M. D. PHELAN.

MACHINE FOR INSERTING METALLIC FASTENINGS.

APPLICATION FILED AUG. 10, 1906.

944,275. Patented Dec. 28, 1909.

8 SHEETS—SHEET 1.

Fig. 1.

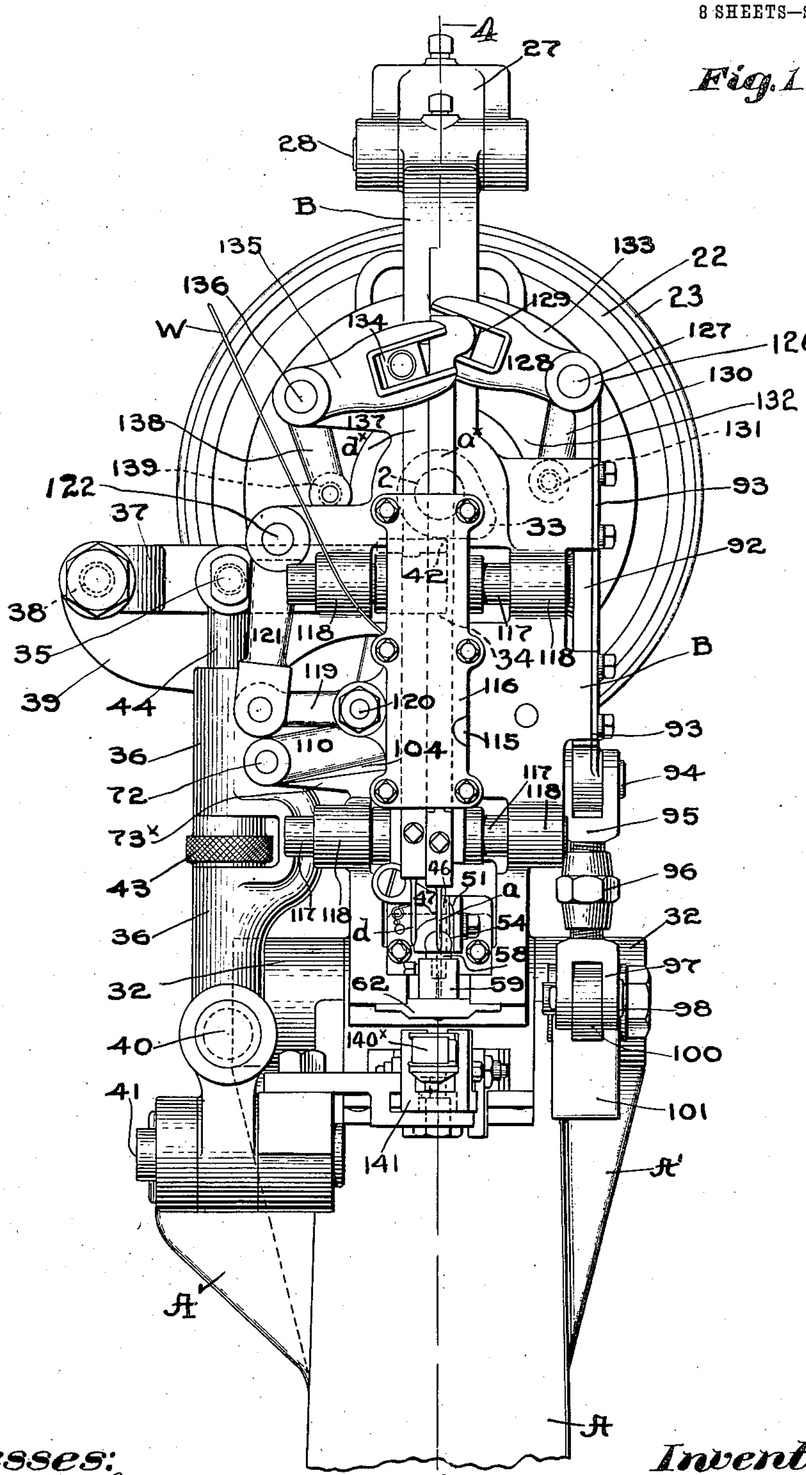

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Fig. 2.

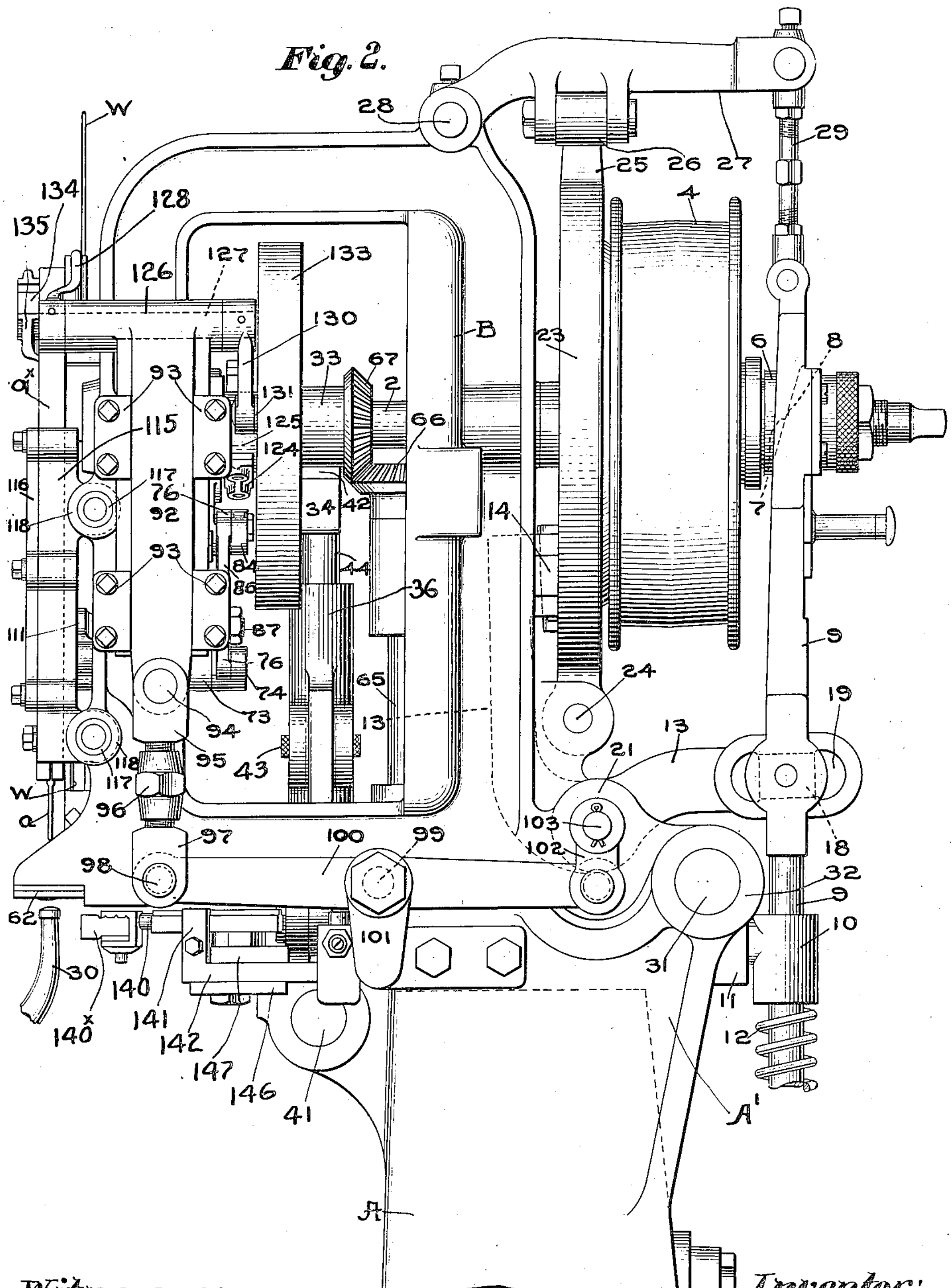

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Fig. 3.

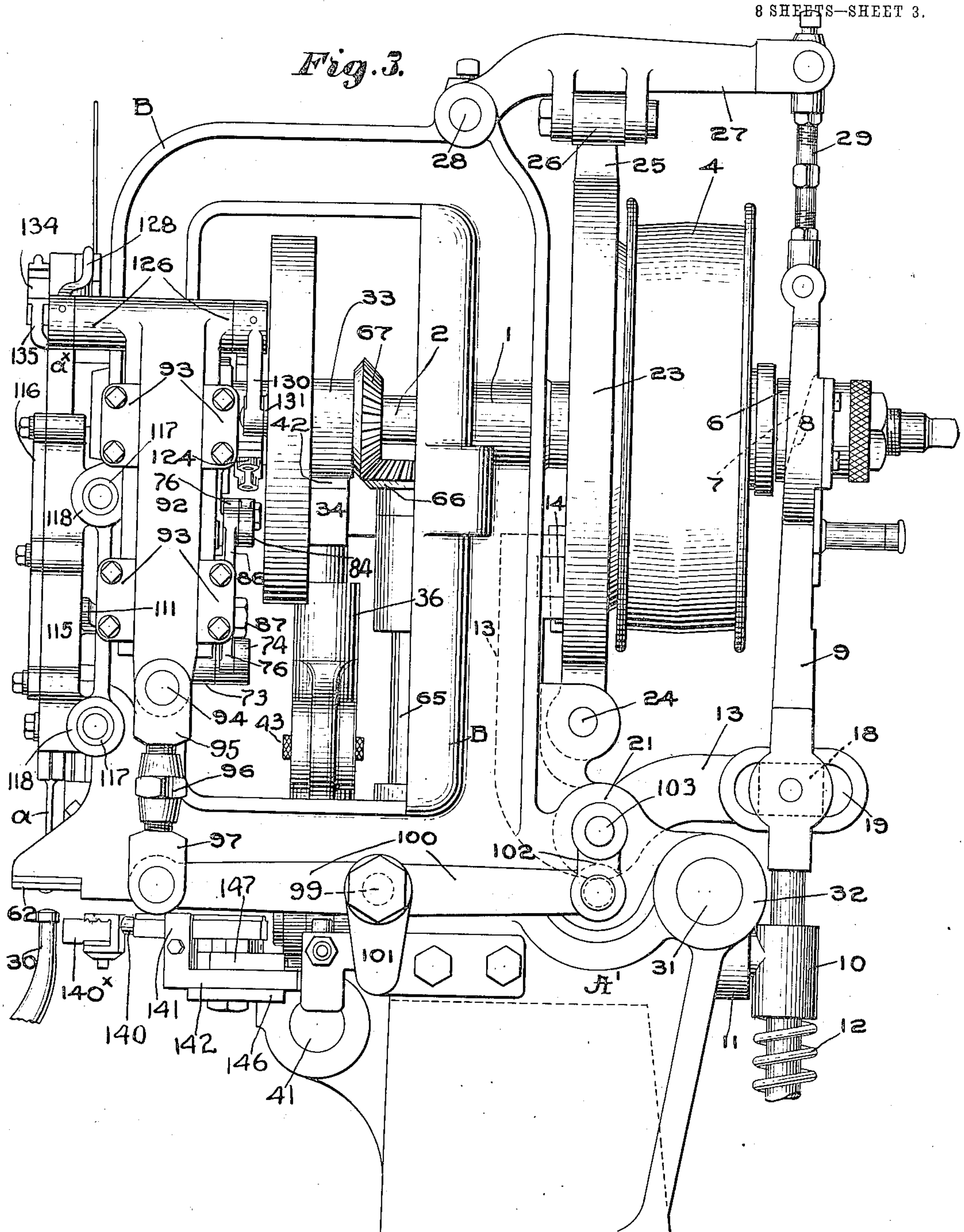

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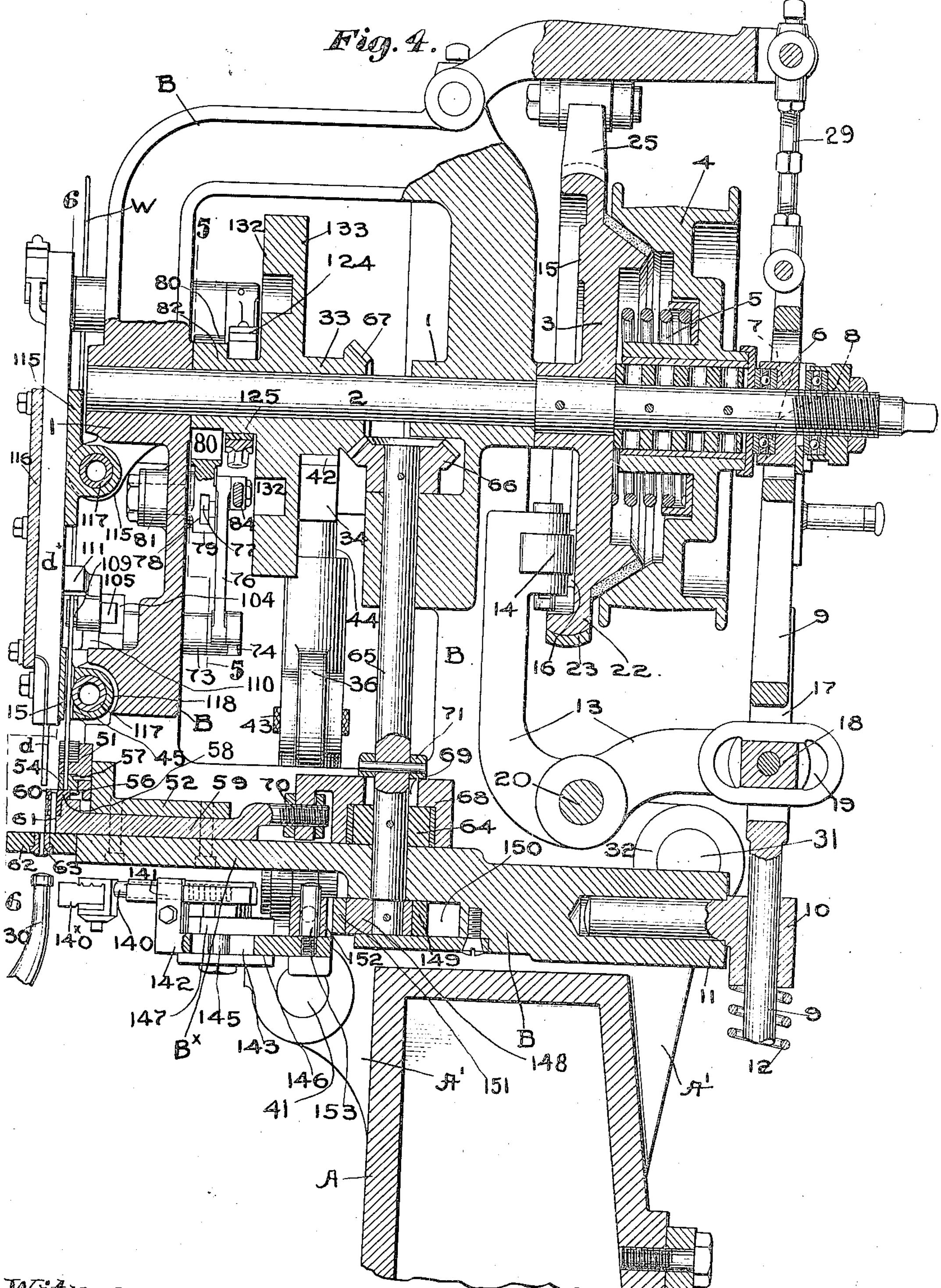
Fig. 4.



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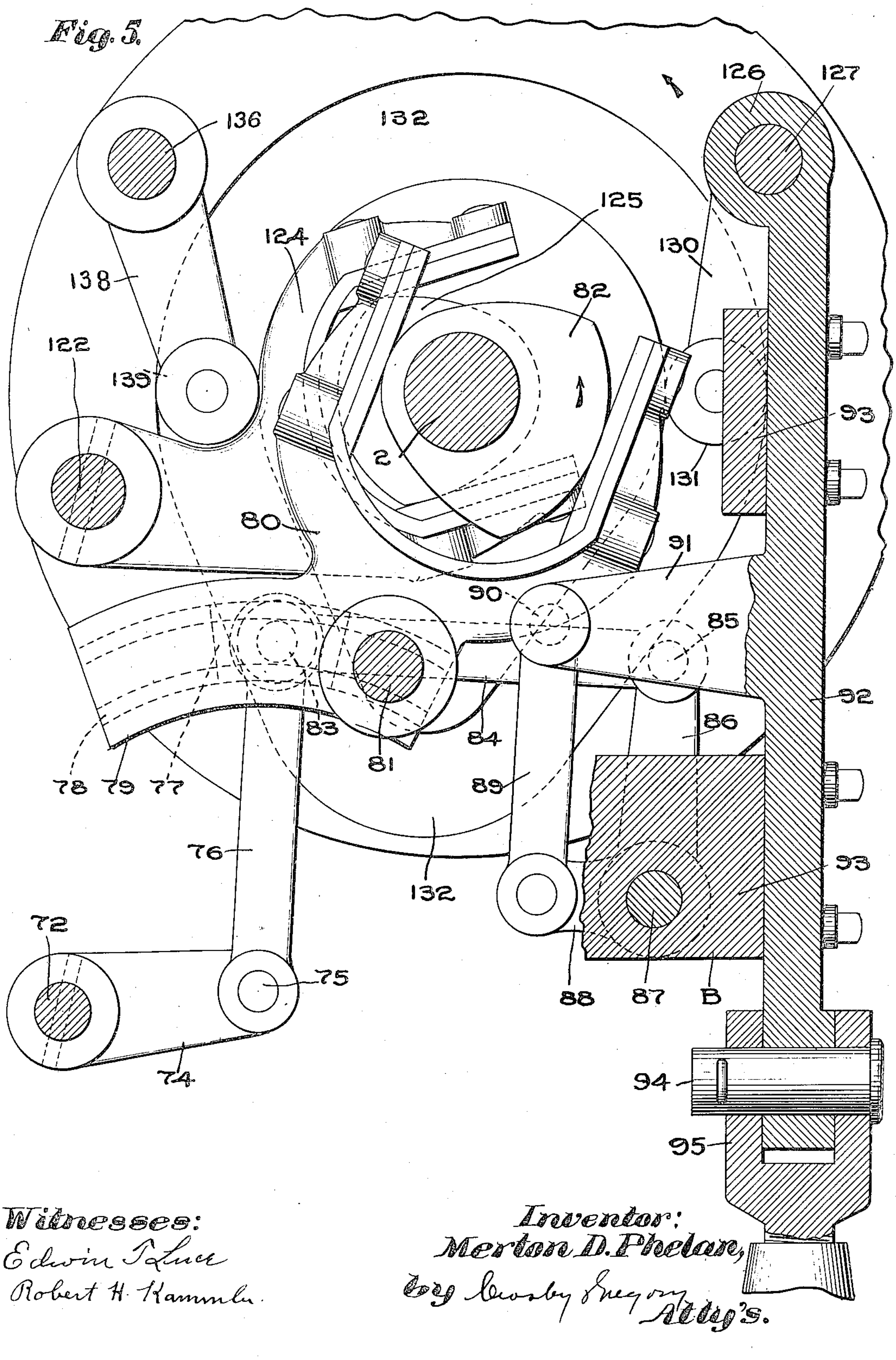
8 SHEETS—SHEET 5.

Fig. 5.



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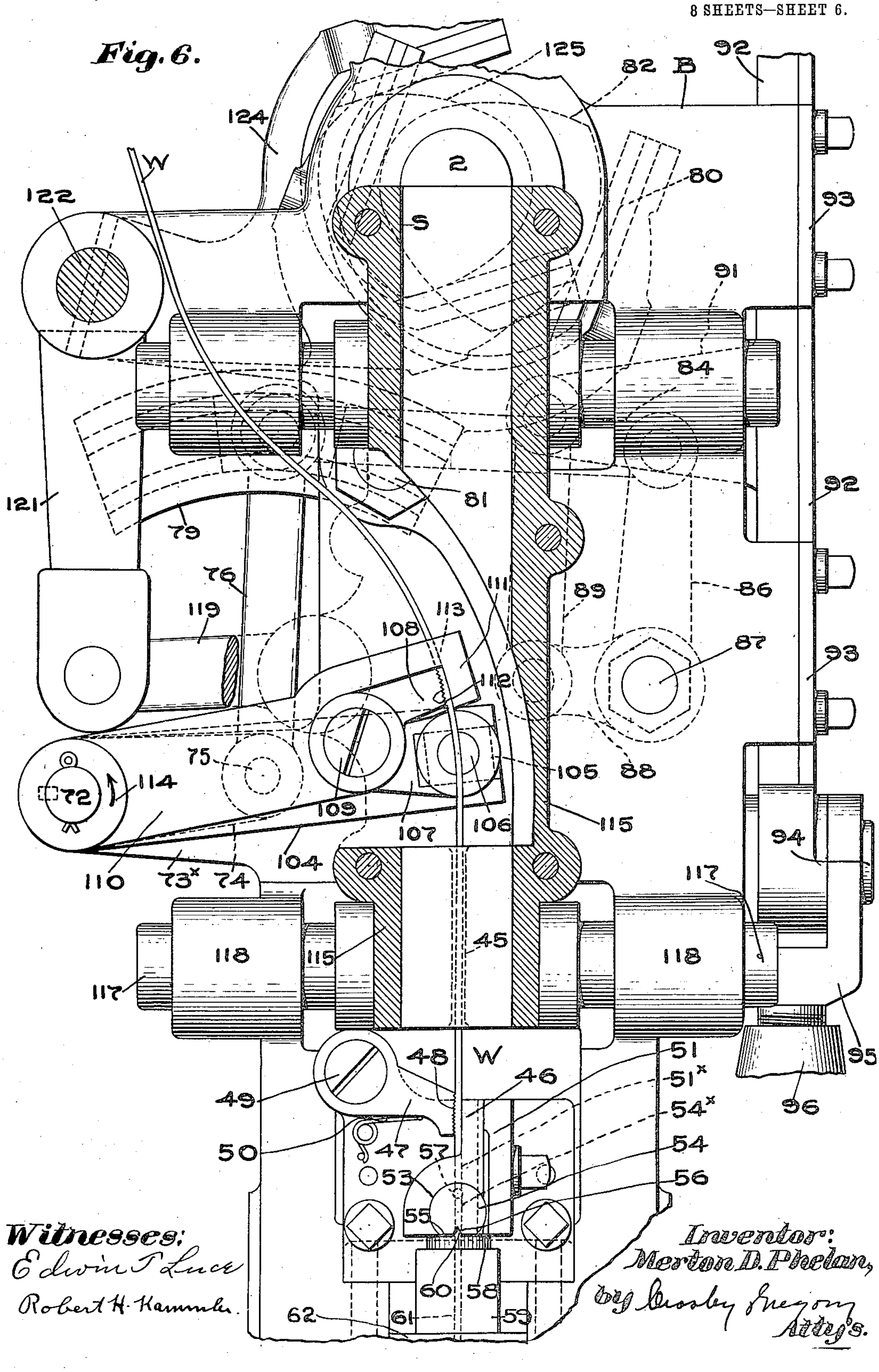
8 SHEETS—SHEET 6.

Fig. 6.



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8 SHEETS—SHEET 7.

Fig. 9.

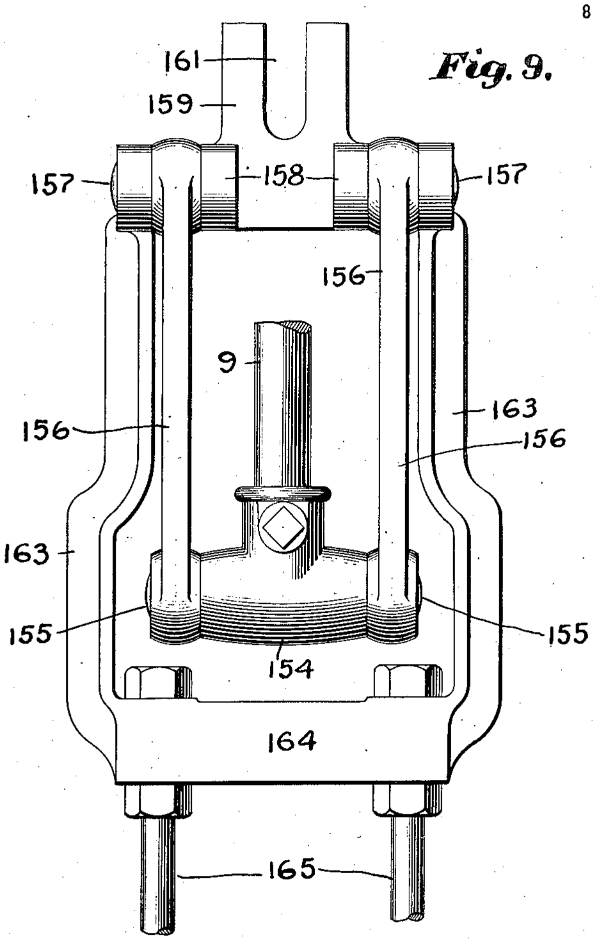
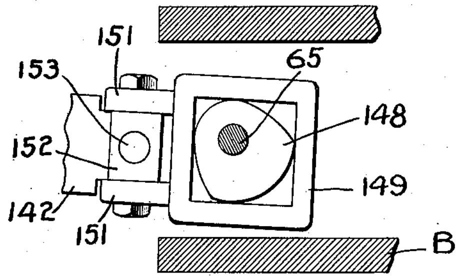


Fig. 7.



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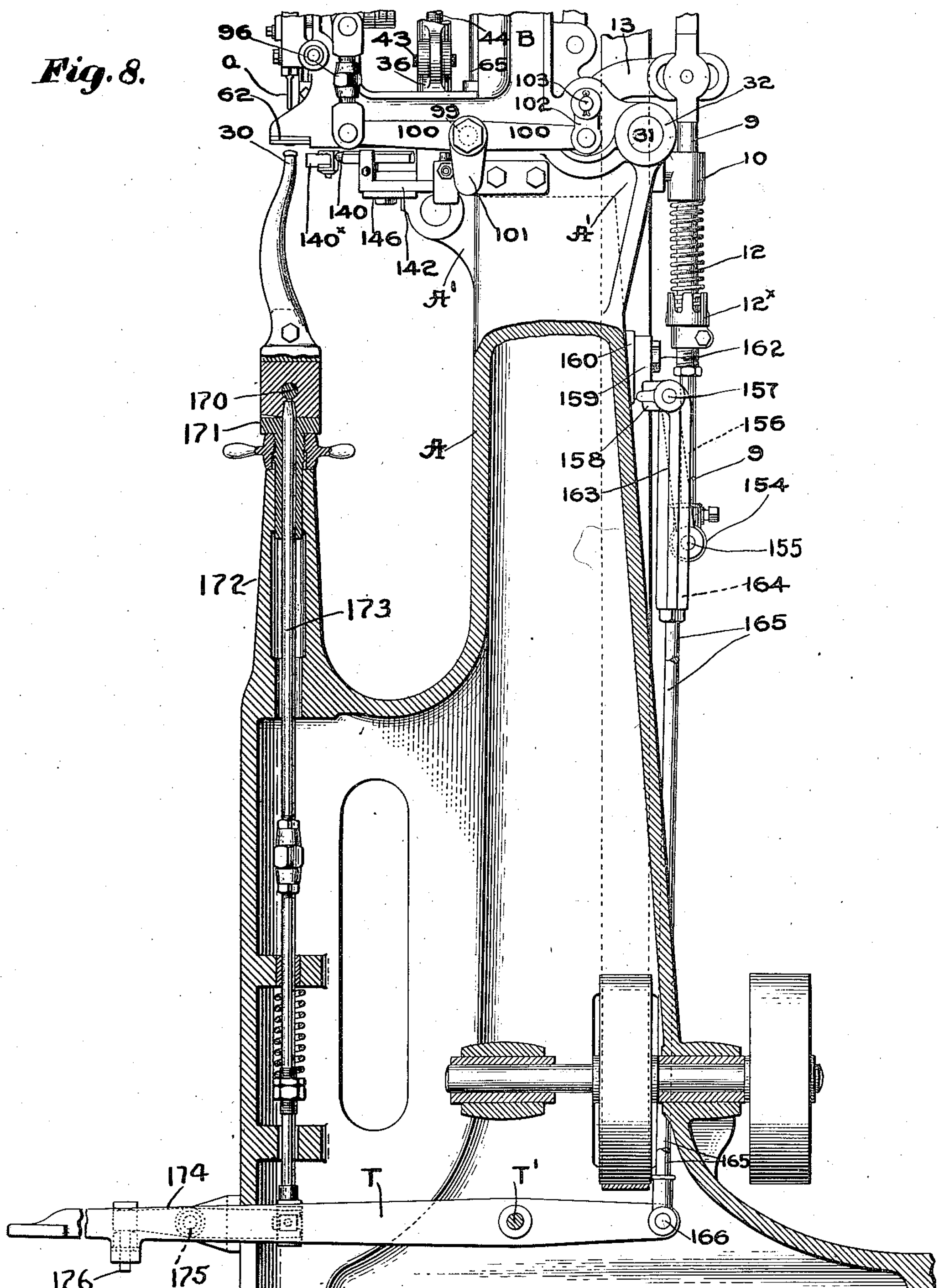
8 SHEETS—SHEET 8.

Fig. 8.



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UNITED STATES PATENT OFFICE.

MERTON D. PHELAN, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MANUFACTURERS MACHINE COMPANY, OF MONTCLAIR, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR INSERTING METALLIC FASTENINGS.

944,275. Specification of Letters Patent. Patented Dec. 28, 1909.

Application filed August 10, 1906. Serial No. 330,022.

To all whom it may concern:

Be it known that I, MERTON D. PHELAN, a citizen of the United States, and resident of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Machines for Inserting Metallic Fastenings, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawings representing like parts.

This invention relates to machines for inserting metallic fastenings into leather and it is more particularly applicable to so-called heel-seat nailers, employed in the manufacture of boots and shoes to secure the heel-seat portion of the sole, the upper, counter, lining, and inner sole firmly together.

My invention comprehends various novel features of construction, arrangement and operation, and one of such features is improved means for beating down and holding the work or stock upon a work-support or horn while the fasteners are being driven and clenched to firmly hold and secure the connected parts.

My invention also comprehends novel and improved means for effecting the feed of the wire-like material from which the fasteners are cut, and for so regulating and measuring the feed that each fastener cut shall be of the proper length to correspond with the thickness of the stock or work upon the work-support.

My invention also comprehends novel and improved means for effecting the operation of the awl and driver, which puncture the stock to receive a fastener, and drive the latter into the stock, respectively.

These and other novel features of my invention will be fully described in the subjoined specification, wherein one practical embodiment of my invention is explained in connection with the accompanying drawings, and the scope of the invention more particularly pointed out in the claims appended hereto.

Referring to the drawings:—Figure 1 is a front elevation of a machine embodying one form of my present invention, the awl being in position to descend and enter the stock, the lower part of the standard and the work-support or horn being omitted; Fig. 2 is a right-hand side elevation of the machine, the upper end of the work-support or horn being also shown; Fig. 3 is a similar view but with the movable or oscillating head raised, and with the work-feeding device projected; Fig. 4 is a central vertical sectional detail on the line 4—4, Fig. 1, but some of the parts are in a different position, to facilitate illustration of the mechanism; Fig. 5 is an enlarged transverse sectional detail taken on the line 5—5, Fig. 4, looking toward the right, of parts of the automatic wire-feeding mechanism and the mechanism which controls the movement of the carrier for the awl and driver bars; Fig. 6 is a similar view, but on the irregular line 6—6, Fig. 4, to illustrate details of the wire-feeding mechanism and parts coöperating therewith; Fig. 7 is a top plan view of details of the work feeding means. Fig. 8 is a right-hand side view of the lower part of the head, and the entire length of the supporting standard or column is shown, (partly in section), with the horn or work-support, the treadle by which the operative governs the operation of the machine, and a connection between the treadle and the clutch mechanism on the head, such connection being so constructed and arranged that transmittal of the oscillating or vibrating movements of the head to the treadle is prevented. Fig. 9 is an enlarged rear elevation of a portion of such connection, to be explained hereinafter.

In the embodiment of my invention herein illustrated, the framework comprises a standard or column A, see Figs. 1 to 4, and 8, having at its upper end an enlarged portion or bed A′ which supports a swinging or rocking frame or head B, as it will be hereinafter designated, adapted to beat down or hammer the work or stock, said head having suitably mounted thereon in bearings 1 a driving shaft 2, the head also carrying wire-feeding, cutting, and nailing or driving mechanism, to be hereinafter described. The said shaft, Figs. 2, 3 and 4, is provided at its rear end with a suitable clutch comprising fixed and movable members 3, 4, having opposed conical faces to coöperate one with the other when the movable member is brought into engagement with the fixed member, the movable member 4 being herein shown as a pulley loose on the driving shaft, and moved away from the fixed member by a suitable spring 5, see

Fig. 4. To effect engagement of the movable member of the clutch with the fixed member, a loose collar 6 mounted on the driving shaft is provided with wedge faces 7, Figs. 3 and 4, engaging coöperating wedge faces 8 formed upon a vertically sliding bar 9 suitably slotted to embrace the driving shaft and collar, the wedge bar 9 also sliding in a guide 10 suitably secured in a boss 11 on the rear part of the head B near its hinge or pivot. A coiled expansion spring 12 surrounds the wedge bar below the guide 10 and at its lower end bears upon a collar 12^{x} Fig. 8, on said bar 9, to normally hold the latter down or depressed and the clutch members disengaged. The lower end of the wedge-bar is in practice connected in any suitable manner to a lever or treadle T, Fig. 8, pivoted at T′, depression of the treadle acting to elevate the wedge-bar and slide the loose collar and movable member of the clutch inwardly to engage the fixed clutch member and rotate the driving shaft in well known manner. Means are provided to stop the driving shaft at a predetermined point of its rotation, and also to prevent stoppage of the machine before a complete revolution of the driving shaft has been made, and herein such means comprise a bell-crank 13 carrying on its vertical arm a roller or other stud 14, Fig. 4, running upon an annular cam surface 15 on the fixed clutch member 3, such surface having a recess or depression 16 of sufficient depth to enable the roller to enter thereinto.

The wedge-bar 9 is vertically slotted at 17, Fig. 4, to receive the horizontal arm of the bell-crank 13, the latter being operatively connected with the wedge-bar by a block 18 pivoted on the wedge-bar and entering a slot 19 in the bell-crank arm, said bell-crank being fulcrumed on a pin 20 mounted in ears 21 on the head B. The described connection between the bell-crank and the wedge-bar enables the former to rock or swing vertically when the wedge-bar is elevated or depressed. When a part of the bell-crank (herein the roller 14) can swing rearwardly into the recess 16, the outer arm of the bell-crank is depressed, and the latter, being connected with the wedge-bar, is constantly under the tension of the spring 12, the latter normally acting to depress the bar whenever the roller 14 is opposite the recessed portion of the annular surface 15. This annular surface manifestly prevents the roller running thereon from moving toward the fixed member of the clutch, and thereby prevents depression of the wedge-bar by or through the action of its spring the moment the treadle is released. When, however, the recess 16 is opposite the roller, treadle release permits release or opening of the clutch, so that the fixed member stops with the roller in the recess, the latter being positioned to correspond to a predetermined point of the rotation of the driving shaft. In such position of said shaft the driver and awl are elevated, and the work can be removed from or placed upon the horn, or moved thereupon.

The periphery of the clutch member 3 is preferably shaped to form a rotatable brake member 22 with which coöperates a spring band 23 fulcrumed at 24 (see Figs. 2 and 3) on the head B, the free ends of the said band being extended radially upward at 25, between rolls 26 carried by a lever 27 fulcrumed at 28 on the upper part of the head, the free and rearwardly extended end of the lever 27 being connected by an adjustable connection 29 with the upper end of the wedge-bar 9. The upturned ends 25 of the spring band 23 are tapered so that when the wedge bar is depressed to release the clutch members, the band is compressed to frictionally engage the annular member 22 to stop its rotation simultaneously with or immediately following the release of the clutch. Manifestly the operation of the wedge-bar to set the clutch lifts the arm 27 and rolls 26, the spring of the brake band 23 then acting to release the brake member 22.

While the clutch mechanism herein shown is well adapted for the purpose, my invention is not restricted to the use thereof as any other suitable clutch device may be employed.

It will be understood that if the treadle is depressed to start the machine, and then released, the machine will be brought to a stop when the driving shaft 2 has made one complete revolution, but if the operator maintains the treadle depressed the machine will continue to operate until the treadle is released and the roller 14 of the bell-crank can enter the recess in the annular cam surface on the fixed member of the clutch, hereinbefore described.

In practice the column or standard, on which is mounted the head B and the mechanism carried thereby, is provided with a suitable work-support or horn 30, Figs. 2, 3 and 4. This horn in practice is pivotally and adjustably mounted to vary its distance from the normal position of the head B, to be hereinafter described, but otherwise said horn is stationary, and is not depressed or otherwise moved during the operation of the machine.

The head B which is adapted to beat down the work supported on the horn is herein shown as pivoted or hinged to the bed A′ by trunnions 31 Figs. 2, 3 and 4, which enter and rock in suitable bearing hubs 32 on the bed A′, shown also in Fig. 1, the trunnions 31 projecting oppositely and laterally from the rear portions of the head. As will be hereinafter explained, the head is arranged to oscillate or rock about the trunnions as a fulcrum, the forward portion of the head above the horn acting to deliver hammer blows upon the work or stock supported on the horn. The head is lifted by means to be described, and is suddenly released to descend and beat down the work and clamp it as the fastenings are driven and clenched, and to effect such oscillating movement of the head, the driving or operating shaft 2 is provided with a cam 33, see Figs. 1, 2, 3 and 4, the operating face of which is adapted to bear upon the inner end of a substantially horizontal lever 34 Fig. 1, fulcrumed at 35 upon a vertical tubular support 36 carried by the bed A′. The outer end 37 of said horizontal lever is pivotally connected at 38, see Fig. 1, with a laterally projecting arm 39 of the oscillatory or rocking head B. Rotation of the shaft 2 causes the cam 33 thereon to act upon the lever 34, 37, and lift the cam and the head B bodily, and then to drop it into its lowermost position or upon the work, if the latter be in position beneath. This lifting and dropping or oscillation of the head occurs at every revolution of the shaft 2. As the head B swings or oscillates vertically about a fixed axis or fulcrum on the bed A′, and the lever 34, 37 about a fixed pivot 38 on the head, the tubular support 36, hereinbefore referred to, is connected with the head by a species of universal joint comprising pivots or joints 40, 41, to enable it to move forward and backward and transversely, while at the same time serving as the stationary support for the lever. To reduce wear on the cam-actuated end of said lever, I prefer to provide the same with a hardened steel wear-plate, as 42, see dotted lines Fig. 1.

The lever-fulcrum 35 is made adjustable vertically by means of an internally threaded nut 43 to coöperate with the lower, correspondingly-threaded end of the rod 44 on which the horizontal lever 34, 37 is directly fulcrumed, said nut and rod being sustained by the tubular support 36. By changing the height of the fulcrum 35 from the bed A′ the uppermost position of the head B is adjusted manually for the thickness of the work to be acted upon.

The metallic strip, rod, wire, or wire-like material W from which the fasteners or nails are formed, is led from a suitable reel, not shown, at the top of the machine, down through a vertical channel 45, see Figs. 4 and 6, in the lower part of the shifting carrier for the awl and driver bars, to be presently described and passes thence between a fixed vertical abutment 46 and an opposed coöperating detent 47 having a toothed or corrugated wire engaging face 48, Fig. 6, the detent being fulcrumed at 49, and in the present instance its face 48 is pressed against the wire by a suitable spring 50. The abutment 46 is formed on a block 51 rigidly secured to a horizontal guide 52, on the lower front portion of the head B, said block 51 having a socket 53 therein to receive the fixed cutter 54 herein shown as slabbed off or flattened at 55, and provided with a Λ shaped groove 56, extending longitudinally of the cutter. The latter is held from rotative movement in its socket by a suitable pin 57, Fig. 4. The cutter and the block 51 are provided with vertical and alined passages 54^{x}, and 51^{x} respectively, through which the leading end of the wire passes.

The coöperating movable cutter 58 is herein shown as a flat block rigidly secured to a cutter carrier 59, horizontally movable fore and aft in the guide 52, the upper face of the said movable cutter 58 sliding upon the lower, flattened face 55 of the fixed cutter 54, the groove 56 in the latter being entered by a correspondingly shaped rib 60 on the movable cutter.

A nail receptacle 61 extends vertically through the cutter 58 and the adjacent portion of the cutter carrier 59, the latter sliding at its forward end upon a foot 62 at the front of the head, said foot being provided with a throat 63 through which the nail or fastener is driven into the work. The nail receiving passage 61 intersects the rib 60, as shown in Fig. 4, and the perforated portion of the cutter carrier 59 serves as a nail-transferrer to transfer the severed nail or fastener into driving position above the throat 63. At the time the wire W is fed, the passage 61 is in alinement with the passages 51^{x}, 54^{x}, and the wire-feed having taken place, the cutter-carrier 59 is then moved forward until the passage 61 registers with the throat 63. As the carrier is so moved forward, the end of the rib 60 behind the nail-passage 61 cuts or severs the measured length of wire from the main body of the wire above it, and owing to the shape of the cutting rib and the groove 56 in the fixed cutter, the leading end of the nail or fastener next to be formed is notched, while the upper end of the fastener just severed is pointed. The reciprocatory movement of the carrier 59 to sever the nail or fastener, transfer the latter to driving position, and thereafter to return the nail-transferrer and movable cutter into wire-receiving position, is effected by means of a cam 64 Fig. 4 fast on a spindle 65 mounted in suitable bearings on the head B, and provided with a bevel gear 66 in mesh with and driven by a similar gear 67 fast on the driving or operating shaft 2, as will be clear from an inspection of Fig. 4. The cam 64 coöperates with a box 68 slotted at 69, Fig. 4, to receive the spindle and adjustably connected at 70 with the rear end of the cutter-carrier 59. A collar 71 pinned to the spindle 65 prevents any lifting movement of the box as it slides on the base portions B^x of the head.

While the detent 47 will give or move on its fulcrum to permit the feed of the wire, it will be manifest that any retrograde movement of the latter will be prevented by such detent, as the wire will thereupon be gripped or clamped between the face 48 of the detent and the abutment 46.

I will now describe the mechanism for feeding the wire, and the means by which the amount fed at each operation is determined automatically in accordance with the thickness of the stock or work into which the next fastener is to be driven.

The head drops upon the work prior to the feed of the fastener material, and manifestly the foot 62 which beats upon the work will descend more or less, as the stock is thinner or thicker, and this variation in the descent of the head is made effective to absolutely and positively control and measure the length of wire to be fed at each operation of the wire-feeding mechanism.

A substantially-horizontal rock-shaft 72, Fig. 6, mounted in a long bearing 73 on a bracket 73^x, rigid with or forming part of the head, see Figs. 1 and 6, and in parallelism with the shaft 2, has fast upon it at its rear end an arm 74, Fig. 5, pivotally connected at 75 to an upturned radius bar 76, clearly shown in Fig. 5, and also in Fig. 4, the upper end of said bar carrying a pivotally-connected block 77, slidably mounted in a T-shaped, curved guide-way 78 formed in a segment 79, forming part of a yoke 80 fulcrumed on the head on a stud 81. The yoke 80 coöperates with a cam 82 best shown in Fig. 5, fast on the operating shaft 2. When the yoke 80 is at rest, by coöperation with the dwell portion of the cam, and the arm 74 in the position shown in Fig. 5, the parts are in readiness for the thickness of the work or stock to be measured, and for the setting of the wire-feed mechanism correspondingly, and at such time, the block 77 can be moved toward or away from the fulcrum 81 without rocking the shaft 72. This neutral position of the parts enables the setting operation to be performed without in any way moving the wire-feeding devices, which as will appear hereinafter are actuated by or through the rock-shaft 72.

The pivot stud 83 connecting the radius-bar and the block 77 serves also to connect the latter with one end of a link 84 jointed at 85, see Fig. 5, to the longer arm 86 of a bell-crank fulcrumed at 87 on the main head. The shorter arm 88 of the bell-crank is jointed to an upright link 89 pivoted at 90 to an ear 91 extending inwardly from a vertically movable slide 92 supported in guides 93 on the head, see Figs. 1, 2, 3, 5 and 6. The slide 92 has pivoted to its lower end at 94 a yoke 95 connected by an adjustable coupling 96 with a similar yoke 97 jointed at 98 to one end of a lever 100 fulcrumed at 99 between its ends on a bracket 101 secured to or forming a part of the bed A′. The connection between the forward end of the lever 100 and the slide 92 provides for any desired or necessary adjustment between the parts. The opposite end of lever 100 is connected by a short link 102 to the head B by the projecting end 103 of the pin 20. When the head rises or is swung upward, the rear end of the lever 100 will be lifted a certain distance, and the front end of said lever depressed an equal amount, and the slide 92 will be moved downward a like distance. In like manner, the descent of the head, whether more or less, will through the transmitting lever 100 impart to the slide 92 precisely the same lift or rise, and the slide through the intervening connections, such as described, will move the block 77 correspondingly toward the fulcrum 81 of the segment 79. Manifestly the amplitude of the oscillation of the rock-shaft 72 will be greater or less as the block is farther from or nearer to fulcrum 81, and if the thickness of the stock into which a fastener is to be driven increases, the head will not descend so far as it did previously. Consequently by the means described, the slide 92 will be elevated a less distance and the block 77 will be set farther from the fulcrum 81, so that the rock-shaft 72 will be turned through a greater arc. Conversely if the stock decreases in thickness, the head will descend farther, the slide 92 will have a greater rise, and the block 77 will be set nearer the fulcrum 81, decreasing the feed for the wire.

I have herein shown and described a convenient, practical and efficient form of equalizing connection between the head of the machine and the slide, which latter forms a part of the instrumentality adapted and arranged to set the wire-feeding mechanism to feed the proper length of wire, as determined by the measuring of the stock by or through the oscillating or rocking head, the slide also governing the stroke of the awl. The great disparity in length between the bell-crank arms 86, 88 provides a considerable variation in the position of the block 77 for an extremely slight variation in the thickness of the work or stock, so that the feed is regulated and controlled with great exactness.

At the front end of the rock-shaft 72, see Fig. 6, a rigidly attached arm 104 is extended toward the center of the head, and it is longitudinally slotted at its free end to receive a block 105 pivotally connected at 106 to the shank 107 of a movable jaw 108 fulcrumed at 109 on a jaw-carrier 110, shown as an arm mounted with a frictional fit on the rock-shaft 72, and provided with a jaw 111, which overhangs and has its working face opposed to the preferably toothed face 112 of the jaw 108. The jaw 111 has a guide passage 113, see dotted lines Fig. 6, through which the wire W passes, and thence leads between the opposed faces of the jaws 108, 111 to the duct 45. When the rock-shaft 72 is turned in the direction of the arrow 114 Fig. 6, the arm 104 first swings the jaw 108 upward on its fulcrum, unclamping the wire, and then the jaw-carrier 110 moves in unison with the arm 104, the friction of the jaw-carrier being overcome. The swinging movement is determined, as has been described, by the location of the block 77 with respect to the segment fulcrum 81, and when the time for feeding the wire arrives, the rock-shaft 72 is turned oppositely to the arrow 114, swinging downward the arm 104, the first action thereof being to swing the jaw 108 on its pivot 109 sufficiently to clamp the wire between the feeding jaws, the friction at first holding back the jaw-carrier. The continued downward swing of the arm 104 then overcomes the friction and moves or feeds the wire forward throughout such stroke of the arm 104, the jaw-carrier 110 moving with the arm. This feed stroke having been predetermined as described, precisely the right length of wire is fed forward for the next fastener to be severed therefrom, such severed fastener when driven into the work being neither too long nor too short, but of the proper length for the thickness of the work at that particular point.

I have provided an awl *a*, Fig. 1, to puncture the work to receive a fastening, and I have provided a driver *d* to drive the fastenings into the work then upon the horn or work-support 30, said awl and driver being herein shown as attached respectively to the lower ends of vertically reciprocating bars a^x, d^x. The awl and driver bars are mounted in a laterally shiftable carrier 115, completed by a cover plate 116, located at the front of the head and provided with pairs of oppositely extended, horizontal trunnions 117, mounted to slide longitudinally in bearings 118 on the front of the head B, so that the shifting carrier can move laterally, such movement being provided to bring either the awl or the driver into operative position above and in alinement with the throat 63. A short link 119 pivotally connected to the carrier at 120, Fig. 1, is jointed to the free end of a depending rocker-arm 121, fast on a rock-shaft 122, see Figs. 1 and 6, mounted in a bearing, on the head, the rear end of said rock-shaft having a rigidly attached yoke 124 with which coöperates a cam 125, fast in the operating shaft 2, the shape of the cam being shown in dotted lines Fig. 6, and in full and dotted lines Fig. 5. The cam 125 is of such shape that when its dwell portion coöperates with one side of the yoke, the shifting carrier 115 will be held stationary with the awl and awl-bar in operative position, and when the dwell portion of the cam acts upon the other side of the yoke, the driver and driver-bar will be operatively positioned, and in Fig. 1 the awl is shown in its operative position, but out of the work.

The awl and driver bars are vertically reciprocated by separate mechanisms, and the operation is peculiar in the following respects. The length of the stroke of the awl, relative to the rocking head, is variable and is such as to cause the awl always to descend to substantially the same fixed point relative to the lower surface of the work on the horn, irrespective of the thickness of the stock and the consequent position of the rocking head. The length of the stroke of the driver, however, relative to the rocking head, is constant, causing the driver to descend to a point whose location is variable and depends upon the position of the head, but which bears a fixed relation to the upper surface of the stock, whatever the thickness of the latter.

The upper end of the slide 92, Figs. 1 and 5, has a transverse, tubular head 126 parallel to the operating shaft 2, and which forms a bearing for a rock-shaft 127 provided at its front end with a rocker-arm 128, see Fig. 1, longitudinally slotted to receive a slide block 129, pivotally connected to the upper end of the awl bar a^x. The rear end of the rock-shaft 127 has rigidly secured to it a depending arm 130, provided with a follower 131, in practice a roller or other stud, which enters a cam-groove 132, see Fig. 5, and partly shown in Fig. 1, formed in the face of a disk 133, rigidly secured to the operating shaft 2. Rotation of the shaft operates through the said cam-groove and follower 131 to rock the shaft 127 and the rocker-arm 128 to positively raise and lower the awl-bar and awl. Inasmuch as the shifting carrier 115 rises and falls with the head B, the awl would descend farther when working on thin stock, and not so far when working on thicker stock, were it not for the fact that the awl-operating mechanism compensates for variations in the lowermost position of the head due to variations in thickness of the stock by means of the slide 92. The greater the descent of the head, the higher will the slide 92 be elevated, and correspondingly the follower 131 will be raised, changing its position with respect to the center of the cam 132, so that the down-stroke of the awl will be diminished, relatively to the downward movement of the head. Conversely, when acting upon thicker stock, the head will descend a less distance thereonto, the slide 92 will not be raised so high, and the stroke of the awl will be correspondingly increased, relatively. The point of the awl therefore at all times reaches the same level (on its down stroke) with respect to the tip of the horn or work-support, so that the work is properly punctured, no matter whether it be thick or thin.

The driver bar d^{x} is pivotally connected at its upper end to a block 134 slidably mounted in the longitudinally slotted end of a rocker-arm 135 fast on a rock-shaft 136 mounted in a bearing arm 137, Fig. 1, forming a rigid part of the head B, said rock-shaft 136 having also rigidly attached to it a depending arm 138 provided with a follower roll 139, which travels in the cam-groove 132, hereinbefore referred to, but on the opposite side of the center of the cam with relation to the follower 131. The said cam, therefore, effects the reciprocation of both the driver and the awl, but at different times, and while the stroke of the awl is such as to cause the awl always to descend to the same fixed point, the lower limit of the stroke of the driver varies inasmuch as the rock-shaft 136 is fulcrumed on the head B, so that when the latter descends upon thick stock the driver will not descend as far as when the head is working upon thin stock. This is as it should be, for the nail to be driven in thick stock is longer than one for thin stock, and hence the variable level to which the driver descends conforms to the length of the nail or fastener which has been previously cut off, and transferred into position to be driven into the work by the descent of the driver-bar and clenched upon the horn, while the heavy head B clamps the work on the horn during the driving and clenching of the nail.

A preferably spring-controlled, work-feeding bar 140, Figs. 2 and 4, is adjustably mounted in the outer end 141 of a feed bar carrier 142, longitudinally slotted at 143, Fig. 4, to receive a stud 145, which connects a bottom-plate 146 with the fixed guide 147 in which the feed-bar carrier is longitudinally and also laterally movable, such lateral movement being about the stud 145 as a center. The feeding bar 140 is provided with a tip 140^{x} preferably of rubber, the tip bearing against the shoe mounted on the horn, and the movements of the feed-bar in the operation of the machine feed and turn the heel of the shoe or other work, to provide a desired uniform spacing between the nails or fasteners as they are driven, it being necessary for the operator only to steady the work on the horn. A four-motion feed is herein shown, the actuating cam 148 being secured to the spindle 65, see Fig. 4, and it is inclosed within a box 149 slidable within a recess 150 in the head B, the cam and box being shown in plan in Fig. 7. The forward portion of the box is provided with ears 151, between which is pivotally mounted a sleeve 152 through which slides an upright stud 153 rigidly secured to the rear end of the feed-bar carrier 142. The guide 147 in which the said carrier moves is secured to or forms part of the bed A′, hence the necessity for the compensating connection just described between the cam-box 149 and the carrier, as the cam and its box are mounted on the oscillating head B. The four motions of the feed-bar are forward into position to engage the work, laterally to feed the work, rearwardly away from the work, and then again laterally, but in an opposite direction to bring the tip of the feed-bar by the next forward movement into engagement with the work, the controlling-cam 148 being of such shape and so timed as to effect feed of the work while the head is up, the subsequent movements of the work-feeding device taking place after the head descends and beats down and clamps the work upon the horn during the nailing operation. These four motions are produced by the engagement of the cam 148 with the four walls of the box 149, the feed bar sliding and being guided between the fixed guide 147 and the bottom plate 146. In its lateral feeding and return movements the feed bar turns upon the pin 145 as a fulcrum, while in the forward and rearward movements of said bar the pin 145 slides in the slot 143.

When single nailing is performed the operator depresses the starting-treadle T, Fig. 8, to elevate the wedge-bar 9 and throw the clutch into operation, and immediately releases the treadle, the machine stopping automatically when its cycle of operations is completed, as has been described, a single nail or fastener being formed and inserted in the work. Ordinarily, however, in heel-seat nailing, the operator holds the treadle depressed throughout the nailing, the machine performing as many complete cycles as there are fasteners formed and driven, the action being very rapid, the head oscillating or rocking at great speed. It will be remembered that the guide 10 for the wedge-bar is mounted on the head, and consequently said bar must partake of the rapid movements of the head, vibrating in a vertical plane at right angles to the fulcrum 31 on which said head rocks. If the wedge-bar is connected directly with the treadle, the latter will be rapidly vibrated or rocked up and down while the machine is in motion, such vibrating or jarring movement being transmitted forcibly and directly to the operator and not only quickly tiring him, but also interfering with a steady control of the work by his hands as it is fed over the horn. I have herein shown simple and efficient connecting means intermediate the treadle and the clutch-controller or wedge-bar whereby the vibrations of the head are taken up and the transmittal of such vibrations to the treadle substantially prevented or minimized. As will appear the connection is positive in its action but no matter how rapid or extensive the vibrational movement of the head the treadle remains practically quiescent, completely obviating the objections herein referred to.

Referring to Figs. 8 and 9 the lower end of the wedge-bar 9 is provided with a cross-head 154 to the ends of which are pivoted at 155 the lower end of short links 156, their upper ends being connected by pivot-pins 157 with rearwardly extended ears 158 on a slide block 159 vertically movable on a flat support 160 formed on the standard or column A. The slide-block is bifurcated at 161, Fig. 9, to loosely receive the shank of a headed guide and retaining bolt 162 secured in the column, so that the block can rise and fall vertically on the plane surface of the support 160. The sides of a stirrup 163 are pivotally connected at their upper ends with and suspended from the slide-block by the pivot-pins 157, the cross-head 154 being free to swing within the stirrup and above the bottom 164 thereof, as will be manifest from Figs. 8 and 9. Rods 165 are rigidly attached at their upper ends to the stirrup and at their lower ends are pivotally connected at 166 with the treadle T, Fig. 8, fulcrumed at T′ as previously stated, within the base of the standard or column A, the end of the treadle being interposed between the lower ends of the rods 165. Depression of the treadle elevates said rods and the attached stirrup, and thereby the links 156 are raised to pull up the cross-head 154 and attached wedge-bar, throwing the clutch into operation to start the machine, the block 159 sliding upward and causing the pivot-pins 157 to move in paths parallel thereto. As the head B is rocked or oscillates during the operation of the machine the wedge-bar 9 will vibrate in a vertical plane at right angles to the fulcrum of the head, the cross-head 154 on the lower end of the said bar being moved thereby toward and away from the column A within the stirrup, but in a short, flat arc. The links 156 swing slightly on their fulcra 157 by such movement of the cross-head relatively to the stirrup, but without causing any appreciable vertical movement of such fulcra or of the stirrup depending therefrom, and the curvature of the short arc through which the lower ends of the links move is so flat, that no appreciable vibration is transmitted through the rods 165 to the treadle. The connection thus provided between the treadle and the wedge-bar is positive in its action to operatively move the wedge-bar, while at the same time it takes up and absorbs or so minimizes vibrational movements of the head and the wedge-bar that transmission thereof to the treadle is practically prevented. Throughout the operation of the machine, therefore, the treadle is at rest and substantially free from vibration, so that there is nothing to interfere with the proper guidance of the work by the operative, no matter how rapid or long continued the oscillatory movements of the head. The slide-block 159 serves to guide the upper end of the stirrup and the pivot-pins 157 in a fixed path with relation to the stationary support or standard A on which the oscillating head is mounted.

In the operation of the machine the operator places the work, such as a shoe, upon the horn with the heel portion or counter against the feed-bar and with the part of the heel-seat at which nailing is to commence directly under the throat in the foot-plate of the head. The operator then depresses the treadle to release the brake and throw into operation the clutch to start the machine. As the driving or operating shaft rotates the head B, which is then in its raised position, is dropped, the foot plate falling with a species of hammer blow upon the work, compressing and clamping it upon the horn, and the feed bar is then retracted. As the head descends the shifting carrier for the awl and driver bars is moved to the left, viewing Fig. 1, to bring the awl into operative position in alinement with the throat 63, while the cutter-carrier 59 has been retracted to bring the nail transferring device, which herein includes the movable cutter, into position to receive the leading end of the wire. The awl now descends through the throat and pierces the work, forming the hole into which the next fastener is to be driven, and then the awl is at once retracted. During the descent and retraction of the awl the slide-block is set in the segment 79 to thereby determine the proper length of wire which is to be fed forward by the feeding mechanism, to form the fastener to be driven into the hole in the work just made by the awl. Such setting and determination of the length of feed of the wire is made at a time when no movement of the feed mechanism can take place, as has been explained. The wire-feeding mechanism is then operated and the predetermined measured length of wire is fed forward into the nail transferrer just before the awl is fully retracted. The shifting carrier is moved to the right, viewing Fig. 1, after the retraction of the awl, to bring the driver into operative position in alinement with the throat, and the cutter-carrier is moved forward, the fixed and movable cutters coöperating to sever the measured nail or fastener, as has been described, and as the forward movement of the cutter-carrier is completed the severed nail is thereby transferred into position to be driven through the throat and into the work in the hole made by the awl. The driver is now depressed, descending upon the upper end of and driving the nail from the transferrer through the throat and into the awl-hole in the work, the points or prongs at the lower end of the nail being clenched upon the top of the horn. The wire-feeding mechanism, which has been at rest since the feed of the wire was completed, is also returned to its initial position, and the driver is lifted, the return of the said feed mechanism to its initial position being accomplished during the descent and rise of the driver. During the piercing of the work by the awl, and the subsequent driving of the nail or fastener, the head has remained down upon the work, clamping it securely upon the horn after it has been beaten down and compressed, so that the parts to be united are firmly secured without possibility of subsequently opening or separating from each other. As the driver rises the head is lifted, releasing the work, and the work-feeding bar, (which in the meantime has moved back from the work, then laterally and again forward into engagement with the work at a new point), advances the work into position for the next descent of the awl thereinto. As the head is lifted the nail transferrer begins its retractive movement to the position in which it receives the end of the wire at the next operaton of the wire-feeding mechanism, and the shifting carrier is moved to the left to bring the awl and driver into normal position, at points equidistant from a vertical line passing through the throat. The cycle of operations is now completed, and the parts are in normal position, with the head lifted, the awl and driver up, and the various mechanisms in readiness to repeat the cycle.

The work-feeding- cam is positioned or timed to cause the work-feeding means to feed the work forward the proper distance after a nail or fastener has been driven and clenched, thereby positioning the heel-seat so that the next awl-hole and nail driven thereinto shall be uniformly spaced from the last nail driven. The operator steadies the work as it is fed along by repeated cycles of operations until the nailing is completed, the operator maintaining the treadle depressed until the desired number of nails has been driven, whereupon he releases the treadle to stop the machine. Stoppage of the machine can only take place when the recess in the annular cam path on the fixed member of the clutch is opposite the co-operating roller, when the latter moves into the recess and the clutch is automatically released and the brake applied. The recess is so positioned that the machine will stop only when the head is lifted and the awl and driver bars up and completely out of the way, so that the work can be readily removed from or applied to the horn. In Fig. 1 the head is down, and the awl is in operative position and just about to descend. Should the operator depress the treadle to start the machine, and immediately release the treadle, the machine will perform a complete cycle of operations, piercing the work, measuring and feeding the wire to form a fastener or nail of the proper length, severing such fastener, and driving it into the awl-hole, the entire mechanism coming to rest at the completion of the cycle.

Referring to Fig. 8, the horn or work support 30 is shown as pivoted horizontally at 170 in the forked upper end of a horn carrier 171 adjustably mounted on an upright arm 172 of the column, the horn being free to be tipped about its said fulcrum from back to front to permit removal and application of the work therefrom and thereto. If not locked in work supporting position, this horn might fall away from the feed and render the latter ineffective as well as the line of work untrue. To obviate this, I have provided the lower end of the horn beneath its fulcrum 170 with a tapered recess adapted to receive the tapered upper end of a horn-locking rod 173 mounted to slide in suitable bearings provided in the column or parts thereof and connected at its lower end with an auxiliary or operating lever 174, shown in dotted lines, and fulcrumed at 175 on a bracket extended frontward from the column. The front end of this lever is constructed to embrace the outer end of the treadle T, a set screw 176 furnishing means for adjusting the engagement of the treadle-lever with said rod-operating or auxiliary lever to determine the movement of the latter by the former, so as to cause the movement of one to be co-extensive with the other or to present a given though variable lost motion of the one relative to and by the other as occasion may require. By this arrangement when the treadle is depressed to start the machine the locking rod 173 is elevated to lock the horn in work supporting position where it remains until the treadle is released to stop the machine when said locking rod will be dropped to free the horn to permit it to be tipped forward for removal of the work.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a nailing machine, in combination, a movable head to beat down the work, an awl mounted on the head, and means to impart a variable operative movement to the awl relative to the head and dependent upon the amplitude of movement of the head.

2. In a machine for inserting metallic fastenings, in combination, a vertically movable head adapted to descend upon the work

from a constant height, mechanisms carried by said head to feed wire-like material, sever a fastener therefrom, and drive the severed fastener into the work, a common primary operating member for said mechanisms, also carried by the head, and means set by the descent of the head to cause the feed mechanism to feed a variable length of the wire-like material according to the thickness of the work into which the fastener is to be driven.

3. A nailing machine comprising a movable head having a variable descending stroke, and a reciprocating awl mounted on the head and having a variable operating movement relative to the head and dependent upon the descending stroke of the head.

4. In a machine for inserting metallic fastenings, in combination, a work beating and clamping head, intermittingly operated mechanisms carried thereby to feed wire-like material, sever measured fasteners therefrom, and drive the fasteners into the work, and means, governed by and acting upon operative movement of the head to engage the work, to set the feed mechanism to feed a measured length of wire-like material adapted to the thickness of the work, the feeding mechanism being constructed and arranged to prevent any movement thereof until after the setting means has operated.

5. A nailing machine comprising a movable head having a variable descending stroke, and a reciprocating awl mounted on the head and having an operating movement terminating at a substantially fixed point.

6. A nailing machine comprising a movable head the operative stroke whereof is variable inversely to the thickness of the work, an awl mounted on the head, and means to impart to the awl on its operative stroke a throw terminating at a substantially fixed point.

7. A nailing machine comprising a movable head the operative stroke whereof is variable inversely to the thickness of the work, a relatively stationary work-support, an awl mounted on the head, and means to reciprocate the awl, said means being constructed and arranged to cause said awl always to descend to the same point with relation to the work-support irrespective of the thickness of the work.

8. A nailing machine comprising a movable head the operative stroke whereof is terminated by engagement with the work and varied inversely as the thickness thereof, a reciprocating awl mounted on the head, a relatively stationary work-support, and means to cause the point of the awl to move to a uniform distance from the work-support at each descent.

9. In a nailing machine, in combination, a vertically movable head having a variable operative vertical stroke, an awl movable with and also relatively to the head, and means to impart an operating stroke to the awl terminating at a substantially fixed point.

10. In a nailing machine, in combination, a movable head having a variable operating stroke governed by the thickness of the work, a reciprocating work-puncturing awl movable with and relatively to the head, and compensating or equalizing means intermediate the awl and head to impart to the former a stroke terminating at a substantially fixed point irrespective of the operating stroke of the latter.

11. In a nailing machine, in combination, a rocking head having a variable operating stroke governed by the thickness of the work, a reciprocating work-puncturing awl movable with and relatively to the head, mechanism to feed wire-like material from which the nails are severed, equalizing means operated by the head on its operating stroke, and connections between said means and the awl and feed mechanism, to impart to the awl an operating stroke terminating at a substantially fixed point and to cause the feed mechanism to feed a length of the wire-like material adapted to the thickness of the work.

12. In a nailing machine, in combination, a horn, a rocking head carrying wire-feeding, severing and nailing mechanisms, a work-puncturing awl reciprocable with and relatively to the head, and means governed by the work-engaging stroke of the head to cause said mechanisms to feed, cut and drive a nail adapted to the thickness of the stock, and also to cause the point of the awl to descend a uniform distance from the horn on each operating stroke.

13. A nailing machine comprising a movable head adapted to beat down and clamp the work and having its operating stroke variable inversely to the thickness of the work, a reciprocating awl and a reciprocating driver, both mounted on the head, the limit of the effective stroke of the driver varying in accordance with the thickness of the work, and means to impart to the awl an operating stroke terminating at a substantially fixed point.

14. A nailing machine comprising a movable head the operative stroke whereof is variable inversely to the thickness of the work, an awl mounted on the head, and means to impart to said awl a stroke which is variable relative to said head.

15. In a nailing machine, a support, a fixed horn, a head provided with means to lift itself relatively to the support, the descent of the head being limited by contact with the work on said horn, an awl and mechanism to reciprocate it, mounted on the head, and controlling means for said mech-

anism to impart to the awl a stroke terminating at a substantially fixed point.

16. In a machine for inserting metallic fasteners, a vertically rocking or swinging head to clamp the work, an awl movable with and also relatively to the head, mechanism to reciprocate the awl to enter and leave the work, and means, including a lever fulcrumed independently of the head, to govern said mechanism and impart to the awl a stroke terminating at a substantially fixed point.

17. In a nailing machine, in combination, a movable head having a variable operating stroke governed by the thickness of the work, a reciprocating work-puncturing awl movable with and relatively to said head, and compensating or equalizing means intermediate the awl and head to impart a variable operative movement to the awl relative to the head, dependent upon the stroke of said head.

18. In a nailing machine, in combination, a rocking head having a variable operating stroke governed by the thickness of the work, a reciprocating awl movable with and relatively to said head, mechanism to feed wire-like material from which nails are severed, equalizing means operated by the head on its operating stroke, and connections between said means and said awl and feed mechanism to impart a variable operating stroke to the awl relative to the head and to cause the feed mechanism to feed a length of the wire-like material adapted to the thickness of the work.

19. In a nailing machine, in combination, a vertically-movable head provided with means to lift it and adapted to descend upon and beat down the work, wire-feeding mechanism, including a rock-shaft, a jaw-carrier loose thereon provided with relatively movable jaws to grasp the wire, an operating member fast on the rock-shaft and adapted to open and close the jaws and to oscillate them in unison, to feed and to return to initial position, and means governed by the thickness of the work to rock said shaft a variable amount and thereby regulate the feed stroke of the jaws.

20. In a nailing machine, in combination, a vertically movable head provided with means to lift it and adapted to descend upon and beat down the work, wire feeding mechanism, including a rock-shaft and feed-jaws operated thereby, a rocking segment having a fixed fulcrum, connections between the rock-shaft and segment and adjustable toward and from the fulcrum of the latter, to rock the shaft varying amounts according to the length of wire to be fed by the jaws, and a setting device for said connections governed by or through the descent of the head upon the work.

21. In a nailing machine, a support, a fixed horn, a head provided with means to lift itself relatively to the support, the descent of the head being limited by contact with the work on said horn, an awl, and mechanism to reciprocate said awl, mounted on the head, and controlling means for said mechanism to impart a variable stroke to said awl relative to said head.

22. In a wire-nailing machine, a movable head provided with a shaft, means actuated by the shaft to move the head, wire-feeding, severing and nailing mechanisms carried by the head and operated in a predetermined sequence by movement of the shaft, means to move the latter, means actuated by operative movement of the head toward the work to set the wire-feeding mechanism before its operation, to thereby cause a measured length of wire to be fed, an intermittingly-reciprocated awl mounted on the head, and means to impart to the awl a stroke terminating at a substantially fixed point irrespective of the extent of operative movement of said head.

23. In a wire-nailing machine, a rocking head provided with a shaft, and wire-feeding mechanism, means to operate the shaft and thereby oscillate the head and actuate the feeding mechanism, an equalizing member fulcrumed externally of the head, and connections between said member and the head and the feeding mechanism, to regulate the feed to the thickness of the work to be nailed.

24. In a machine for inserting metallic fasteners, a rising and falling work-engaging head, a relatively stationary horn, an awl and a driver, a cam, and separate operating connections between it and the awl and driver, all mounted on the head, the limit of the stroke of the driver varying with the movement of the head, and means to change the relation between said cam and the awl-operating connections by or through variations in the movement of the head, whereby the awl descends to the same point on each operative stroke.

25. In a machine for inserting metallic fasteners, a rocking head to descend upon and clamp the work, a rotatable cam and a reciprocating awl mounted on the head, connections, including a cam-follower, between said cam and awl, to reciprocate the latter, and means governed by the descending movement of the head to vary the position of the follower relatively to the cam, whereby on its operative stroke the awl invariably reaches the same point.

26. In a machine for inserting metallic fasteners, a stationary horn, a work-clamping head movable toward and from it, a reciprocating awl mounted on the head, a slide on the head, means controlled by the slide to lengthen or shorten the operative stroke of the awl, and slide positioning means ac-

tuated by the movement of the head toward the work, increase in such movement acting through the slide to shorten the awl stroke, and vice versa.

27. A nailing machine having, in combination, a movable head adapted to beat down and clamp the work, a slide movable with and relatively to the head, work-puncturing mechanism and fastener-forming mechanism, both mounted on the head, connections between said mechanisms and the slide, to govern the operation thereof, and an equalizing device controlled by operative movement of the head to change the relative position of the slide thereon in accordance with the thickness of the work.

28. A nailing machine having, in combination, a head having self-contained mechanism to elevate it and permit it to descend upon the work, a fixed support for the head, a slide on and movable relative to the head, means, including an equalizing lever fulcrumed on the support, to raise or lower the slide more or less as the head descends a greater or less amount, and wire-feed mechanism operatively connected with the slide, to vary the feed inversely as the distance the head descends.

29. A nailing machine having, in combination, a head having self-contained mechanism to elevate it and permit it to descend upon the work, a fixed support for the head, a slide on and movable relative to the head, an equalizing lever fulcrumed midway between its ends on the support, links pivotally connecting the head and slide, to move the latter on the head oppositely and proportionally to the descent of the head, wire-feeding mechanism and a reciprocating awl, both carried by the head, and controlling connections between said mechanism and awl and the slide, to impart to the awl a stroke terminating at a substantially fixed point and a variable feed movement to said mechanism, such feed movement varying with the thickness of the work.

30. In a nailing machine, a movable head, means, including an operating shaft on the head, to lift the latter, a cam thereon, two followers coöperating therewith, awl and driver bars, connections between them and the followers, to effect reciprocation of said bars, intermittingly operating wire-feeding mechanism, and means governed by the operative movement of the head to vary the feed of said mechanism according to the thickness of the work.

31. In a nailing machine, a rocking head, means including an operating shaft on the head, to lift the latter, a cam thereon, two followers coöperating therewith, awl and driver bars, connections between them and the followers, to effect reciprocation of said bars, intermittingly operating wire-feeding mechanism, means, including a slide movably mounted on the head and governed by the operative movement of the head, to vary the feed of said feeding mechanism according to the thickness of the work, and a connection between the slide and the awl-bar actuating follower to change the position of the same relative to the operating cam, whereby the stroke of the awl-bar is increased with the thickness of the work, and vice versa.

32. A nailing machine comprising a movable head adapted to beat down and clamp the work and having its operating stroke variable inversely to the thickness of the work, a reciprocating awl and a reciprocating driver, both mounted on the head, the effective stroke of the driver relative to the head being constant, and means to impart to the awl an operating stroke terminating at a substantially fixed point.

33. A nailing machine comprising a movable head adapted to beat down and clamp the work and having its operating stroke variable inversely to the thickness of the work, a reciprocating awl and a reciprocating driver, both mounted on the head, the effective stroke of the driver relative to the head being constant, and means to impart a variable operative stroke to the awl relative to the head.

34. A nailing machine comprising a movable head adapted to beat down and clamp the work and having its operating stroke variable inversely to the thickness of the work, a reciprocating awl and a reciprocating driver, both mounted on the head, the limit of the effective stroke of the driver varying in accordance with the thickness of the work, and means to impart a variable operative stroke to the awl relative to the head.

35. In a nailing machine, a rocking head adapted to clamp the work, mechanism, including a rotatable shaft 2 on the head, to lift the head, a slide 92 vertically movable on the head, a rock-shaft 127 on the slide having a cam-follower, a coöperating cam 132 on the said shaft 2, and awl a and an awl-bar a^x to which it is secured, connections between said awl-bar and rock-shaft, to effect reciprocation of the former, and means, including an equalizing lever 100 fulcrumed independently of the head and operatively connected with it and the slide 92 to change the position of the slide on the head and through the rock-shaft 127 vary the relative position of the follower and its cam, to vary the operative stroke of the awl-bar inversely to the variations in the distance the head descends upon the work.

36. In a nailing machine, a support A, a head B provided with means including a rotatable shaft 2, to lift itself relatively to the support, the descent of the head being determined by the thickness of the work, an

awl a and mechanism to reciprocate it, driven from the shaft 2 and mounted on the head, and controlling means for said mechanism to impart to the awl a stroke terminating at a substantially fixed point, said means including a lever 100 having a fixed fulcrum 99 on the support A, and a connected slide 92 on the head.

37. In a nailing machine, a movable head provided with means, including a rotatable shaft 2, to lift itself, wire-feeding mechanism on the head, including coöperating jaws 108, 111 mounted on a vibrating jaw-carrier 110, a segment 79 fulcrumed at 81 and having a block 77 movable toward and from the fulcrum and connections between the block and the jaw-carrier, to oscillate it and effect feed of the wire, combined with means to set the block in or out on the segment to decrease or increase the stroke of the jaw-carrier.

38. In a wire-nailing machine, a movable head provided with a shaft, means actuated by the shaft to move the head, wire-feeding, severing and nailing mechanisms carried by the head and operated in a predetermined sequence by movement of the shaft, means to move the latter, means actuated by operative movement of the head toward the work to set the wire-feeding mechanism before its operation, to thereby cause a measured length of wire to be fed, an intermittingly reciprocated awl mounted on the head, and means to impart a variable stroke to said awl relative to said head and dependent upon the extent of operative movement of said head.

39. In a nailing machine, a head to descend upon and clamp the work, self-contained means to lift the head, a reciprocating awl-bar a^{x} provided with an awl and mounted on the head, a slide 92 vertically movable on the head, connected rocker arms 128, 130, carried by the slide, a follower 131 on one of the arms to coöperate with an actuating cam 132, a connection between the other arm and the awl-bar to reciprocate the latter, and an equalizing connection between the head and slide to vary the position of the same upon the head and change the relative position of the cam and follower according to changes in the thickness of the work, whereby the downward stroke of the awl-bar always terminates at the same point irrespective of the thickness of the work.

40. In a nailing machine, an oscillating head a fixed fulcrum for said head and operating mechanism, carried by said head, said mechanism including a clutch, and a controller therefor, a treadle fulcrumed independently of the head, and an operating connection between the treadle and controller, constructed and arranged to substantially absorb or take up vibrations of the controller and prevent their transmission to the treadle.

41. A nailing machine comprising a fixed support, a head mounted to oscillate thereon and carrying operating mechanism, and a controller therefor also carried on the head and oscillating therewith, a treadle fulcrumed on the support, and a connection between the controller and treadle to operate the former, said connection being constructed and arranged to prevent transmission of the oscillation of the head and controller to the treadle when the machine is in operation.

42. In a nailing machine, an oscillating head carrying operating mechanism and a controller, a starting treadle fulcrumed independently of the head, and an operating connection between the treadle and controller, including a device to take up and prevent transmission to the treadle of movements of the controller induced by oscillation of the head.

43. In a nailing machine, a head adapted to intermittingly engage and beat down the work, operating mechanism for and mounted on the head, including a controller, a starting member mounted independently of the head, and a positive connection between said starting member and controller, said connection including a device to reduce to a minimum head-induced movements of the controller and thereby prevent any objectionable vibration of the starting member when the machine is in operation.

44. In a nailing machine, a vertically oscillating head, a clutch-controller carried thereby, a starting device for the machine, and a positively-acting operating connection between said device and the controller, including means to prevent vibration of the starting device by or through oscillation of the head.

45. In a nailing machine, a vibratable head, means, including a controller, carried by and to effect vibration of the head, a starting treadle having a stationary fulcrum, a stirrup having a rigid depending extension jointed to the treadle, links pivotally connected at their upper ends with said stirrup and at their lower ends jointed to the controller, and means to guide the upper ends of the links, in fixed paths, vibrations of the controller being taken up by swinging movement of the links, whereby transmission of such controller movements to the treadle is prevented.

46. In a nailing machine, a vertically oscillating head, a clutch-controller carried thereby and movable longitudinally relatively thereto, to set or release the clutch, a starting treadle having a stationary fulcrum, a member pivotally connected therewith and

movable at its upper end in a fixed path, and a swinging connection between the upper end of the said member and the lower end of the controller, to take up vibratory motion of the latter and prevent transmission thereof to the treadle.

47. In a nailing machine, an oscillating head, actuating mechanism therefor, a controller movable with the head, and also relatively thereto to govern said mechanism, a treadle mounted independently of the head, and an operating connection between the treadle and the controller, to move the latter relatively to the head, said connection including means to take up or absorb movement of the controller with the head and thereby prevent transmission of such movement to the treadle.

48. In a nailing machine, an oscillating head, actuating mechanism therefor, a controller movable with the head, and also relatively thereto to govern said mechanism, the lower end of the controller describing a short curved path of long radius when vibrated by oscillation of the head, a treadle mounted independently of the head, a stirrup having a rigidly attached extension pivotally connected at its lower end with the treadle, links jointed to the lower end of the controller and at their upper ends pivotally connected with the stirrup, and means to guide the upper ends of the links in a vertical path, the vibrations of the lower end of the controller being taken up by the swing of the links on the stirrup to prevent transmission of such vibrations to the treadle, said links, stirrup and its extension also forming a positive connection between the treadle and controller to move the latter relatively to the head.

49. A nailing machine having, in combination, a head having self-contained mechanism to elevate it and permit it to descend upon the work, a fixed support for the head, a slide on and movable relative to the head, an equalizing lever fulcrumed midway between its ends on the support, links pivotally connecting the head and slide to move the latter on the head oppositely and proportionally to the descent of the head, wire-feeding mechanism and a reciprocating awl, both carried by the head, and controlling connections between said mechanism and awl and slide to impart a variable operative movement to the awl relative to the head and a variable feed movement to said mechanism, said movements varying with the thickness of the work.

50. A machine for inserting metallic fastenings, comprising in combination a work-support, a head movable toward and from said support, awl mechanism and driver mechanism mounted on said head, and means to maintain an awl movement to a fixed position relative to said work-support and a driver movement to a variable position relative thereto.

51. A machine for inserting metallic fastenings, comprising in combination a work-support, a head movable toward and from said support, awl mechanism and driver mechanism mounted on said head, means to maintain an awl movement to a fixed position relative to said work support and a driver movement to a variable position relative thereto, fastener supplying means, and connections to cause the latter to deliver fasteners of variable lengths to said driver mechanism.

52. A machine for inserting metallic fastenings comprising a work-compressing head and a work-support toward and from which the head is movable, fastener driving mechanism and fastener supplying mechanism, both carried by the head, an awl movable with and also relatively to the head, and means governed by work-engaging movement of the head, to cause the point of the awl to descend to a fixed point relative to the work-support and also to cause said mechanisms to supply a fastener adapted to the thickness of the work and drive the same.

53. A machine for inserting metallic fastenings comprising a work-compressing head and a work-support one of which is movable relative to the other, wire-feeding jaws, a rocking segment having a fixed fulcrum, an operating connection between the segment and jaws and adjustable toward and from the fulcrum of the segment, to vary the movement of said jaws according to the length of wire to be fed thereby, and a setting device for said connections governed by the relative movement between the head and work-support.

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

MERTON D. PHELAN.

Witnesses:

JOHN C. EDWARDS,

FREDERICK L. EMERY.