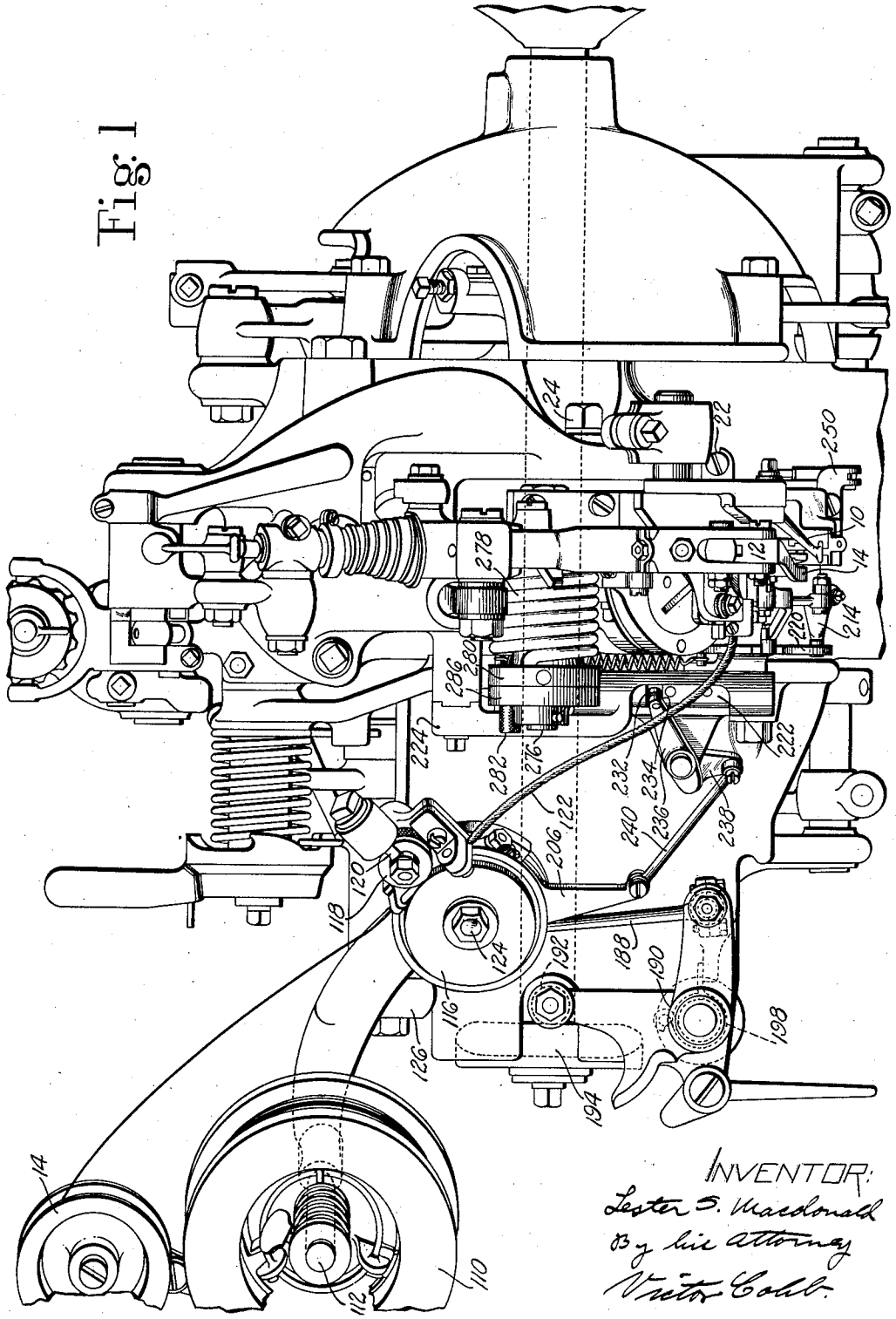
June 15, 1937. L. S. MACDONALD 2,083,655

FASTENING INSERTING MACHINE

Filed Feb. 11, 1936 4 Sheets-Sheet 1

Fig. 1

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FASTENING INSERTING MACHINE

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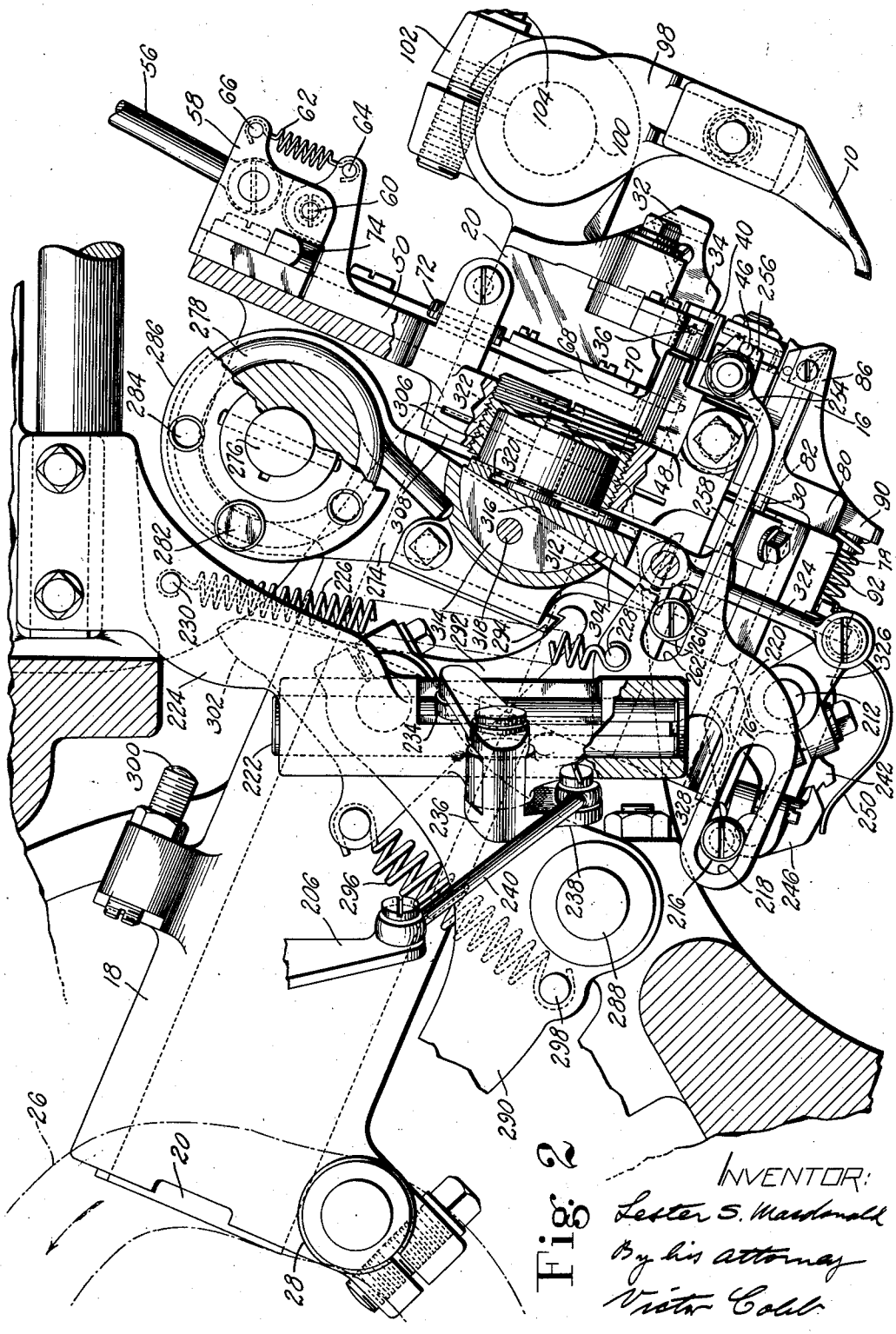

Fig. 2

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FASTENING INSERTING MACHINE

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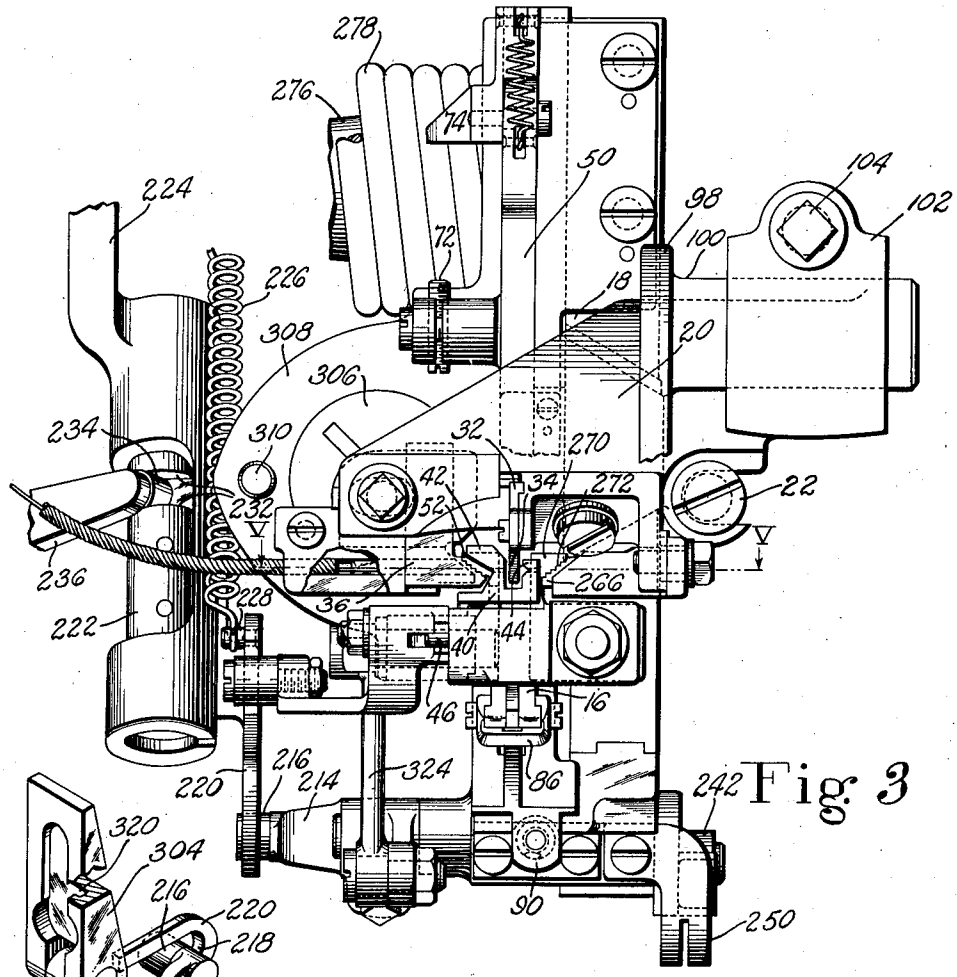


Fig. 3

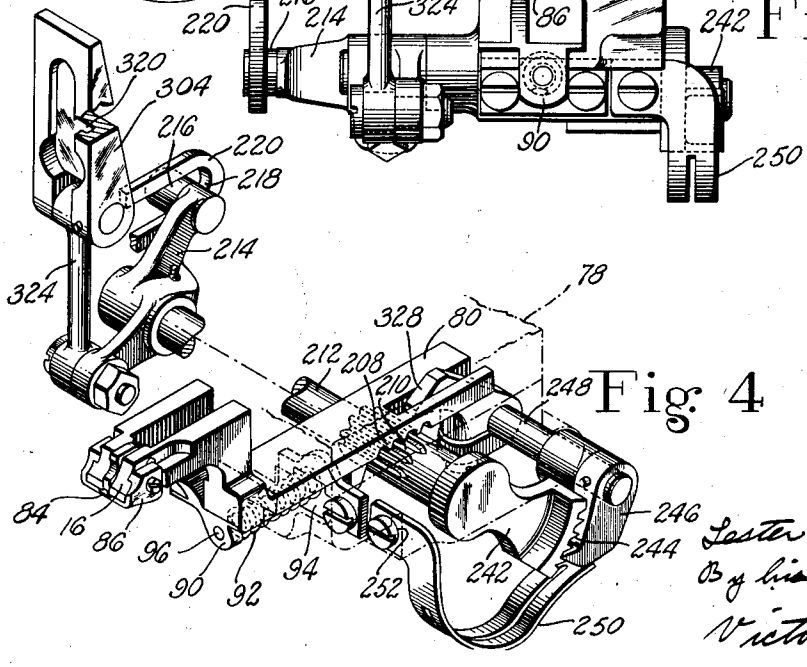


Fig. 4

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FASTENING INSERTING MACHINE

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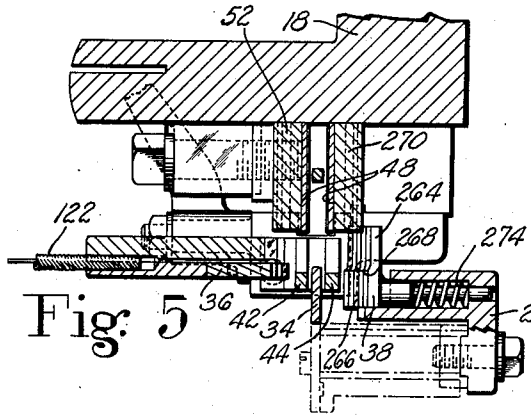



Fig. 5

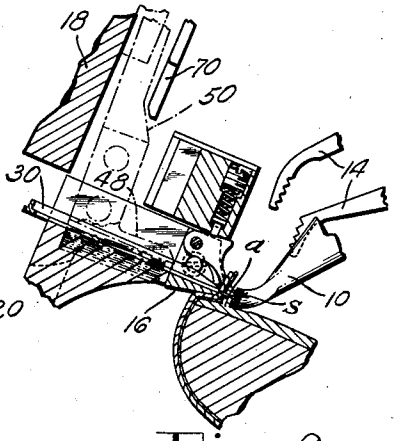



Fig. 6

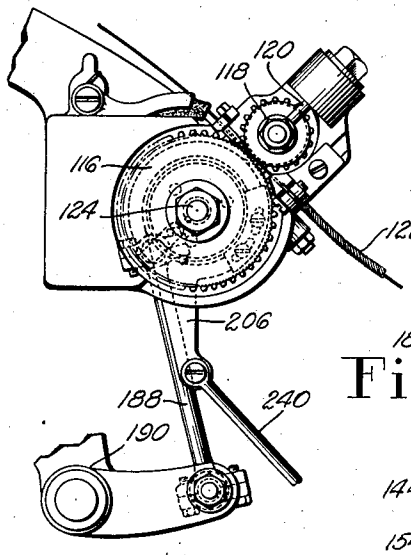



Fig. 7

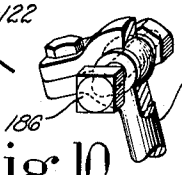
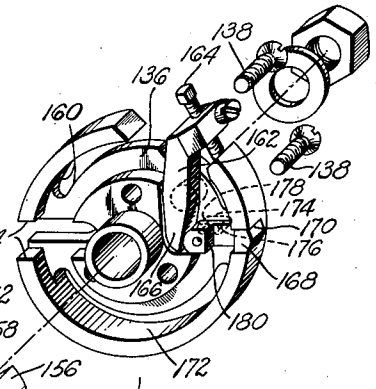



Fig. 10



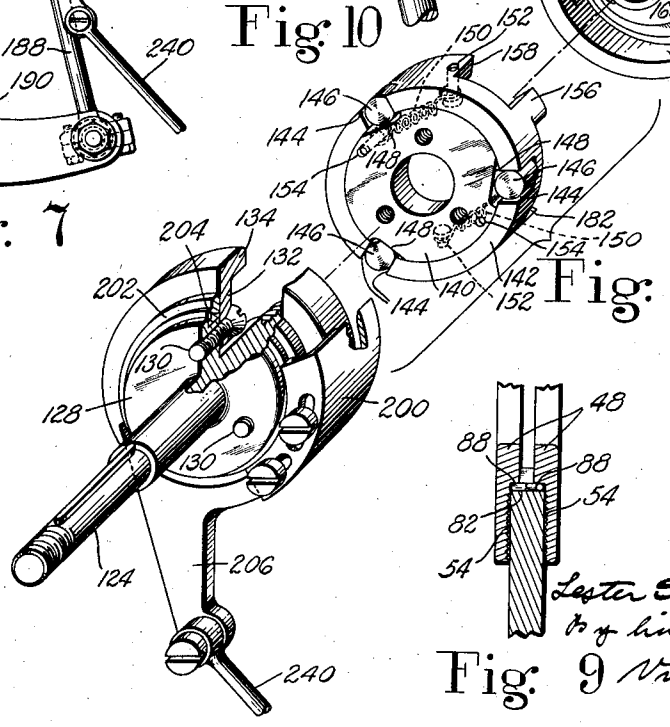




Fig. 8




Fig. 9

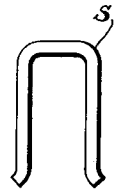



Fig. 11

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Patented June 15, 1937 2,083,655

# UNITED STATES PATENT OFFICE

2,083,655

## FASTENING-INSERTING MACHINE

Lester S. Macdonald, Beverly, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application February 11, 1936, Serial No. 63,370

30 Claims. (Cl. 1—20)

This invention relates to machines for inserting fastenings and is herein illustrated as embodied in a machine of the type shown in Letters Patent of the United States No. 1,796,451, granted March 17, 1931 on an application of George Goddu, although it will be understood that in various novel and useful aspects the invention is not limited to machines of the particular type illustrated.

Machines constructed as shown in the above-mentioned Letters Patent comprise in their organization means for forming and driving fastenings in the form of staples from a guiding nozzle through shoe upper materials and a lip or rib of a sole to fasten the upper to the sole, the guiding nozzle being movable inwardly over the outer face of the sole to lay the marginal portion of the upper materials against the lip or rib prior to the driving operation, and the fastenings being clenched in the driving operation by a work rest or anvil which is arranged to engaged the inner face of the lip or rib of the sole. In the use of the machine, the upper materials are thus fastened to the sole successively in different locations, and since there is frequently a variation in thickness between different portions of the upper materials of the same shoe and sometimes also a considerable variation in thickness of the uppers of different kinds of shoes it is desirable that the lengths of the fastenings be varied in accordance with variations in the thickness of the work so as to prevent any lack of, or excess of, fastening length in the clenched portions of the fastenings to insure that the fastenings will be effectively clenched and the upper materials securely fastened to the sole.

An object of the invention is to provide means for determining the lengths of the fastenings in accordance with variations in the thickness of the work. For the purpose in view, there is provided in accordance with one feature of the invention means for varying the extent of feeding movement of the fastening-feeding mechanism of the machine and the length of the fastening material severed to form the fastening in accordance with variations in the thickness of the work clamped between the nozzle member and the work rest. In the illustrated construction, the nozzle member is moved toward the work by a carrier between which and the nozzle member there extends a spring which is arranged to yield to permit relative movement of the carrier and the nozzle member to clamp the work yieldingly against the work rest. Mounted on the carrier are fastening-severing means arranged to sever from fastening material pieces of different lengths, and an outside former which forms each severed length of fastening material into a fastening, herein illustrated as a staple, over a stationary inside former in response to the movement of the carrier. The fastening material is guided from the fastening-feeding mechanism of the machine to the fastening-severing means by means which is adjustable relatively to the severing means to determine the length of the fastening material severed and which is adjusted by mechanism operative in response to the relative movement of the carrier and the nozzle member to control the amount of feeding movement of the fastening-feeding mechanism, the construction being such that the length of the fastening material fed and severed and consequently the length of a staple formed is determined by the thickness of the work.

In accordance with a further feature of the invention, there is provided improved means for determining the limit of driving movement of the fastening driving means in accordance with the thickness of the work. In the illustrated machine, the fastenings are driven through the nozzle member into work by a driver to which operative movement is imparted by a spring-operated arm. The spring is tensioned by the movement of the nozzle member toward the work and is released to effect the insertion of the fastening, after the nozzle member has completed its movement toward the work, by means which is operative independently of that movement. In the construction shown, the driving movement of the driver is limited by the engagement with the spring-operated arm of a wedge which is movable into different positions to vary the extent of driving movement of the driver and, preferably and as herein shown, there is provided means for automatically varying the position of the wedge in accordance with variations in the position of the nozzle member to clamp the work. Preferably, as shown, there is also provided means for adjusting the wedge relatively to the spring-operated arm to vary the position of the driver relatively to the nozzle member at the end of its driving movement, the construction of the parts being such that the position of the driver relatively to the nozzle member at the end of its driving movement is not disturbed by movement of the wedge into different positions to vary the limit of driving movement of the driver. In order to insure against any possible displacement of the staple in the driving operation there is provided in accordance with a further feature of

the invention, means operative substantially at the end of the downward movement of the outside former for moving it yieldingly into engagement with the nozzle member to provide a continuous passage for the staple as it is driven.

The above and other features of the invention, including various novel details of construction and combinations of parts, will now be more particularly described with reference to the accompanying drawings and pointed out in the claims.

In the drawings,

Fig. 1 is a view in front elevation of the head of a machine embodying the present invention;

Fig. 2 is a view partly in side elevation and partly in section of parts including the fastening forming and inserting mechanism on an enlarged scale;

Fig. 3 is a view in front elevation of parts shown in Fig. 2;

Fig. 4 is a detached perspective view in detail of the overlying member and associated parts;

Fig. 5 is a section on the line V—V of Fig. 3;

Fig. 6 is a sectional view illustrating the driving of the staple;

Fig. 7 is a side elevation of the wire feeding means;

Fig. 8 is an exploded view of parts of a clutch mechanism associated with the wire feeding means;

Fig. 9 is a sectional view on an enlarged scale showing the position of the outside former relatively to the nozzle during the staple driving operation;

Fig. 10 is a detail view of parts shown in Fig. 7; and

Fig. 11 is a view on an enlarged scale of a staple formed by this machine.

Since the machine as a whole, except for novel mechanisms provided for purposes of this invention, is fully shown and described in the above mentioned Letters Patent, only such parts as it is necessary to refer to for an understanding of the present invention will be herein described in detail. It will be understood that the shoe is presented by the operator in position for lasting in each location where that operation is to be performed along the sides of the shoe, the machine being provided with a work rest **10** which, in operating, for example, on shoes of the welt type, as illustrated in Fig. 6, engages the lip *a* of the insole in each lasting location and serves as an anvil to clench a staple *s* driven through the upper and the insole lip to fasten the upper in lasted position. Prior to the fastening operation the upper is pulled over the last by a gripper **12** having upper gripping jaws **14** and is laid inwardly over the feather and against the lip of the insole by a member **16** which serves as a nozzle or guide for the staple. The nozzle member **16** is supported in a manner more particularly hereinafter described on a carrier or slide **18** which is movable along a forwardly and downwardly inclined guideway provided by a bracket member **20** (Figs. 2 and 3) adjustable on the head of the machine by means of a screw **22** and secured in adjusted position by screws **24**, one of which is shown in Fig. 1, this bracket serving as a support for the work rest **10**. It will be understood that by movement of the slide **18** along its guideway the staple guiding nozzle **16** is carried toward and from the work rest **10** and the work positioned thereby and is operated in its movement toward the work rest to lay the upper over the insole as above described. The slide **18** is operated by a path cam **26**, shown diagrammatically in Fig. 2, in engagement with a roll **28** on the carrier.

Also mounted on the slide **18** is the staple driving mechanism comprising a driver **30** (Figs. 2 and 6) and its operating means hereinafter described, a portion of the mechanism with which the machine is provided for forming each staple in a location out of alinement with the driver by the forward movement of the carrier toward the work and also means for transferring the staple into alinement with the driver after the carrier has completed its movement toward the work and prior to the operative movement of the driver. Secured to the bracket **20** is a support for a plate **32** which has depending therefrom a finger **34** (Figs. 2 and 3) shaped and arranged to serve as an inside former for the staple. Mounted also on the bracket **20** in fixed relation to the inside former **34** is a wire guiding nozzle **36** to which wire for forming the staples is fed by means hereinafter described, the wire being advanced until it engages an abutment **38** mounted in the bracket **20** (Fig. 5). Mounted in the forward end of the slide **18** is a wire guiding member **40** provided with upwardly extending portions **42**, **44** (Fig. 3) having rearwardly extending slots therein through which the wire is fed from the guiding nozzle **36**. The member **40** is vertically movable in a guideway in the slide **18** and carries a pin **46** to which is connected mechanism, more particularly hereinafter described, for moving the member **40** to vary the position of the slots in the upwardly extending portions **42**, **44** relatively to the wire cutting or severing mechanism of the machine to vary the length of wire severed. The upwardly extending portions **42**, **44** of the wire guiding member **40** are spaced apart to receive the inside former **34** and the portions **42**, **44** are shaped to prevent interference with stationary parts of the wire cutting and staple forming mechanism.

Cooperating with the inside former **34** is an outside former comprising two plates **48** (Figs. 5 and 9) which are spaced apart and are fast on a bar **50** (Fig. 2) mounted in a guideway in the slide **18** for movement in directions at right angles to the direction of movement of the slide. The wire is severed by a cutter **52** (Fig. 3) which is fast on the carrier **18** and cooperates with the wire guiding nozzle **36** to cut the wire before the forming of the staple begins. The cutter **52** and the wire guiding nozzle **36** have their cooperating end faces stepped, as shown in Fig. 3, to provide a plurality of short substantially vertical cutting edges for severing different lengths of wire from a continuous strip, the wire being positioned relatively to the cutter **52** and the nozzle **36** by the guiding member **40**. It will be understood that as the slide **18** moves forwardly a U-shaped staple is formed by relative movement of the outside and inside formers **48** and **34**, the severed piece of wire being supported for the operation of the outside and inside formers by the guiding member **40**. In order to insure against displacement of the staple relatively to the outside former as the latter is moved to transfer the staple from forming position into driving position the inner faces of the plates **48** (Fig. 9) are provided with oppositely disposed grooves or serrations **54**, one pair of which receive the legs of the staple at the time that the staple is formed.

For imparting staple transferring movement to the bar **50** which carries the outside former **48** there is provided mechanism which is substantially the same as that shown and described in

the prior Letters Patent comprising a bell-crank lever (not shown) which is swung in one direction by a spring to impart staple transferring movement to the bar 50 and in the opposite direction by a cam (not shown) to return the bar and outside former into staple forming position. One arm of this bell-crank lever is adjustably connected by a link 56 (Fig. 2) to a short slide 58 to which the bar 50 is pivotally connected at 60. A spring 62 connected at one end to a pin 64 carried by the bar 50 and at the other end to a pin 66 projecting from the slide 58 tends to swing the bar 50 in a direction to carry the outside former forwardly. The bar is held against swinging movement as the staple is transferred from forming position into driving position by the engagement of a plate 70 on the slide 18 with a projection 68 on the bar 50. Substantially at the end of the downward movement of the bar 50 the projection 68 is moved out of engagement with the plate 70, thereby permitting the spring 62 to swing the bar in a direction to move the outside former forwardly into engagement with the staple guiding nozzle 16 to provide a continuous passage for the staple during the driving operation (Fig. 6). For limiting the transferring movement of the bar 50 the slide 18 carries a stop screw 72 which is engaged by a lug 74 on the slide 58, the screw being adjustable to cause the staple at the end of its transferring movement to aline properly with the driver.

The driver 30 is carried by a slide 76 (Fig. 2) mounted in a guideway in a member 78 fast on the slide 18. Also mounted for sliding movement in a guideway formed in the member 78 is a slide 80 which carries the staple guiding nozzle 16. The driver advances along the ledge 82 on the nozzle 16 and in alinement with the upper surface of this ledge is a staple guiding slot 84 formed in a cap 86 which is secured to the nozzle 16 (Fig. 4). As the outside former is moved downwardly to carry the staple from forming position into driving position the ledge 82 receives and supports the staple, the construction being such that at the end of the downward movement of the outside former the staple is confined between the ledge 82 and shoulders 88 on the plates 48 (Fig. 9). Depending from the slide 80 is a lug 90 between which and the member 78 is a spring 92 one end of which enters a recess in a plate 94 (Fig. 4) fast to the member 78, and the other end of which is centralized with the recess in the plate by a pin 96 projecting from the lug 90. The spring 92 affords provision for yield of the staple guiding nozzle 16 in accordance with variations in the thickness of the materials at different parts of the shoe but is of sufficient strength to hold the nozzle firmly in position to clamp the work against the work rest 10 during the staple driving operation. The work rest 10 is adjustably secured in a holder 98 (Fig. 2) having formed thereon a shank 100 mounted to turn in a split bearing 102 formed on the front end of the bracket 20, a screw 104 being provided for effecting relative movement of the two parts of the split bearing to bind the shank and holder in adjusted position.

The wire from which the staples are formed is carried upon a reel 110 (Fig. 1) mounted to turn upon a pin 112 and from the reel the wire is led up and over an idler pulley 114 and thence downwardly between feed rolls 116 and 118, the latter being pressed against the former by a spring-pressed pin 120. From the feed wheels the wire is led through a tube 122 to the wire guiding nozzle 36. The feed roll 116 is keyed to a shaft 124 (Fig. 1) rotatably mounted in a bracket 126 secured to the head of the machine. Formed integral with or secured to the shaft 124 is a flange 128 (Fig. 8) to which there is fastened by screws 130 a disk 132 of hardened steel which is provided with a rearwardly extending circular flange 134. Rotatably mounted on the shaft 124 is a second disk 136 to which there is secured by screws 138 a disk 140 upon which there is rotatably mounted a ring 142 provided with slots 144 for hardened rolls 146 which engage tapering recesses 148 formed in the disk 140, these members together with the disk 132 forming parts of a "Horton clutch." Springs 150 extending between pins 152 projecting from the ring 142 and pins 154 carried by the disk 140 tend to rotate the ring 142 on the disk 140 in a counterclockwise direction (Fig. 8) to hold the rolls 146 wedged between the disk 140 at the smaller ends of the recesses 148 and the circular flange 134 on the disk 132. Formed upon the ring 142 is a lug 156, and a curved tongue 158 which is arranged to enter an arcuate slot 160 formed in the disk 136. Pivotally connected to the disk 136 is a lever 162 provided with an upwardly extending arm to which there is adjustably secured a screw 164 arranged to engage the lug 156 on the ring 142. The lever 162 has a downwardly extending arm 166 which is arranged to engage one end of a member or plunger 168 which is guided for movement toward or from the arm 166 by a slot 170 formed in a forwardly extending circular flange 172 on the disk 136. A spring 174 extending between a pin 176 in the disk 136 and a pin 178 projecting from the plunger 168 acts normally to hold the plunger with a shoulder 180 formed thereon in engagement with the inner face of a lug 182 on the ring 142. The disk 136 is provided with a T-shaped slot 184 to receive the head of a bolt 186 (Fig. 10) to which there is connected a link 188 the opposite end of which is connected to one arm of a bell-crank lever 190 (Figs. 1 and 7) which is provided with a roll 192 engaged by a cam wheel 194 on a cam shaft 196 rotatively mounted in the head of the machine (Fig. 1). A spring 198 acts on the bell-crank lever 190 to hold the roll 192 in engagement with the cam wheel 194, the shape of which is such that at a predetermined time in the cycle of operations of the machine the bell-crank lever 190 is swung in a counterclockwise direction (Fig. 1) and through the link 188 rotates the "Horton clutch" in a clockwise direction. It will be understood that as the "Horton clutch" is thus rotated the rolls 146 are in wedging contact with the two members 134 and 140, thereby rotating the shaft 124 and the feed wheel 116 to feed the wire. For moving the rolls 146 out of wedging contact with the disk 132 to open the clutch and to stop the operation of the feed wheel 116 there is provided a shield 200 (Fig. 8) which overlies the disk members 132 and 136 and is arranged to engage and to depress the plunger 168 as the disk 136 is rotated in response to the swinging movement of the bell-crank lever 190. Depression of the plunger 168 acts to swing the lever 162 in a direction to rotate the ring 142, through the screw 164, relatively to the disk 140 in a direction to move the rolls 146 into the wider portions of the recesses 148, thus moving the rolls out of wedging contact with the disk 140 and the disk 132 and thereby disconnecting these two clutch members. It will be understood that as the bell-

crank lever 190 continues to swing in the same direction the shield 200 holds the parts in the positions just described so that no further movement is imparted to the feed wheels 116 and 118, and that as the lever 190 is swung in the opposite direction the rolls 146 are again moved into wedging contact with the disk members 140 and 142 by the action of the spring 150 on the ring 142 as the plunger 168 moves out of engagement with the shield 200. As herein shown, the shield 200 is adjustably secured to a ring 202 (Fig. 8) which is rotatably mounted in a groove 204 formed by the disk 132 and the flange 128, the ring 202 being provided with a downwardly extending arm 206 which is connected to mechanism, hereinafter more particularly described, for rotating the ring to vary the position of the shield and thereby to control the length of feed of the wire in accordance with the desired length of the staple to be formed.

As previously pointed out, the staple guiding nozzle 16 is carried by a slide 80 between which and the member 78 secured to the slide 18 there extends a spring 92 which is arranged to yield in the forward movement of the slide 18 after the work has been clamped against the work rest 10 by the nozzle 16. As shown particularly in Fig. 4 there is formed upon the slide 80 rack teeth 208 arranged to mesh with teeth 210 formed upon a shaft 212 rotatively mounted in the member 78. Fast to one end of the shaft 212 is an arm 214 which carries a roll 216 extending into a slot 218 formed in a plate 220 which is provided with an upwardly extending shank portion 222 (Figs. 2 and 3) mounted to slide vertically in a guideway formed in a bracket 224 secured to the head of the machine. A spring 226 connected at one end to a pin 228 carried by the plate 220 and at the other end to a pin 230 projecting from the bracket 224 acts to hold the plate 220 against downward movement relatively to the bracket 224. The shank portion 222 of the plate 220 has formed therein a slot 232 (Figs. 1 and 3) to receive a roll 234 carried by one arm of a bell-crank lever 236 which is pivotally connected to the bracket 224. The bell-crank lever 236 has a second arm 238 connected by a link 240 to the depending arm 206 of the ring member 202 which carries the shield 200 for operating the plunger 168 of the "Horton clutch" to stop the operation of the feed wheels 116 and 118. It will be understood that after the work has been clamped against the work rest 10 by the nozzle 16 the spring 92 yields and the slide 18 moves forward relatively to the slide 80, thus imparting bodily forward movement to the shaft 212 which by reason of its toothed engagement with the slide 80 is rotated in a counterclockwise direction (Fig. 2). As the shaft 212 is thus rotated it swings the arm 214 in a direction to move the plate 220 downwardly against the resistance of the spring 226 and to swing the bell-crank lever 236 in a direction to impart clockwise movement to the ring member 202 and the shield 200. The position of the shield 200 for operating the plunger 168 to disconnect the "Horton clutch" is thus varied to vary the length of feed of the wire and the length of the staple to be formed in accordance with variations in the thickness of the work clamped between the nozzle 16 and the work rest 10. Formed upon the opposite end of the shaft 212 (Fig. 4) is a downwardly extending arm 242 provided with ratchet teeth 244 arranged to be engaged by a pawl 246 fast to a short shaft 248 rotatively mounted in the member 78 secured to the slide 18. A flat spring 250 secured to the member 78 by a screw 252 and arranged to engage the pawl 246 acts to swing the pawl toward the ratchet teeth 244. After the slide 18 completes its forward movement, the shaft 212 and, through the arm 214, the plate 220 and the parts connected thereto are held in adjusted positions by the engagement of the pawl 246 with one of the ratchet teeth 244. The teeth 244 correspond in number to the steps on the cutter 52 and the wire guiding nozzle 36, and in order that the wire guiding member 40 will be positioned in proper relation to these parts to insure that the desired length of wire will be severed there is pivotally connected to the slide 18 (Fig. 2) a lever 254 having a forwardly extending forked arm 256 arranged to straddle the pin 46 projecting from the member 40 and a rearwardly extending arm 258 carrying a roll 260 extending into a slot 262 formed in the plate 220. As the plate 220 is moved downwardly to vary the position of the shield 200, the lever 254 is swung about its pivotal connection to the slide 18 in a direction to move the wire guiding member 40 into position to support the fed-in portion of wire in proper relation to the wire severing means.

As above stated, in operating upon shoes of the welt type, the work rest 10 serves as an anvil to clench the legs of the staple driven through the upper and the insole lip to hold the upper in lasted position. In order that the staple will hold the upper effectively in tensioned condition it is desirable that the ends of the staple legs be deflected outwardly in such manner as to cause the ends of the legs to reenter the work. For this purpose the illustrated machine is constructed and arranged to form staples having the ends of their legs bent slightly outward in the direction in which they are to be deflected and further to assist in thus deflecting the ends of the staple legs, the lip engaging face of the anvil 10 against which the ends of the staple legs are clenched is formed by plane surfaces inclined relatively to each other in directions to deflect successive portions of the ends of the staple legs outwardly, these faces being provided with serrations arranged to prevent displacement of the ends of the staple legs heightwise of the lip of the insole in the clenching operation. As shown, particularly in Fig. 5, the substantially vertical cutting edges of the cutter 52 are slightly rounded to form a slight bend in one end of the piece of wire which is severed from the continuous length of wire in response to the relative movement of the cutter 52 and the wire guiding nozzle 36. For bending the opposite end of the fed-in piece of wire just before it is severed the abutment 38 has a stepped portion 264 against which the free end of the wire is fed. The inclination of the stepped portion 264 is substantially the same as the inclination of the stepped cutting edge of the nozzle 36, but it is inclined in the opposite direction. Forwardly of the portion 264 the abutment 38 has a similarly stepped portion 266 forming with the stepped portion 264 a shoulder 268 against which the free end of the wire is bent by a member 270 carried by the slide 18 and having a stepped face 272 (Fig. 3) arranged to cooperate with the stepped portion 266 of the abutment 38. As the slide 18 moves forwardly the member 270 presses the free end of the wire against the shoulder 268 and bends it toward the same side of the wire as the bend formed in the opposite end of the wire by the cutter 52.

The member 270 and the cutter 52 engage and bend the opposite ends of the length of wire from which the staple is to be formed substantially at the same time, and in order to prevent shearing of the end of the wire in engagement with the shoulder 268 the abutment 38 is slidingly mounted in the bracket 20 and is arranged to yield against the resistance of a spring 274 (Fig. 5) in response to pressure of the wire against the shoulder 268, thus permitting free passage of the bent end of the wire in the continued forward movement of the member 270. It will be understood that as the slide 18 continues to move forwardly the outside former 48 engages the severed length of wire and bends or shapes it about the inside former 34 thus forming a staple the ends of the legs of which are bent slightly outward in the direction in which they are to be clenched in the driving operation.

For operating the driver slide 76 there is provided mechanism which is substantially the same as that shown and described in the prior Letters Patent comprising an arm 274 which at its upper end is pivoted on a stud 276 on the slide 18 and at its lower end has a bearing in a recess formed in the driver slide 76. The arm 274 is operated to impart staple driving movement to the driver 30 by a torsion spring 278 one end of which is connected to a member 280 which may be turned to adjust the tension of the spring and is held in adjusted position by a pin 282 (Figs. 1 and 2) arranged to enter any one of a series of holes 284 formed in a member 286 fast on the stud 276. For controlling the arm 274 in such manner as to tension the spring 278 and to retract the driver 30 preparatory to the staple driving operation there is pivoted at 288 (Fig. 2) on the head of the machine a lever 290 on which is pivotally mounted a latch 292 for engaging the lower end of a plate 294 fast on the arms 274. A spring 296 connected at one end to the latch 292 and at the other end to a pin 298 in the lever 290 tends to hold the latch in position to engage the plate 294. It will thus be evident that when the slide 18 receives its forward movement to carry the staple nozzle 16 toward the work the arm 274 is held back by the latch 292 so that the driver 30 is not moved forwardly with the slide 18 and accordingly the spring 278 is tensioned by the movement of the slide. For operating the latch 292 to release the arm 274 for the staple driving operation the slide 18 is provided with an adjustable screw 300 (Fig. 2) which is arranged to engage and operate a finger 302 projecting from the latch. The forward movement of the slide 18, however, does not carry the screw far enough to act on the finger 302 since it is necessary to allow time for the transferring of the staple after the carrier has arrived at the end of its forward movement. Release of the arm 274 is accordingly effected in response to a swinging movement of the lever 290, effected by a cam (not shown). It will be understood that by such movement of the lever 290 the screw 300 causes the latch 292 to swing far enough to disconnect it from the plate 294. In the return of the parts to starting positions the latch 292 is engaged by a shoulder (not shown) on the lever 290 to hold it in position to connect again with the plate 294 when the slide 18 arrives at the end of its retractive movement.

The driving movement of the arm 274 is limited by a member or stop 304 (Fig. 2) which may be adjusted toward or from the arm 274 to vary the position of the driver 30 at the end of its driving stroke relatively to the nozzle 16 by a screw 306 mounted in a split bearing 308 on the slide 18, a screw 310 (Fig. 3) being provided for effecting relative movement of the two parts of the split bearing to bind the screw 306 in adjusted position. In order that the adjusted position of the driver 30 relatively to the nozzle 16 at the end of the stroke will remain fixed regardless of variations in the thickness of the work clamped between the nozzle 16 and the work rest 10, the illustrated machine is provided with means controlled by the position of the nozzle for varying the limit of driving movement imparted to the arm 274. For this purpose the member 304 is formed as a wedge having an upwardly and forwardly inclined face 312 arranged to be engaged by a fiber insert 314 seated in a curved recess in the arm 274, the fiber insert having a substantially plane face 316 for engaging the inclined face 312 of the wedge 304 and being loosely mounted on a pin 318 for limited turning movement relatively to the arm 274. The wedge 304 is provided with a T-shaped slot 320 to receive the head of a screw 322 which is threaded into the screw 306. Pivotally connected to the lower end of the wedge is a link 324 the opposite end of which is pivotally connected to a forwardly extending arm 326 fast on the shaft 212. It will be evident that as the nozzle 16 yields in the forward movement of the slide 18 after the work has been clamped against the work rest 10, the slide 80 will rotate the shaft 212 in a direction to swing the arm 326 upwardly (Fig. 2) to raise the wedge 304.

It will be understood that the greater the thickness of the work clamped between the nozzle 16 and the work rest 10 the greater will be the amount of relative movement of the slides 18 and 80 and the higher the position of the wedge 304 at the end of the forward movement of the slide 18, and that the higher the position of the wedge the less will be the amount of driving movement of the arm 274, the parts being so constructed that the amount of driving movement of the arm 274 is thus varied in accordance with variations in the thickness of the work so as not to vary substantially the position of the driver 30 relatively to the nozzle member at the end of the stroke of the driver.

As previously pointed out, in response to the yielding of the nozzle 16 in the forward movement of the slide 18, the shaft 212 is rotated by the slide 80 to operate the mechanism above described for adjusting the positions of the wire guiding member 40, the shield 200 and the wedge 304 in accordance with the thickness of the work clamped between the nozzle and the work rest 10. For operating the pawl 246 to release the arm 244 to permit the shaft 212 to be thus rotated there is fast to the short shaft 248 (Figs. 2 and 4) a member 328 which, as the slide 18 is moved forwardly, is arranged to engage the driver slide 76 and to be swung in a direction to swing the pawl 246 against the resistance of the spring 250 out of engagement with the ratchet teeth 244 on the arm 242. In the illustrated machine the member 328 is thus swung to unlock the parts in the forward movement of the slide 18 after the wire has been severed by the cutter 52 and before the nozzle 16 has been moved into engagement with the work. The nozzle 16 is thus released to the action of the spring 92 to measure the thickness of the work, after which as the slide 80 moves relatively to the nozzle member the shield 200, the wire guiding member

40 and the wedge 304 are adjusted through the connections above described to determine the amount of feeding movement imparted to the feed wheels 116, 118, the length of a staple formed and the limit of driving movement imparted to the driver 30 in accordance with the thickness of the work clamped between the nozzle member and the work rest. It will be understood that as the spring-operated lever 274 is swung in a direction to effect the insertion of a staple the driver slide 76 is moved out of engagement with the member 328 so that the pawl 246 is released to the action of the spring 250 which swings it into position to engage one of the ratchet teeth 244 on the arm 242 and to lock the shield 200 and the guiding member 40 in adjusted positions. Since, in the illustrated machine, the feeding of the wire takes place substantially at the beginning of the cycle of the machine the shield 200 and the guiding member 40 are thus held in adjusted positions during the next wire feeding and severing operations. While the construction is therefore such that the length of each staple formed is determined by the measured thickness of the work in the last preceding location in which a staple has been driven, in the progressive lasting of the opposite sides of shoes the lengths of the staples as thus determined have been found to be sufficiently accurate for all practical purposes.

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

1. A fastening-inserting machine having, in combination, a sole rest, an overlaying member movable to lay the marginal portion of an upper inwardly over the outer face of a sole and to press the upper and a lip on the sole yieldingly against said sole rest, means for severing from fastening material pieces of different lengths and for forming each severed piece into a fastening, means for inserting each fastening through the upper and into the sole to secure the upper in lasted relation to the sole, and automatic means for determining the length of the fastening material severed to form a fastening in accordance with the thickness of the work between said overlaying member and the sole rest.

2. A fastening-inserting machine having, in combination, a sole rest, an overlaying member movable to lay the marginal portion of an upper inwardly over the outer face of a sole and to press the upper and a lip on the sole yieldingly against said sole rest, means for severing from fastening material pieces of different lengths and for forming each severed piece into a fastening, means for inserting each fastening through the upper and into the sole to secure the upper in lasted relation to the sole, and means controlled by the position of the overlaying member at the end of its overlaying movement for determining the length of the fastening material severed to form a fastening.

3. A fastening-inserting machine having, in combination, a sole rest, an overlaying member, means for operating said overlaying member to lay the marginal portion of an upper over the outer face of a sole and to press the upper and a lip on the sole against said sole rest, means for severing from fastening material pieces of different lengths and for forming each severed piece of fastening material into a fastening, means for driving each fastening through the upper and into the sole to fasten the upper in lasted position, and means controlled by the overlaying member when in work pressing position for determining the length of the fastening material severed to form a fastening and the limit of driving movement imparted to said fastening-driving means.

4. A fastening-inserting machine having, in combination, a sole rest, an overlaying member movable to lay the marginal portion of an upper inwardly over the outer face of a sole and to press the upper and a lip on the sole yieldingly against said sole rest, means for severing from fastening material pieces of different lengths and for forming each severed piece into a fastening, means for feeding fastening material to said severing and forming means, means for driving each fastening through the upper and the lip of the sole to fasten the upper in lasted position, and mechanism for automatically varying the amount of feeding movement of said fastening feeding means and the limit of driving movement of said fastening driving means in accordance with variations in the thickness of the work between said overlaying member and the sole rest.

5. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece of fastening material into a staple, means for feeding fastening material to said severing and forming means, a member for guiding the fastening material from said feeding means to said severing and forming means and for supporting the severed piece of fastening material for the operation of the forming means, said guiding member being adjustable relatively to said severing and forming means to determine the length of the fastening material severed, means for clamping the work, and means for controlling automatically the amount of feeding movement of said fastening feeding means in accordance with the thickness of the work and for simultaneously adjusting said guiding member.

6. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, a member for guiding fastening material to said severing and forming means and for supporting the severed piece of fastening material for the operation of the forming means, said guiding member being adjustable relatively to said severing and forming means to vary the length of the fastening material severed to form a staple, and mechanism for clamping the work and for adjusting said guiding member relatively to said severing and forming means to determine the length of a staple formed in accordance with the thickness of the work.

7. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, a member for guiding fastening material to said severing and forming means and for supporting the severed piece of fastening material for the operation of the forming means, said guiding member being adjustable relatively to said severing and forming means to vary the length of the fastening material severed to form a staple, mechanism for clamping the work including a work rest and a member movable to press the work against said work rest, and mechanism controlled by said last-named member when in work-pressing position for adjusting said guiding member to determine the length of a staple

formed in accordance with the thickness of the work.

8. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, means for guiding fastening material to said severing and forming means, said guiding means being adjustable relatively to said severing and forming means to vary the length of the fastening material severed to form a staple, work-positioning means, a member for clamping the work against said work-positioning means, a spring for controlling said member, a carrier movable relatively to the clamping member for compressing said spring, and mechanism operative in response to the relative movement of the carrier and said clamping member for adjusting said guiding means to determine the length of a staple formed.

9. A fastening-inserting machine having, in combination, work-positioning means, a nozzle member for guiding the fastenings into the work, means for severing from fastening material pieces of different lengths, means for forming each severed piece into a staple, a carrier for moving the nozzle member toward the work to clamp the work yieldingly against said work-positioning means, and means mounted on the carrier and controlled by the nozzle member when in work-clamping position for determining the length of the fastening material severed.

10. A fastening-inserting machine having, in combination, work-positioning means, a nozzle member movable toward said work-positioning means to clamp the work and to guide the fastenings into the work, means for severing from fastening material pieces of different lengths, means for forming each severed piece of fastening material into a staple, means for guiding the fastening material to said severing means, said guiding means being adjustable relatively to said severing means to vary the length of the fastening material severed, and means controlled by said nozzle member when in work clamping position for adjusting said guiding means relatively to said severing means to determine the length of the fastening material severed to form a staple.

11. A fastening-inserting machine having, in combination, work-positioning means, a nozzle member movable toward said work-positioning means to clamp the work and to guide the fastenings into the work, means for severing from fastening material pieces of different lengths, means for forming each severed piece of fastening material into a staple, means for guiding the fastening material to said severing means, said guiding means being adjustable relatively to said severing means to vary the length of the fastening material severed, a member movable toward the work for operating the nozzle and relatively to which the nozzle is yieldable to clamp the work, and means operative in response to the yielding of the nozzle for adjusting said guiding means relatively to said severing means to determine the length of the fastening material severed to form a staple.

12. In a fastening-inserting machine, means for severing from fastening material pieces of different lengths and for forming each severed piece of fastening material into a staple, means for guiding fastening material to said severing means, said guiding means being adjustable relatively to said severing means to vary the length of the piece severed, means for measuring the work and for adjusting said guiding means relatively to said severing means, means for locking the guiding means in adjusted position, and means for automatically releasing the locking means prior to each work-measuring operation.

13. In a fastening-inserting machine, a pair of cooperating members for severing from fastening material pieces of different lengths, a member for guiding the fastening material to said severing members, said guiding member being adjustable to present the fastening material in different positions for the operation of said severing members to vary the lengths of the pieces severed, means for measuring the work, and means for automatically adjusting the guiding member relatively to the severing members to determine the length of the piece of fastening material severed in accordance with the thickness of the work.

14. In a fastening-inserting machine, a pair of cooperating members for severing from fastening material pieces of different lengths, a member for guiding fastening material to said severing members, said guiding member being adjustable to present the fastening material in different positions for the operation of said severing members to vary the lengths of the pieces severed, means for locking the guiding member in adjusted position, means for measuring the work, and means for releasing the locking means for the guiding member and for adjusting the guiding member relatively to said severing members to vary the lengths of the pieces of fastening material severed in accordance with variations in the thickness of the work.

15. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, means for feeding fastening material to said severing and forming means comprising a pair of rotatable feed wheels, means for operating said feed wheels, means for measuring the work, and means controlled by said work-measuring means for stopping the operation of said feed wheels after a predetermined length of fastening material has been fed to said severing and forming means.

16. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, means for feeding fastening material to said severing and forming means comprising a pair of rotatable feed wheels, a clutch through which said feed wheels are operated, means for measuring the work, and means controlled by said measuring means for opening said clutch at different times in the operation of the machine to vary the length of the fastening material fed in accordance with variations in the thickness of the work.

17. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, means for feeding fastening material to said severing and forming means comprising a pair of rotatable feed wheels, means for operating said feed wheels, means for connecting said feed wheels to their operating means including a clutch, means for measuring the work, and automatic means for unclutching said feed wheels after the work has been measured and a length of fastening material has been fed to said severing and

forming means determined by the thickness of the work.

18. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, means for feeding fastening material to said severing and forming means comprising a pair of rotatable feed wheels, a cam-controlled means for operating said feed wheels, a clutch for connecting the feed wheels to said cam-controlled means, and automatic mechanism for measuring the work and for unclutching the feed wheels so as to discontinue the feeding of the fastening material after a length of fastening material has been fed to the severing and forming means determined by the thickness of the work.

19. A fastening-inserting machine having, in combination, means for severing from fastening material pieces of different lengths and for forming each severed piece into a staple, means for feeding fastening material to said severing and forming means comprising a pair of rotatable feed wheels, cam-controlled means for imparting to said feed wheels a feeding movement of predetermined extent, a clutch for connecting the feed wheels to said cam-controlled means, means for holding said clutch closed, an adjustable shield, means arranged by engagement with said shield to open said clutch and thereby to disconnect said feed wheels from their operating means, means for measuring the work, and mechanism controlled by said work measuring means for adjusting said shield to vary the time in the operation of said cam-controlled means when the clutch is opened and thereby to vary the length of the fastening material fed to form the staple in accordance with variations in the thickness of the work.

20. A fastening-inserting machine having, in combination, work-positioning means, means for clamping the work yieldingly against said work-positioning means and for guiding fastenings into the work, means for driving fastenings into the work, adjustable means for limiting the driving movement of said driving means, and means for automatically adjusting said last-named means after the work has been clamped against said work positioning means to vary the limit of driving movement of said driving means in accordance with variations in the thickness of the work.

21. A fastening-inserting machine having, in combination, shoe-positioning means, a nozzle member for clamping the upper of a shoe and the lip of a sole yieldingly against said shoe-positioning means and for guiding fastenings into the work, fastening driving means including a driver for driving fastenings through said nozzle member, an adjustable member for limiting the driving movement of said driver, and automatic means for operating the nozzle member to clamp the work and for thereafter adjusting said last-named member to determine the amount of driving movement imparted to said driver in accordance with the thickness of the work.

22. A fastening-inserting machine having, in combination, a work rest, a nozzle member for guiding fastenings into the work, a spring for pressing said nozzle member against the work, a carrier movable relatively to said nozzle member to compress said spring, a driver for the fastenings, an arm on said carrier for operating the driver, a spring for imparting to said arm its driver-operating movement, a stop for limiting the driving movement of said arm, said stop being movable into different positions to vary the limit of driving movement of said spring-operated arm, and automatic means for varying the position of the stop in accordance with variations in the position of the nozzle member to clamp the work.

23. A fastening-inserting machine having, in combination, a work rest, a nozzle member for guiding fastenings into the work, a spring for pressing said nozzle member against the work, a carrier movable relatively to said nozzle member to compress said spring, a driver for the fastenings, a spring-operated arm for operating said driver, a wedge for limiting the driving movement of said arm, said wedge being adjustable to vary the limit of driving movement of the arm, and mechanism operative in response to the relative movement of the carrier and the nozzle member for adjusting said wedge.

24. A fastening-inserting machine having, in combination, a work rest, a nozzle member for guiding fastenings into the work, a spring for pressing said nozzle member against the work, a carrier movable relatively to said nozzle member to compress said spring, a driver for the fastenings, a spring-operated arm pivotally connected to said carrier for operating said driver, a wedge for limiting the driving movement of the arm, said wedge being adjustable to vary the limit of driving movement of the arm, and a second arm swingable in response to the relative movement of the carrier and the nozzle member for adjusting the wedge.

25. A fastening-inserting machine having, in combination, a work rest, a nozzle member for guiding fastenings into the work, a spring for pressing said nozzle member against the work, a carrier movable relatively to said nozzle member to compress said spring, a driver for the fastenings, a spring-operated arm for operating the driver, a wedge for limiting the driving movement of said arm, means for adjusting said wedge toward or from said arm to vary the position of the driver relatively to the nozzle member at the end of its driving movement, and mechanism controlled by the nozzle member and operative in response to the relative movement of the carrier and the nozzle member for adjusting the wedge relatively to said last-named means to vary the limit of driving movement of said spring-operated arm without varying the position of the driver relatively to the nozzle member at the end of its driving movement.

26. A fastening-inserting machine having, in combination, work-positioning means, a nozzle member for pressing the work against said work-positioning means and for guiding the fastenings into the work, a driver for driving fastenings through said nozzle member into the work, a spring-operated arm for imparting operative movement to said driver, a stop for limiting the driving movement of said arm, said stop being adjustable to vary the limit of driving movement of said arm, a carrier movable toward the work, a spring for operating the nozzle member by the movement of the carrier, and mechanism for adjusting said stop in response to the movement of the carrier after the nozzle member has been moved into engagement with the work.

27. A fastening-inserting machine having, in combination, work-positioning means, a nozzle member for clamping the work against said work-

positioning means and for guiding fastenings into the work, a driver for the fastenings, a spring-operated arm for imparting driving movement to said driver, a wedge for limiting the driving movement of said arm, connections between said nozzle member and the wedge for adjusting the wedge relatively to said spring-operated arm to vary the limit of its driving movement, and means for moving the nozzle member into position to clamp the work yieldingly against said work-positioning means and for thereafter operating said connections to adjust said wedge.

28. A fastening-inserting machine having, in combination, work-positioning means, a slide movable toward said work-positioning means, a nozzle member carried by said slide for guiding fastenings into the work, a spring extending between said slide and the nozzle member and arranged to yield to permit relative movement of the slide and the nozzle member to clamp the work against said work-positioning means, a driver for driving fastenings through said nozzle member into the work, an abutment for limiting the driving movement of said driver, said abutment being adjustable to vary the limit of driving movement of said driver, and connections between the nozzle member and said abutment operative in response to relative movement of the slide and the nozzle member for adjusting the abutment.

29. A fastening-inserting machine having, in combination, work-positioning means, a staple-guiding nozzle movable toward the work and having a staple-guiding passage therein, a driver for for driving staples through said passage into the work, an inside former and an outside former relatively movable to form a staple in a location out of alinement with the driver above the line of drive, said outside former being movable to transfer the staple downwardly into alinement with the driver, and means operative substantially at the end of the downward movement of the outside former for moving it yieldingly into engagement with the nozzle to provide a continuous passage for the staple during the driving operation.

30. A fastening-inserting machine having, in combination, work-positioning means, a staple-guiding nozzle movable toward the work and having a staple-guiding passage therein, a driver for driving staples through said passage into the work, inside and outside formers, one movable with said nozzle and the other stationary, for forming a staple in a position out of alinement with said passage as the nozzle is moved toward the work, means for imparting to said movable former after the nozzle has arrived at the limit of its movement toward the work a movement to transfer the staple into alinement with said passage, and additional means for moving the former substantially at the end of its transferring movement into engagement with the nozzle to provide a continuous passage for the staple during the driving operation.

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