April 5, 1932. L. S. MACDONALD 1,852,019

STAPLE FORMING AND INSERTING MACHINE

Filed Jan. 29, 1929 3 Sheets-Sheet 1

Fig. 2.

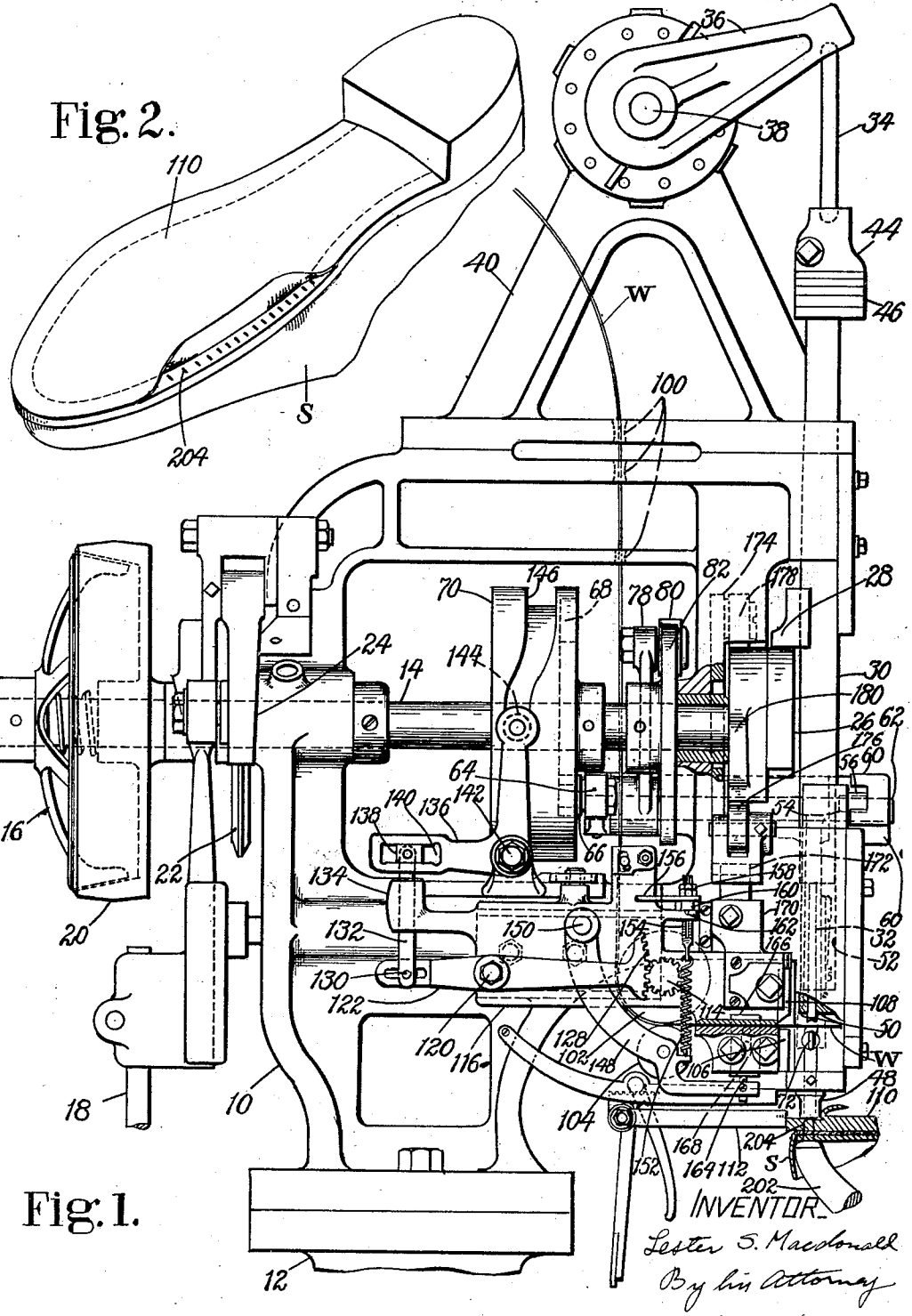


Fig. 1.

INVENTOR
Lester S. Macdonald
By his Attorney
Victor Cobb.

April 5, 1932. L. S. MACDONALD 1,852,019

STAPLE FORMING AND INSERTING MACHINE

Filed Jan. 29, 1929 3 Sheets-Sheet 2

Fig. 3

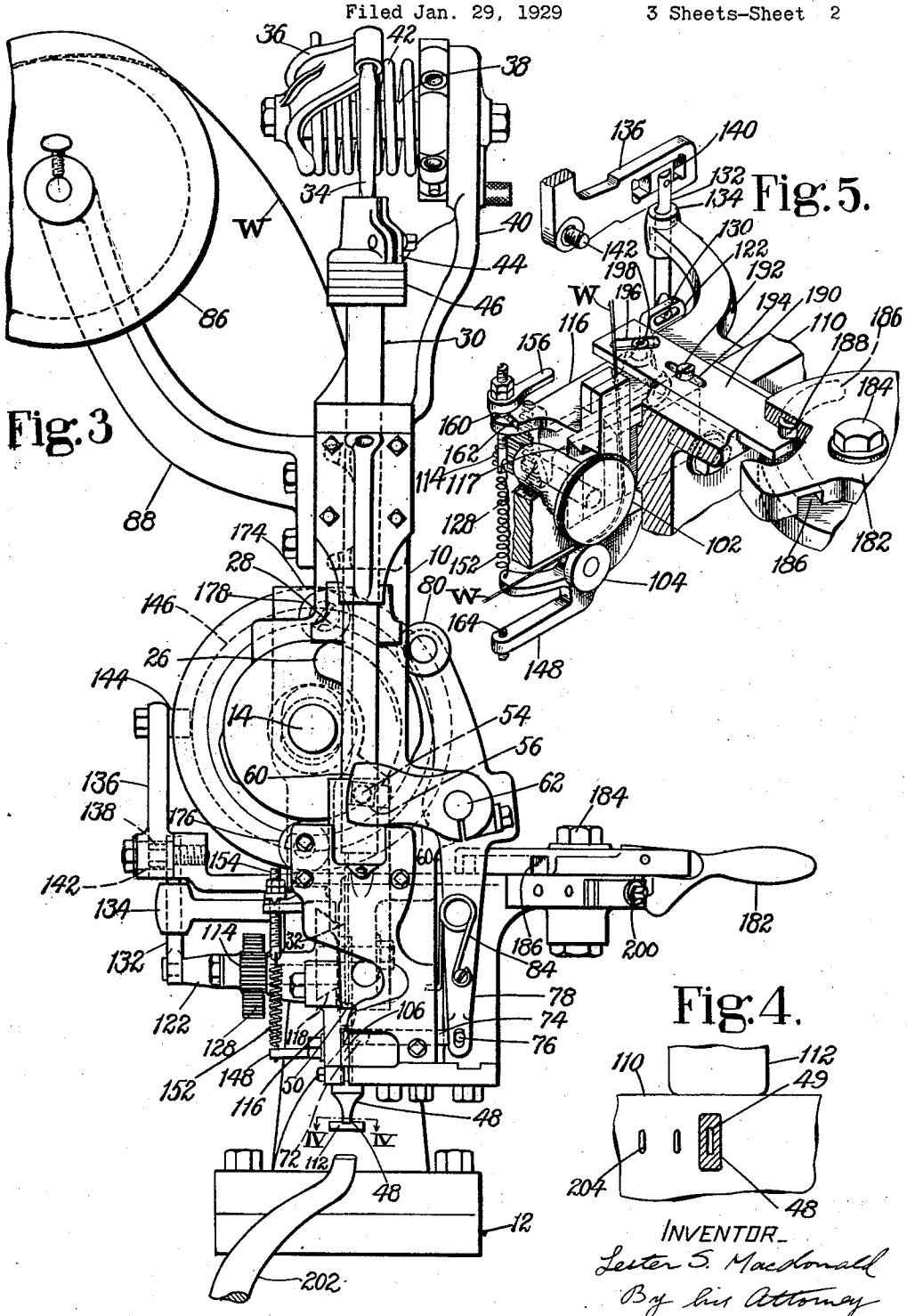


Fig. 5.

Fig. 4.

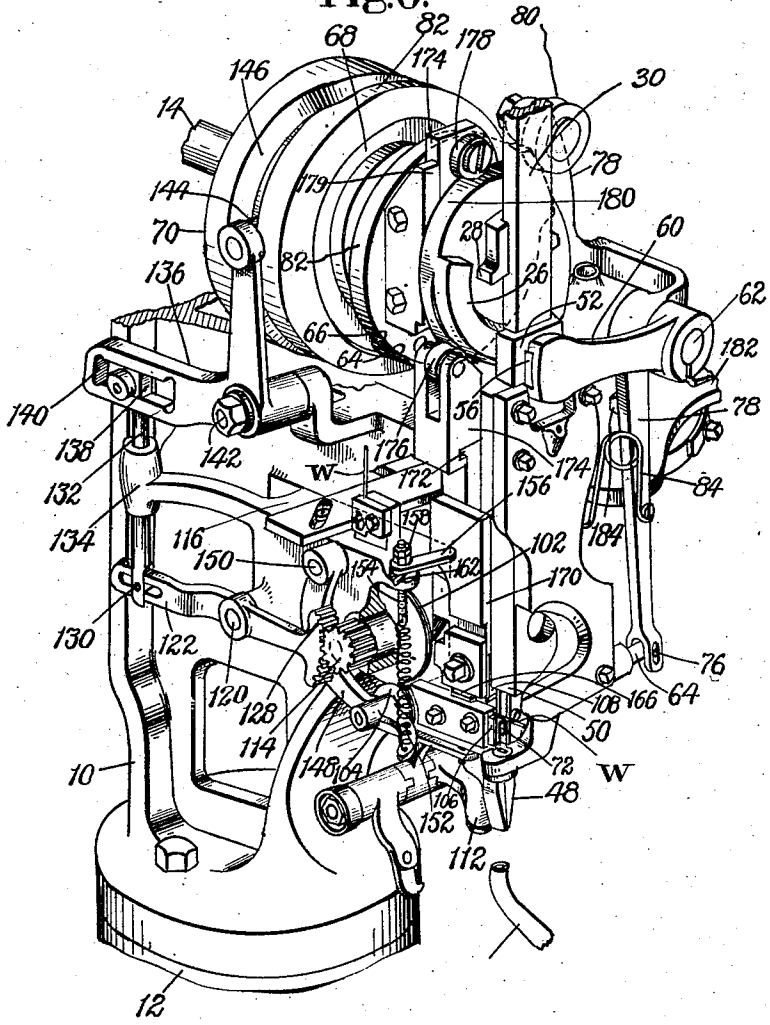
INVENTOR.
Lester S. Macdonald
By his Attorney
Victor Cobb

April 5, 1932. L. S. MACDONALD 1,852,019

STAPLE FORMING AND INSERTING MACHINE

Filed Jan. 29, 1929 3 Sheets-Sheet 3

Fig.6.



INVENTOR.
Lester S. Macdonald
By his Attorney
Victor Cobb

Patented Apr. 5, 1932 1,852,019

UNITED STATES PATENT OFFICE

LESTER SLATER MACDONALD, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY

STAPLE FORMING AND INSERTING MACHINE

Application filed January 29, 1929. Serial No. 335,852.

This invention relates to stapling machines and is illustrated herein as embodied in a staple forming and inserting machine particularly adapted for use in the manufacture or repairing of shoes.

In repairing boots and shoes it is frequently desired to attach sole members by all-around stapling. In order to preserve the flexibility of the shoes it has been proposed to insert these staples with their bars substantially perpendicular to the edge of the sole member in which they are inserted and this procedure is now being used upon an extensive scale in the repairing of turn and McKay shoes. For a full disclosure of a method of repairing turn shoes in accordance with the foregoing reference may be had to Letters Patent of the United States No. 1,694,446, granted December 11, 1928, on an application of James W. Meloon.

It is an object of the present invention to provide an improved machine particularly adapted for use in the attachment of sole members to boots and shoes by all-around stapling arranged to form and drive the staples with their bars substantially at right angles to the edge of the sole member in which they are inserted. Accordingly, in the illustrated stapling machine the wire from which the staples are formed is fed directly toward the operator by a pair of feed rolls and the inside former is moved transversely of the direction of the wire feed as it is moved into operative position prior to the descent of the outside formers. The staple which is thus formed passes down through the throat member of the machine without changing the direction in which its bar extends and is driven into the sole of a shoe presented to the throat member and positioned by a gage located to the rear of the throat member at a distance from the driver passage equal to the desired distance of the staples from the edge of the sole member with the bar of the staple substantially perpendicular to the edge of the sole.

While the illustrated machine is particularly adapted for use in all-around stapling, it should be understood that it is in no way limited to use for this purpose. Obviously it is well capable of use for driving staples in the performance of other operations in the manufacture or repairing of boots and shoes.

With the above and other objects and features in view the invention will now be described with reference to the accompanying drawings and pointed out in the claims.

In the drawings,

Fig. 1 is a side elevation of the head of a stapling machine embodying the present invention and illustrating its use in the attachment of a sole member to a shoe by all-around stapling;

Fig. 2 illustrates a McKay shoe which has been repaired by the attachment of a new sole by all-around stapling;

Fig. 3 is a front elevation of the head of the machine in Fig. 1;

Fig. 4 is a sectional view on the line IV—IV of Fig. 3, showing the throat member or nozzle of the machine in cross-section, and showing also the relation of a gage to the nozzle and the relation of the bars of the staples to the edge of the sole of the shoe in which they are inserted;

Fig. 5 is a perspective view, partly in cross-section, showing the wire feeding means of the machine and part of the adjusting mechanism therefor; and

Fig. 6 is a perspective view of the head of the machine.

The head 10 of the illustrated machine may be supported in any suitable manner as by a column 12 the upper portion of which is shown in Fig. 1. A cam shaft 14 is mounted in suitable bearings carried by or formed in the head 10 and is rotated in any suitable fashion. Thus, the illustrated machine is provided with clutch mechanism 16 mounted upon the shaft 14 and controlled by a treadle connected to a treadle rod 18 so that the shaft 14 may be driven by or operatively disconnected from a belt pulley 20. In order to bring the shaft 14 and parts operated thereby to rest at the proper time when the clutch is released to stop the machine, a brake drum 22 is fast upon the shaft 14 in cooperative relation to a brake member 24 also controlled by the treadle in a well-known fashion.

At its forward end the shaft 14 carries a

lifting cam 26 (Figs. 1, 3 and 6) in co-operating relation to a lifting block 28 fast upon a driver bar 30 mounted for vertical reciprocation in ways formed in the head 10 of the machine and carrying at its lower end a driver 32. The upper end of the driver bar 30 is connected by a link 34 to a lever 36 fulcrumed at 38 to an upstanding bracket 40 carried by the head 10 of the machine and urged in a clockwise direction as viewed in Fig. 1 by a stiff coil spring 42 one end of which bears against the lever 36 and the other end of which is adjustably secured to the bracket 40. A bumper 44 secured to the driver bar 30 is provided with a series of leather washers 46 arranged to strike a surface formed upon the top to the head 10, thereby limiting the downward stroke of the driver 32 and the driver bar 30 and cushioning the blow.

The machine is provided with a nozzle or throat member 48 having a driver passage 49 in line with the driver 32. This driver passage 49 is elongated in cross-section (as shown in Fig. 4), its greater dimension extending toward and from an operator standing in his normal position in front of the machine. In alinement with the portions of the nozzle immediately forward and rearward of the driver passage are a pair of outside formers 50 (Fig. 1) carried at the lower end of a member 52 mounted for vertical reciprocation in ways formed in or carried by the head 10 of the machine adjacent to the driver bar 30. At its upper end the member 52 is provided with a forwardly extending pin 54 on which is pivoted a block 56 mounted in a slot formed in the end of a rock arm 60 secured to a rock shaft 62 parallel to the cam shaft 14 and mounted in stationary bearings carried by the head 10 of the machine. Secured to the rearward end of the rock shaft 62 is a rock arm 64 (Fig. 1) carrying a cam roll 66 positioned in a closed cam track 68 formed in the forward face of a cam member 70 fast upon the shaft 14. Thus, it will be seen that the outside formers 50 are reciprocated in timed relation to the driver 32.

Mounted for transverse reciprocation in co-operative relation to the outside formers 50 is an inside former 72 (Figs. 1 and 3) carried at the forward end of a stem 74 slidably mounted in the head of the machine and provided at its right-hand end, as viewed in Fig. 3, with a pin 76 extending into a slot formed in the lower end of an approximately vertical lever 78 fulcrumed upon the shaft 62 for rocking movement independently thereof. At its upper end the lever 78 is provided with a cam roll 80 engaging a surface cam 82 (Fig. 1) fast upon the cam shaft 14 and yieldingly held in engagement therewith by a spring 84.

The wire W from which the staples inserted by the machine are formed is carried upon a reel 86 carried by a bracket 88 secured to the head 10 of the machine from which it passes downwardly through holes 100 formed in the head of the machine to a pair of feed rolls 102, 104 by which it is fed, as more fully hereinafter described, toward and past a stationary knife 106 and a movable knife 108 into staple forming position above the inside former 72 and below the outside formers 50. When a staple length of the wire W has been fed to this position the knives 106, 108 are operated, as more fully hereinafter described, to sever a piece of wire, whereupon the outside formers 50 descend, wiping the wire into staple form about the inside former 72. At this time the severed portion of the wire W, and consequently the bar of the staple formed therefrom, is positioned in a direction extending toward and from the operator. Accordingly, when, after the withdrawal of the inside former 72, the staple is driven downwardly and into a shoe S presented to the nozzle 48 for all-around stapling with the edge of its sole 110 in engagement with an edge gage 112, the bar of the staple will extend substantially at right angles to the edge of the sole as shown in Figs. 1, 2 and 4.

The feed roll 102 and a pinion 114 secured thereto and concentric therewith are carried by a slide member 116 provided with a dovetailed slot 117 engaged by a complemental dovetailed rib 118 secured to the head 10 of the machine and extending in a forwardly and rearwardly direction. Fulcrumed at 120 to the slide member 116 is a lever 122 formed at its forward end with a gear segment 128 and provided at its rear end with a slot in which is positioned a pivot pin 130 carried by the lower end of a rod 132 mounted for vertical sliding movement in a guideway formed in a lug 134 extending rearwardly from the slide 116. At its upper end the rod 132 is adjustably connected to a bell crank lever 136 through a block 138 slidably mounted in a slot 140 formed near the end of an arm of the bell crank lever 136 which extends substantially parallel to the lever 120. The bell crank lever 136 is fulcrumed at 142 to the head 10 of the machine and is provided with an upwardly extending arm carrying a cam roll 144 positioned in a cam track 146 formed in the cam member 70. Thus, it will be seen that as the shaft 14 rotates the feed roll 102 will be oscillated.

In order that the feed rolls 102, 104 will be effective to feed the wire W step-by-step, means is provided for alternately moving the feed roll 104 into and out of co-operative relation to the feed roll 102, the two being in co-operative relation while the feed roll 102 moves in a counterclockwise direction, as viewed in Fig. 1, and being in inoperative relation while the feed roll 102 moves in a clockwise direction. For this purpose the feed roll 104 is carried by a lever 148 fulcrumed at 150 to the slide member 116. A spring 152 at-

tached at its lower end to the lever 148 and at the upper end to a threaded rod 154 tends to hold the feed rolls 102, 104 in engagement with each other.

In order readily to permit separation of the feed rolls if desired when the machine is at rest, the rod 154 passes through a small hand lever 156 above which are a nut and lock nut 158 threaded upon the rod 154 and adjustable to provide the desired tension for the spring 152. The lower surface of the lever 156 adjacent to the rod 154 is provided with a pair of downwardly projecting V-shaped lugs 160 which normally rest upon a surface formed on the slide 116, as shown in Fig. 1, but which, upon rotation of the hand lever 156 through 90°, may enter a pair of V-shaped grooves 162, thereby relieving the tension upon the spring 152 and permitting the right-hand end of the lever 148 to drop a short distance.

During the operation of the machine, of course, the lever 156 is at all times in its elevated position with the lugs 160 clear of the V-shaped grooves 162 so that tension is maintained upon the spring 152. The lever 148 is, however, cyclically rocked against the tension of the spring 152 to move the feed roll 104 out of co-operative relation to the feed roll 102 during the backward movement of the feed roll 102. For this purpose a vertical pin 164 (Fig. 1) is adjustably secured near the right-hand end of the lever 148 in the path of movement of a block 166 mounted for vertically sliding movement in ways carried in the slide member 116 and restrained against excessive movement by a pin-and-slot connection 168. The upper end of the block 166 is in the path of movement of a knife carrier 170 to which the movable knife 108 is clamped.

At its upper end the knife carrier 170 is connected by a forwardly and rearwardly extending tongue-and-groove connection 172 with a slide member 174 (best shown in Fig. 6) mounted for vertical reciprocation in ways 179 carried by the head 10 of the machine. The slide member 174 is provided with a pair of cam rolls 176, 178 engaging cam surfaces 180 formed on the edge of the lifting cam 26. Thus it will be seen that as the shaft 14 rotates the knife 108 will be moved downwardly into co-operating relation with the knife 106 to sever a length of wire and at the conclusion of this movement the knife carrier 170 will impinge upon the block 166, thrusting the right-hand end of the lever 148 downwardly a short distance and separating the feed roll 104 from the feed roll 102. While the feed rolls are in this condition the lever 122 is caused to rock in a counterclockwise direction preparatory to a wire feeding stroke which takes place after the knife carrier 170 has been lifted, thereby moving the knife 108 out of the way of the end of the wire W and permitting the spring 152 to move the feed roll 104 back into engagement with the feed roll 102.

In order to vary the length of the wire fed and thus to vary the length of the legs of the staples formed it is only necessary to move the slide 116 along the dovetailed rib 118, forward movement of the slide 116 serving to shorten the feed since the rod 132 and the block 138 are brought nearer to the fulcrum 142 while rearward movement of the slide 116 serves to increase the length of the wire. The slide 116 is adjusted by means of a hand lever 182 (Fig. 3) fulcrumed at 184 to the head 10 of the machine and provided with a cam slot 186 in which is positioned a cam roll 188 (Fig. 5) carried by a plate 190 slidably mounted for movement transversely of the machine in ways formed in the head 10. A screw 192 passing through a slot 194 formed in the plate 190 serves to prevent displacement of the plate 190 from the ways in which it travels. Toward its right-hand end the plate 190 is provided with an inclined slot 196 in which is positioned a roll 198 carried by the slide member 116. Thus it will be seen that rocking movement of the lever 182 is effective to move the plate 190 transversely of the machine thereby moving the slide member 116 forwardly or rearwardly as the case may be. A latch member or members 200 may be provided to hold the lever 182 in adjusted position.

In the operation of the machine for all-around stapling in repairing shoes, the shoe with an outsole (either a whole sole or a half sole) positioned upon it is placed upon the work support or horn 202 of the machine, the sole being positioned by the edge gage 112 as shown in Fig. 1. The edge gage 112 of course may be adjusted as desired so that it is spaced from the driver passage a distance equal to the desired distance between the edge of the sole and the row of staples which are to be inserted. With the shoe supported and positioned in this manner with the tread surface of the outsole 110 in engagement with the lower end of the nozzle 48, the machine is caused to operate. The feed rolls 102, 104 feed a length of wire W forward toward the operator and into position above the inside former 72. The outside formers 50 descend, forming the staple with its bar extending in a direction at right angles to the edge of the shoe. The inside former 72 is then withdrawn and the staple is driven into the sole of the shoe by the driver 32, the bar of the staple as it descends through the driver passage maintaining its direction so that when inserted in the shoe it still extends at right angles to the edge of the sole as shown at 204 in Figs. 1 and 2. A row of staples is inserted in this fashion, the shoe being fed forward a short distance by the operator between the insertion of successive staples.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent of the United States is:

1. A staple forming and inserting machine having, in combination, a work support constructed and arranged to support a shoe, an edge gage arranged to position a sole member on the shoe while the sole member is attached to the shoe by a row of staples extending in a direction substantially parallel to the edge of the sole member, staple forming means constructed and arranged to form staples with their bars extending transversely of the direction of the row of staples and substantially perpendicular to the edge of the sole member positioned by the gage, and means for inserting the staples into a sole member positioned by the gage without changing the direction in which the bars of the staples extend whereby the staples are inserted in the sole member with their bars substantially perpendicular to its edge.

2. A staple forming and inserting machine for use in attaching sole members to shoes, having, in combination, staple forming means constructed and arranged to form staples with their bars extending toward and from an operator standing in his normal position in front of the machine, a throat member having a driver passage arranged to receive the staples, a work support constructed and arranged to present the sole portion of a shoe to the throat member, a driver, means for reciprocating the driver to drive the staples into a sole member of a shoe presented by the support to the throat member without changing the direction in which the bars of the staples extend, and a gage spaced from the driver passage in the direction in which the bars of the staples extend when the staples are formed and at a distance therefrom equal to the desired distance between the edge of the sole member and the row of staples by which it is to be attached, so that the bars of the staples will extend substantially at right angles to the edge of the sole of the shoe.

3. A staple inserting machine having, in combination, staple forming mechanism, a driver arranged to insert staples formed by said mechanism into a work piece, a movable wire engaging member arranged by its movement to feed the wire to the staple forming mechanism, a lever arranged by its rocking to actuate the wire feeding member to feed the wire a distance determined by the amplitude of its rocking movement, a second lever having an arm approximately parallel to the wire feed actuating lever, means for rocking said second lever, an adjustable support for the wire feed actuating lever, and a connection movable with the adjustable support and pivoted at one end to the wire feed lever and adjustably connected at the other end to said arm of the second lever, the arrangement being such that adjustment of the lever support is effective to change the length of the wire fed for the formation of a staple and to position the wire relatively to the staple forming mechanism so that the two legs of the staples formed are both of the same length regardless of the length of wire fed.

4. A staple inserting machine having, in combination, staple forming mechanism, a pair of feed rolls arranged to feed wire to the staple forming mechanism, a slide member adjustable in the direction of the wire feed, a lever fulcrumed to said slide member arranged by its rocking to rotate one of the feed rolls thereby feeding the wire an amount determined by the amplitude of its rocking movement, a second lever having an arm approximately parallel to the feed roll lever, means for rocking the second lever, and a connection movable with the slide and pivoted at one end to the feed roll lever and adjustably connected at the other end to said arm of the second lever, the arrangement being such that adjustment of the slide is effective to change the length of the wire fed to the staple forming mechanism and to control the presentation of the wire to the staple forming mechanism in such a manner that the two legs of the staple are both of the same length regardless of the length of the wire fed.

5. A staple inserting machine having, in combination, a cam shaft, staple forming mechanism, a driver arranged to insert the staples formed by said mechanism into a work piece, a pair of feed rolls arranged to feed wire to the staple forming mechanism, a slide member adjustable in the direction in which the end portion of the wire extends at the start of the staple forming operation, a lever fulcrumed to said slide member and arranged by its rocking to rotate one of the feed rolls thereby feeding the wire an amount determined by the amplitude of its rocking movement, a bell crank lever having a slotted arm approximately parallel to the feed roll lever, a cam on the shaft arranged to rock the bell crank lever, and a connection movable with the slide and pivoted at one end to the feed roll lever and at the other end to a block located in the slot of the bell crank lever, the arrangement being such that adjustment of the slide is effective to change the length of the wire fed for the formation of a staple by an amount twice as great as the distance that the slide is moved.

6. A staple inserting machine having, in combination, staple forming mechanism, a driver arranged to insert staples formed by said mechanism into a work piece, a movable wire engaging member arranged by its movement to feed the wire to the staple forming mechanism, a lever arranged by its rocking to actuate the wire feeding member to feed the wire a distance determined by the amplitude of its rocking movement, a lever having a

slotted arm approximately parallel to the wire feed actuating lever, means for rocking said slotted lever, an adjustable support for the wire feed actuating lever, and a connection movable with the adjustable support and pivoted at one end to the wire feed lever and at the other end to a block located in the slot of the slotted lever, the arrangement being such that adustment of the lever support is effective to change the length of the wire fed for the formation of a staple and to position the wire relatively to the staple forming mechanism so that the two legs of the staples formed are both of the same length regardless of the length of wire fed.

7. A staple inserting machine having, in combination, staple forming mechanism, a pair of feed rolls arranged to feed wire to the staple forming mechanism in a direction toward and from an operator standing in his normal position in front of the machine, a slide member adjustable in the direction of the wire feed, a lever fulcrumed to said slide member arranged by its rocking to rotate one of the feed rolls thereby feeding the wire an amount determined by the amplitude of its rocking movement, a lever having a slotted arm approximately parallel to the feed roll lever, means for rocking the slotted lever, and a connection movable with the slide and pivoted at one end to the feed roll lever and at the other end to a block located in the slot of the slotted lever, the arrangement being such that adjustment of the slide is effective to change the length of the wire fed to the staple forming mechanism and to control the presentation of the wire to the staple forming mechanism in such a manner that the two legs of the staple are both of the same length regardless of the length of the wire fed.

In testimony whereof I have signed my name to this specification.

LESTER SLATER MACDONALD.