May 16, 1961 D. T. CARR 2,983,935

MACHINES FOR FORMING SHOE UPPERS

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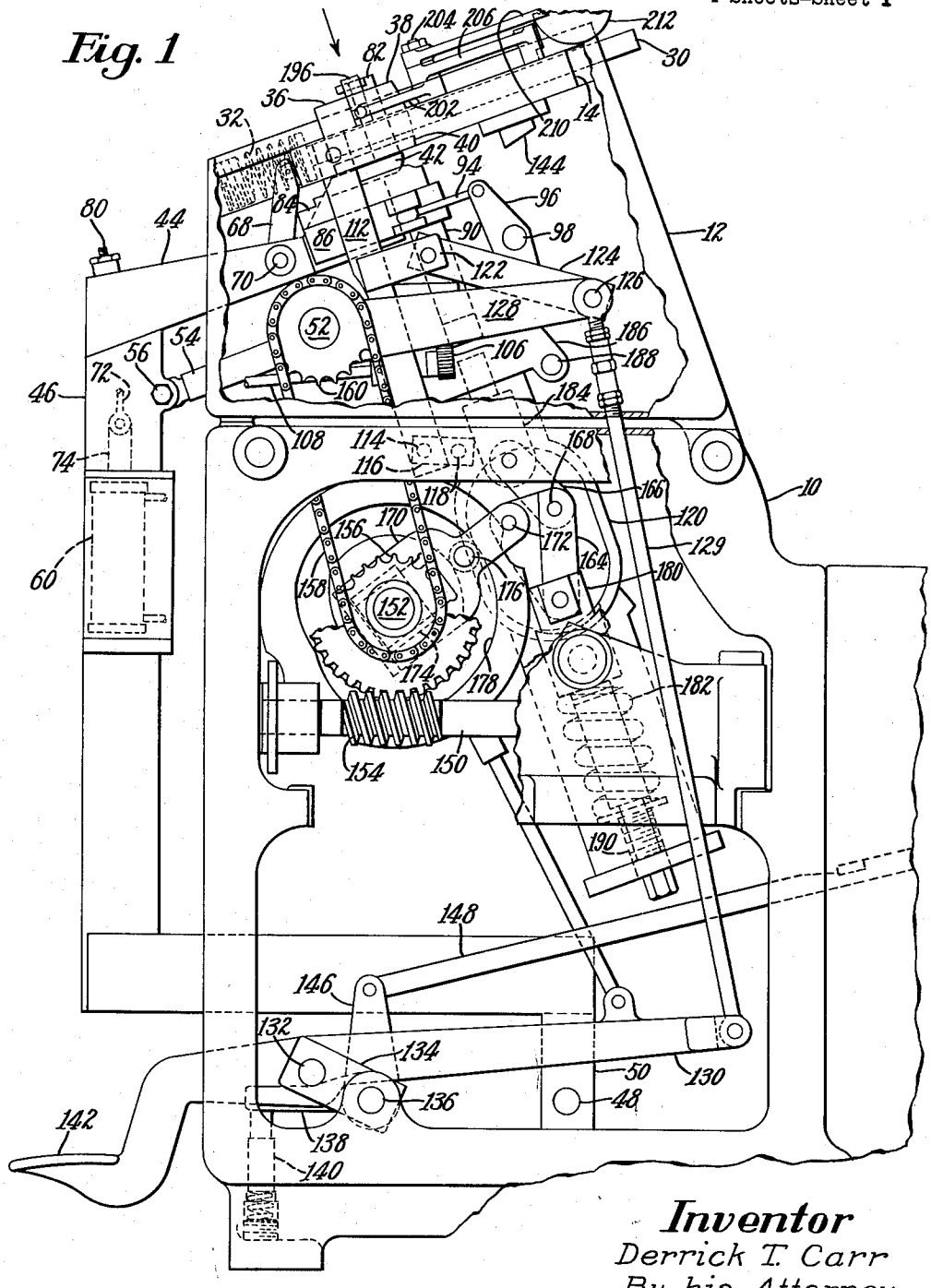
Fig. 1



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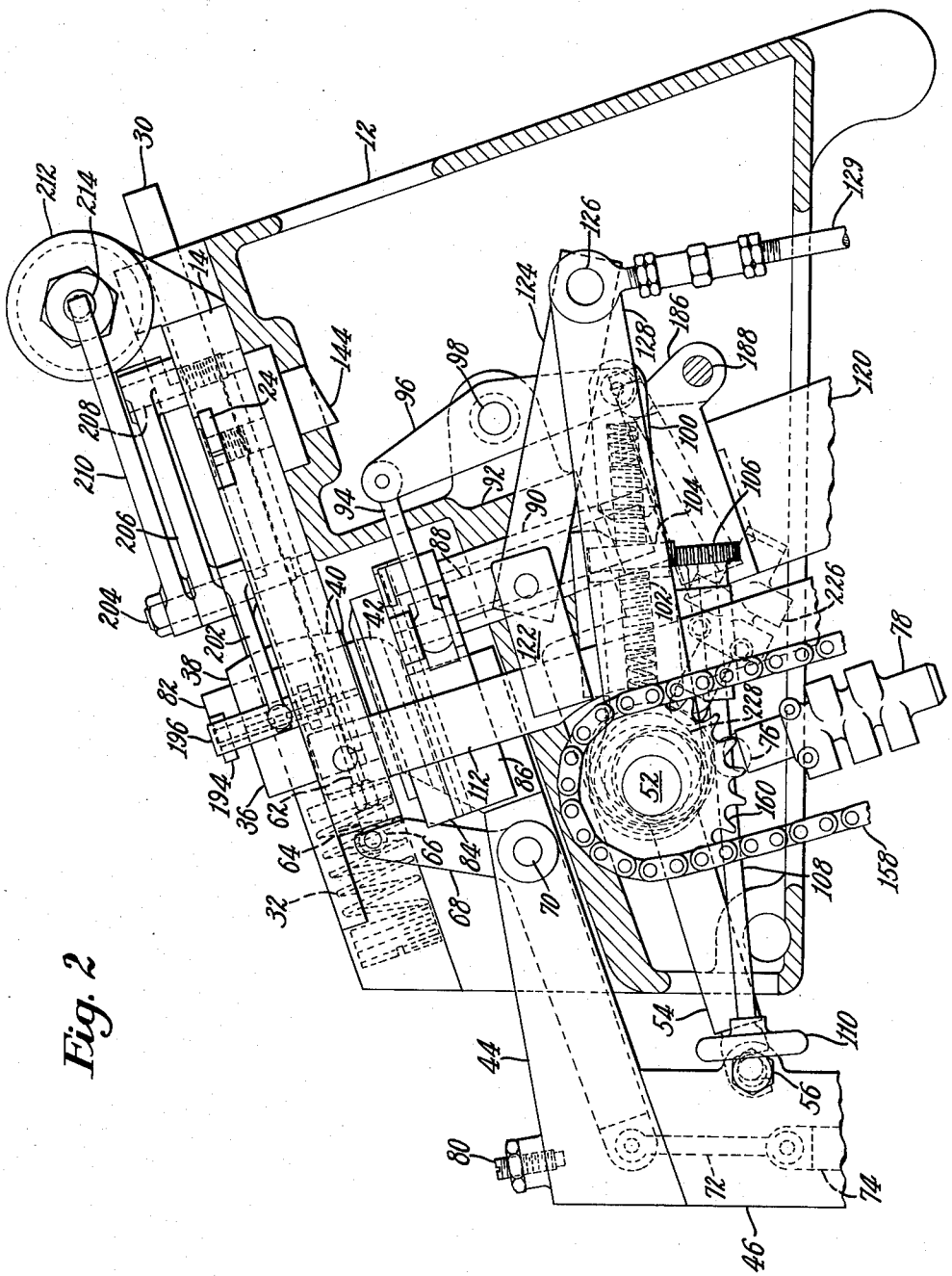

Fig. 2

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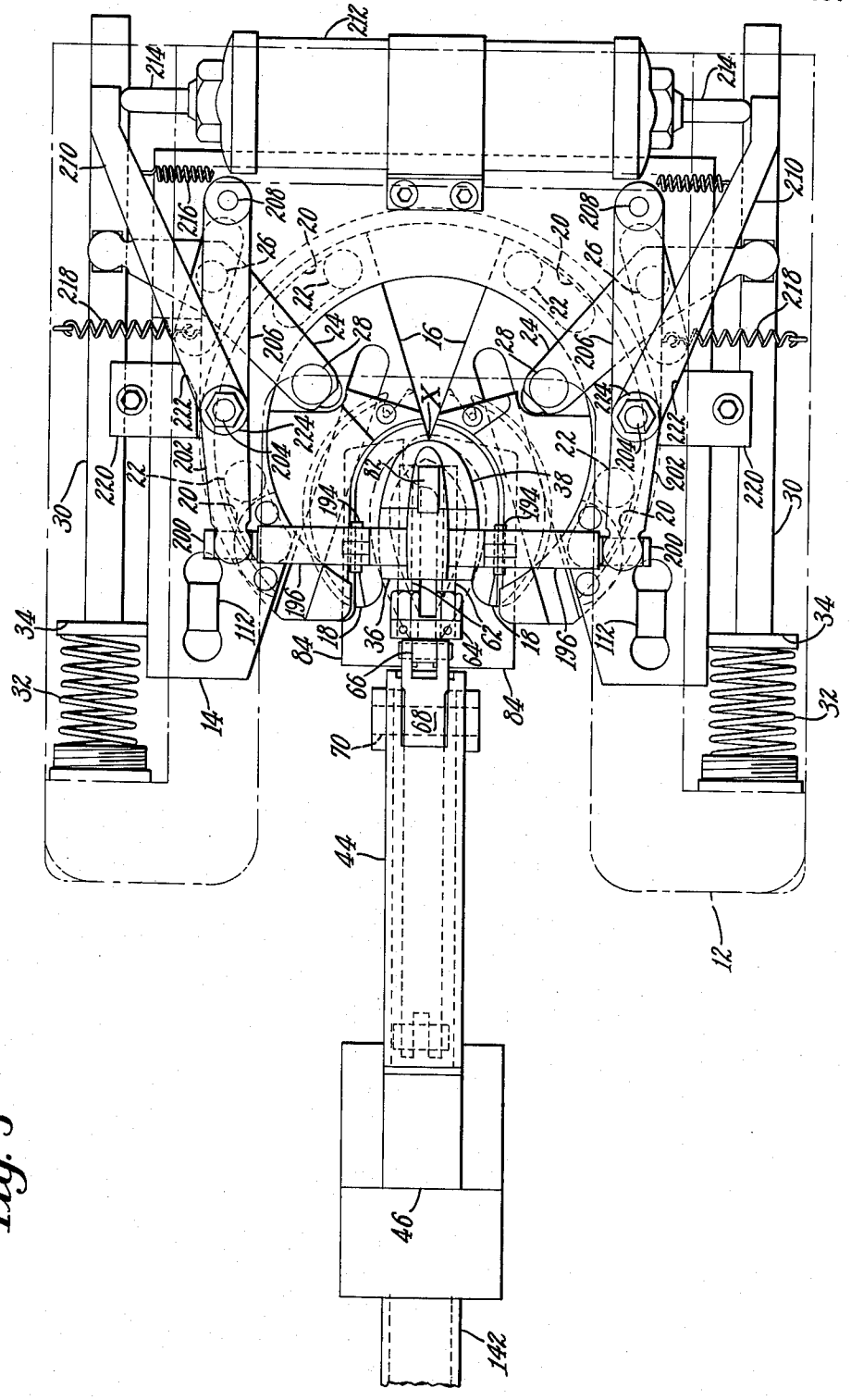

Fig. 3

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Fig. 4

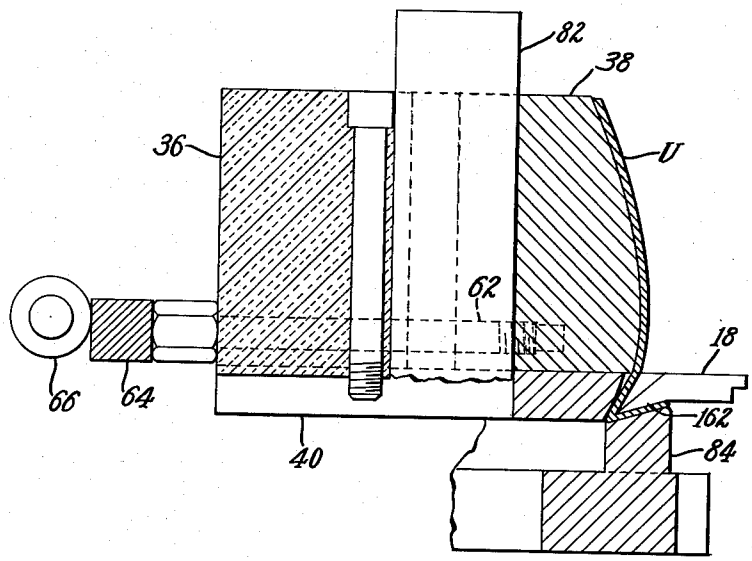
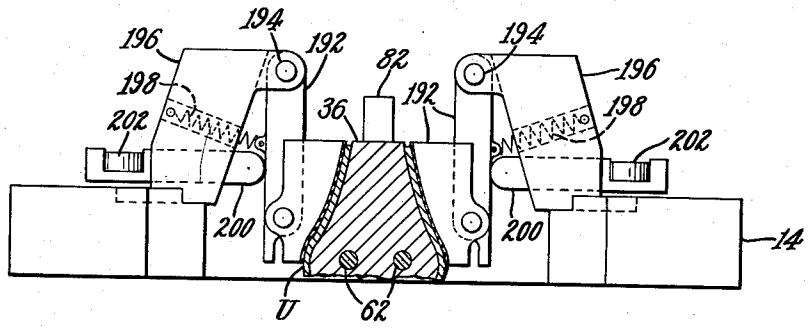


Fig. 5



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2,983,935

MACHINES FOR FORMING SHOE UPPERS

Derrick Talbert Carr, Leicester, England, assignor to United Shoe Machinery Corporation, Flemington, N.J., a corporation of New Jersey

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Claims priority, application Great Britain Oct. 14, 1958

6 Claims. (Cl. 12—54.3)

This invention relates to machines for forming the uppers of shoes, and is especially concerned with shaping the back parts of stitchdown shoes. While the invention is thus designed primarily to prepare the heel ends of such uppers for assembly with their soles, it is to be recognized that in various aspects application of the invention is not thus limited.

In order to facilitate proper performance of certain basic shoemaking operations after an upper is mounted on its last, such as pulling over and lasting, it is frequently highly desirable first to impart to the heel end of an upper while off the last the precise shape desired in the completed shoe. To this end, machines have been designed to mold the back parts of uppers, including a flanging of the lower margins thereof, as disclosed for instance in United States Letters Patent No. 2,379,425, granted July 3, 1945, on an application of René E. Duplessis, and in a later Patent No. 2,694,821, granted November 23, 1954, on an application of Augustus D. Willhauck. Although the latter discloses a construction somewhat simpler than the former, it is a principal object of the present invention to provide an improved machine of this general type which shall be of even more simplified construction and hence less expensive, but nevertheless capable of producing exact reproduction and permanent initial forming of an end of a shoe upper including its flanged margin.

In accordance with the object just stated, the invention is hereinafter described as embodied in an illustrative machine provided with an inner composite heel form adapted to recive and support the heel end portion of an upper for a stitchdown shoe, and a pair of outer forming members arranged to close on the inner form to clamp the heel end portion of the upper against a lower face of the inner form and exert pressure on the upper in the locality to be creased to form an outturned margin. As shown herein, a pair of flanging members initially occupy a closed position beneath the inner form and are opened widthwise as the inner and outer forming members are moved lengthwise of the upper to shape the outturned margin, the flanging members thereupon being pressed against the work to provide better definition in the crease thus formed. The composite heel form or mold disclosed herein is of three complemental parts, a forward portion being of material of low heat conductivity and an extreme heel end or molding portion of relatively high heat conductivity. The machine is further illustrated as being provided with a pair of side clamps arranged to cooperate with the opposite sides of the forward portion of the inner form to clamp the upper thereagainst as power means is operative relatively to move the heel forming parts lengthwise to tension and mold the heel end of the upper on the extreme heel end part which is adapted to be appropriately heated.

The above and other features of the invention, together with various novel details of construction and combinations of parts, will now be described with greater particularity with reference to an illustrative machine in which the invention is exemplified and in connection with the accompanying drawings thereof, in which

Fig. 1 is a view in right-hand elevation, certain portions of the frame being broken away to reveal inner construction, the parts occupying their initial rest positions;

Fig. 2 is a vertical section of the upper portion of the machine shown in Fig. 1, but on a larger scale;

Fig. 3 is a view taken in the direction of the arrow in Fig. 1 and showing the parts at a later stage of operation when outer forming members have moved inwardly;

Fig. 4 is a longitudinal section through an expanded heel end form and showing cooperative flange forming parts at one stage of operation; and

Fig. 5 is a detail view in front elevation indicating the mounting of side pressing members shown in other views.

The illustrative machine has a main frame **10** supporting a head casting **12** (Figs. 1–3) in which inclined guideways are formed for mounting a slide **14** for movement rearwardly and upwardly. This slide, as shown in Fig. 3, has a recessed front portion adapted by means of a circular guideway formed therein to receive a pair of carriers **16** respectively supporting detachable outer-forming members **18**. The latter are, by means subsequently explained, movable into and out of upper-engaging position about a focal point on an axis common to the members **18** and designated *x* in Fig. 3. For guiding the swinging of these forming members, each of the carriers **16** is formed with a pair of arcuate slots **20** receiving rolls **22** carried by the slide **14**.

For closing the members **18**, levers **24**, **24** are respectively pivotally mounted on pins **26** which are fixed in the slide **14**. Inner ends of the levers respectively have pin and slot connection with the carriers **16** at **28** (Fig. 3), and the outer ends are received in bearing slots respectively formed in parallel rods **30** disposed for endwise movement in bores in the casting **12**. Headed end portions of the rods **30** are engaged, respectively, by compression springs **32** nested in enlarged portions of the bores, the rod heads thus being urged against retaining shoulders **34** of the bores. Accordingly, the arrangement is such that upon forward movement of the slide **14** as hereinafter related, the upper lever **24** will be swung clockwise, as seen in Fig. 3, and the lower lever **24** will be swung counterclockwise on their pins **26** and hence the carriers **16** are caused to impart closing movements to the outer forming members **18**.

For supporting the upper during shaping, the machine is provided with an inner composite heel form including a forward portion **36** (Figs. 3 and 6) preferably of a material having low heat conductivity (such as an epoxy resin with suitable filler) and a heel end extremity **38** of high heat conductivity. The portion **36** is fixedly mounted on a U-shaped plate **40** having a beveled outer wall with which the outer forming members **18** cooperate, as shown in Fig. 4, in the vicinity of a crease and an outspread flanged portion of the upper. For reasons later stated, the entire heel form is bodily movable lengthwise of the upper, i.e., parallel to the slide **14**, and the heel end portion **38** is additionally movable lengthwise relatively to the portion **36** by means now to be explained. The plate **40** is connected by a bracket **42** (Fig. 2) upstanding from a rearwardly extending portion **44** of an angular lever **46** pivotally mounted on a cross pin **48** (Fig. 1), the latter extending through a depending arm **50** of the lever **46** and being journaled in the base of the frame **10**. The movement of the heel form as a whole is effected by rotation of an eccentric secured on a shaft **52** (Figs. 1 and

2) journaled in the casting **12**, the eccentric being carried by one end of a link **54** the other end of which is pivotally connected by an eccentric adjusting pin **56** to the lever **46**. The pin **48** is so located that operation of the eccentric causes the lever **46** to reciprocate the inner heel form parts **36**, **38** and the plate **40** in an operating path parallel to the plane of the slide **14**.

The independent lengthwise movement of the form **38** away from the form **36** is automatically effected by a fluid pressure device **60** (Fig. 1). To this end, the form **38** threadedly receives a pair of parallel rods **62** (Figs. 2–5) slidably extending through bores formed longitudinally in the portion **36**. Forward ends of these rods are secured to a crosspiece **64** a surface of which is engaged by a roll **66** carried in the upper end of a lever **68** pivoted on a pin **70** in the lever portion **44**. The lower end of the lever **68** is connected by a link **72** to a vertically movable piston rod **74** of the device **60** which may be air-operated, its cylinder being secured to the lever **46**. Admission of air under pressure to the cylinder is controlled in a cycle of operations by means of a cam secured on the shaft **52** and arranged to engage a spring-backed roll **76** (Fig. 2) of a valve **78**. In order adjustably to limit the tension to be applied to the heel end of an upper, a stop screw **80** (Figs. 1 and 2) in the lever **46** is disposed to engage the lever **68** endwise. In order to facilitate molding of the upper as the heel end portion is under tension the extreme heel end form **38** is slotted to receive a heating element **82** carried by the bracket **42**.

For shaping the marginal portion of the upper, which initially will extend downwardly beyond the lower face of the plate **40**, the machine is provided with a pair of flange formers **84** (Figs. 3 and 4) that occupy a level just beneath that face of the plate **40**. The formers **84** are swingable about an axis parallel to the axis *x* and open to perform, in cooperation with the lower faces of the outer formers **18**, an outspreading or flange shaping of the upper as required in the making of stitchdown shoes. Accordingly, the formers **84** are detachably mounted in carrier arms **86** (Figs. 1 and 2) which extend one from a stem **88** (Fig. 2) and the other from a sleeve **90** concentric therewith and received in a bore formed in a boss **92** on the casting **12**. By mechanism next to be explained, each of two operating links **94**, the forward ends of which are pivotally connected to the respective flange formers **84**, is actuated. The rearward ends of the links **94** are respectively connected to spaced yoke arms (one shown in Fig. 2) of a lever **96** fulcrumed in bearings **98** in the casting **12**. The lower end of the lever **96** has pivotal connection with one end of a composite link **100** (Fig. 2) the forward end of which is connected with a sheave of an eccentric secured on the shaft **52**. Closing and opening of the flange formers **84** are thus derived from rotation of the shaft **52**, but their initial positions (i.e., the amount they are initially open) are determined by manual adjusting means as required. To this end, the composite link **100** has separate coaxial hollow portions which may be moved axially and hence are internally threaded to received spaced, oppositely threaded portions, respectively, of a screw **102**. The latter is formed with a pinion **104** arranged to mesh with a circular rack **106** on one end of an adjusting rod **108** bracketed to the link **100**. Accordingly, turning a handle **110** secured on the other end of the rod **108** changes the length of the link **100** and thereby modifies the opening between the flange formers **84**. As later described, these formers are also movable heightwise at the proper time in a cycle to serve as presser members, and preferably are suitably heated by heating elements in the carrier arms **86**.

For causing the outer forming members **18** to close and clamp an upper on the inner heel form against the beveled face of the plate **40** at the will of the operator, the slide **14** is pivotally connected at its forward end to parallel links **112** (one only shown in Figs. 1 and 2). The lower end portions of the latter are each mounted on a pin **114** (Fig. 1) carried by a link **116** which is supported by a pin **118** projecting from a casting **120** (Figs. 1 and 2) secured to the main frame **10**. The parts initially are in their rest positions as shown in Figs. 1 and 2, but manually controlled means, next to be explained, is provided for shifting the links **112** and hence the slide **14** forwardly, i.e., to the left as seen in Fig. 1. Integral with the links **112** are arms **122** respectively pivotally connected with corresponding ends of a pair of links **124** the other ends of which receive a cross shaft **126** (Figs. 1 and 2). For purposes later explained, a pair of links **128** (one only shown in Figs. 1 and 2) has its forward portions receiving eccentrics mounted on the shaft **52** and rearward end portions pivotally mounted on the cross shaft **126**. This shaft is connected by a rod **129** to the rearward end of a treadle lever **130** (Fig. 1) fulcrumed on a pin **132** carried by a pair of parallel links **134** fixedly secured to a bearing pin **136** journaled in the frame **10**. An arm **138** secured at one end to the pin **136** is engaged at its other end by a spring-backed plunger **140**. Accordingly, the arrangement is such that the first portion of the downward movement of a treadle **142** formed on the front of the lever **130**, by reason of resistance to depression of the plunger **140**, causes the lever **130** to pivot counterclockwise as seen in Fig. 1 on the pin **132** and hence the rod **128** is moved upwardly until the cross shaft **126** engages a stop **144** secured to the casting **12**. Consequent shifting in the toggle relation of the links **124**, **128** acting through the arms **122** moves the slide **14** forwardly to cause the members **18** to clamp the stock. An arm **146** secured to the pin **136** is connected at one end to a control rod **148** of a conventional clutch (not shown) preferably of the type providing an automatic dwell and coupled to a motor (not illustrated). When the stop **144** has arrested the shaft **128** and the operator is satisfied with the manner in which the outer formers **18** embrace the heel end of the upper, further depression of the treadle **142** moves the links **134** counterclockwise, as seen in Fig. 1, against the resistance of the plunger **140**, thus rocking the pin **136** and the arm **146** counterclockwise to trip the clutch and initiate a power cycle of the machine.

Referring to Fig. 1, the clutch serves to transmit power to a main shaft **150** which drives a cam shaft **152** journaled in the frame by means of a worm **154**. By means of a sprocket **156** on the shaft **152** and an endless chain **158** on the sprocket and meshing with a sprocket **160** on the shaft **52** the latter is driven to operate the eccentrics thereon previously mentioned. It will accordingly be understood that as the eccentric associated with the links **128** moves the slide **14** forwardly under power to close the outer formers **18**, the eccentric associated with the link **54** operates the lever **46** to shift the entire heel end form **36**, **38** and **40** as a unit forwardly to a corresponding extent, the springs **32** yielding if need be to prevent biting of the upper by the formers **18**. During this forward movement of the upper, and while it is clamped by the formers **18** and the plate **40**, the flange formers **84** are swung outwardly by the action of the eccentric associated with the link **100** on the parts **96**, **94**, thus creasing and forming the outwardly flanged marginal portion of the upper around the heel end, as indicated in Fig. 3. The open and heated formers **84** are then, by mechanism next to be described, made to press and somewhat "overmold" the outwardly spread margin against an undercut surface **162** (Fig. 4) of the formers **18**.

For moving the formers **84** heightwise into flange pressing positions, a pair of toggle links **164**, **166** (Fig. 1), having a knee pin **168**, is actuated to straightened condition. Accordingly, a toggle operating slide **170** is connected at one end by a pin **172** to the link **164**. The other end of

the slide 170 is forked to ride on a bearing block 174 freely mounted on the shaft 152, and an intermediate portion of the slide 170 carries a roll 176 adapted to be received in a closed cam 178 (Fig. 1) mounted on the shaft 152. The lower end portion of the link 164 is pivotally connected to a plunger 180 slidable axially in a tubular portion of the casting 120, the plunger 180 being backed by a compression spring 182. The upper end portion of the link 166 is connected to a plunger 184 slidable coaxially with the plunger 180 in another tubular portion of the casting 120. Between the upper end of the plunger 184 and the sleeve 90 is a wedge 186 the position of which is adjustable by means of a hand lever (not shown) secured on a shaft 188. Accordingly, the heightwise position of the sleeve, and hence of the formers 84, may be varied to accommodate uppers of different thickness. When the cam 178 straightens the toggle 164, 166 the formers 84 exert pressure on the flange of the upper according to the degree of compression of the spring 182, this being adjustable by turning a sleeve 190 (Fig. 1) threaded into the casting 120 and bearing endwise on the spring.

In order to mold the heel end of the upper while it is under lengthwise tension shaping it over the heated form 38, which preferably is of metal, a pair of side clamps 192, 192 (Figs. 3 and 5) cooperates with the relatively stationary nonheated inner form 36. These clamps have their inner faces lined with rubber or the like to avoid marring the upper and the faces corresponding in curvature with that of the adjacent contour of the form 36. The clamps are each pivotally suspended from a pin 194 (Fig. 5) carried by a bracket 196 secured to the slide 14. In order to provide ample space for mounting the upper on the heel end support form 36, 38, a tension spring 198 connects each bracket 196 to its adjacent clamp 192. For yieldingly forcing the clamps into work engaging positions at the proper time, the following mechanism is operative. Each bracket 196 is bored widthwise of the machine slidably to receive a plunger 200, an inner end of which acts on an outer surface of its adjacent clamp. An outer portion of the respective plungers 200 is slotted to receive a rounded end of an arm 202 secured to a stud 204 which is journaled in the forward end portion of a link 206. The rearward ends of the links 206 are pivotally mounted on studs 208 respectively projecting from the slide 14. Also secured to the studs 204 are actuating arms 210. For finally forcing the clamps 192 inwardly, the rearward ends of the arms 210 are disposed to be spread apart simultaneously by a fluid pressure operated cylinder 212, opposed pistons therein having piston rods 214 thus effective on the arms against resistance of a tension spring 216 (Fig. 3) connecting them. For determining the initial open positions of the clamps 192, a return tension spring 218, connecting the respective links 206 to the frame 12, urges the arms 210 outwardly against the stop blocks 220 secured to the frame 12. An inclined surface 222 (Fig. 3) of each of the blocks 220 is disposed, during initial forward movement of the slide 14 for closing the outer formers 18 to the position indicated in Fig. 3, to engage a boss 224 on the link 206 to move the latter, and hence a clamp 192, into initial clamping relation to the upper. For automatically admitting air under pressure to the cylinder 212 between its pistons, and thus clamping the upper firmly against the form 36 as the heel end is about to be moved lengthwise, a valve 226 (Fig. 2) is operated by a cam 228 secured on the shaft 52. During this clamping of the upper, the form 36, being a relatively poor conductor of heat, has a surface temperature not likely to damage the upper.

In operating the illustrative machine, the heel end portion of a stitchdown upper is first mounted on the heel support form 36, 38, the heightwise position of the upper being determined by engagement of its lower edge with horizontal upper faces of the flange formers 84. Pulling the upper forwardly against the plate 40, the operator will next depress the treadle 142. As above explained, the wiper-like outer forming members 18 are thereupon caused to embrace and clamp the upper against the plate 40, and the last part of the treadle depression initiates the power cycle of operations of the machine. In this cycle, the members 18 conform the upper firmly yet yieldingly against the inner form 36, 38 as well as the plate 40, the members 18 moving forwardly as the flange formers 84 are swung open, as above stated, to crease and form the heel end flange. The flange formers 84 are then forced upwardly by the cam-straightened toggle 164, 166 against the surface 162 (Fig. 4) of the outer formers. In this stage of the cycle the clamps 192 are caused, by the admission of air to the cylinder 212, firmly to press the upper against opposite sides of the heel form 36, and thereupon air under pressure is admitted automatically to the device 60 to force the heated heel form 38 lengthwise from the form 36 and from the plate 40. The heel end of the upper is thus tensioned lengthwise and molded, the clutch permitting the machine to come to rest with the upper and its flange under molding stress. After the desired dwell in this condition, the operator will again trip the clutch to cause the parts, except possibly the form 38, to return to their starting positions, whereupon the molded upper may be removed from the machine. The form 38 is, of course, easily returned to its starting position, if necessary, by pulling forwardly on the upper as it is removed. Having now received its proper heel end contour, this upper may be readily mounted on its last with correct fit and the subsequent shoemaking operations performed with more ease and greater assurance of a uniform and properly formed product.

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

1. In a machine for shaping the end portions of shoe uppers, the combination with inner and outer upper shaping molds, of marginal flange forming means cooperative therewith, the inner mold including a first portion remote from the end portion of an upper thereon and a relatively movable, heated second portion of higher heat conductivity than the first for forming said end portion, and means for clamping the upper against opposite sides of the first portion while the second portion is relatively movable lengthwise to tension and mold the end portion of the upper with heat.

2. In a machine for shaping the end portions of shoe uppers, a movable work support including an end form of high heat conductivity and a complemental form of relatively low heat conductivity, means for heating the end form, outer formers movable to embrace and close on an end of an upper on the work support, a pair of flange formers disposed to be opened beneath the outer formers as the latter close to form an outspread marginal flange in the upper about its end, means operative to clamp the upper against the complemental form while the flange formers cooperate with the outer formers to mold said outspread flange, and means automatically operative to tension and form the end of the upper by relative lengthwise movement of the end form.

3. In a machine for operating on the back parts of shoe uppers, a composite heel end form for supporting an upper, the form being shaped substantially like the heel portion of a last and including complemental portions, a heel end one of which has a relatively higher heat conductivity and is relatively movable lengthwise from a forward portion, means for heating the heel end portion, a pair of outside formers closable about the heel end form yielding to clamp one portion of a margin of the upper thereagainst, a pair of flange formers adapted to be opened as the outside formers close to crease and form an outside flange of the remaining portion of the margin, a pair of clamping members respectively adapted to clamp the upper against opposite sides of the forward portion

of the heel end form, and fluid pressure operated means for thus operating the clamping members and then relatively moving the heel end portion of the heel end form lengthwise of its forward portion to tension and mold the back part of the upper.

4. In a machine for operating on the back parts of shoe uppers, a frame, a slide reciprocable thereon and having a recess for receiving a heel end support, said support including a heel end portion and a complemental forward portion, outer forming members operatively connected to the slide and arranged to cooperate with the support, flange forming means disposed to cooperate with the outer forming members, manual control means operative to move the slide in one direction for actuating the outside formers, and power means responsive to further operation of the manual control means for operating the flange forming means and then relatively moving the forward portion and the heel end portion of the support lengthwise to mold the upper.

5. In a machine for operating on the back parts of shoe uppers, a frame, a slide movable thereon, a heel end support disposed for movement parallel and adjacent to the slide, said support including a forward portion of low heat conductivity and a heel end portion of high heat conductivity, said heel end portion being adapted to receive a heating element, outer forming members operatively connected to the slide and arranged to a cooperate with the support, means carried by the slide for clamping the upper on the support against its forward portion only,

fluid pressure means for operating said clamping means and then relatively moving said heel end portion lengthwise, manual control means for initially causing the outside formers to embrace the upper upon the support, and means responsive to further operation of the manual control means for operating the fluid pressure means.

6. In a machine for operating on the back parts of shoe uppers, inner and outer forms for shaping an upper, the inner form comprising complemental heel end portions of different heat conductivity which are bodily and relatively movable lengthwise of the upper thereon, that portion of higher heat conductivity being formed to receive a heating element, a pair of clamps movable toward and from opposite sides of that heel end portion having lower heat conductivity, manually controlled means for initially causing the outer forms to embrace the inner forms, and power means operable in response to actuation of the manual control means for sequentially operating the clamps and then relatively moving the heel end portions lengthwise to tension and mold the shoe.

References Cited in the file of this patent

UNITED STATES PATENTS

2,274,063	Hazelton	Feb. 24, 1942
2,379,425	Deeplessis	July 3, 1945
2,694,821	Willhauck	Nov. 23, 1954

FOREIGN PATENTS

1,785	Great Britain	of 1884