Feb. 7, 1928. 1,658,098

A. F. PYM

MACHINE FOR USE IN THE MANUFACTURE OF SHOES

Filed Aug. 19, 1921 2 Sheets-Sheet 1

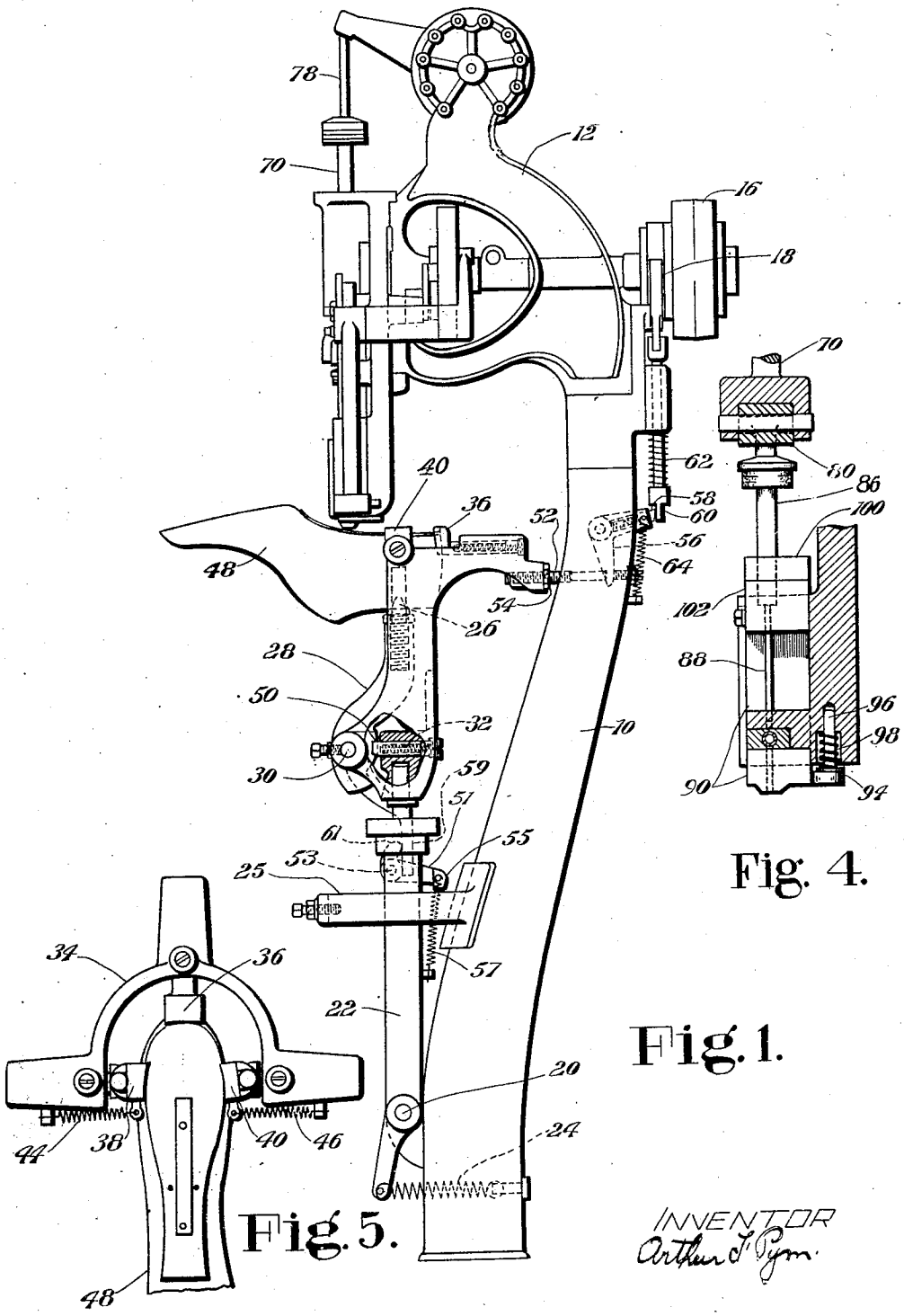

Fig. 5.

Fig. 4.

Fig. 1.

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Fig. 8.

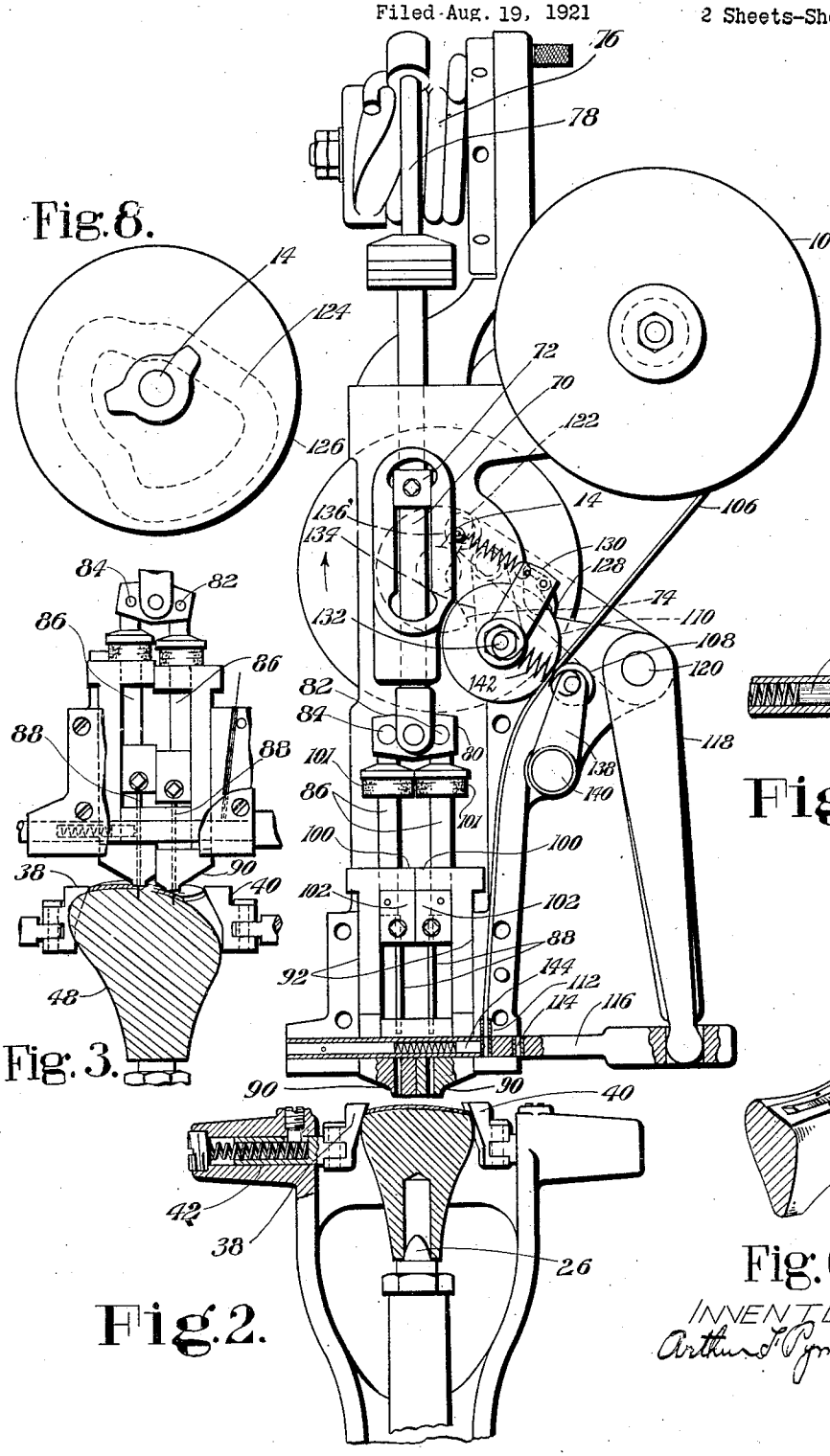

Fig. 3.

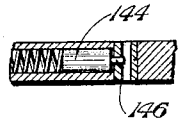

Fig. 7.

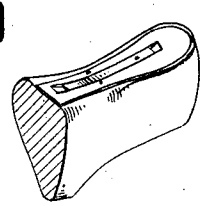

Fig. 6.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR USE IN THE MANUFACTURE OF SHOES.

Application filed August 19, 1921. Serial No. 493,704.

This invention relates to machines for use in the manufacture of shoes and is illustrated herein as embodied in a fastening inserting machine having provision for controlling the position of lasts and shank pieces while the shank pieces are fastened to the lasts.

In the manufacture of turn shoes it is common practice to fasten shank pieces, composed of leather, fibre-board, or other appropriate material reinforced with a metallic stiffener, to the second last by headless tacks prior to the relasting of the shoes upon these lasts, a suitable adhesive being applied to the shank pieces to insure that they stick to the soles of the shoes. When the lasts are pulled, the adhesive having set and the heel seats of the shoes having been lasted, the shank pieces remain in the shoes and the headless tacks are pulled therefrom and come out with the lasts from which they may later be removed.

Prior to my invention the operation of tacking the shank pieces to the lasts had been performed by hand or by machines without effective gaging means, the operative endeavoring to locate the shank piece correctly upon the last visually and by the sense of touch and holding it with his fingers while the tacks were driven. This procedure is not at all times satisfactory since the shank stiffeners are occasionally, and with unskilled or inexperienced help frequently, misplaced relatively to the lasts so that they are not brought into correct relation to the soles and uppers of the shoes when they are relasted, with a resulting malformation or weakening thereof.

It is accordingly an object of the present invention to provide an improved machine for attaching shank pieces to lasts which will comprise in its organization adequate positioning means. To this end the illustrated machine is provided with gage members arranged to be positioned by the last to which a shank is to be fastened and themselves positioning the shank piece relatively to the last. In the herein disclosed machine these gage members engage and are controlled by the configuration of the heel portion of the last while the gage members themselves engage and position the heel portion of the shank piece to be secured to the last. While the invention is disclosed herein as embodied in a machine for tacking shank pieces to lasts and is well adapted to this purpose, it should be understood that it is not limited thereto since, in various of its aspects, it is useful for other purposes.

Such machines as have been used in the past to fasten shank pieces to lasts have been of the usual tacker type, in which the operative holds the work against the nozzle or throat of the machine while the fastenings are inserted. As it is necessary to use at least two tacks to prevent relative movement of a shank piece and last, it has been necessary for the operative to move the last and shank piece relatively to the nozzle of the machine between the insertion of the two tacks with the result that even though the shank piece is correctly positioned with respect to the last when the first tack is inserted it may and occasionally does become displaced when the last is moved prior to the insertion of a second tack.

It is an object of the invention to facilitate the insertion of fastenings under such circumstances. Accordingly a feature of the invention comprises novel means arranged to accomplish the simultaneous insertion of a plurality of fastenings, and, since many of the articles, for example shoe parts and lasts, in which it is necessary to insert fastenings of this character are of an irregular shape so that a level surface is not presented to the fastening inserting instrumentalities, the invention contemplates, as shown in the illustrative machine, a plurality of throat members yieldingly mounted for movement with respect to each other toward and from the work. Thus the work is utilized to control the throat members so that each of them may contact with the work during the insertion of the fastenings. With the same object in view another feature of the invention comprises an equalizing device arranged automatically to proportion the force and motion applied to each of a plurality of drivers, a still further feature comprising a novel arrangement by which the position of a shiftable throat member is utilized to control the extent of operative movement of a driver.

With the foregoing and other objects and features in view the invention will now be described with reference to the accompanying drawings and pointed out in the appended claims. It should be noted, however, that these drawings are intended primarily

for purposes of exemplification and that in many of its aspects the invention is in no way limited to the specific disclosure of the drawings but that, on the other hand, substantial modifications and variations therefrom may be made without departing from the scope of the claims.

In the drawings,

Fig. 1 is a side elevation of a machine embodying the invention, for tacking shank pieces to lasts;

Fig. 2 is a front elevation, partly in section, of the head and upper portion of the work support of the machine;

Fig. 3 is a front elevation, with certain parts broken away, of the fastening inserting mechanism of the machine, with the parts in the relative positions which they occupy at the conclusion of the insertion of fastenings;

Fig. 4 is a vertical section showing means by which the throat members of the machine are mounted for yielding movement;

Fig. 5 is a plan view of gage mechanism used to position the shank pieces with respect to the lasts to which they are to be attached;

Fig. 6 is a perspective view, partly in section, showing a shank piece as attached to a last by the machine;

Fig. 7 is a sectional detail of a device used to prevent the escape of fastenings as they are transferred from one position to another; and

Fig. 8 shows a cam operative to control the movement of the fastenings into inserting position.

The illustrated machine is provided with a column 10 upon which is mounted a head 12 having journaled therein a cam shaft 14. Loosely mounted upon this shaft is a continuously rotated pulley 16 arranged to be clutched thereto during the operation of the machine by a Horton or other suitable single-revolution clutch 18. Pivoted at 20 to the column 12 is a work support 22 provided with a spring 24 tending to move the work support forward to inoperative position but permitting rearward movement thereof by the operative to the position of Fig. 1. A slotted bracket 25, carried by the column, limits the movement of the work support and, when the machine is not in operation, retains it in convenient position for the reception of the work.

A suitable work engaging member, illustrated as a short last pin 26, is carried at the upper end of an arm 28 pivoted at 30 to the work support 22, a spring-pressed plunger 32 being arranged positively to limit rearward swinging of arm 28 with respect to the work support 22 and arranged, when the parts are in the position of Fig. 1, yieldingly to prevent forward movement of that arm with respect to the work support except under the influence of force applied thereto by the operative. The upper end of the work support 22 is provided with a yoke 34 carrying, as shown in Figs. 2 and 5, three yieldingly mounted gage members 36, 38 and 40 shaped to conform to the lateral surface of the heel portion of a last. The transverse gage members 38 and 40 are pivotally connected each to a spring-pressed plunger 42 movable rectilinearly towards and from a last upon work support 22, and the rear gage member 36 is rigidly connected to a similar plunger. Springs 44 and 46, each anchored at one end to the yoke 34 and at the other to a finger extending forwardly from one of the transverse gage members, tend, in the absence of a last upon the work support, to move these gage members to such a position that they will diverge toward the front and thus facilitate the insertion of a last between them. When a last 48 is placed upon the member 26 and the arm 28 is swung rearwardly about pivot 30, the last enters between gage members 38 and 40, tensioning springs 44 and 46 and compressing springs 42 so that those gage members assume a position such as that indicated in Fig. 5, one contacting with each side of the last. At the same time, the spring of the plunger of the rear gage member 36 is compressed until a shoulder 50 of arm 28 contacts with the upper surface of plunger 32 when the last is in the desired position. Thus it will be seen that the last itself is operative to position the gage members and at the same time these gage members are arranged about the last in such a manner that they may be utilized to control the position of a shank piece as indicated in Figs. 2 and 5. A latch member 51, pivoted to the work support 22 at 53, is provided with a downwardly extending lug 55 normally urged into engagement with a notch in bracket 25 by a spring 57. At the conclusion of the rearward movement of arm 28, however, a depending finger 59 carried by arm 28 engages an upstanding finger 61 of latch member 51, rocking the latter to release its lug 55 from the notch of bracket 25. Thus it will be seen that the work support 22 is held latched against rearward movement until the work has been brought into operative relation to the gage members 36, 38, 40.

While the shank piece is held in this position by the operative the machine may be operated to drive a pair of headless tacks or nails through the shank piece into the last. To facilitate this the clutch of the illustrated machine is controlled by the work support 22, the latter being provided at its upper rearmost portion with an adjustable screw 52 arranged to be held securely in position by a lock-nut 54 and impinging, when the work support is swung rearwardly, upon

the downwardly extending arm of a bell crank lever 56.

When the machine is at rest the end portion of a spring-pressed plunger 58, housed within the rearwardly extending arm of bell crank lever 56, projects beneath the lower end of clutch rod 60, but when the work support is swung into operative position the bell crank lever 56 is rocked, in a counter-clockwise direction as viewed in Fig. 1, sufficiently to elevate clutch rod 60 to throw in the clutch. The last part of the counter-clockwise movement of bell crank lever 56 results in withdrawing plunger 58 from beneath the end of rod 60 so that the latter rod moves downward under the influence of a spring 62, this resulting in throwing out the clutch 18 after a single revolution of shaft 14. When the work support 22 is moved forwardly to remove the work therefrom a spring 64 rocks bell crank lever 56 back to its normal position, the spring of plunger 58 yielding to permit the plunger to pass beneath the lower end of rod 60.

The fastening inserting mechanism of the illustrated machine includes a driver bar 70 provided with a lifting block or lug 72 co-operating with a cam 74 mounted on shaft 14 to elevate the driver bar, and a compression spring 76 connected by a link 78 with the upper end of the driver bar to force the latter downward when lug 72 drops off cam 74. Pivoted to the lower end of the driver bar 70 is an equalizer bar 80 pivoted at 82 and 84 to a pair of driver carriers 86 each of the latter having a driver 88 clamped to its lower end. By this arrangement the blows struck by the drivers are automatically proportioned in accordance with the resistance offered to their descent. Co-operating with drivers 88 are a pair of throat members 90 mounted for sliding movement in ways 92 carried by the head of the machine. As shown in Fig. 4, each throat member 90 is provided with a rearwardly extending lug 94 from which a pin 96 extends upwardly to receive and guide a spring 98 housed in a cavity formed in the head of the machine and thus tending yieldingly to move the throat member downward. At its upper end each throat member is formed with a lug or stop 100, each stop being arranged in the path of movement of a lug 102 and of a washer 101 also acting as a stop and with which each driver carrier 86 is provided.

The machine is arranged to come to rest with the drivers in elevated position, so that when the machine is at rest lugs 102 of the driver carriers engage lugs 100 of the throat members and hold the latter in a slightly elevated position with a consequent compression of springs 98. When the clutch is tripped, however, as soon as the drivers start down, the throat members are released and, under the influence of springs 98, move into engagement with the work, reaching the work before the fastenings are inserted. Since the two throat members are mounted for movement independently of each other, and since each is moved downward by its own spring 98, they may, and will when the shape of the work is irregular, advance different amounts so that they engage the work at different levels as illustrated in Fig. 3. This prevents the escape or crippling of fastenings which might occur if one throat member held the other out of contact with the work, the tapering of the throat members (see Fig. 3) assisting in this. Moreover, the downward movements of the drivers are limited by lugs 100 and it therefore follows that if one throat moves further than the other its driver will automatically have a corresponding further movement, this being permitted by the equalizer bar 80 so that each fastening will be driven equal distances into the work, as illustrated, flush with the surface of the work.

The machine is illustrated as provided with a reel 104 which may be of any suitable form and from which wire 106 passes between a pair of feed rolls 108, 110, through a guide 112, to one or the other of a pair of openings 114 formed in a transfer member or slide 116 movably mounted in transverse ways carried by the head of the machine. Slide 116 is reciprocated in timed relation to the movement of the other parts of the machine by a bell crank lever 118 connected to the outstanding end thereof and pivoted at 120 to the head of the machine. This lever carries at one extremity a roll 122 arranged in a closed cam track 124 formed in a cam member 126 carried by shaft 14.

The upper edges of the openings 114 are arranged to co-operate with the lower edge of the opening in wire guide 112 to shear fastenings from the wire 106, the feed roll 110 being operated in timed relation to the movement of bell crank lever 118 to feed the wire into the openings 114 as they are presented to guide 112. As illustrated, roll 110 is given a step-by-step movement by a pawl 128 carried by a lever 130 formed rigidly with shaft 132 upon which the roll is rotatably mounted and engaging a ratchet carried by the roll. Shaft 132 is provided also with a rock-arm 134 carrying a roll 136 co-operating with a cam upon shaft 14. Roll 108 is mounted upon the extremity of an arm 138 fulcrumed at 140 to the head of the machine and urged toward roll 110 by a spring 142.

There is but little possibility of the escape of a fastening from the left-hand hole 114 (Fig. 2) as it moves past the opening in the right-hand throat member on its way to the left-hand throat member, but positively

to insure against such an accident a spring-pressed plunger 144 (Fig. 7) is mounted in slide 116, the plunger being provided with a rounded end 146 to engage the fastening and to permit the wire 106 or a driver to move therepast.

The machine comes to rest with slide 116 nearly, but not quite, at its extreme left-hand position and with a pair of fastenings in openings 114. When the clutch is tripped slide 116 continues its movement to the left bringing openings 114 into alinement with the openings of the throat members, the drivers then starting down to insert the fastenings. As the drivers start to move the throat members come down into contact with the work thus preventing the escape or crippling of the fastenings. Since the downward movement of the drivers is limited by the contact of washers 101 with lugs 100 of the throat members, each fastening is driven flush with the surface of the work irrespective of any irregularities in the surface of the work. Upon their return to elevated position, lugs 102 of the driver carriers lift the throat members to the position shown in Fig. 2, thus permitting the easy withdrawal of the work from the machine. After the elevation of the drivers but before the clutch is released, slide 116 moves to the right, into the position of Fig. 2 and feed roll 110 is operated to feed wire 106 into the left-hand opening 114. After this slide 116 moves to the left to bring the right-hand opening 114 into alinement with the wire which is again fed forward and, upon the further movement of slide 116 to the left, the second fastening is sheared from the wire allowing the machine to come to rest, as stated above, with slide 116 near its extreme left-hand position.

Having described my invention, what I claim is:

1. In a machine of the class described, the combination of a work support, and a gage constructed and arranged for linear movement towards the work and for pivotal movement about an axis substantially perpendicular to the direction of linear movement so as to be positioned by an article upon the support and itself arranged to position a second article with respect to the first.

2. In a machine of the class described, the combination of a work support, a gage member arranged for linear movement towards the work and for pivotal movement about an axis substantially perpendicular to the direction of linear movement so as to be positioned by part of the work upon the support and itself arranged to position a second part of the work with respect to the first, and means for operating upon the work while so positioned.

3. In a machine of the class described, the combination of a last support, and a gage member arranged for linear movement toward and from a last upon the support and for pivotal movement about an axis approximately perpendicular to the sole of the last whereby the gage may be positioned by a last upon the support and is itself arranged to position a shoe part upon the last.

4. In a machine of the class described, the combination of a work support, a group of gages constructed and arranged for linear movement toward and from an article upon the support and for pivotal movement about axes substantially perpendicular to the directions of their respective linear movements and themselves arranged to position a second article with respect to the first.

5. In a machine of the class described, the combination of a last support, a gage member and a spring tending to move the gage member linearly toward the last, the gage member being arranged also for pivotal movement about an axis substantially perpendicular to the direction of its said linear movement so that the gage member may be positioned by a last upon the last support and is itself arranged to position a shoe part upon the sole of the last.

6. In a machine of the class described, the combination of a last support, a group of spring pressed gage members arranged for linear movement toward a last on the support and for pivotal movement about axes substantially perpendicular to the sole of the last so as to be positioned by a last upon the last support and themselves arranged to position a shoe part upon the sole of the last, and means for operating upon the shoe part while so positioned.

7. In a machine of the class described, the combination of a last support, and a pair of gage members arranged upon opposite sides of a last upon the support and mounted for linear movement toward the last and for pivotal movement about axes substantially perpendicular to the direction of their linear movement so as to be positioned by the last and themselves to position a shoe part applied to the last.

8. In a machine of the class described, the combination of a last support, a pair of gage members pivotally supported upon opposite sides of the support for rocking movement about axes substantially perpendicular to the heel seat of a last upon the support and arranged to be positioned by a last upon the support and themselves to position a portion of a shoe applied to the last.

9. In a machine of the class described, the combination of a frame member, a last support, and a plurality of gage members yieldingly carried by the frame member and arranged for pivotal movement about axes substantially perpendicular to the heel seat of a last upon the last support, the frame mem-

ber and the last support being relatively movable to permit the gage members and a last upon the support to be brought into contacting relation so that the gage members will be so positioned in conformity with the shape of the last as themselves to position a shoe part applied to the last.

10. In a machine of the class described, the combination of a frame member, a last support, and a plurality of gage members pivoted to the frame member for movement about axes substantially perpendicular to the sole of a last upon the support and arranged to engage the heel portion of said last, the frame member and the last support being relatively movable to permit the gage members and the heel portion of the last upon the support to be brought into contacting relation so that the gage members will be positioned in conformity with the shape of the heel portion of the last and may themselves be utilized to position a shoe part applied to the last.

11. In a machine of the class described, the combination of a frame member, a plurality of gage members yieldingly and pivotally carried thereby, a last support, the last support and the gage members being arranged for relative movement to permit a last carried by the support to be brought into contacting relation with the gage members, and means tending to swing certain of the gage members so as to cause them to diverge in the direction from which the last approaches the gage members.

12. A machine of the class described having, in combination, means for operating upon the work, a plurality of gage members mounted for pivotal and rectilinear movement and shaped to conform to the lateral surfaces of the heel portion of a last, and springs tending to move said gage members rectilinearly towards one another so that the position of the gage members will be determined by the form of the heel portion of a last brought therebetween.

13. A machine of the class described having, in combination, a plurality of pivotally mounted gage members, and means tending yieldingly to move the gage members towards the work, the gage members being shaped to conform to the heel portion of a last and being arranged so that as a last is moved between them they will be positioned in contact with the heel portion of the last so as to position a shank piece with respect to the last.

14. A machine of the class described having, in combination, a plurality of pivotally and slidably mounted gage members formed and arranged to engage the lateral surface of the heel portion of a last and to project beyond the heel seat surface of the last, and means tending yieldingly to move the gage members towards the work so that as a last is moved between the gage members the latter will take up a position determined by the form of the heel portion of the last so as to position a shoe part applied to the heel seat portion of the last.

15. A machine of the class described having, in combination, means for operating upon the work, a plurality of slidably mounted gage members arranged to position a shoe part relatively to a last, and springs tending to move said gage members towards each other so that the position of the gage members will be determined by the form of a last brought therebetween.

16. In a machine of the class described, the combination of a movable last support, a pair of gage members slidingly and yieldingly mounted to be positioned by a last upon the support and arranged themselves to position a shoe part applied to the last, and fastening inserting mechanism operable to drive a fastening into the shoe part while so positioned.

17. In a machine of the class described, the combination of fastening inserting mechanism, a movable last support, a gage member yieldingly mounted to be positioned by a last upon the support and arranged itself to position a shoe part applied to the last, and means controlled by the movement of the work support into operative relation to the fastening inserting means to cause the operation of the latter to drive a fastening through the shoe part into the last.

18. In a machine of the class described, the combination of a gage member arranged to be positioned by a last and itself to position a shoe part applied to the last, a throat member arranged to be positioned by the shoe part applied to the last, and a driver reciprocable through the opening of the throat member to drive a fastening through the shoe part into the last, the extent of operative movement of the driver being controlled by the position of the throat member.

19. A machine of the class described having, in combination, a pair of slidingly mounted, normally diverging gage members arranged to be positioned by a last and themselves arranged to position a shoe part with respect to the last, and means for inserting a fastening in the shoe part while thus positioned.

20. In a machine of the class described, the combination of a gage member arranged to be positioned by a last and itself to position a shoe part applied to the sole of the last, a plurality of throat members arranged to be positioned by the shoe part applied to the sole of the last, and a plurality of drivers reciprocable through the openings of the respective throat member to drive fastenings through the shoe part into the

last, the extent of operative movement of the drivers being controlled by the position of the respective throat members.

21. A fastening inserting machine having, in combination, a plurality of throat members mounted for movement relatively to each other under pressure applied through the work, a driver movable through each throat, and means for limiting the operative movement of each driver in accordance with the position of its throat member at the instant of the insertion of each fastening.

22. A fastening inserting machine having, in combination, a throat member, a spring tending to move the throat member toward a work piece presented thereto, a driver bar, a driver carried thereby and movable through the throat member, a spring tending to force the driver carrier and the driver toward the work, a lifting cam arranged to lift the driver carrier and the driver against the compression of the spring and then to release the driver carrier to permit the spring to give a fastening inserting stroke to the driver carrier and driver, and means carried by the throat member for limiting the extent of the fastening inserting stroke of the driver in accordance with the position of the throat member at the instant of insertion of each fastening.

23. A fastening inserting machine having, in combination, a driver, a spring operable to force the driver toward the work, a throat member arranged to guide the driver and mounted for movement into contact with the work, and a stop carried by the throat member and arranged to terminate the operative movement of the driver under the influence of said spring at a variable point, the position of which is determined by the work.

24. A fastening inserting machine having, in combination, a throat member, a driver reciprocable therethrough, a work support arranged for movement into and out of operative position relatively to the throat member to present the work piece thereto, means tending to move the throat member toward the work piece mounted on the support, and a stop carried by the throat member arranged to terminate operative movement of the driver at a point variably determined by the position of the work piece.

25. A fastening inserting machine having, in combination, a throat member, a driver carrier, a driver carried thereby and reciprocable through the throat member, a clutch arranged to transmit power to the reciprocable driver, means tending yieldingly to urge the throat member in the direction of a work piece presented thereto, a stop carried by the driver carrier, another stop carried by the throat member, said stops being arranged to engage each other thereby to limit the movement of the driver in accordance with the position of the throat member at the time of the insertion of each fastening, and means for tripping the clutch to cause a fastening inserting stroke of the driver.

26. A fastening inserting machine having, in combination, a plurality of throat members arranged for relative movement to conform to the shape of the work presented thereto, a driver co-operating with each throat member, and means for limiting the operative movements of the different drivers in accordance with the position of their respective throat members at the instant of the insertion of fastenings.

27. A fastening inserting machine having, in combination, a plurality of throat members arranged for relative movement to conform with the shape of the work presented thereto, a driver co-operating with each throat member, and co-operating stops mounted to move with the drivers and throat members for limiting the operative movements of the different drivers in accordance with the position of their respective throat members at the instant of the insertion of fastenings.

28. A machine for inserting fastenings having, in combination, a plurality of drivers, a reciprocable driver operating member, and an equalizer pivotally connected to the drivers and to the operating member to permit continued movement of one driver after another comes to rest.

29. A machine for inserting fastenings having, in combination, a plurality of drivers, a reciprocable driver operating member, and automatically operating equalizing means connecting the drivers with said member arranged to cause the different fastenings inserted to be driven equal distances into the work.

30. A fastening inserting machine having, in combination, a pair of drivers, driver reciprocating means, and an equalizer bar connecting the drivers with the reciprocating means arranged automatically to control the length of the driver strokes in accordance with the different resistances offered to the descent of the two drivers.

31. A machine for inserting fastenings having, in combination, a plurality of driver carriers, a reciprocable driver operating member, and an equalizer bar connecting the driver carriers with said member arranged automatically to control the length of the driver strokes in accordance with the different resistances offered to the descent of the two drivers.

32. A fastening inserting machine hav-

ing, in combination, a plurality of throat members each tapered towards its work engaging surface, means tending yieldingly to urge the throat members in the direction of the work, a driver carrier and a driver for each throat member, a stop arranged to limit the movement of each driver in accordance with the position of its throat member at the time of the insertion of fastenings, driver reciprocating means, and an equalizing device operatively connecting the driver carriers with the driver reciprocating means.

33. A fastening inserting machine having, in combination, a plurality of throat members each formed with a fastening receiving opening, and means for moving fastenings across one opening to another opening.

34. In a fastening inserting machine having a plurality of fastening receiving throat openings, a slide having a fastening receiving opening therein and arranged to transfer fastenings across one throat opening to another.

35. In a fastening inserting machine having a plurality of fastening receiving throat openings, means for severing a fastening from a wire and transferring it past one opening to another opening, and means for preventing the fastening from entering the first opening as it moves therepast.

36. In a fastening inserting machine having a plurality of fastening receiving throat openings, a slide having a fastening receiving opening therein for severing a fastening from a wire and transferring it past one throat opening to another, and means for preventing the fastening from entering the first opening as it moves therepast.

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

ARTHUR F. PYM.