in a whipping, scissor-like motion, to push leather from the heel upper below the die and fold it inwardly. A resilient heel-shaping form is provided, movable with respect to the die from a withdrawn position clear of the die to a position where it surrounds the die, so that the resilient form can press the heel upper around the heel die. The form is provided with cams which engage the spread apart arms in such a manner that the arms close as the heel-shaping form advances towards the die. Thus, the bottom part of the heel upper is folded around the die while the die simultaneously is surrounded by a heel shaping form. If an inflatable cushion is used, the arms will be within the outline of the heel die when the inflation step for the cushion begins, so that there is no interference between the folding arms or pincers for the heel upper and the inflation cushion of the heel-shaping form.

Preferably, both the heel die and the forming arms, or pincers, are arranged to be heated. The heat supply for the pincers, or arms, can be an electrical heating element; current can be supplied through retracting springs which simultaneously provide for movement of the arms to the open position while also supplying electric current to resistance elements within the forming arms.

To provide for smooth folding over of the bottom portion of the heel upper around the heel forming die, the arms may move vertically against the die; this movement may be controlled by a fluid, such as hydraulic fluid or compressed air; or by inclined planes or camming surfaces, which are preferably spring loaded to provide resilient force of the arms against the heel die.

The structure, organization and operation of the invention will now be described more specifically in the following detailed description with reference to the accompanying drawings, in which:

FIG. 1 is a side view of the apparatus, in schematic form, and omitting parts well known in the art;

FIGS. 2–5 are top views of the apparatus, showing succesive steps during the heel forming operation;

FIG. 6 is a side view of a folding arm lifting arrangement; and

FIG. 7 is a partial, detailed top view of the camming arrangement for the folding arms.

Referring now to the drawings, and particularly to FIG. 1: a heel die **2**, which is preferably arranged to be heated, for example by an internal heating element, by heated air or the like, as well known in the art, is arranged to be covered by the upper **12**; the upper **12** is held in position by means of clamps **1**, as well known in the art. A pair of articulated folding arms, or pincers **4**, are arranged on a carriage **5**, to swing about a bolt **14**. The arms **4** form the leather of the upper **12** around the heel **2**; these forming arms being located on the carriage and movable vertically with respect to the heel die **2**. The carriage is arranged for horizontal movement by connection to a guide rod **10**, slidable within a guide tube **11**; guide tube **11** being closed off at the end and containing spring **17** bearing against rod **10**. Guide tube **11** is secured to a piston rod **8**, movable within a fluid cylinder **9** where it can be subjected to fluid pressure, such as hydraulic pressure or compressed air, to move piston rod **8** and with it carriage **5** with respect to die **2**. The heel-shaping form **7**, which preferably includes an inflatable tube, as is known in the art, is secured by guide plate **13** to the piston rod **8**. Heel-shaping form **7**, from the top, as best appears in FIGS. 2–5, has a U-shaped outline; at the lower part thereof, and on either side of the legs of the U, are a pair of camming surfaces **6** which are arranged to engage the outer parts of arms **4**, and fold them inwardly. The arms **4** are held in their extended or spread-apart position by a pair of springs **20** (FIG. 2). Arms **4** preferably contain electrical heating elements. The springs **20** may be utilized as electrical conductors for these heating elements, thus avoiding the necessity of cables interconnecting the movable arms, and the attendant danger of electrical short circuits due to wear of the insulation around the cables during repetitive operation of the arms **4**.

Arms **4** are located on carriage **5** for vertical movement. They are preferably arranged to fit loosely below die **2**. In their closed position, and in order to provide for positive folding-over of the heel upper, these arms can be pressed against die **2** by means of a counter plate **15**, which in turn is pressed upwardly either by springs **16** or, and in addition thereto, by a fluid operated pressure device schematically shown at **18**. Use of the fluid operated pressure cylinder also can provide for positive retraction of the plate **15**. Synchronization of forward motion from the cylinder **9**, and of upward motion of plate **15** can be achieved by means of a control valve **24**, and fluid interconnections **22**, **23**, all supplied from a source of compressed fluid schematically shown at **30**.

Arms **4** are arranged to be cammed inwardly by means of camming surfaces **6**. It may, additionally, be desirable to have the arms swing inwardly in advance of engagement with camming surface **6**. A plate **26** (FIG. 7) is arranged on the forward part of carriage **5**, and located to be engaged by a counter stop **3**, which can also secure the heel die **2** in position. The pivot **14**, about which the arms **4** can swing, is placed, for longitudinal sliding movement, in a slot **25** formed in carriage **5**. Plate **26** carries an extension bearing on pin **14**. Thus, when plate **26** engages block **3**, pin **14** is urged backwardly and arms **4** will begin to close.

The sequence of operation can best be illustrated in connection with FIG. 2 to 5. In FIG. 2, the arms **4** are in their spread-apart position, the heel-shaping form is withdrawn clear of the die, and the operation is about to begin. In FIG. 3, both the heel-shaping form **7**, as

well as the arms 4 have begun to advance. Plate 26 has engaged with block 3, and the arms 4 are beginning to close about the bottom of the heel upper to fold the rear portion, and the bottom of the upper around the die 2. FIG. 4 illustrates the next position, in which the camming surfaces 6 begin to engage arms 4, to fold the arms 4 within the outline of the die 2, and to complete the folding of the heel upper around die 2. FIG. 5 illustrates the completed folding operation, and further inflation of a pressure cushion formed on heel-shaping form 7. During the initial travel, that is between positions 2 and 3, the spring 17 carries the carriage 5 forwardly, compressing and permitting continued movement of the heel-shaping form 7 as the form advances, as shown in FIGS. 3–5. As the arms 4 close, they are pressed upwardly by means of plate 15, and spring pressure 16 and fluid pressure from device 18, or by spring 16, or by both.

An alternative form of providing upward pressure is shown in FIG. 6. Arms 4 are shaped as shown at 34, in FIG. 6, by having an inclined front face 36, inclined both inwardly as well as towards the front side. A plate 35, operated as before from a pressure device 18, or held towards the die by means of spring 16 has matching inclined surfaces, with the side-inclination towards the outside. As the arms 34 close, inclined surfaces 36 will ride over the inclined surfaces on plate 35, so that the top surface of arms 34 will move upwardly and press the bottom portion of the heel upper against die 2.

When the forming step is completed, pressure in cylinders 9 and 18 is released, or reversed, to retract both plate 15 and rod 8. Springs 20 will open, permitting removal of the now shaped upper 12 from clamps 1 and heel form 2. Spring 17 is progressively relieved of pressure; thus, carriage 5 and its push rod 10 is retracted only after the heel shaping form 7 has released and has been retracted. Thus, damage to the resilient heel-shaping form by the opening arms 4 is entirely avoided.

Arranging the camming means, that is camming surfaces 6, such that they are associated with the heel-shaping form 7 itself permits simultaneous closing of the forming arms, and complete placement of the arms within the outline of heel die 2 for subsequent shaping of the heel with maximum pressure. To prevent undue closing, block 3 may be provided with suitable stops for the arms 4, as is well known in the art.

What I claim is:

1. Heel upper forming apparatus comprising a heel forming die; a pair of articulated forming arms located below said die and movable from an open position in which the arms are spread apart to a closed position below the die, in which the arms are moved towards each other; by a scissor-like wiping action below the die, the space between the arms falling within the outline of the die; a resilient heel shaping form relatively movable with respect to said die from a withdrawn position clear of said die to a heel forming position surrounding said die; and camming means associated with said heel shaping form arranged to engage said forming arms upon movement of said heel shaping form from said withdrawn position to said heel forming position, said camming means engaging said arms to cause swinging thereof towards the closed position to fold a heel upper placed over said die around the bottom of the die while the upper

is being formed around said die by said heel shaping form.

2. Apparatus as claimed in claim 1 wherein said heel-shaping form includes an inflatable cushion.

3. Apparatus as claimed in claim 1 including a carrier to support said arms and spring means interconnecting said arms and said carrier to urge said arms into open, spread-apart position.

4. Apparatus as claimed in claim 3, including a separate spring means for each arm; means heating said arm electrically, associated with said arms, said separate spring means forming electrical connections to said electrical heating means associated with said arms.

5. Apparatus as claimed in claim 3 including means mounting on said carriage for vertical movement to permit pressing said arms against the bottom of said die to fold the bottom of the heel upper around the bottom of the die.

6. Apparatus as claimed in claim 1 wherein said heel-shaping form is U-shaped to surround and enclose a heel upper, and said camming means includes a camming surface arranged on either side of the legs of the U to bear against the outside of said arms and swing said arms inwardly towards each other.

7. Apparatus as claimed in claim 6 including operating means camming said arms in advance of the engagement of said camming surfaces to cause said arms to swing together and prefold said heel upper about the bottom of the die.

8. Apparatus as claimed in claim 1, including means mounting said heel forming arms vertically with respect to said die, and spring means to press said arms against said die.

9. Apparatus as claimed in claim 1, including means mounting said heel forming arms vertically below said die, and fluid pressure means engaging said arms to move said arms towards and away from said die.

10. Apparatus as claimed in claim 1, including means mounting said heel forming arms vertically with respect to said die, a support forming an inclined plane located below said die, said inclined plane engaging said arms as the arms move towards closed position to press said arms against said die and fold the bottom of the heel upper tightly against the die.

11. Apparatus as claimed in claim 9 including fluid pressure operating means associated with said heel-shaping form to move said heel-shaping form; said fluid pressure operating means being synchronized with said fluid pressure means engaging said arms, to provide for simultaneous pressure of said arms against said die as said heel-shaping form moves to surround said heel-forming die.

12. Apparatus as claimed in claim 10, wherein said support is resiliently, movably mounted with respect to said heel-forming die.

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