(No Model.)

5 Sheets—Sheet 1.

G. GODDU.

NAILING MACHINE.

No. 583,044. Patented May 25, 1897.

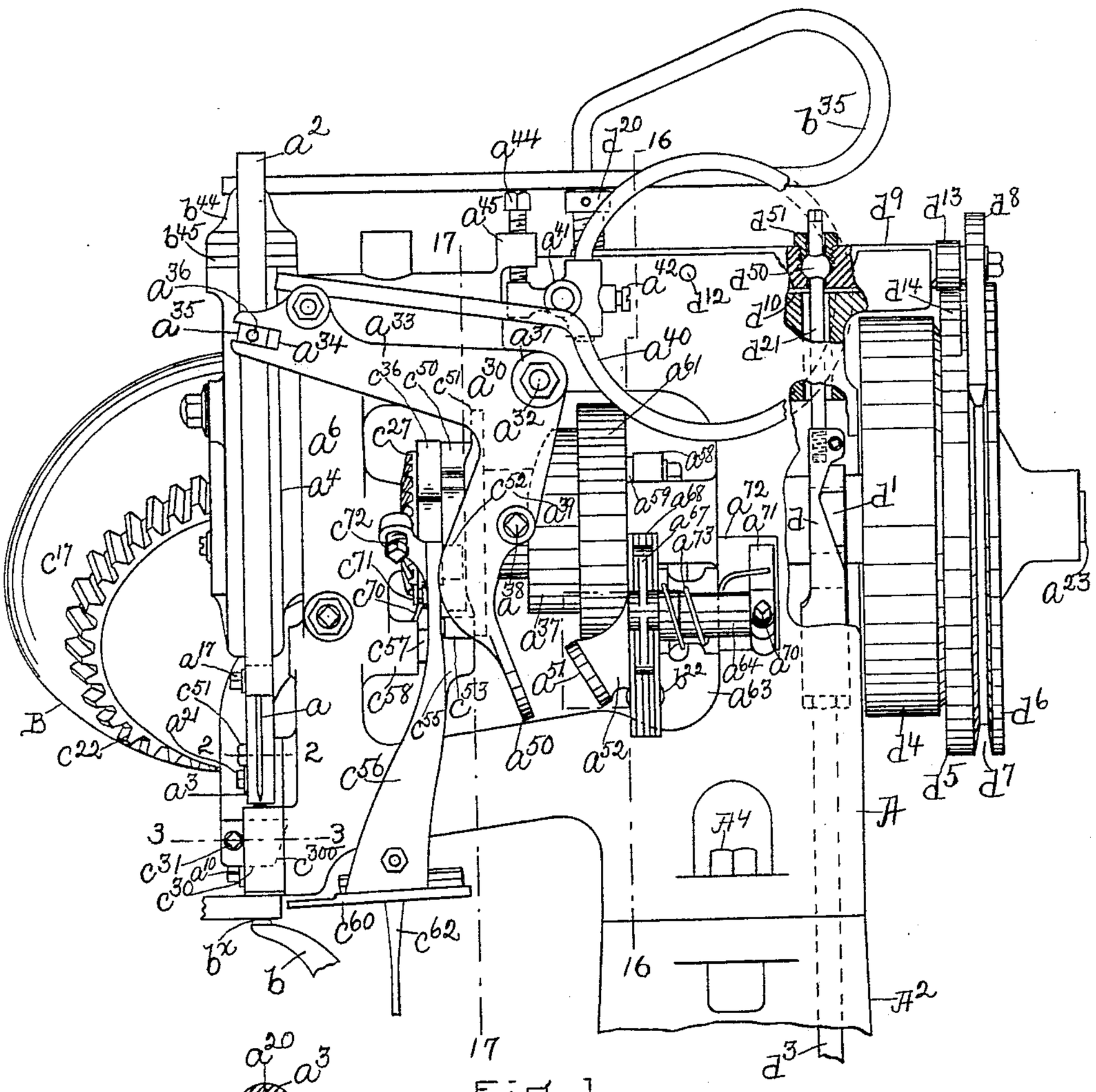

Fig. 1.

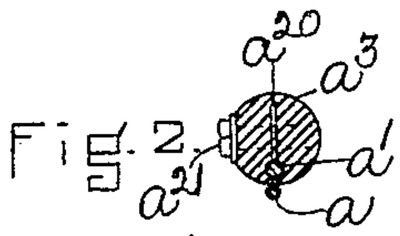

Fig. 2.

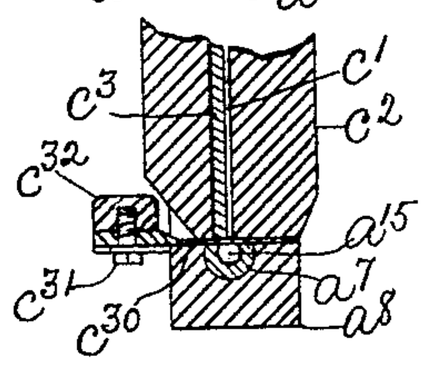

Fig. 3.

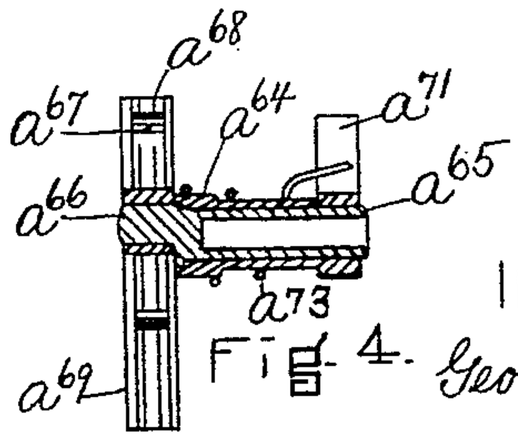

Fig. 4.

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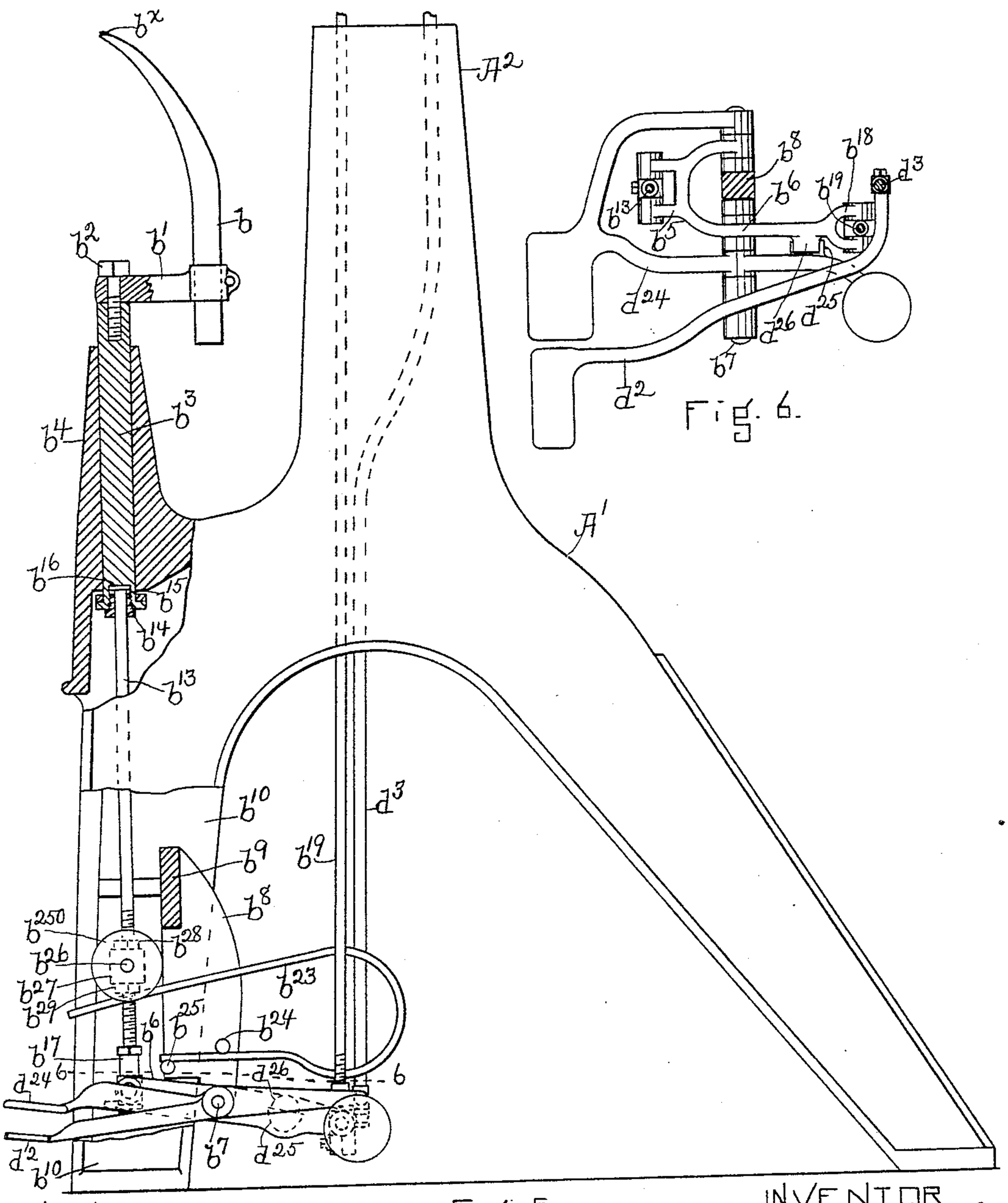

Fig. 5.

Fig. 6.

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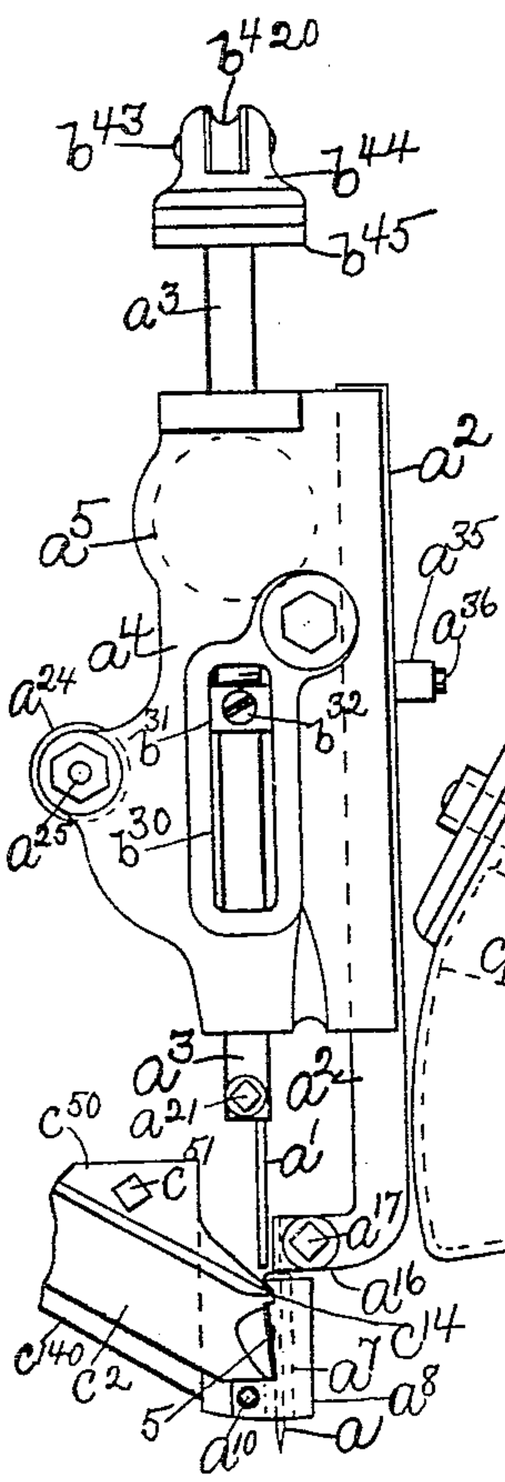

Fig. 1.

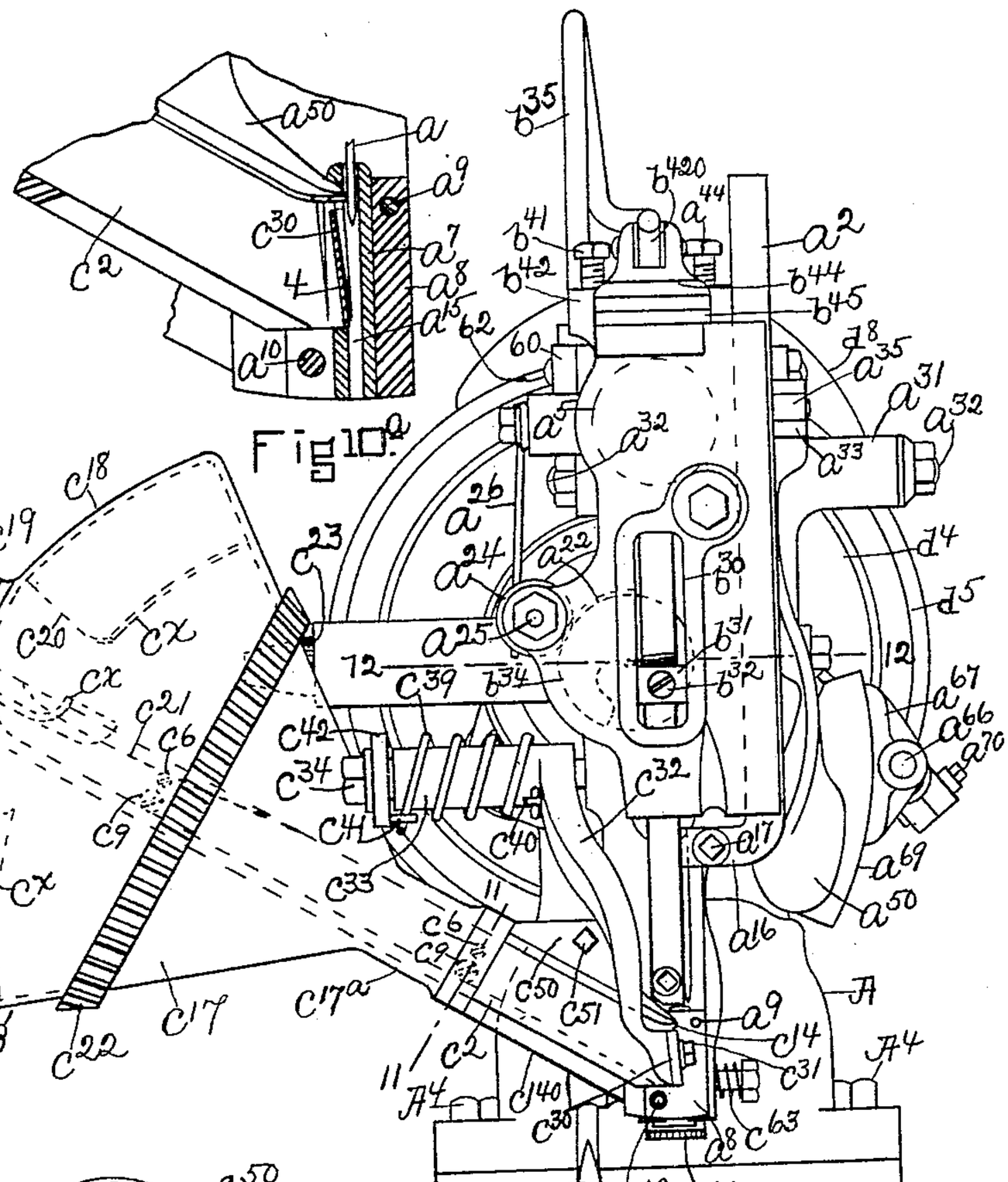

Fig. 2.

Fig. 7.

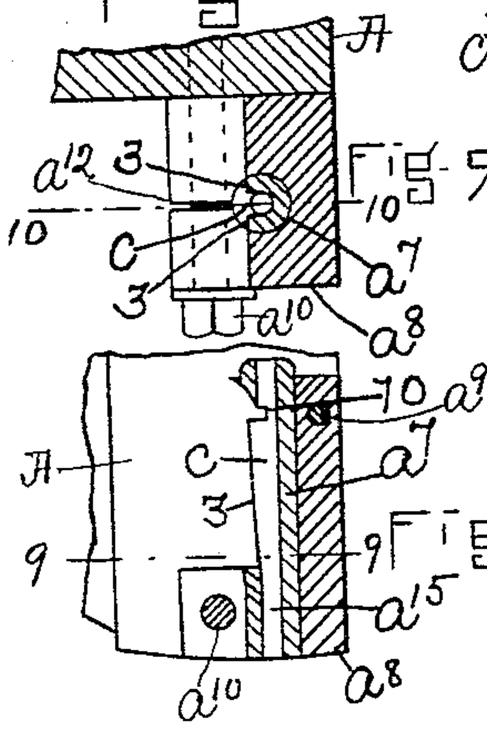

Fig. 8.

Fig. 10.

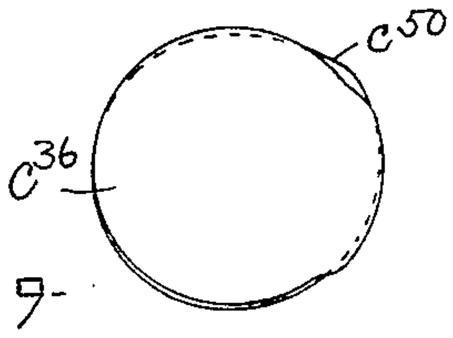

Fig. 14.

Fig. 9.

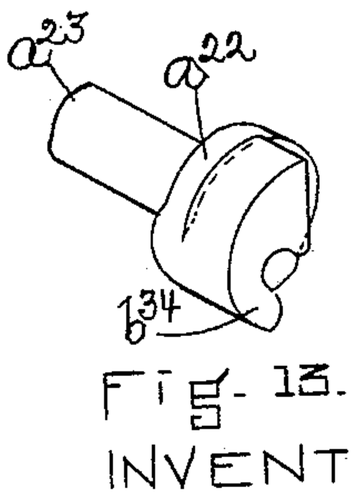

Fig. 13.

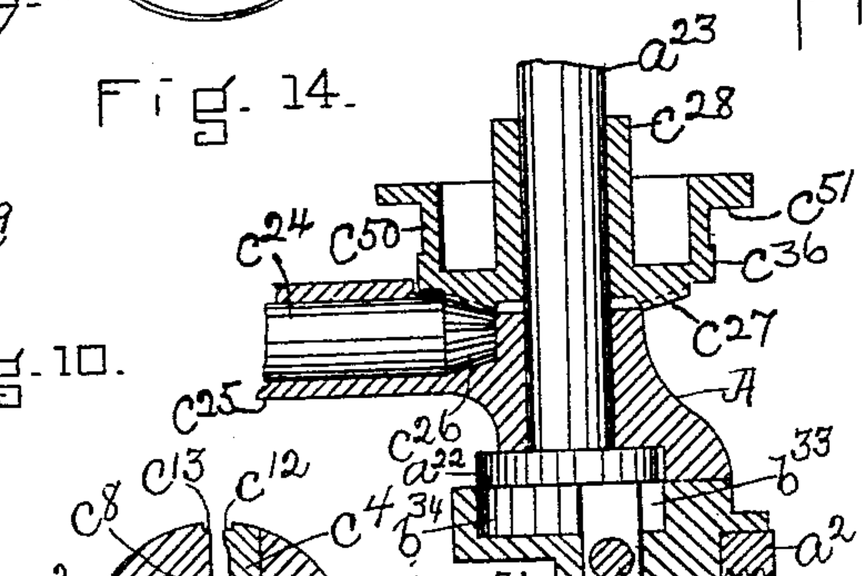

Fig. 11.

Fig. 12.

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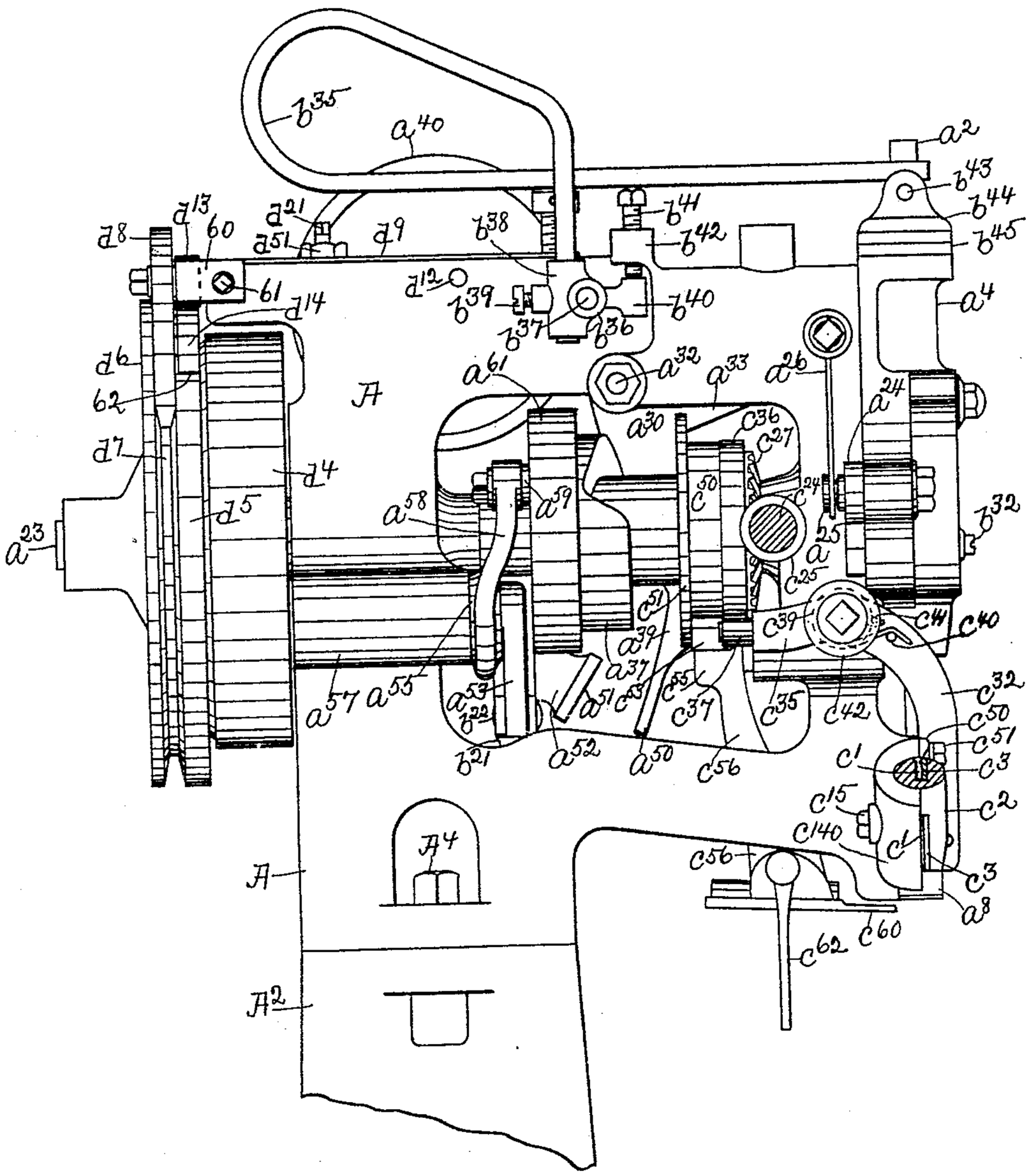

Fig. 15.

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NAILING MACHINE.

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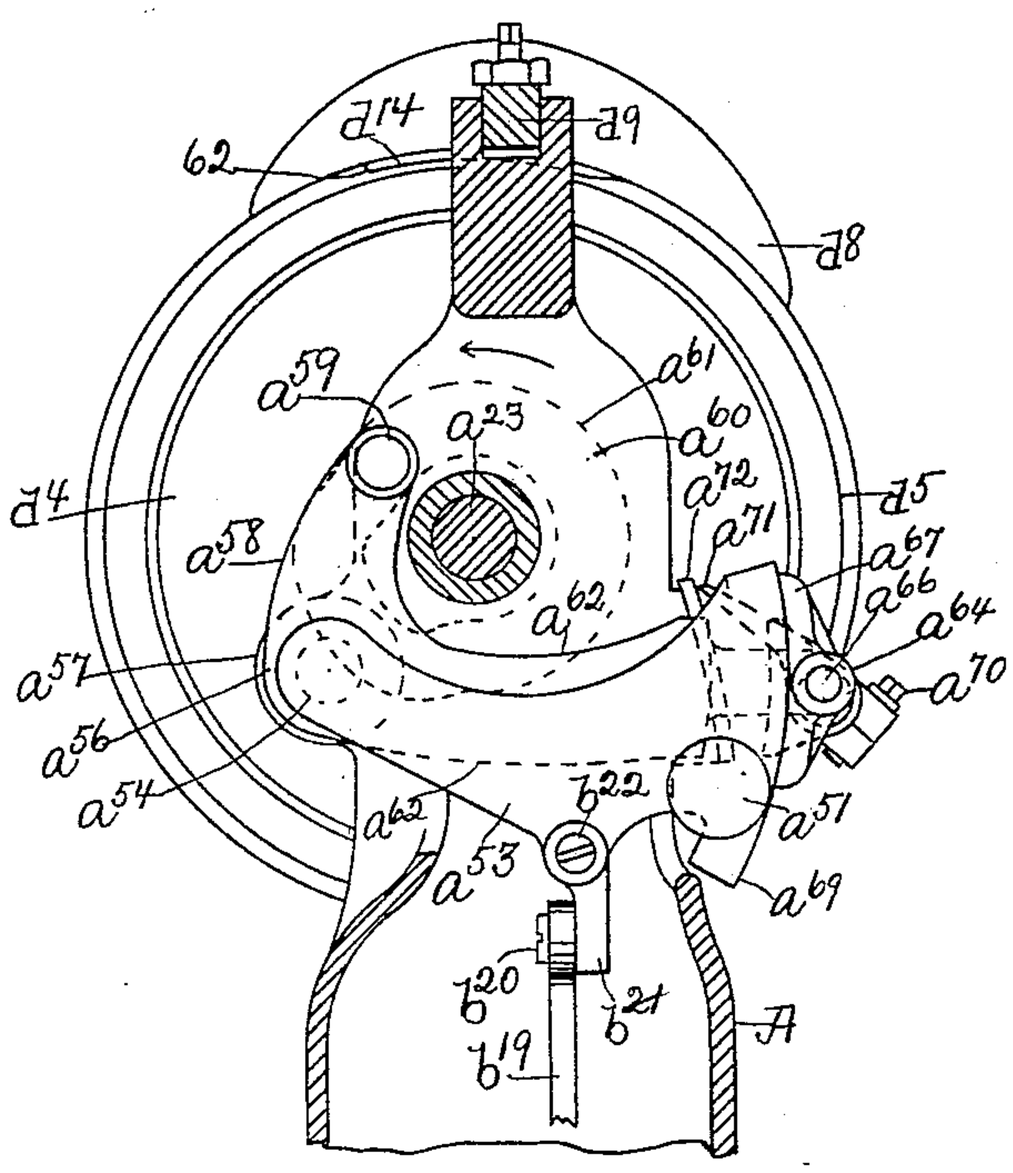

Fig. 16.

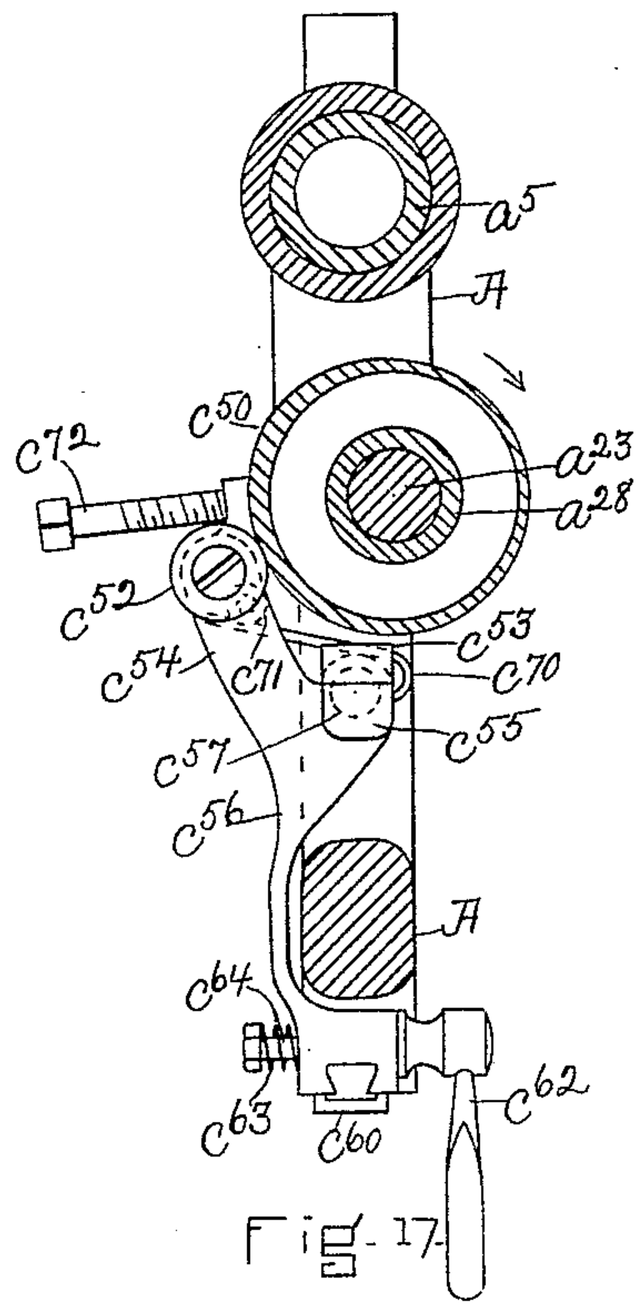

Fig. 17.

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UNITED STATES PATENT OFFICE.

GEORGE GODDU, OF WINCHESTER, MASSACHUSETTS.

NAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 583,044, dated May 25, 1897.

Application filed August 25, 1896. Serial No. 603,883. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GODDU, residing in Winchester, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Nailing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to a machine for inserting metallic fastenings into work, and is herein shown as embodied in a machine of that class commonly called "loose" nailers and employed in the manufacture of boots and shoes.

This invention has for its object to provide a machine with which loose nails may be driven into the work in a superior manner, so as to avoid imperfections in the work, such as crippling or bending of the heads of the nails and unevenly-driven nails, some of which project above the surface of the work.

The machine is provided with an awl to prick a hole in the work and with a driver to force the loose nails into the holes pricked by the awl, and it is further provided with a stationary throat through which both the awl and driver are adapted to pass, and the said throat also coöperates with a horn or work-support which is in line with the said throat and between which and the said throat the portion of the work to be pierced by the awl is firmly clamped or compressed and held stationary while the operations of pricking a hole in the work and then driving a nail into the hole thus formed take place, the machine being constructed, as will be described, so as to permit these operations to be performed.

The throat referred to has the double function of a rest for the work and a guide for the nail, which results in the nails being supported throughout their length while being driven into the work, thereby avoiding crippling or bending of the heads of the nails, and also results in each nail being driven into the work so that its head is flush or substantially flush with the surface of the work compressed between the horn and the bottom surface of the throat.

The awl and driver pass into the same stationary throat, and to effect this result the said awl and driver are carried by a movable frame or carrier which in the present instance is pivoted to the head or stationary part of the machine, and the movements of the said carrier are effected when both the awl and driver are out of the throat, thereby leaving the said carrier free or clear to be moved in one direction to place the awl in line with the throat and in the opposite direction to place the driver in line with the said throat. The stroke of the awl may and preferably will be automatically governed by the thickness of the work, so that the hole made in a thin part of the work may not extend entirely through the work, but may leave a portion of the thickness of the work unpunctured, whereby the nail when driven will be forced through solid material or work in the thin part as well as in the thick part, which solid material affords a firm hold upon the nail and thereby effects a more efficient fastening together of the work, and, furthermore, the point of the awl is prevented from being dulled or otherwise injured by striking the horn. The stationary throat has coöperating with it a roadway for the loose nails, which roadway is fastened to a stationary part of the machine, and between which and the throat is interposed a separator by which the nails in the roadway are transferred one by one to the throat.

The roadway may and preferably will be extended into a hopper, to be hereinafter described, which contains the loose nails in bulk and which is rotated as will be described.

The work-support or horn may and preferably will be lowered by a novel mechanism, as will be described, and the work when released by the horn may be fed forward by a feed mechanism independent of the awl, as will be described.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a side elevation, with parts broken away, of the upper portion or head of a machine embodying this invention; Fig. 2, a sectional detail on the line 2 2, Fig. 1; Fig. 3, a sectional detail on the line 3 3, Fig. 1; Fig. 4, a sectional detail to be referred to; Fig. 5, a side elevation, with parts broken away, of the lower portion of the machine shown in Fig. 1; Fig. 6, a sectional detail on

the line 6 6, Fig. 5; Fig. 7, a front elevation of the machine shown in Fig. 1; Fig. 8, a detail in front elevation, to be referred to, showing the awl in the throat; Figs. 9 and 10, sectional details, on an enlarged scale, of the stationary throat, Fig. 9 being taken on the line 9 9, Fig. 10, and Fig. 10 being taken on the line 10 10, Fig. 9; Fig. 10^a, a detail on an enlarged scale, to be referred to; Fig. 11, a sectional detail, on an enlarged scale, through the roadway, the section being taken on the line 11 11, Fig. 7; Fig. 12, a sectional detail on the line 12 12, Fig. 7; Figs. 13 and 14, details of cams to be referred to; Fig. 15, a side elevation of the machine shown in Fig. 1, looking from the opposite side; Fig. 16, a transverse section of the machine on the irregular line 16 16, Fig. 1, looking toward the right, parts of the machine shown in Fig. 1 being omitted from Fig. 16; Fig. 17, a transverse section of the machine on the line 17 17, Fig. 1, looking toward the left, parts of the machine shown in Fig. 1 being omitted from Fig. 17.

The operating parts of the machine herein shown as embodying this invention consists, essentially, of a head A, a base A′, and a hollow upright or post A^2, preferably integral with the base, and upon which the head A is secured, as by bolts A^4. The machine herein shown includes as part thereof (see Figs. 7 and 8) an awl a to prick a hole in the work and a driver a' to drive a nail into the said hole, and the said awl and driver are respectively secured to an awl-bar a^2 and a driver-bar a^3, which are adapted to be independently reciprocated in a frame or carrier a^4, which, in accordance with this invention, is movably secured to the stationary head or frame of the machine, it being pivoted, as at a^5, to the front face or side a^6 of the said head. The awl a and the driver a', in accordance with this invention, are designed in their independent reciprocations in a downward direction to both enter a throat a^7 in a throat plate or block a^8, which is stationary and secured to the head A or other stationary part of the machine below the carrier or frame a^4. The throat-plate a^8 may be secured to the front face of the head A, as herein shown, it being fastened at its upper end by a pin a^9 and at its lower end by a screw a^{10}, and in order to permit the throat a^7 to be readily removed the throat-block is provided with a longitudinal slit a^{12} (see Fig. 9) at one side of the hole, into which the throat a^7 is inserted, and the said throat is firmly secured in its block a^8 by the screw a^{10}, which acts as a clamping-screw to draw the split parts of the block a^8 together to clamp the throat.

The awl a and the driver a' are alternately inserted into and withdrawn from the throat a^7 in the operation of the machine, and to permit this result to be accomplished the carrier or frame a^4 is moved on its pivot a^5 at a time when both the awl and driver are out of the throat, the said frame or carrier being moved in one direction to place the awl over and in line with the passage a^{15} in the throat, and in the other or opposite direction to place the driver in line with the passage a^{15} in the said throat. In order to reduce this oscillating movement of the carrier or frame a^4 to a minimum and thereby facilitate the speed of the machine, the driver and awl are preferably brought together as close as possible without interfering with each other, and this result may be effected, as herein shown, by providing the awl-bar a^2 with an arm a^{16}, which extends toward and close to the path of movement of the driver, (see Fig. 8,) the said arm being preferably provided with a slitted end, between the parts of which the awl a is clamped by a set-screw a^{17}, and the driver-bar a^3 is also preferably provided with a longitudinal slit a^{20} at one side, (see Fig. 2,) into which the driver a' is inserted and clamped by the set-screw a^{21}.

The carrier or frame a^4 may be swung in one direction by a cam-disk a^{22} on a shaft a^{23}, (see Figs. 7 and 13,) which in the present instance is the main shaft of the machine and which is supported in bearings in the head A of the machine. The cam a^{22} acts, as shown, on a roller a^{24}, mounted on a stud or pin a^{25}, (see Figs. 7 and 15,) carried by the frame a^4, and the said roller is kept in engagement with its coöperating cam a^{22} by a spring a^{26}, herein shown (see Fig. 15) as secured at one end to the head A of the machine and having its other end engaging the stud or pin a^{25}, the said spring moving the carrier or frame a^4 in an opposite direction from the cam-disk a^{22}.

The carrier or frame a^4 is turned on its pivot when both the awl and driver are removed from the stationary throat a^7, and the said awl and driver are and may be reciprocated as will now be described. In the present instance the awl-bar a^2 is movable in a guideway formed in the carrier or frame a^4 at one side thereof, as shown in Figs. 1, 7, and 8, and the said awl-bar is reciprocated in said guideway by an elbow-lever a^{30}, (see Fig. 1,) provided, as shown, with a hub a^{31}, (see Fig. 7,) mounted upon a stud or pivot pin a^{32}, attached to the head A of the machine. The lever a^{30} has one arm a^{33} operatively connected to the awl-bar a^2, and this connection may be effected, as herein shown, by providing the arm a^{33} with a slot a^{34} to receive a block a^{35}, loosely mounted on a stud or pin a^{36}, extended from the awl-bar a^2. The elbow-lever a^{30} is moved on its pivot a^{32} in one direction by a cam a^{37}, herein shown as a face-cam fast on the main shaft a^{23}, the said cam engaging a roller, (not shown,) but which is loose on a stud or pin a^{38}, carried by the arm a^{39} of the elbow-lever, and the said elbow-lever is moved in an opposite direction by a suitable spring, herein shown as a wire rod a^{40}, bent at one end into the form of a loop or coil, which is fastened to an adjustable or movable support, shown as an arm or lever

a^{41}, pivotally secured to the head A and provided with a socket into which one end of the spring-rod a^{40} is fastened, as by a set-screw a^{42}, the said lever or arm having its other end adapted to engage an adjusting-screw a^{44}, extended through a threaded opening in a boss or projection a^{45} on the head A. The free end of the spring a^{40} bears upon the arm a^{33} of the lever a^{30}. In the present instance the awl is moved downward by the spring a^{40} and is moved upward by the cam-disk a^{37}, and one of the features of this invention consists in automatically regulating the length of the downstroke of the awl according to the thickness of the stock or work in line with the throat and to be entered by the awl. This automatic regulation may and preferably will be effected by mechanism as will now be described.

Referring to Fig. 1, it will be seen that the arm a^{39} of the lever a^{30} is provided with an extension a^{50}, inclined with relation to the said arm and adapted to coöperate with a variable back-stop, shown as an inclined head a^{51} on a lug or arm a^{52}, projecting from a lever or arm a^{53}, (see Figs. 1 and 16,) provided with a pivot pin or stud a^{54}, suitably supported, and herein represented as extended into a socket in the hub a^{55} of a cam-actuated lever a^{56}, supported in a boss or hub a^{57}, attached to the head A. The lever a^{56} is provided with an arm a^{58}, (see Figs. 15 and 16,) carrying a stud or roller a^{59}, which enters a cam-groove a^{60} (see dotted line, Fig. 16) in the face of a disk a^{61}, herein represented as forming part of the cam-disk a^{37}. The lever a^{56} has its other arm a^{62} extended through an opening a^{63} in the head A and provided at its end with a sleeve or hub a^{64}, through which extends a rock-shaft a^{65}, (see Fig. 4,) provided at one end with an eccentric arm or crank a^{66}, on which is mounted a clutch or friction shoe or member a^{67}, preferably provided with a beveled face to enter a beveled groove a^{68} in a curved or segmental arm or end a^{69} of the lever a^{53}. The sleeve a^{64} of the cam-actuated lever a^{56} is preferably split and secured together by a clamping-screw a^{70} to frictionally hold the rock-shaft a^{65}.

The clutch or friction-shoe a^{67} is adapted to be held out of engagement with its coöperating surface a^{68} by a crank or arm a^{71} on the rock-shaft engaging a block or rest a^{72}, (see Fig. 1,) preferably adjustably secured to the head A, and the said shoe is adapted to be engaged with its coöperating surface when the crank or arm a^{71} is carried off from the block a^{72}, as will be described, by a spring a^{73}, shown as coiled about the sleeve a^{64} and having one end fast to said sleeve and its other end engaging the crank or arm a^{71}.

The lever a^{53} is operatively connected to the work-support, shown in the present instance as a curved or bent horn b, (see Fig. 5,) provided at its upper end with a suitable tip or cup $b^{\times}$ and adjustably secured in an arm b', fastened as by a screw b^2 to the end of a shaft b^3, having bearings in a post or upright b^4, erected from the base A'. The shaft b^3 is connected to one arm b^5 of a lever b^6, (see Figs. 5 and 6,) mounted on a shaft or rod b^7, supported in a depending arm b^8, attached to a cross-bar b^9, connected to the front legs b^{10} of the base A'. The connection of the shaft b^3 with the lever b^6 is effected, as herein shown, by means of a link or rod b^{13}, extended through a sleeve or nut b^{14}, adapted to enter a screw-threaded socket b^{15} in the lower end of the shaft b^3, the said rod or link being provided at its upper end with a head b^{16}. The lower end of the rod or link b^{13} is screw-threaded and enters a threaded socket in an arm b^{17}, pivotally connected to the arm b^5 of the lever b^6. The other arm b^{18} of the lever b^6 is connected to the lever a^{53} by a link or rod b^{19}, extended up through the hollow post A^2 and in the present instance fastened at its upper end by a screw b^{20} to an arm or lug b^{21}, pivotally secured, as at b^{22}, to the lever a^{53}. (See Fig. 16.) The horn b is normally elevated, which may be accomplished, as herein shown, by bent spring-rods b^{23}, only one of which is shown in Fig. 5, one end of the said bent spring-rods being fastened to the opposite sides of the bracket or arm b^8 by pins or projections b^{24} b^{25}, which engage the upper and lower surfaces of the said rods, the other or free ends of the said rods bearing against the under surface of suitably-grooved rolls b^{250}, only one of which is shown in Fig. 5, the said rolls being mounted on studs or pins b^{26}, projecting from the opposite sides of a sleeve or block b^{27}, fitted upon the link or rod b^{13} and secured in its adjusted position thereon, as herein shown, by means of lock-nuts b^{28} b^{29}.

By reference to Fig. 1 it will be seen that the position of the horn with relation to the stationary throat automatically positions the inclined back-stop or head a^{51} with relation to the inclined extension a^{50} and thereby automatically governs the extent of movement of the awl-actuating lever a^{30} and consequently automatically governs the length of the downstroke of the awl and therefore the depth of the hole made in the work by the said awl, according to the thickness of the stock or work between the horn and the throat, so that when a thin part of the work is interposed between the horn and throat a hole of less depth will be made by the awl than when a thick part of the work is supported on the horn.

The eccentrically-operated clutch or friction member or shoe a^{67} connects the horn mechanism with the cam-operated lever a^{56} to lower the horn, as will be described.

The awl-bar a^2 and the driver-bar a^3 are alternately reciprocated, and the reciprocation of the latter may and preferably will be accomplished as will now be described.

Referring to Figs. 7, 8, and 12, the driver-bar a^3 is shown as extended through its carrier a^4, and the latter is provided with a slot

or opening b^{30}, forming a guideway for a cross head or block b^{31}, fastened on the driver-bar as by a set-screw b^{32} and having one end extended into a chamber or space b^{33}, (see Fig. 12,) between the carrier a^4 and the front face of the head A, and into which projects a lifting-cam b^{34}, fast on the main shaft a^{23}, and herein shown as integral with the carrier-operating cam a^{22}. The cam b^{34} serves to lift the driver-bar and to retain it in its elevated position a predetermined length of time, and is suitably shaped to permit the said bar to be moved downward or in the opposite direction by a suitable spring, preferably of the construction herein shown, it consisting of a bent wire rod b^{35}, (see Figs. 1 and 15,) having one end fastened to an adjustable support, shown as a lever b^{36}, pivoted, as at b^{37}, to the head A and having a socketed arm b^{38}, into which one end of the wire rod b^{35} is inserted and fastened, as by a set-screw b^{39}, the other arm b^{40} of the said lever being engaged by an adjusting-screw b^{41}, extended through a boss b^{42} on the head A. The other end of the spring b^{35} engages the driver-bar a^3, and in the present instance the said spring rests upon a grooved roll b^{420}, mounted on a pin b^{43}, supported in a head b^{44} on the end of the driver-bar, the said driver-bar also having on it, as herein shown, washers b^{45}, of leather or other suitable material, to cushion the blow of the driver. The driver a' on its descent passes into the throat a^7 and forces the nail therein out of the said throat and into the hole in the stock or work previously made by the awl, the said driver being moved the same or a uniform distance on each stroke, and in its lowered position in the throat the end of the said driver is substantially flush with the bottom surface of the throat, so that each nail is driven into the work or stock with its head flush with the upper surface of the work.

The nails referred to are supplied to the throat one by one, and to effect this result in the machine herein shown the throat a^7 is provided on one side with a longitudinal slot or opening c, (see Fig. 10,) preferably provided with inclined side walls which extend downward and rearward, as shown in Fig. 10, and which may be formed by removing a portion of the circumferential wall of the throat to leave an inclined flat face 3, (see Figs. 10 and 10^a,) for a purpose as will be described. The slot c in the throat a^7 has coöperating with it a longitudinal nail-slot c' in a roadway, preferably made as herein shown, and consisting of a cylindrical bar c^2, (see Figs. 11 and 15,) having its lower end wall or face 4 adjacent to the throat a^7 (see Fig. 10^a) inclined and substantially parallel to the inclined flat face 3 of the throat, for a purpose as will be described. The cylindrical bar c^2 is provided with preferably a substantially wide longitudinal slot c^3, into which is placed a substantially flat plate or bar c^4 of substantially the length of the roadway and constituting an adjustable side wall for the nail-slot c', the said side wall being secured in its adjusted position in the slot c^3, as herein shown, by means of screws c^5 c^6, the screw c^5 being extended into a threaded opening in the movable side wall or plate c^4, (see Fig. 11,) and the screw c^6 working in a threaded opening c^7 in the roadway c^2 and adapted to abut against the movable plate or side wall to adjust or position the same with relation to the stationary side wall c^8 of the slot c', to vary the width of the slot according to the width or thickness of the nails. The screw c^5 is provided, as herein shown, with a head c^9, adapted to seat against the bottom of the socket c^{10} in the side of the roadway.

The side walls c^4 c^8 of the slot c' are provided at their upper ends with shoulders c^{12} c^{13}, upon which rest the heads of the nails.

The roadway c^2 is provided, as herein shown, (see Figs. 7, 8, and 10^a,) with projecting fingers c^{14}, only one of which is shown in said figures, and which fingers are extended from the upper part of the inclined end wall 4 of the said roadway and project into transverse slots 10 in the inclined walls of the slot c, for a purpose as will be described.

The roadway c^2 is adapted to fit into a substantially semicircular groove in a lug or projection c^{140} on the side of the head A (see Fig. 15) and to be secured to said lug by a screw c^{15}, extended through said lug and into one side of the roadway.

The roadway c^2 is inclined upwardly with relation to the head A and is adapted to be supplied with nails from a rotating hopper B, preferably of the construction herein shown, it consisting of a tapering or conical body portion c^{17}, preferably provided with a cylindrical extension or sleeve c^{17a}, which abuts against the end of the lug or projection c^{140} on the frame or head A. The conical body portion c^{17} is preferably provided with a curved head c^{18}, provided with a suitable inlet-opening for the nails, which opening may be normally closed by a cover or cap c^{19}, secured to the end of the roadway c^2, (see Fig. 7,) the said cap forming a bearing for one end of the hopper. The conical body portion c^{17} is provided on its inner circumference with a series or plurality of troughs, shelves, or arms c^{20}, preferably attached to the head c^{18} and provided with an upturned outer side or edge $c^{\times}$, (see dotted lines, Fig. 7,) which arms act as scoops or shovels to lift the nails and carry them up over the roadway and to discharge them upon the latter and into an enlargement c^{21} of the slot c' in the roadway, which enlargement is indicated by dotted lines in Fig. 7.

The conical hopper is mounted upon the inclined roadway to revolve thereon, and by reference to Fig. 7 it will be seen that the under side or portion of the conical hopper inclines downward from the apex toward the base of the cone—that is, from the point of contact of the conical hopper—namely, the cylindrical extension c^{17a}—with the roadway—toward the head of the hopper, which con-

struction, it will readily be seen from an inspection of Fig. 7, precipitates or gravitates the nails which are not lodged in the roadway toward the base of the conical body portion c^{17} and therefore toward the lifting arms or shovels c^{20}, upon which they are caught and retained by the curved or upturned edges of the said arms and again carried over and discharged upon the enlarged opening in the roadway. This construction of hopper avoids the nails accumulating at the discharge end of the roadway and insures a free passage of the nails down the roadway, and also enables the machine to be run until substantially all the nails in the hopper have been used.

The rotation of the conical hopper B may be effected, as herein shown, by means of a bevel-gear c^{22}, encircling the hopper and meshing with a bevel-pinion c^{23} on the end of a shaft c^{24}, having bearings in a hollow arm c^{25}, extended from the head A of the machine, the said shaft being provided on its inner end with a bevel-pinion c^{26}, (see Fig. 12,) which meshes, through an opening in the hollow arm c^{25}, with a bevel-gear c^{27} on the face of a cam c^{36}, fast on the shaft a^{23}.

The loose nails deposited in the slot c' of the roadway travel down the said roadway with their heads supported by the shoulders c^{12} c^{13} and are retained in the said slot by the sleeve c^{17a} and an adjustable cap for the front end of the slot c', the said cap being shown as a substantially triangular piece c^{50}, having its front end, as herein shown, extended into the throat (see Fig. 10^a) to cover the endmost nail.

The cap c^{50} may and preferably will be adjustable away from the slot c' in the roadway to permit of inspection of the nails, which adjustment may be effected by providing the cap with a hole larger than the screw c^{51}, by which the said cap is detachably secured to the head A. The cap c^{50}, being detachable, also permits of access to the nails in the discharge end of the roadway in case they should become wedged or their passage down the roadway obstructed.

The passage of the nails one by one from the slot in the roadway into the passage a^{15} in the throat through the slot c is controlled by a separator preferably of the construction herein shown, (see Fig. 3,) it consisting of a thin blade c^{30}, provided with a rearwardly-inclined front edge c^{300}, (see Fig. 1,) and secured, as by the screw c^{31}, to the lower end of a separator-lever c^{32}, (see Figs. 7 and 15,) the said lever, as herein shown, being provided with a hub c^{33}, loosely mounted on a stud, pin, or bolt c^{34}, extended from the head A of the machine.

The separator-lever c^{32} has its lower end inclined with relation to its hub, so that the blade c^{30}, when secured to said lever, may enter the inclined passage between and formed by the inclined end wall 4 of the roadway and the inclined flat face or wall 3 of the throat a^7. The inclined separator-blade when inserted into the passage between the throat and the end of the roadway closes the slot c in the throat and forms an inclined support, down which the nail may be directed into and toward the bottom of the throat, as clearly shown in Fig 10^a.

The lever c^{32} is provided with an arm c^{35}, (see Fig. 15,) adapted to be acted upon by a cam on the periphery of a cam-disk c^{36}, provided with a hub c^{28}, fast on the shaft a^{23}, the said cam in the present instance engaging a roller c^{37}, loose on the arm c^{35} of the separator-lever. The cam c^{36} acts on the separator-lever to move it in one direction, and the said lever may be moved in the opposite direction, as herein shown, by a spring c^{39}, herein shown as coiled about the hub c^{33} of the separator-lever and having one end engaging a pin or projection c^{40} on the lever c^{32} and the other end engaging a pin or projection c^{41} on a collar or flange c^{42} on the bolt or stud c^{34}. The cam-disk c^{36} is further provided, as herein shown, with a peripheral cam c^{50} and a face-cam c^{51}, with which coöperate, respectively, rollers c^{52} c^{53}, (see Figs. 1 and 17,) carried, respectively, by arms c^{54} c^{55} of a feed-lever c^{56}, provided with a pivot-pin or stud c^{57}, having bearings in a hub or boss c^{58} on the head A of the machine, the said pivot-pin being adapted to be rotated and to be moved longitudinally in the boss or bearing-hub c^{58}, for a purpose as will be described. The feed-operating lever c^{56} carries at its lower end a feed-bar c^{60}, provided on its front face with suitable teeth or serrations c^{61}, (see Fig. 7,) which are adapted to engage the work when it is desired to effect a feed or movement of the same on the horn. The feed-bar c^{60} in the present instance is represented as dovetailed into the lower side of the feed-lever c^{56}, and the said bar may be moved in its dovetailed slot by means of a suitable handle c^{62}, after the manner now commonly practiced in this class of machines, the feed-bar being held in its adjusted position in the feed-lever by a spring c^{63}, encircling a shaft or rod c^{64}, to which the operating-handle c^{62} is secured. The face-cam c^{51} is designed in practice to operate upon the roller c^{53} and move the pivot-pin c^{57} for the lever c^{56} longitudinally in its bearing c^{58} toward the front of the machine, so as to bring the feed-bar c^{60} into engagement with the work, and the peripheral cam c^{50} is designed to turn the pivot-pin c^{57} in its bearing in one direction—namely, toward the left, (viewing Fig. 7)—so as to effect a forward or feed movement of the work while the feed-bar c^{60} is held in engagement with the work by the face-cam c^{51}. After the work has been fed forward by the movement of the lever c^{56} toward the left (viewing Fig. 1) the said lever and its pivot-pin c^{57} are moved bodily backward, so as to disengage the feed-bar c^{60} from the work, and after the said lever has been moved backward it is then turned or rocked in an opposite direction into its starting position, and these two movements may and preferably will be effected by a single

spring, shown in the present instance as a wire rod c^{70}, (see Figs. 1 and 17,) one end of the said wire rod being fastened to the framework of the machine and the other end engaging a grooved stud or roller c^{71} on the arm c^{54} of the feed-lever c^{56}. The length of the feed may be regulated, as herein shown, by means of a set-screw c^{72}, extended through an offset on the arm c^{54} and adapted to engage the head A of the machine. The feed movement just described takes place at or about the time the horn b commences to be lowered by the engagement of the clutch member or shoe a^{67} with its coöperating member a^{68}, which engagement, as previously described, takes place when the crank or arm a^{71} passes off from the block a^{72}, and when the clutch member a^{67} is in engagement with its coöperating member a^{68} the horn b is then positively connected with the cam-operated lever a^{56} and the said horn is lowered by the cam a^{60} a sufficient distance to permit the feed of the work.

After the horn has been lowered, as above described, it is again raised, and at or about the time the horn engages the work and firmly presses the same against the bottom of the throat-plate or block a^{8} the crank or arm a^{71} is brought upon the plate or block a^{72} and the rock-shaft a^{65} is turned in such direction as will disengage the clutch member or shoe a^{67} from its coöperating member a^{68}, thereby leaving the latter under the control of the work, so as to position the back-stop or head a^{51} accurately with relation to the extension a^{50} on the awl-operating lever a^{33}, so that the movement of the awl will be governed by the thickness of the work between the horn and the throat-plate or block a^{8}.

The rotation of the main shaft a^{23}, and thereby the operation of the machine, may and preferably will be controlled by means of a clutch mechanism preferably of the construction herein shown and consisting of two members d d', provided with coöperating bevel-faces and made in the form of yokes to fit over the main shaft a^{23}, the member d being connected to the foot-treadle d^{2} by a connecting-rod d^{3}, so that when the foot-treadle d^{2} is depressed the member d will be raised from the position shown in Fig. 1 toward the top of the machine, and its bevel-face will move the member d' longitudinally on the shaft a^{23}, so as to engage a normally loose pulley d^{4} with a coöperating disk d^{5}, fast on the shaft a^{23}. The normally loose pulley d^{4} may be driven by means of a suitable belt (not herein shown) from a counter or other shaft. The fast disk d^{5} may and preferably will have secured to or forming part of it a brake wheel or disk d^{6}, provided, as herein shown, with a substantially V-shaped annular groove d^{7}, with which coöperates a substantially V-shaped brake-shoe d^{8}, fast on the end of a brake-operating lever d^{9}, inserted into a suitable slot d^{10} in the head A of the machine and pivoted, as at d^{12}, the said brake-lever being provided at its front end, as herein shown, with a roller d^{13}, adapted to coöperate with and enter a depression or recess d^{14} in the periphery of the wheel or disk d^{5} when the brake-shoe d^{8} is in engagement with the brake-wheel d^{6}, but which roller d^{13} is adapted to ride upon the full periphery of the wheel or disk d^{5} when the brake-shoe is disengaged from the brake wheel or disk d^{6} and the machine is in operation. The lever d^{9} is adapted to be turned on its pivot d^{12} by a suitable spring, (not shown,) which acts on the under side of the short arm of the lever and tends to force the brake-shoe d^{8} into engagement with the brake wheel or disk d^{6} when the recess d^{14} in the periphery of the disk or wheel d^{5} is brought under the roller d^{13}.

The spring referred to may be located in a suitable socket in the head A of the machine, and its tension may be adjusted by means of a screw d^{20}, extended through the brake-lever d^{9}. The brake-lever d^{9} is adapted to be moved so as to release the brake-shoe d^{8} from engagement with its coöperating brake-wheel d^{6} when the clutch member d is elevated, and this result may and preferably will be effected, as herein shown, by means of a connecting-rod d^{21}, extended loosely through the head A, with its lower end secured to the clutch member d and its upper end loosely attached to the brake-lever d^{9}, which may be accomplished, as herein shown, by providing the brake-lever d^{9} with a socket for the reception of a ball d^{50} and a nut d^{51}, through both of which the connecting-rod d^{21} is extended. (See Fig. 7.)

By reference to Fig. 1 it will be seen that the brake-lever d^{9} when elevated is maintained so by the roller d^{13} riding on the full periphery of the wheel or disk d^{5}, and by reason of the positive connection between the said brake-lever and the clutch member d the latter is also kept elevated, and therefore the loose pulley d^{4} is maintained in engagement with the fast disk d^{5}, in opposition to the weight of the treadle d^{2}, until the groove or depression in the periphery of the disk d^{5} comes under the roller d^{13}, consequently avoiding the necessity of the operator maintaining his foot on the treadle d^{2}.

The foot-treadle d^{2} may be designated the "starting-treadle" for the machine, and the lever b^{6}, to which the horn is connected, is adapted to be turned by the operator, so as to lower the horn, when so desired, by means of a second foot-treadle d^{24}, (see Figs. 5 and 6,) the treadle d^{24} being provided with a lug or projection d^{25}, extended under and adapted to engage a lug or projection d^{26} on the lever b^{6}.

In order to positively stop the rotation of the brake-wheel in case of slip between the brake-shoe and the said brake-wheel, the brake-lever d^{9} is provided with a lug or projection, shown as a block 60, (see Fig. 15,) attached to the lever d^{9} by a screw 61, so that its bottom edge will be carried into the recess or depression d^{14} in the disk d^{5} and into the path of movement of the end 62 (see Fig. 16) of said recess or depression, so as to form

a solid abutment, against which the end 62 will strike if the disk d^5 should not be stopped by the brake-shoe d^8.

The operation of the machine herein shown may be briefly described as follows, assuming the parts to be in the position they would occupy after a nail has been driven and the machine stopped in its operation, which position of the parts is represented in Fig. 7 of the drawings. Let it be assumed that the operator is commencing a new piece of work, in which case he depresses the foot-treadle d^{24}, so as to lower the horn b a sufficient distance to permit him to place the work thereon, after which he removes his foot from the treadle d^{24} and permits the spring b^{23} to elevate the horn and firmly press the work against the under side of the throat-plate. The machine is now in condition to be started, which is effected by the operator depressing the foot-treadle d^2, so as to elevate the clutch member d and release the brake-shoe d^8 from engagement with its brake-wheel d^6, and at the same time bring the loose pulley d^4 into engagement with the fast disk d^5, which operation sets the main shaft a^{23} in rotation and effects a complete cycle of the movements necessary to drive a loose tack or nail into the work. During the rotation of the main shaft the driver a' is first lifted from the throat-plate a^7, and when it has been raised out of the throat the carrier a^4 is turned toward the left, (viewing Fig. 7,) so as to bring the awl a into line with the passage a^{15} in the throat a^7, and when brought into line with the said passage the awl is moved downward through the throat a^7 into the work and into the position shown in Fig. 8 by its spring a^{40}, acting on the lever a^{33}, and the extent of the downward movement of the awl a is controlled or limited by the engagement of the inclined extension a^{50} with its inclined back-stop a^{51}, which has been previously positioned by the work, so as to engage the said extension and limit the backward movement of the arm a^{39} of the said awl-operating lever, and consequently limit the downward movement of the awl into the work according to the thickness of the work. While the awl is in the throat the separator c^{30} is operated so as to uncover the slot in the roadway and permit the endmost nail in the roadway to be forced by the nails above it against the awl and into the position shown in Fig. 10^a, and the awl is then raised, and during its ascent the separator-blade is moved forward in the inclined passage between the roadway and throat, and its pointed upper end enters between the two endmost nails and carries the nail into the throat when the awl has been sufficiently raised, and at the same time the lower portion of the separator-blade closes the slot c in the throat and forms an inclined wall, down which the nail slides into the lower portion of the passage a^{15} in the throat, the separator-blade at the same time also closing the end of the slot c' in the roadway, so that when the awl is entirely withdrawn from the throat the nail will have passed entirely into the passage a^{15} in the throat and into the position to be driven into the stock or work. During these movements of the awl the driver remains elevated and stationary, being held so by the lifting-cam, but as soon as the awl has cleared the throat the carrier a^4 is turned toward the right, (viewing Fig. 8,) so as to place the driver in alinement with the throat, and when properly positioned the driver descends into the throat the full length of the same (see Fig. 7) and drives the nail into the stock, the downward movement of the lever being effected, as above described, by means of the spring b^{35}, which acts when the driver-lifting cam has passed from under the cross-head or block b^{31}, so as to leave a clear path or passage for the descent of the driver. The nail having been driven into the stock or work, the horn is automatically lowered by the cam a^{60}, which acts upon the lever a^{56}, so as to turn the said lever on its pivot and move its long arm a^{62} upward. (Viewing Fig. 16.) On the upward movement of the long arm a^{62} of the lever a^{56} the crank or arm a^{71} is carried off from the block a^{72} and the clutch shoe or member a^{67} is engaged with the coöperating clutch member a^{68} of the lever a^{53}, and the latter is thereby positively connected to the cam-operating lever a^{56}, so that on the further movement of the arm a^{62} in the upward direction (viewing Fig. 16) the normally loose lever a^{53} is positively elevated and the horn, through the intermediate connection previously described, is positively lowered. At or about the time the horn commences to be lowered the work-feed-operating lever c^{56} is moved forward by the face-cam c^{51} and the feed-bar c^{60} is engaged with the work, after which the peripheral cam c^{50} turns the lever c^{56} so as to effect a forward feed of the work, and the lever c^{56} is then moved bodily backward, and then rotated to its normal or starting position by the spring c^{70}.

The pivotal movement of the carrier a^4, as above described, is effected in one direction by means of the cam a^{22} and in the opposite direction by means of the spring a^{26}, and it will be understood that the cams, which effect the various movements above referred to, will be properly timed, so as to permit the said movements to be effected at the proper time and in the proper sequence. After the machine has made a complete cycle of its movements it may be automatically stopped by the brake-lever d^9 engaging the brake-shoe d^8 with the brake-wheel d^6, which engagement takes place when the recess or groove d^{14} in the periphery of the disk or wheel d^5 comes under the roller d^{13}, provided, however, the operator has removed his foot from the starting-treadle d^2. During each complete rotation of the main shaft a^{33} the hopper is rotated, as above described, by means of the gear c^{27}, pinion c^{26}, shaft c^{24}, pinion c^{23}, and bevel-gear c^{22}.

From the above description it will be seen

that the awl and driver are alternately reciprocated and both enter the same stationary throat and that the leather or other work pierced by the awl is compressed and firmly held up against the bottom of the throat, the cup or tip $b^{\times}$ engaging the under side of the work about the point in line with the passage a^{15} in the throat, so that the awl will make a hole in the work in line with the passage in the throat, which insures the nail being properly inserted into the work and properly clenched in the stock to obtain a superior fastening together of a plurality of thicknesses of material. Furthermore, it will be seen that by means of the stationary throat acting as a rest or bearing against which the upper surface of the leather is firmly pressed and by means of the driver working in said throat and having a uniform stroke, which terminates at the mouth of the throat in contact with the leather or work, the nail is guided and supported its entire passage through the throat and into the stock or work until its head has passed out of the throat, at which time the said head will be embedded in the work with its upper surface flush, or substantially flush, with the upper surface of the work, which results in all the nails being uniform with relation to the upper surface of the work—namely, flush therewith—and avoids bending or crippling of the heads of the nails. So also it will be noticed that the awl, which passes through the stationary throat into the work, has a variable stroke with relation to the work, which variable stroke is automatically controlled, so that the point of the awl is prevented from being dulled or otherwise injured by striking the horn when a thin portion of the work is interposed between the horn and throat, and the said awl is prevented from penetrating entirely through the thin portion of the work. Furthermore, it will be noticed that the work is not fed by the awl, but by an independent feed mechanism which does not operate until after both the awl and driver have performed their work.

The slot c' in the roadway may and preferably will be extended entirely through the roadway at its front or lower end, as shown in Fig. 15, to permit loose nails, slivers, &c., to drop out of the said roadway. The hopper B may be provided within it, at or near its discharge end, with any suitable device to remove imperfect nails from the roadway.

I claim—

1. In a machine of the class described, the combination of the following instrumentalities, viz: a throat, a reciprocating awl and a reciprocating driver coöperating with said throat, means to positively move bodily both the awl and driver laterally with relation to the said throat, to alternately carry the said awl and driver from their stationary positions out of line with said throat into line with the same, independent mechanisms to reciprocate said awl and driver and operate one of said parts and insert it into and withdraw it from said throat, while the other of said parts is held stationary out of line with said throat, substantially as described.

2. In a machine of the class described, the combination of the following instrumentalities, viz: a stationary throat, a reciprocating awl, a reciprocating driver movable independent of the awl, a carrier for said awl and driver movable with relation to the stationary throat to alternately place the said awl and driver into line with said throat, and independent and disconnected means to reciprocate said awl and driver independent of each other, substantially as and for the purpose specified.

3. In a machine of the class described, the combination of the following instrumentalities, viz: a throat, a reciprocating awl, a reciprocating driver, a carrier for said awl and driver movable with relation to said throat with the awl out of the work to alternately place the awl and driver in line therewith, independent mechanisms to reciprocate said awl and driver when placed in line with said throat and to hold one of said parts stationary out of line with said throat when the other of said parts is being moved into and out of said throat, substantially as described.

4. In a machine of the class described, the combination of the following instrumentalities, viz: a reciprocating awl, a reciprocating driver, a carrier for said awl and driver, a throat disconnected from said carrier to permit of movement of one with relation to the other, and independent mechanisms to alternately reciprocate the said awl and driver in said throat, and to maintain one of said parts stationary out of the throat while the other of said parts is being inserted therein, and a feed mechanism for the work independent of the awl and acting upon the work when the awl is withdrawn therefrom, substantially as described.

5. In a machine of the class described, the combination of the following instrumentalities, viz: an awl, mechanism to effect movement of the said awl in one direction to prick a hole in the work, a work-support or horn, and mechanism connected to said horn and coöperating with said awl-actuating mechanism to automatically control the extent of movement of the awl into the work according to the thickness of the work, substantially as and for the purpose specified.

6. In a machine of the class described, the combination of the following instrumentalities, viz: an awl, a driver, a carrier for said awl and driver, a throat disconnected from said carrier to permit of movement of one with relation to the other, and means to alternately insert the said awl and driver in said throat, and means to automatically control the extent of movement of the awl through and beyond the said throat, substantially as described.

7. In a machine of the class described, the

combination of the following instrumentalities, viz: a horn or work-support, a lever connected thereto to move simultaneously therewith, a cam-actuated lever, a friction surface or member movable with the cam-actuated lever and adapted to engage a coöperating friction-surface on the lever connected to the said horn, and means to effect the engagement of the said friction-surface with its coöperating surface, substantially as and for the purpose specified.

8. In a machine of the class described, the combination of the following instrumentalities, viz: a horn or work-support, a lever connected thereto to move simultaneously therewith, a cam-actuated lever, a rock-shaft carried by said lever, a crank or eccentric on said rock-shaft, a clutch member operated by said eccentric to engage with and be disengaged from the lever connected to the said horn, and means to control the rotation of the said rock-shaft, substantially as described.

9. In a machine of the class described, the combination of the following instrumentalities, viz: a stationary frame, a throat secured thereto, a roadway attached to said frame and coöperating with said throat, a separator movable between the said throat and the said roadway, a reciprocating awl, a reciprocating driver, a carrier for said awl and driver pivoted to the said frame, and means to move said carrier on its pivot when both the awl and driver are removed from the said throat to alternately place the said awl and driver in line with said throat, and independent mechanisms to reciprocate said awl and driver and operate one and move it into and out of the said throat while the other is held stationary out of line with said throat, substantially as and for the purpose specified.

10. In a machine of the class described, the combination of the following instrumentalities, viz: a reciprocating awl, a reciprocating driver, a carrier for said awl and driver, a throat disconnected from said carrier to permit of movement of one with relation to the other, independent mechanisms to reciprocate said awl and driver and operative at different times to insert one of the said parts in the throat while the other of said parts is held stationary out of line with said throat, and means to automatically control the extent of movement of the awl through and beyond the said throat, substantially as described.

11. In a machine of the class described, the combination of the following instrumentalities: a reciprocating awl, a cam-actuated mechanism to lift the awl, a spring to throw the awl downward, a horn or work-support, and mechanism connected to said horn and coöperating with the awl-actuating mechanism to automatically limit the downward movement of the awl by the said spring, to thereby control the depth of the hole pricked in the work by the awl according to the thickness of the work, substantially as described.

12. In a machine of the class described, the combination of the following instrumentalities, viz: a throat provided with a longitudinal passage and with a longitudinal slot in its side wall communicating with said passage and provided with inclined front faces 3, a roadway coöperating with the said slot and having an inclined end wall 4 substantially parallel with the inclined faces 3 of the said slot to form a separator-passage inclined with relation to the passage in the said throat, a separator movable in said separator-passage, and means to operate said separator, substantially as described.

13. In a machine of the class described, the combination of the following instrumentalities, viz: a stationary throat, a reciprocating awl and a reciprocating driver adapted to be alternately inserted into said stationary throat, means to effect a uniform stroke of the driver in the said throat, and means to effect a variable stroke of the awl in the said throat, substantially as and for the purpose specified.

14. In a machine of the class described, the combination of the following instrumentalities, viz: a reciprocating driver-bar provided with a driver, a cam to move it in one direction, a spring to move it in the opposite direction and composed of a bent wire rod having one end in engagement with the driver-bar and its opposite end secured to a pivoted lever, and means to turn said lever on its pivot and thereby adjust the said spring, substantially as described.

15. In a machine of the class described, the combination of the following instrumentalities, viz: a reciprocating awl-bar provided with an awl, a lever connected therewith to move said awl-bar in one direction, a cam to act on said lever, a spring to move the said lever in an opposite direction and composed of a bent wire rod having one end in engagement with the said lever, and its other end secured to a lever a^{41}, and means to turn said lever on its pivot to adjust the said spring, substantially as described.

16. In a machine of the class described, the combination of the following instrumentalities, viz: a stationary frame, a throat secured thereto, a roadway attached to said frame, a separator movable between said throat and roadway, an awl, a driver, a carrier for said awl and driver pivoted to said frame, means to move said carrier on its pivot in one direction to place the awl in line with the said throat, means to move the carrier on its pivot in the opposite direction to place the driver in line with said throat, means to move the driver into the said throat a uniform distance, means to move the awl through the said throat, and means to vary the extent of movement of the awl through the said throat, substantially as and for the purpose specified.

17. In a machine of the class described, the combination of the following instrumentalities, viz: a stationary throat, a reciprocating awl to prick a hole in the work normally out of line with said throat, a movable carrier

for said awl, mechanism to move said carrier to place the said awl into line with said throat, mechanism to reciprocate said awl, a horn or work-support, and a movable back-stop connected to said horn and coöperating with the awl-actuating mechanism to automatically govern the length of stroke of the awl through said throat, and thereby govern the depth of the hole made in the work by the awl, substantially as and for the purpose specified.

18. In a machine of the class described, the combination of the following instrumentalities, viz: a work-support or horn provided with a tip or cup, a stationary throat permanently in line with the said cup, an awl, a driver, a carrier for said awl and driver movable with relation to said stationary throat to alternately place the said awl and driver into line with said throat, means to move said driver into said throat, means to move said awl into said throat, and means connected to said work-support or horn and cooperating with the awl-actuating mechanism to automatically govern the length of stroke of the awl, substantially as described.

19. In a machine of the class described, the combination of the following instrumentalities, viz: the throat a^7 provided with the passage a^{15} and with the slot c having the inclined walls, a roadway provided with the inclined end wall coöperating with the faces of the inclined walls of the slot c, and the thin separator-blade movable in the inclined passage between the throat and roadway, substantially as described.

20. In a machine of the class described, the combination of the following instrumentalities, viz: the throat a^7 provided with the passage a^{15} and with the slot c having the inclined walls provided with transverse slots 10, the roadway provided with the inclined end wall coöperating with the faces of the inclined walls of the slot c and having projecting fingers extended into the transverse slots 10, and a separator-blade movable in the inclined passage between the throat and roadway, substantially as described.

21. The combination with a throat having a fixed or stationary position, of a reciprocating awl coöperating with said throat, mechanism to reciprocate said awl, a horn or work-support movable toward and away from the under side of the fixed or stationary throat, and means connected to said horn to be moved thereby and coöperating with the awl-actuating mechanism to automatically lengthen or shorten the stroke of the awl through and below the stationary throat according as the work bearing against the under side of the throat increases or diminishes in thickness, to thereby increase or decrease the depth of the hole made in the work according to the thickness of the work below the stationary throat, substantially as described.

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

GEORGE GODDU.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.