G. GODDU.

MACHINE FOR INSERTING FASTENINGS.

APPLICATION FILED JUNE 15, 1912.

1,045,784.

Patented Nov. 26, 1912.

4 SHEETS—SHEET 1.

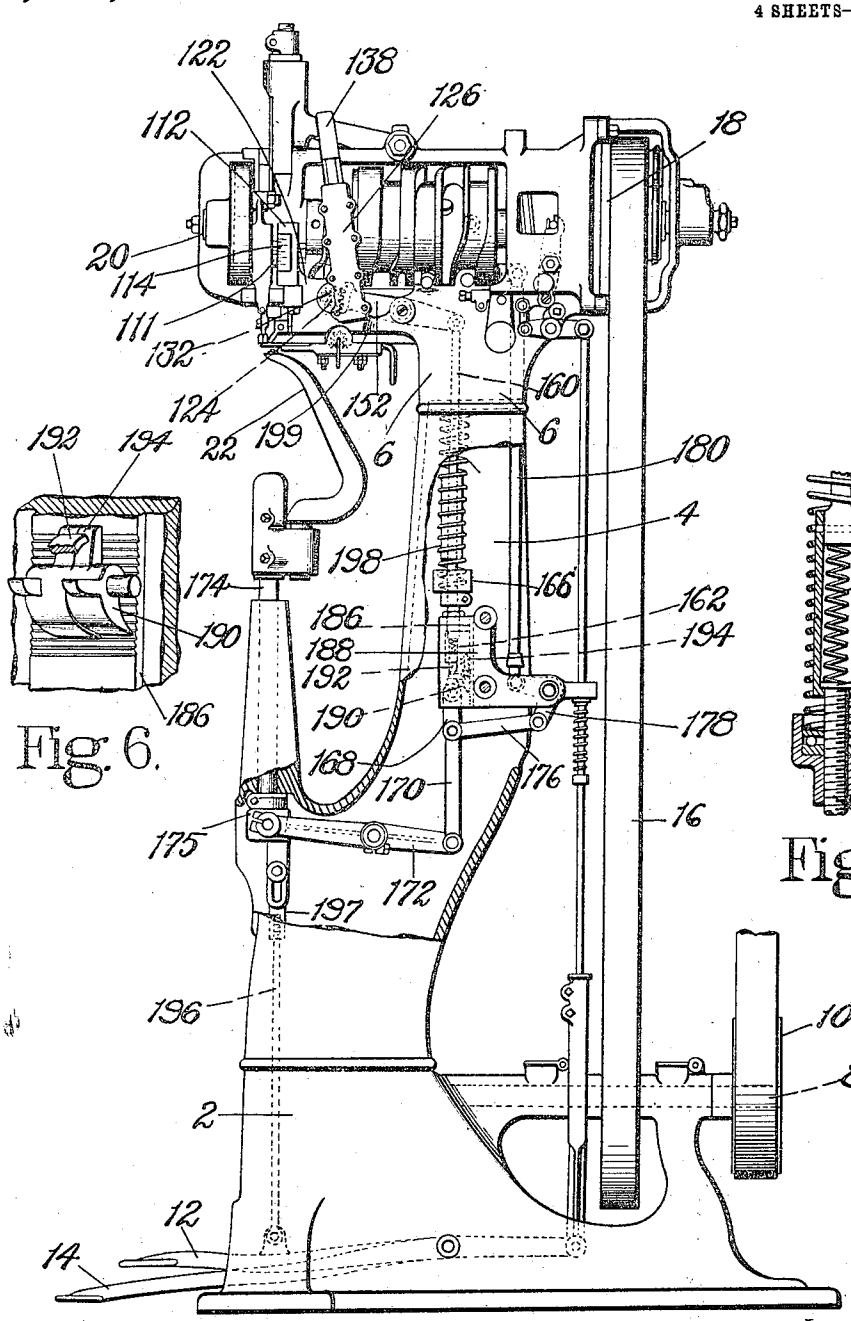

Fig. 1.

Fig. 6.

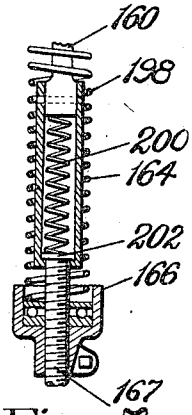

Fig. 7.

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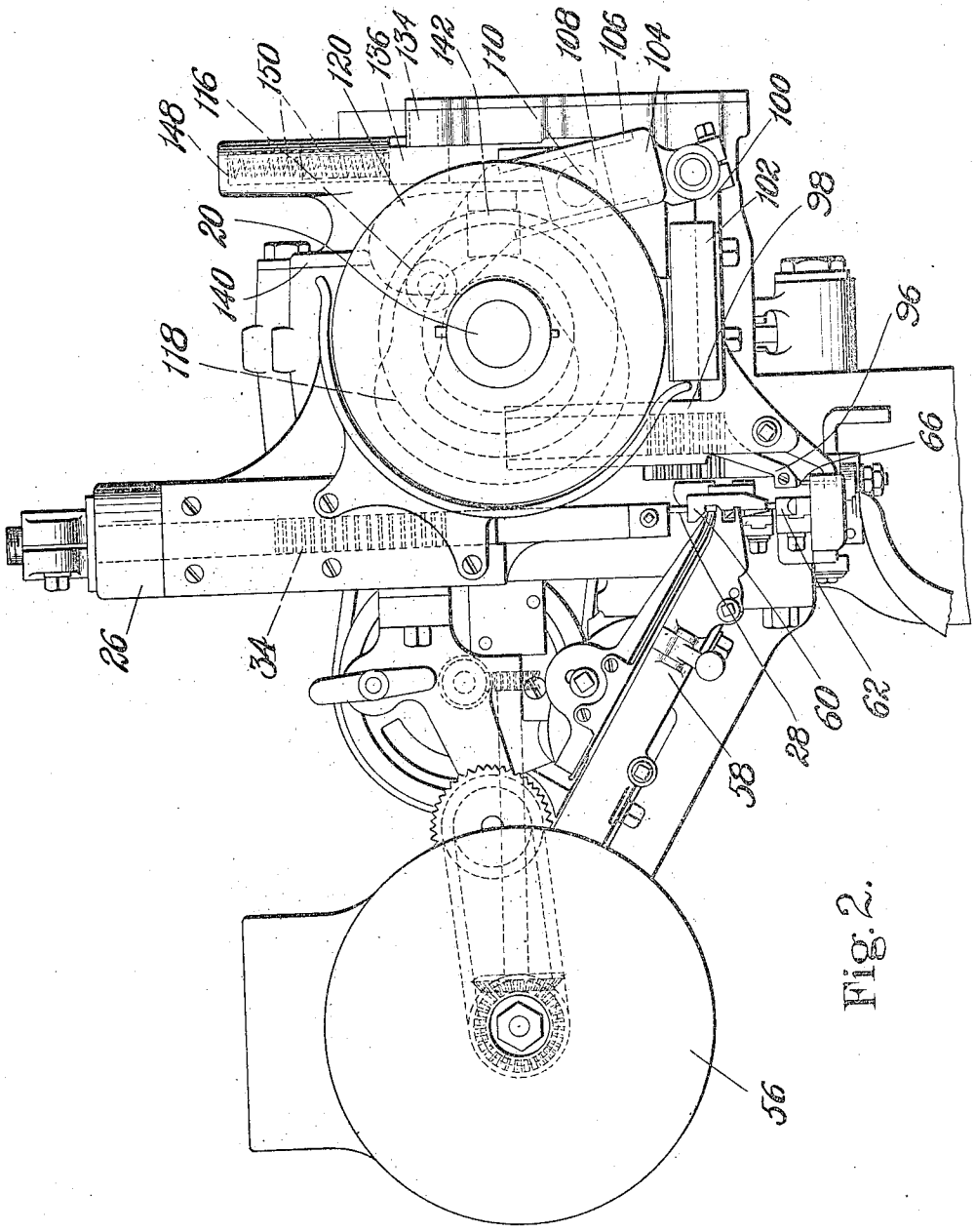

Fig. 2.

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4 SHEETS—SHEET 3.

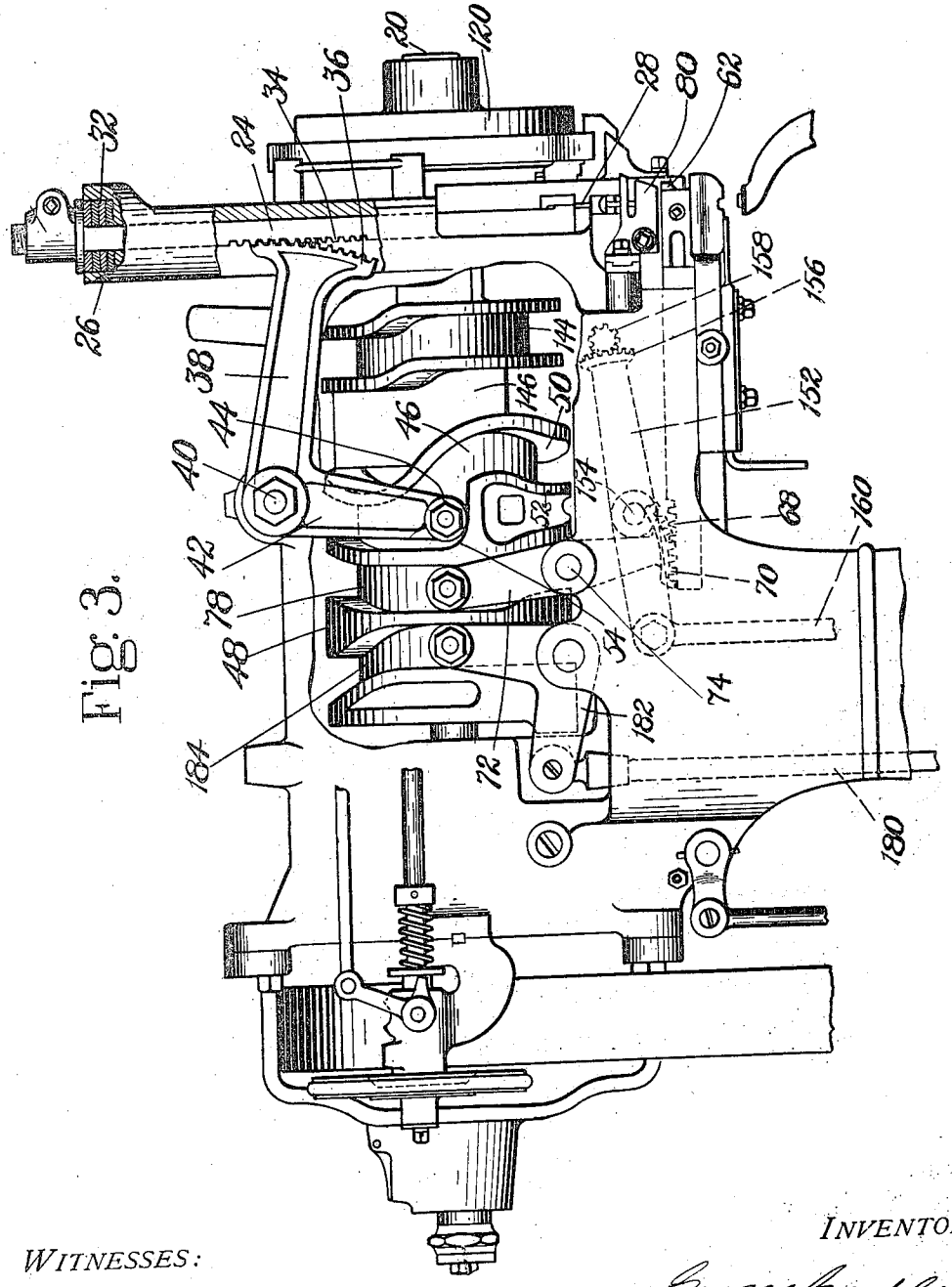

Fig. 3.

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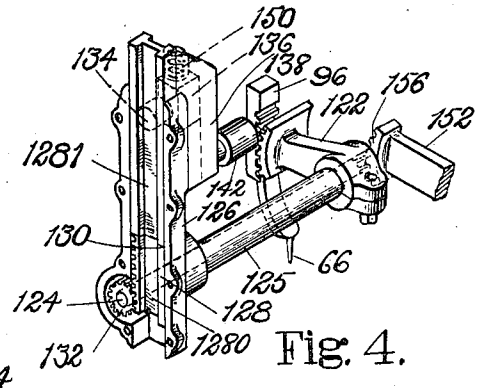

Fig. 4.

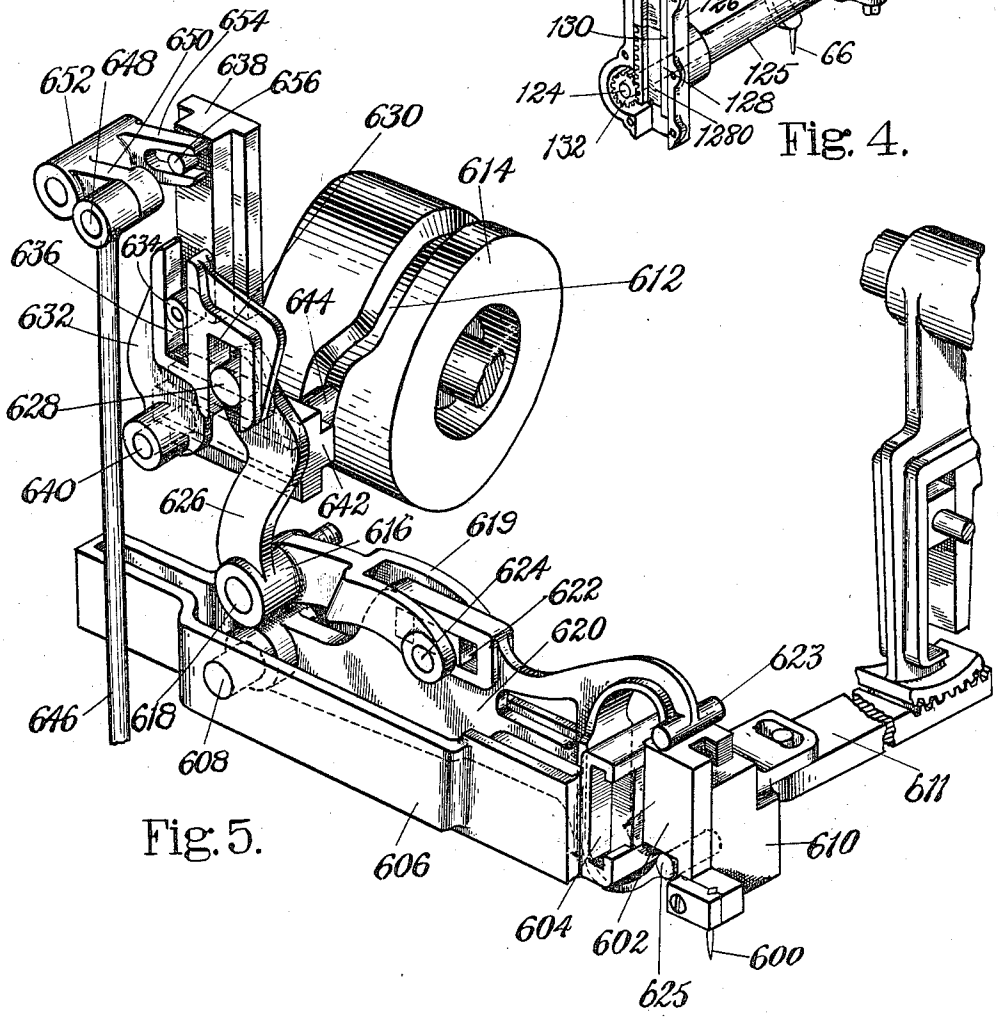

Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE GODDU, OF WINCHESTER, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR INSERTING FASTENINGS.

1,045,784. Specification of Letters Patent. Patented Nov. 26, 1912.

Continuation of application Serial No. 476,649, filed February 8, 1909. This application filed June 15, 1912. Serial No. 703,885.

To all whom it may concern:

Be it known that I, GEORGE GODDU, a citizen of the United States, residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Machines for Inserting Fastenings, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for inserting fastenings and particularly to fastening inserting machines of the type in which means is provided for forming a fastening receiving opening in the work, a preferred form of the invention being shown as embodied in the machine for inserting previously formed fastenings which is illustrated and described in detail in United States Letters Patent to George Goddu, No. 1,030,775, granted June 25, 1912, for improvements in machines for inserting fastenings. The present application is a continuation of the co-pending application which matured into said Letters Patent in so far as the two applications disclose common subject-matter.

A general object of the invention is to provide in a fastening inserting machine improved means for forming the fastening receiving openings in the work which will be especially useful in a fastening inserting machine that is to be run at high speed and which will itself contribute to an increased speed capacity of the machine in which it is embodied. In the illustrated machine the means for forming the fastening receiving openings in the work comprises an awl, and an important object of the invention is to provide improved mechanism for controlling automatically the depth to which the point of the awl is forced into the work in its work penetrating movement.

It is important in a machine which is to be operated at high speed that the movements of the awl or other means for forming a fastening receiving opening in the work be substantially positively controlled, especially those movements which are intended to bring the awl into definite coöperative relation to other parts of the machine at definite times. It is important, therefore, that mechanism for controlling the depth of penetration of the awl into the work be so constructed and arranged that it will not interfere with the substantially positive control of the awl by its operating mechanism.

A particular object of the invention, therefore, is to provide, in combination with awl actuating mechanism arranged to actuate the awl in a substantially positive manner, awl depth controlling mechanism which will serve to effect a variation in the amount of throw imparted to the awl by its actuating mechanism and yet which will have no direct effect upon the awl itself, nor any effect upon the awl through its actuating mechanism except at the desired times.

In its illustrated preferred embodiment the awl depth controlling mechanism is associated with the mechanism which controls the release of the work support for the work feeding operation, and an important feature of the invention is the connection of the awl depth controlling mechanism with a member of the work support controlling mechanism which is held against movement during the work releasing operation, whereby said release, following as it does the work penetrating movement of the awl, will have no effect upon the position of the awl.

In the accompanying drawings,—Figure 1 is a side elevation of a machine embodying the preferred form of the invention; Fig. 2 is a front elevation of the head of the machine; Fig. 3 is a side elevation of the machine head viewed from the left of an observer standing in front of the machine; Fig. 4 is a perspective detail of the preferred form of the mechanism for controlling the depth of penetration of the awl into the work; Fig. 5 shows a modification of the awl depth controlling mechanism; Fig. 6 is a perspective detail of the locking mechanism, constituting a part of the horn operating mechanism; and Fig. 7 is a detail section through the yielding connection between the awl depth controlling mechanism and the horn release mechanism.

The illustrated machine has a supporting frame comprising a base 2, a standard or column 4 and a head 6. In the base are mounted a counter shaft 8 to which is attached a pulley 10 connected to any suitable source of power, and the horn depressing and clutch operating treadles 12 and 14 respectively. The counter shaft 8 also carries

a second pulley rigidly attached to it and connected by a belt 16 to a loose pulley 18 upon the main driving shaft 20 in the head 6. In the upright portion of the frame or standard 4 are mounted the work support or horn 22 and the horn release controlling mechanism. In the head 6 are mounted the various parts of the fastening inserting mechanism and the cams which control the timing of the operations of the various parts of the machine as a whole.

The fastening inserting or nail driving mechanism comprises a driver bar 24 mounted to reciprocate vertically in a guideway in an upright part 26 of the machine head and having clamped to its lower end a driver 28. Upon its rear side the driver bar 24 is provided with rack teeth 34 which are engaged by the teeth of a segment rack 36 carried upon the substantially horizontal arm 38 of a bell-crank lever pivoted at 40 upon the machine head. The other arm 42 of the bell crank driver operating lever carries a cam roll 44 which travels in a cam groove 46 formed in a cam wheel 48 mounted upon the driving shaft 20.

The nails to be driven are contained in a hopper 56 from which they are conducted by a raceway 58 to a point adjacent to the driver passage in the driver guide 60, said guide being broken away at the side adjacent to the raceway whereby the nails may be introduced one at a time from said raceway into said driver passage. Below the driver guide 60 is a nail receiving throat 62 mounted upon a slide 64 and movable with said slide transversely to the path of feed of the work and transversely to the raceway 58.

Transverse movement of the throat 62 and slide 64 is provided to withdraw the throat from the path of feed movement of the awl 66, hereinafter to be described, in order to permit the awl to bring the nail receiving opening which it has formed in the work beneath the driver passage. The slide 64 is guided in an opening in the machine frame and is provided at its rear end with rack teeth 68 with which engage the teeth upon a segment rack 70 upon the lower end of a slide actuating lever 72 pivoted at 74 on the machine head and carrying at its upper end a cam roll which enters a cam groove 78 in the cam wheel 48, said cam groove 78 being so shaped as to effect the movement of the throat 62 into operative position and to withdraw it out of the path of the awl at the proper times in the cycle of operations of the machine. The nail separator 80 is also mounted upon the slide 64 to move therewith and is yieldingly connected with said slide so that on the return movement of the slide 64 the separator may move relatively to said slide in the event that it meets an obstruction in the raceway. The awl 66 is clamped in an awl bar 96 which has a straight vertical portion mounted to slide in a vertical guideway in an awl carrying frame 98, said frame 98 being provided with a horizontal dove-tailed portion 100 arranged to slide in a similarly shaped slideway formed in a bracket 102 bolted to the machine head. The awl bar 96 is arranged to reciprocate vertically in its carrying frame 98 and to be moved horizontally with said frame.

The mechanism for effecting the horizontal movement of the frame 98 comprises a floating lever 104 provided with a guideway 106 in which is slidably mounted a fulcrum block 108 pivoted upon a stationary fulcrum pin 110 carried by a block 111 adjustably mounted in an upstanding portion 112 of the machine head. Vertical adjustment of the fulcrum pin 110 varies the relative length of the two arms of the floating lever 104 and therefore varies the amount of horizontal movement of the frame 98 and the amount of feed movement of the awl. For convenience in adjusting the fulcrum pin 110, the upstanding portion of the frame 112 is provided with a nail spacing scale 114 with which coöperates an indicator on the fulcrum pin carrying block 111. At its upper end the floating lever 104 is provided with a cam roll 116 which travels in a cam groove 118 formed in the rear face of the cam disk 120 mounted upon the forward end of the main driving shaft 20.

Upon the rear face of its vertical portion the awl bar 96 is provided with rack teeth with which engage the teeth upon a segment rack carried upon one arm 122 of an awl operating lever. The awl operating lever is fulcrumed upon a rock-shaft 124, being provided with a sleeve 125 which surrounds said rock-shaft. The arm 122 of the awl-operating lever is attached to the inner end of the sleeve 125 and the other arm 126 is attached to the other end of said sleeve.

The arm 126 of the awl operating lever comprises a casing in which is mounted a slide bar 128 broken at 130 into two separable sections, the lower section 1280 being provided with rack teeth which mesh with the teeth of a pinion 132 carried at the outer end of the rock-shaft 124 and the upper section 1281 receiving through an opening in the back of the casing which forms the arm 126 a pivot pin 134 upon a block 136 arranged to be moved vertically in a lever 138 pivoted at one end at 140 to the machine head and at its other end carrying a cam roll 142 which enters a cam groove 144 in a cam wheel 146 on the main shaft 20.

The lever 138 is provided with a spring socket 148 in which is contained a spring 150 which holds the block 136 yieldingly in its lowermost position. The power which operates the awl to cause it to penetrate the

work being transmitted to the arm 126 of the awl operating lever through the lever 138, the effective length of the arm 126 is therefore varied by varying the vertical position of the fulcrum pin 134.

In order that the work penetrating movement of the awl may be proportioned to the thickness of the work, mechanism is provided for automatically varying the vertical position of the fulcrum pin 134 in accordance with the thickness of the work. This mechanism comprises a lever 152 attached to a rock-shaft 154 having bearings in the machine head, said lever carrying at its forward end a segment rack 156 which engages a pinion 158, see Fig. 3, upon the inner end of the rock-shaft 124. The rear end of the lever 152 is connected by a rod 160 to a slide 162 constituting a part of the work thickness compensating mechanism through which the releasing movement of the horn is controlled for the work feeding operation. Since the position of the slide 162 is determined by the thickness of the work in a manner hereinafter to be described, the vertical position of the fulcrum pin 134 will be controlled through the rod 160, lever 152, segment 156, pinion 158, rock-shaft 124, pinion 132 and slide 128.

The horn release mechanism herein shown is substantially the same in its construction and principle of operation as that shown in my co-pending application, Serial No. 409,352, filed Jan. 4, 1908, except that the mechanism herein shown is mounted in the column 4 to operate in the reverse direction from that in which the mechanism in the co-pending application operates. In the illustrated construction the slide 162 is normally depressed into its lowermost position by a horn raising and work clamping spring 164 bearing at its upper end against a crosspiece in the column 4 and at its lower end being received in an annular socket 166 surrounding and clamped upon a threaded rod 167 connected to the slide 162.

The pressure of the spring 164 is transmitted to the horn 22 through connections comprising toggle links 168, 170 and a lever 172 fulcrumed in the column 4 and connected at its rear end to the toggle link 170 and at its forward end connected by a block and slot connection to a member 175 into which the horn supporting rod 174 is threaded. The lever 172 is forked at its forward end. The straightening of the toggle is effected through a link 176 connected at one end to the knee joint of the toggle and at its other end to one arm of a bell-crank lever 178, the other arm of which is connected by a rod 180 to an arm of a second bell-crank lever 182. The other arm of the lever 182 carries a cam roll entering a cam slot 184 in the cam wheel 48. When the toggle is broken, the spring 164 is preferably locked against action upon the horn, as in the co-pending application above referred to, and said locking means comprises, as in said application, a ratchet plate 186 carried by a casing 188 in which the slide 162 is mounted to reciprocate vertically, pawls 190 being mounted upon said slide and arranged to engage the ratchet when the toggle is broken, said pawls being held out of engagement with said ratchet when the toggle is straightened by the pressure of a finger 192, attached to the toggle link 168, upon the tails 194 of said pawls.

The horn may be depressed when the machine is at rest in order to place work upon it or remove work from it by suitable connections with the horn depressing treadle 12, said connections comprising, in the illustrated construction, a rod 196 threaded at its upper end into a piece 197 having a pin and slot connection with a forked extension of the member 175, said rod being pivotally connected at its lower end to the treadle 12.

The mechanism for automatically controlling the depth of penetration of the awl into the work has preferably only a limited range of movement, since when operating upon work which is very thick it is unnecessary to vary the depth of penetration of the awl and therefore when the thickness of the work exceeds a predetermined amount the awl depth controlling mechanism ceases to cause variations in the movement of the awl corresponding to variations in the thickness of the work. A stop 199 constituted by a part of the machine head located in the path of the segment carrying end of the lever 152 limits the movement of the awl depth controlling mechanism.

In order that the free movement of the horn may not be interfered with when the thickness of the work exceeds that for which automatic variation of the awl movements is provided, a yielding connection is provided between the rod 160 and the slide 162 whereby when the rod 160 has reached the upper limit of its movement, that is, when it has set the awl operating mechanism to give the greatest amount of penetrative movement to the awl, the slide 162 may be moved relatively to the rod 160 to permit the horn 22 to accommodate itself to work of still greater thickness. This yielding connection comprises a socket 198 located within the spring 164 and connected to the rod 160 and having confined within it and bearing against the lower end of rod 160 a spring 200.

A second rod 167 passes through an opening in the bottom of the socket 198 and within said socket is provided with a piston 202 bearing upon the lower end of the spring 200. The spring 200 is strong enough so that the thickness of the work will be accurately gaged by the automatic

controlling mechanism up to the maximum for which this mechanism is effective, and that beyond the said maximum the spring will be compressed to permit the relative movement of the slide 162 and the rod 160.

The downward movement of the slide 162 causes a positive downward movement of the rod 160 after the spring 200 has expanded sufficiently to bring the piston 202 into contact with the bottom of the socket 198 in the event that said spring has been compressed.

During the horn release operation of the horn controlling mechanism there will be no movement of the awl through the awl depth controlling mechanism since at this time the slide 162 will be locked against movement and therefore the rod 160 will be held stationary. It will be noted that when the awl operating lever is turned about the rock-shaft 124 by the action of the lever 138 upon it the part 1280 of the slide bar 128, as it rolls about the pinion 132, will tend to move away slightly from the part 1281 and for this reason the slide bar 128 has been made in two separable sections in order that this slight downward pull may not affect the vertical position of the fulcrum pin 134. When the slideway for the block 136 in the lever 138 and the slideway for the slide bar 128 are substantially parallel, any movement of the bar 128 caused by variations in the thickness of the work will have no effect upon the awl since the parts are in what may be called neutral position, and no tendency to turn is imparted to the arm 126 of the awl operating lever by the movement of the slide 128 when the parts are in this neutral position, or in other words, when the angle between the slideway for the block 136 and the slideway for the slide bar 128 is zero.

Since the position of the awl will not be affected by any adjustment of the awl depth controlling mechanism when the two slideways are in the position just described, the parts are preferably so timed that the movement of the horn back into work gaging position will take place with the slideways in this position and that the machine will stop with the slideways in this position. It will therefore be seen that the horn may be depressed by the treadle 12 to permit work to be placed upon it or removed from it without any effect upon the awl. Moreover it will be noted that the awl has a fixed starting position by reason of the positive connection between the arm 126 and the awl bar 96 and that the range of movement of the awl from this starting position is varied by the means hereinabove described.

The construction of the awl depth controlling mechanism just described is the best form now known to me in which this feature of my invention may be embodied, but it should be understood that while I am the inventor of the broad features of invention embodied in this construction, the specific mechanism is the invention of Fred L. MacKenzie and is described and claimed in an application filed by said MacKenzie, Serial No. 476,718, February 8, 1909.

I will now describe the modification of this mechanism shown in Fig. 5, which is the form in which I first embodied this feature of my invention and upon which the invention of said MacKenzie is an improvement. In the embodiment of this feature of my invention shown in Fig. 5, the awl 600 is clamped in a slide 602 arranged for vertical movement in a horizontal slide 610 which moves in a guideway 604 in the forward end of a third slide 606. The slide 606 was provided in the machine in which this form of my invention was embodied to permit certain movements of other parts, not herein shown and constituting no part of the present invention. The slide 610 has horizontal sliding movement in the guideway 604 to permit the awl to feed the work. The horizontal movement of the awl is positively controlled through connections with a cam, not herein shown, these connections comprising a rack bar 611 having a pin and slot connection with the awl slide 602 whereby horizontal movement of the slide 606 relative to the rack bar is permitted. The vertical movement of the slide 602 which causes the awl to penetrate the work is effected through connections with a cam groove 612 in a cam wheel 614 on the driving shaft. These connections comprise a bell crank 616 fulcrumed at 618 upon the machine frame and having a forked arm 619 which receives between its fork members a third class lever 620 fulcrumed at 608 in the slide 606, the lever 620 being provided with a slot 622 which receives a pin 624 connecting the fork members of the bell crank arm. At its forward end the lever 620 is provided with upper and lower slide engaging members 623 and 625, respectively, through which the vertical movements of said lever are transmitted to the slide 602. The other arm 626 of the bell crank 616 is provided with a pin or stud 628 which enters a slot 630 in one arm of a second bell crank 632 having an adjustable fulcrum 634 received in a slot 636 in said bell crank. The fulcrum 634 is carried by a slide 638 guided in vertical ways in the machine frame, whereby the fulcrum 634 may be moved up and down in the slot 636 to vary the lengths of the two arms of the bell crank 632. The other arm of the bell crank 632 is pivotally connected at 640 to a slide 642 guided in horizontal ways in the machine frame. The slide 642 is reciprocated, to cause the bell crank 632 to oscillate about its fulcrum 634, by connections with the cam groove 612 comprising a cam

roll 644 carried by said slide and entering said cam groove.

To vary automatically the amount of movement imparted to the lever 620, and thereby to the awl slide 602, through the connections just described, as the work varies in thickness, the slide 638 is connected to the horn or other work support so that as the horn moves vertically into clamping relation to the different work thicknesses vertical movement will be imparted to the slide 638, thereby varying the relative effective lengths of the connected lever arms through which movement is transmitted from the cam groove 612 to the lever 620. The connections to the horn comprise a rod 646 pivotally connected at 648 to an arm 650 of a rocker frame 652, fulcrumed upon the machine frame. Another arm 654 upon said rocker frame is slotted to receive a pin 656 upon the slide 638. At its other end the rod may be connected to the slide 162 or any other suitable part which receives motion from the horn.

The parts are shown in Fig. 5 in their positions of rest, at which time the slot 636 is parallel to the path of travel of the slide 638 and therefore as the horn is adjusted in placing the work in position to be operated upon the fulcrum 634 will be carried up and down in the slot 636 without having any effect upon the position of the bell crank 632.

It will be noted that all of the pivotal connections are such that the movements are positive in both directions and that a construction is provided in which the awl is positively controlled throughout its reciprocating movement, in which the amount of reciprocating movement is varied from a fixed starting point as the work varies in thickness, and in which the adjustment in the operating connections is effected at such time that such adjustment has no direct effect upon the position of the awl.

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

1. In a machine of the class described, an awl, means for reciprocating said awl to form an awl hole in the work constructed to control the awl positively and continuously throughout its reciprocating movement, and means governed by variations in the thickness of the work for varying the extent of such positive reciprocating movement.

2. In a machine of the class described, an awl, means for reciprocating said awl from the same starting point at successive operations to form an awl hole in the work constructed to control said awl positively and continuously throughout its reciprocating movement, and means governed by variations in the thickness of the work for varying the range of the positive reciprocating movement of said awl with respect to said starting point.

3. A machine of the class described having, in combination, a vertically reciprocating awl, means for effecting a vertical reciprocation of said awl constructed to control the awl positively and continuously throughout its reciprocating movement, and means controlled by the thickness of the work for adjusting the aforementioned means to vary its effective throw, said adjusting means not affecting the position of the awl during the adjusting operation.

4. A machine of the class described having, in combination, a vertically reciprocating awl, means for effecting the vertical reciprocation of said awl constructed to control the awl positively and continuously throughout its reciprocating movement, and means for automatically adjusting said aforementioned means to vary its effective throw in accordance with variations in the thickness of the work constructed and arranged to operate without changing the position of the awl during the adjusting operation.

5. In a machine of the class described, an awl arranged to reciprocate vertically to form an awl hole and to reciprocate laterally to feed the work, means for controlling positively both the vertical and the lateral reciprocations of said awl, and means governed by variations in the thickness of the work for varying the amount of the positive vertical reciprocation of said awl.

6. A machine of the class described having, in combination, mechanism for inserting fastenings, an awl for forming fastening receiving openings in the work, and a work support controlling mechanism connected to said work support and comprising a member locked during the work releasing operation always at the same distance, measured through said connections, from the under side of the work, means for operating the awl, and means connected to said member of the work support controlling mechanism for varying the amount of operative movement of the awl in accordance with the thickness of the work.

7. A machine of the class described having, in combination, mechanism for inserting fastenings, an awl for forming fastening-receiving openings in the work and a work support, means for operating the awl, and means for varying the amount of operative movement of the awl in accordance with the thickness of the work comprising two levers pivotally connected with each other and means connected with the work support for varying the relative effective lengths of the connected lever arms.

8. A machine of the class described having, in combination, mechanism for inserting

fastenings, an awl, means for positively operating said awl, a work support and means for effecting a work releasing movement of said work support of uniform amount for successive operations comprising a slide arranged to be locked in stationary position during said work releasing operation, and means for automatically varying the effective throw of said awl operating means connected to said slide.

9. A machine of the class described having, in combination, mechanism for inserting fastenings, an awl for forming fastening-receiving openings in the work and a vertically movable work support, means for raising and lowering the work support to clamp and release the work for successive inserting and work feeding operations respectively, comprising a slide arranged to be locked to the frame of the machine during the work releasing operation in different vertical positions in accordance with the thickness of the work, mechanism for operating the awl and means for varying the operative movement of said awl operating mechanism connected to said slide.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE GODDU.

Witnesses:
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HARLOW M. DAVIS.