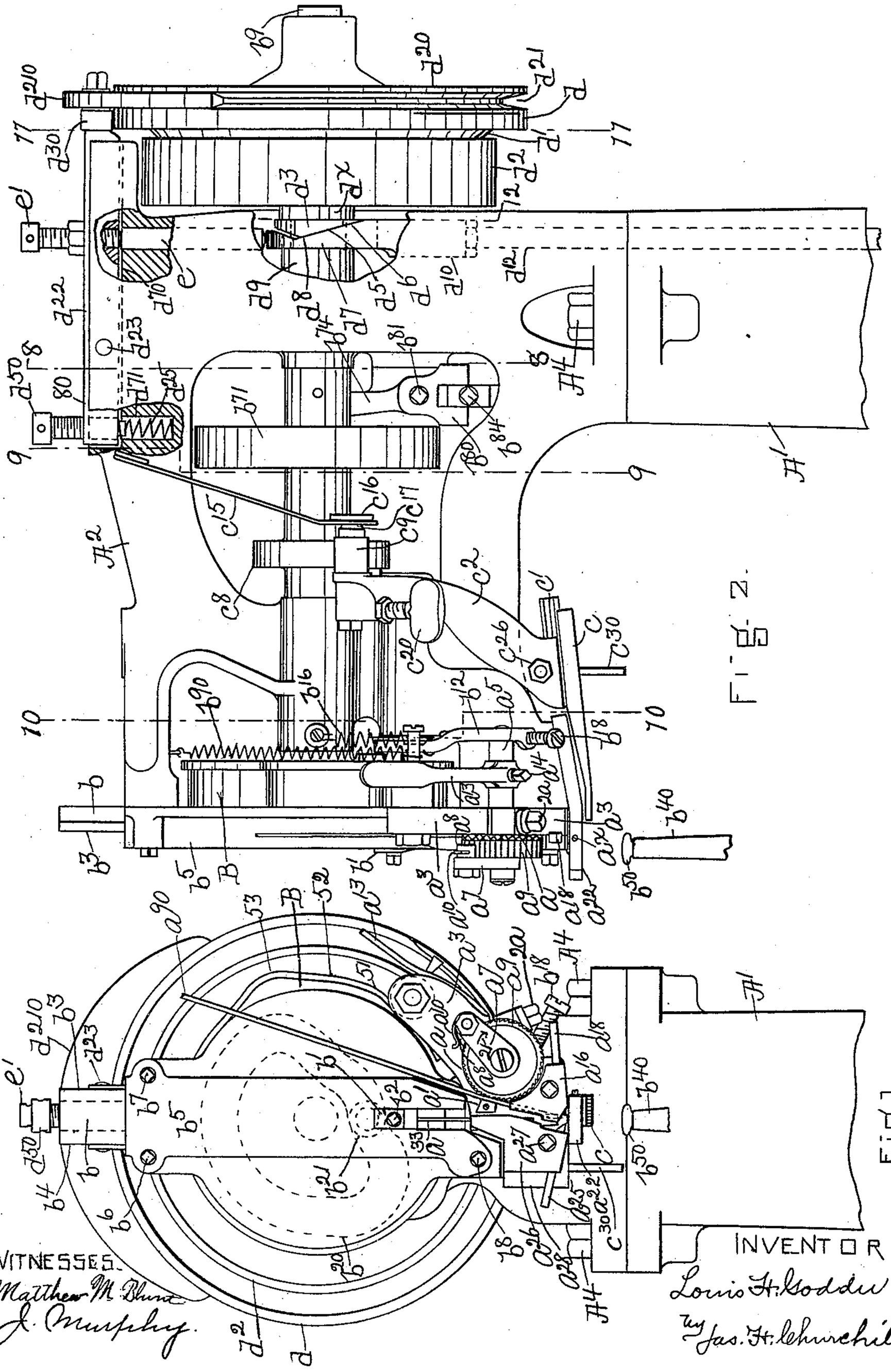
(No Model.) 6 Sheets—Sheet 1.

L. H. GODDU.

NAILING MACHINE.

No. 583,046. Patented May 25, 1897.



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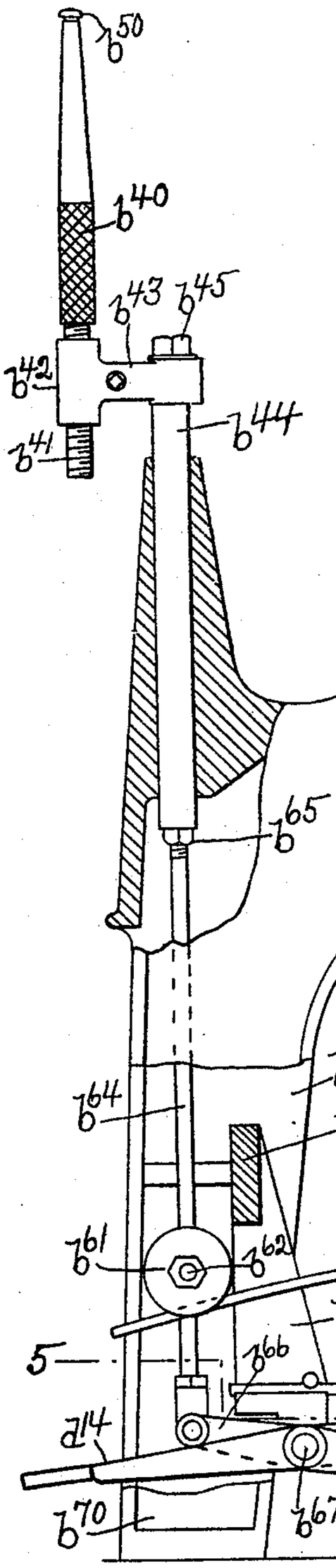

Fig. 6.

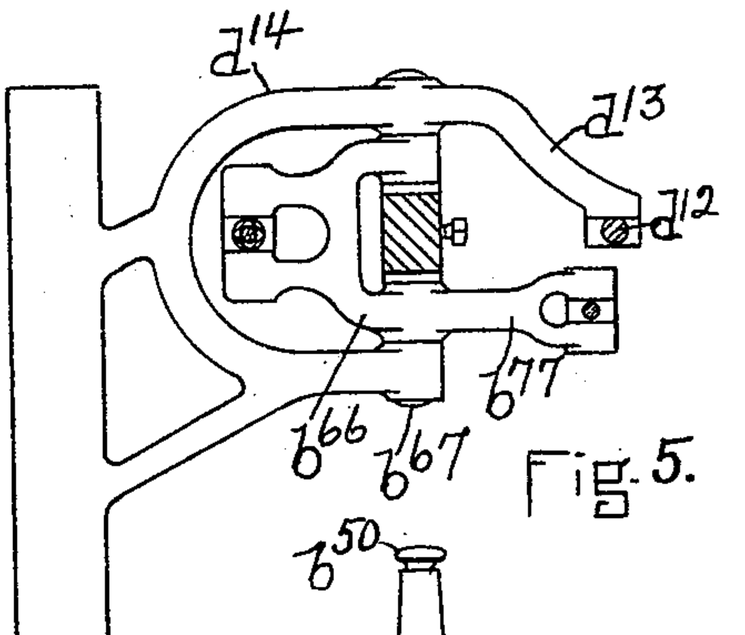

Fig. 5.

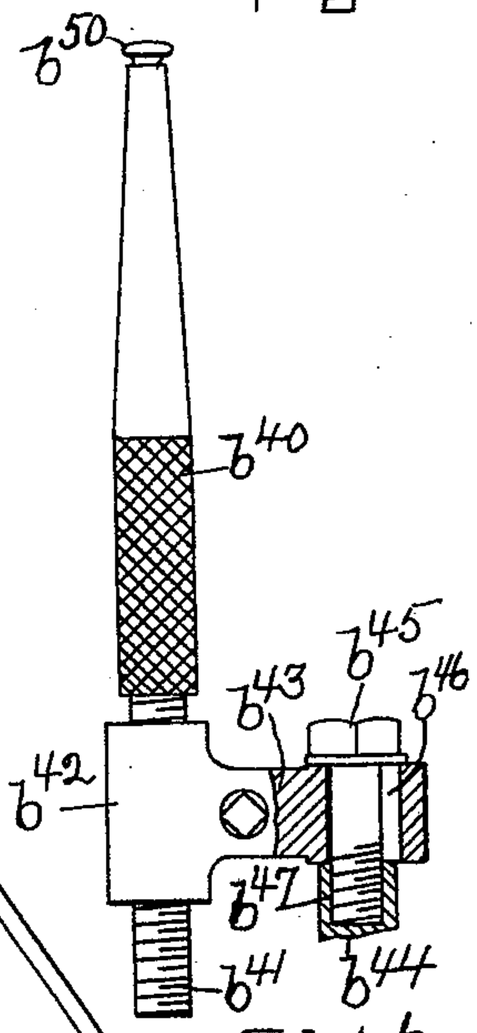

Fig. 6.

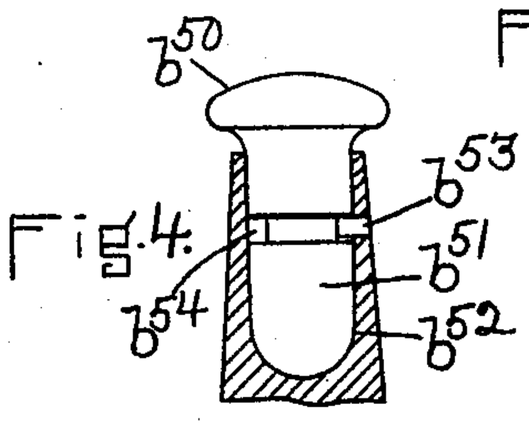

Fig. 4.

Fig. 3.

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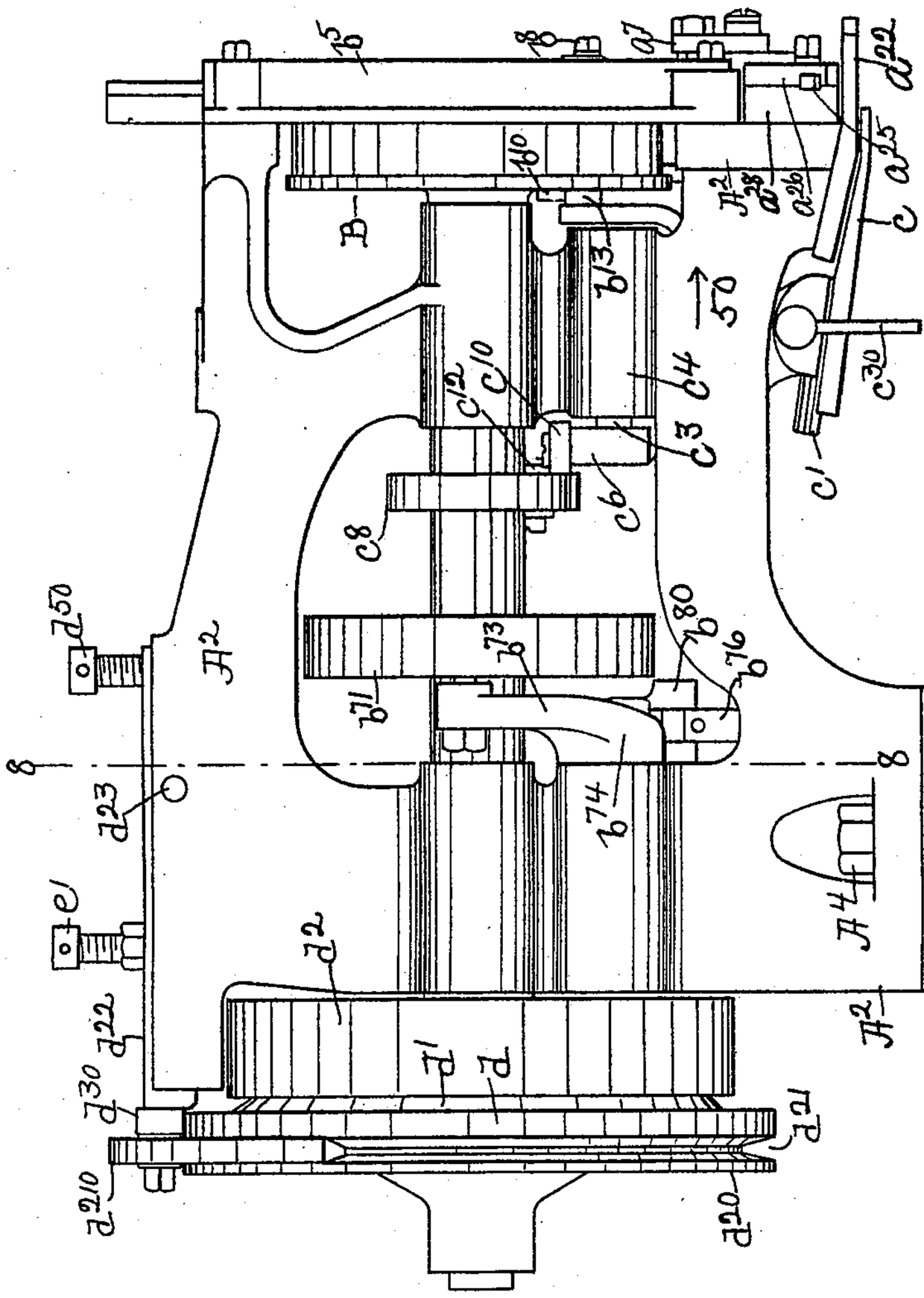

Fig. 7.

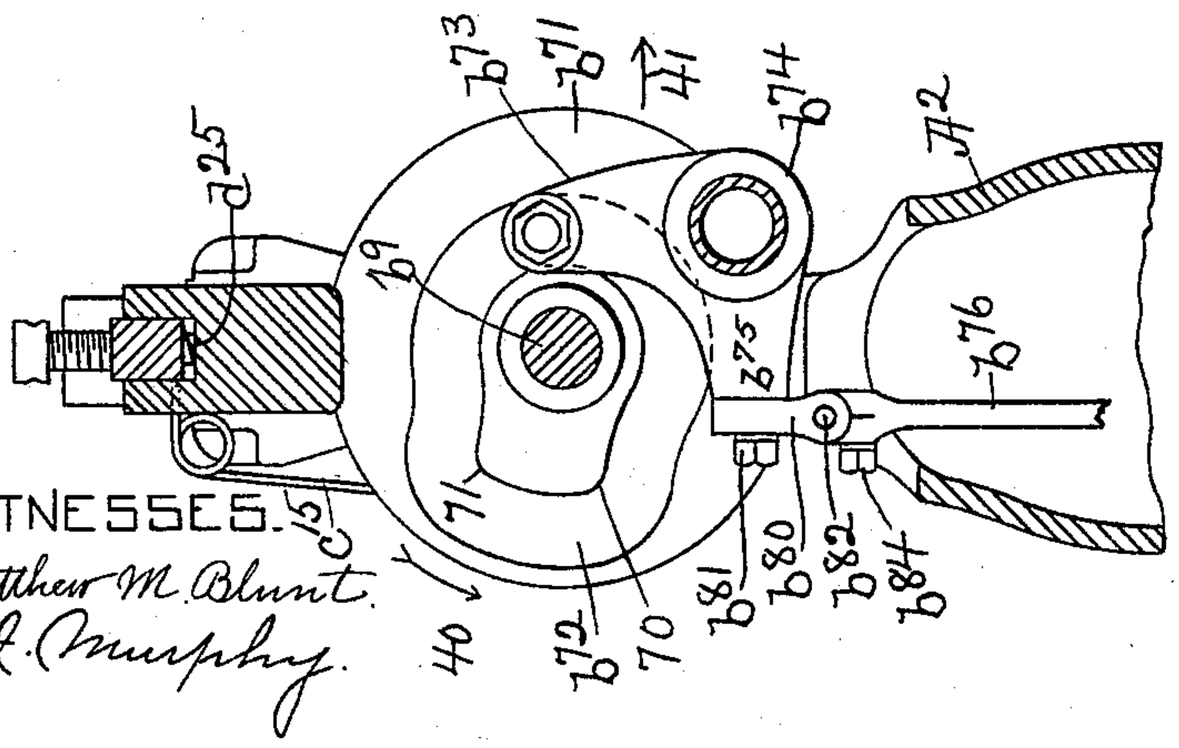

Fig. 8.

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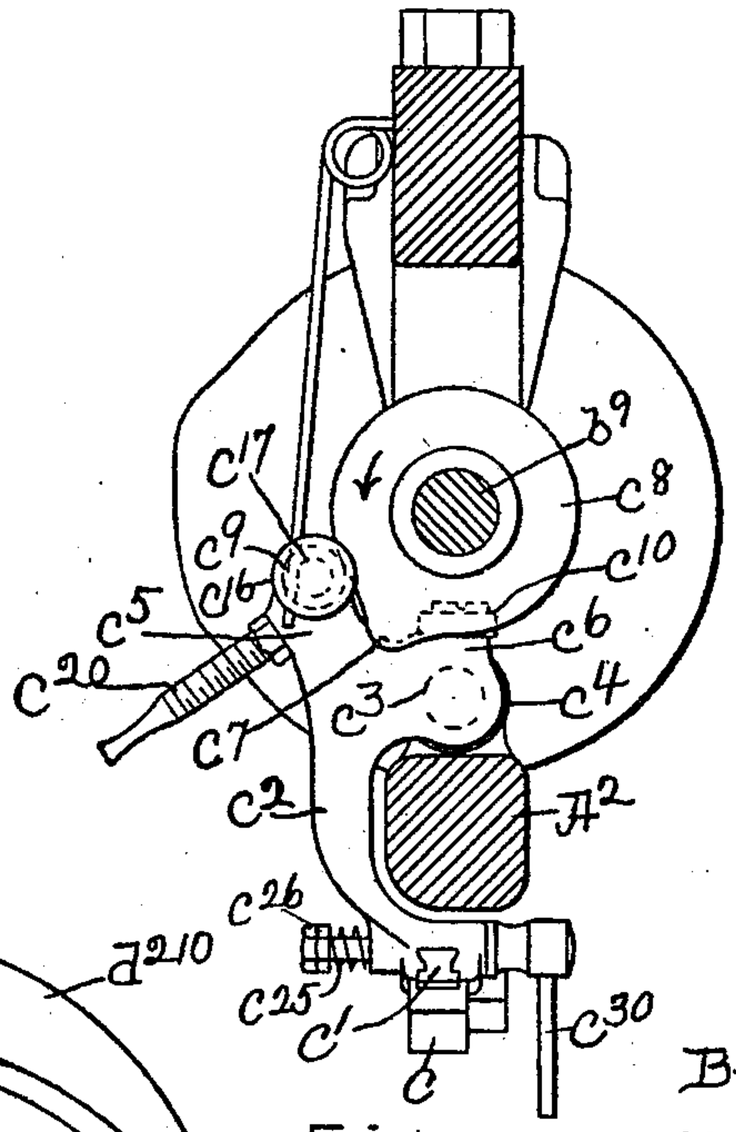

Fig. 9.

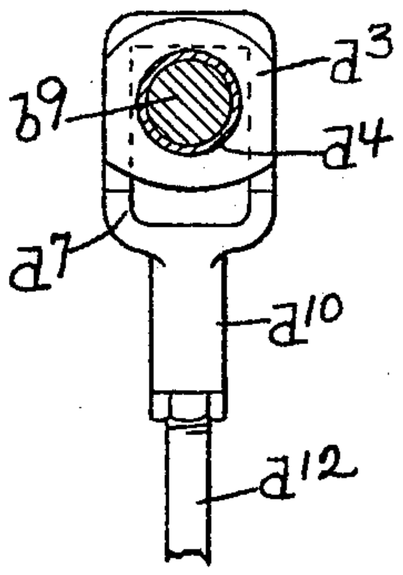

Fig. 12.

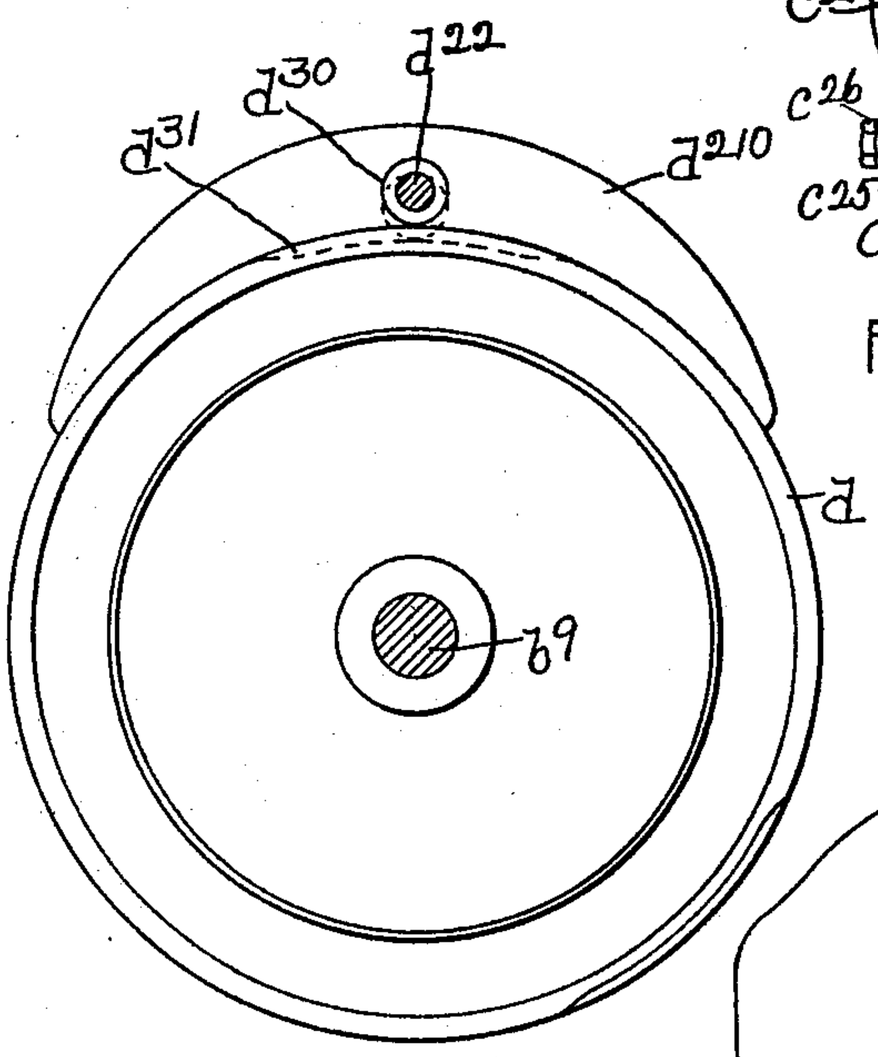

Fig. 11.

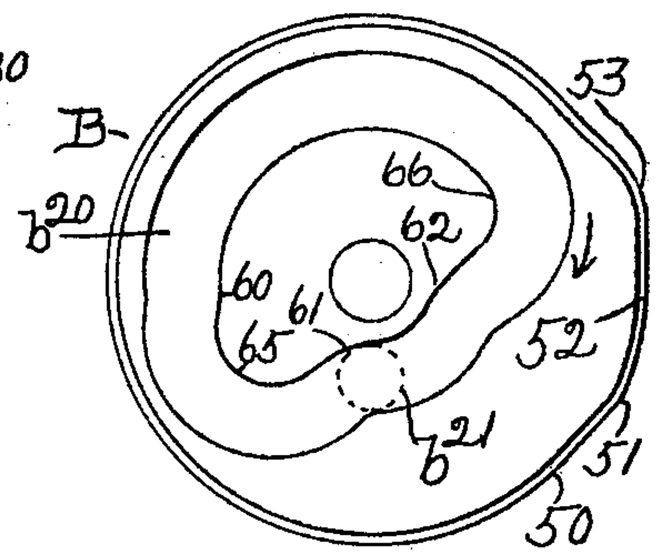

Fig. 13.

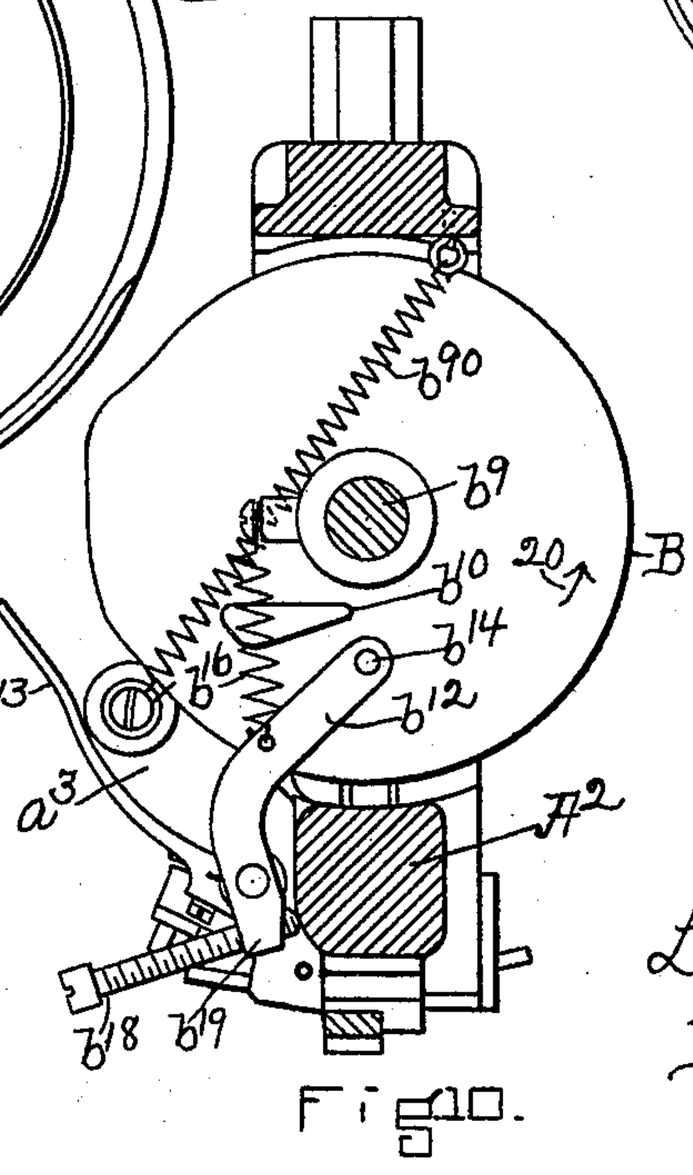

Fig. 10.

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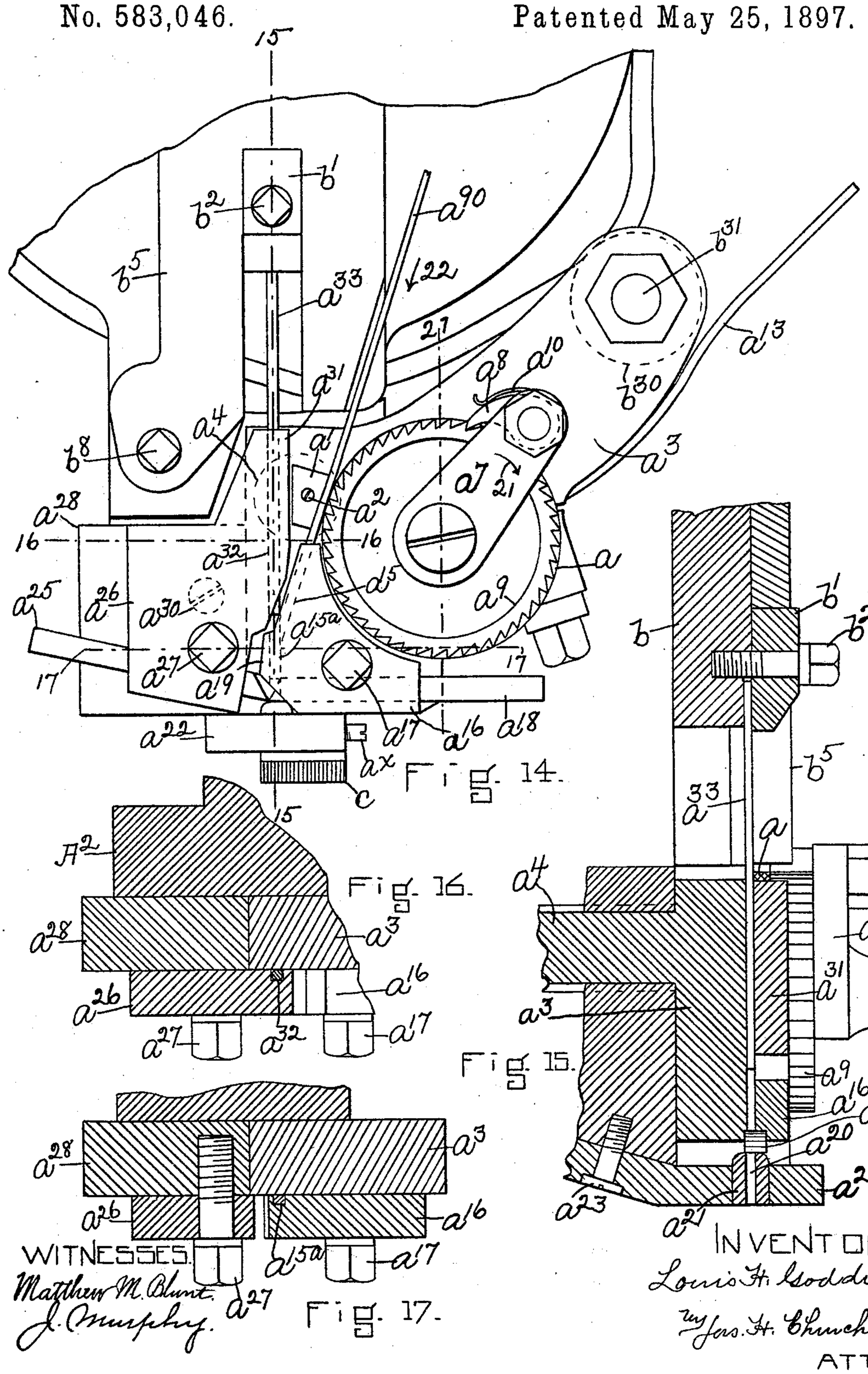

Fig. 14.

Fig. 16.

Fig. 17.

Fig. 15.

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NAILING MACHINE.

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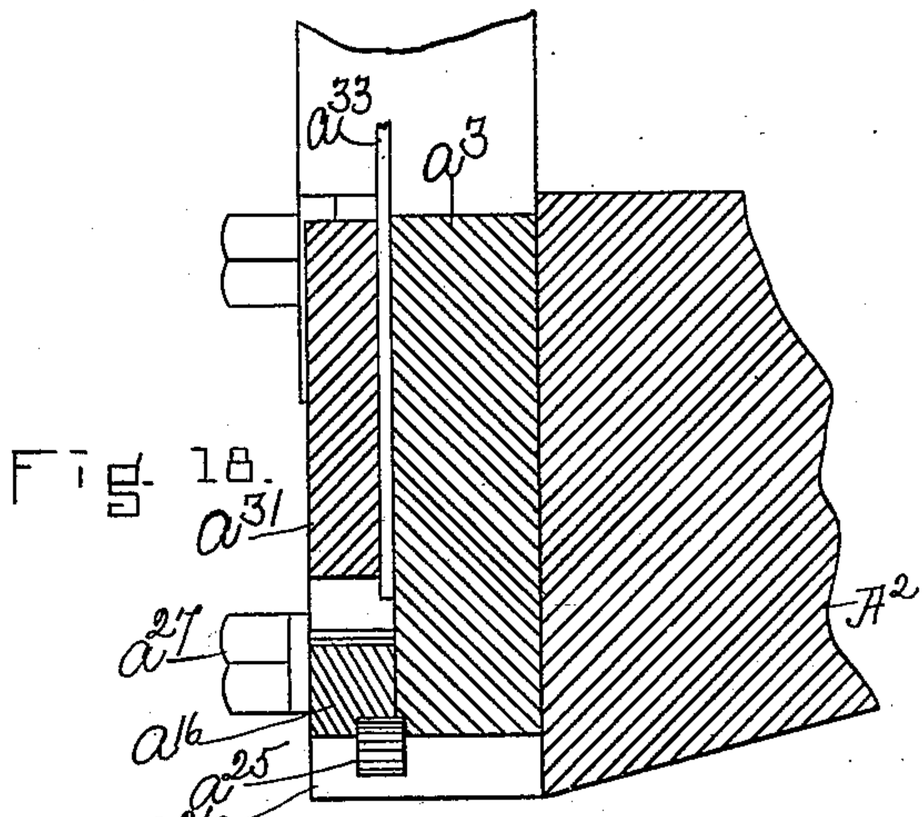

Fig. 18.

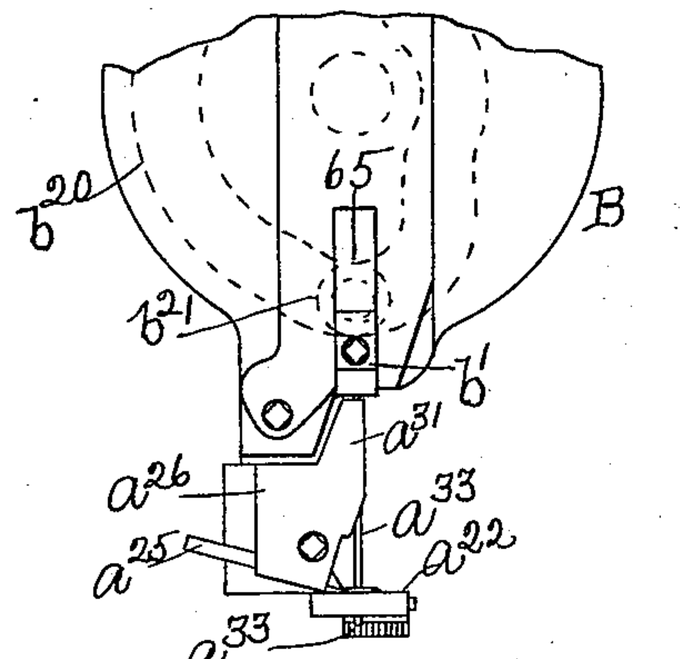

Fig. 23.

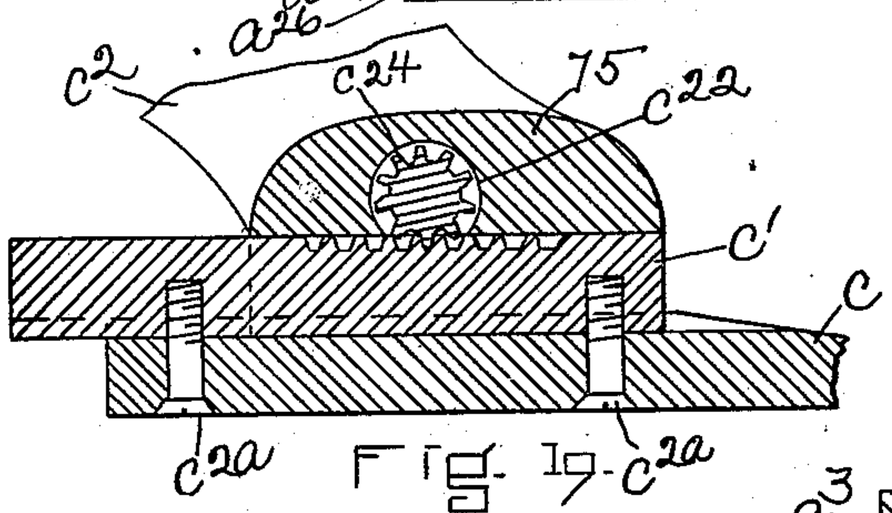

Fig. 19.

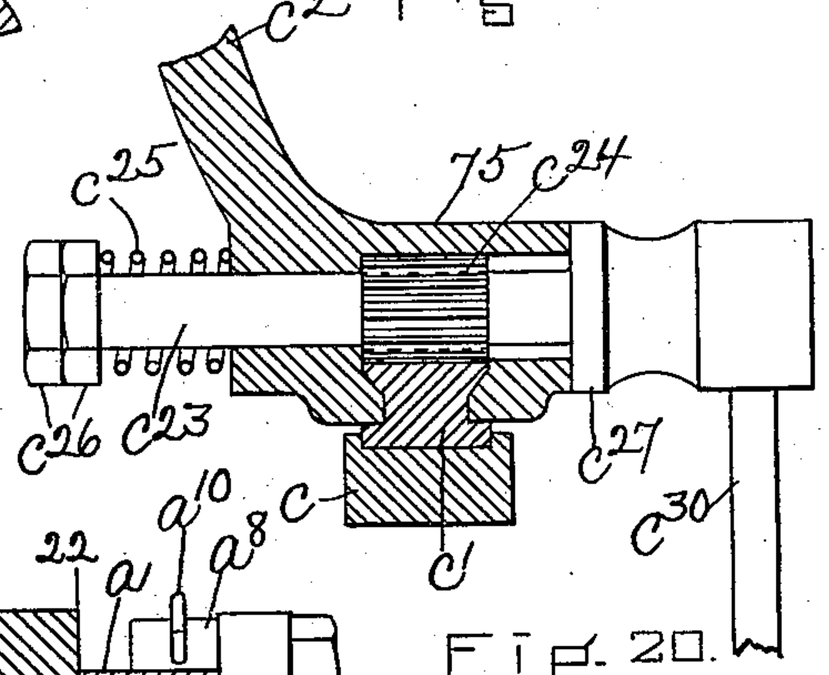

Fig. 20.

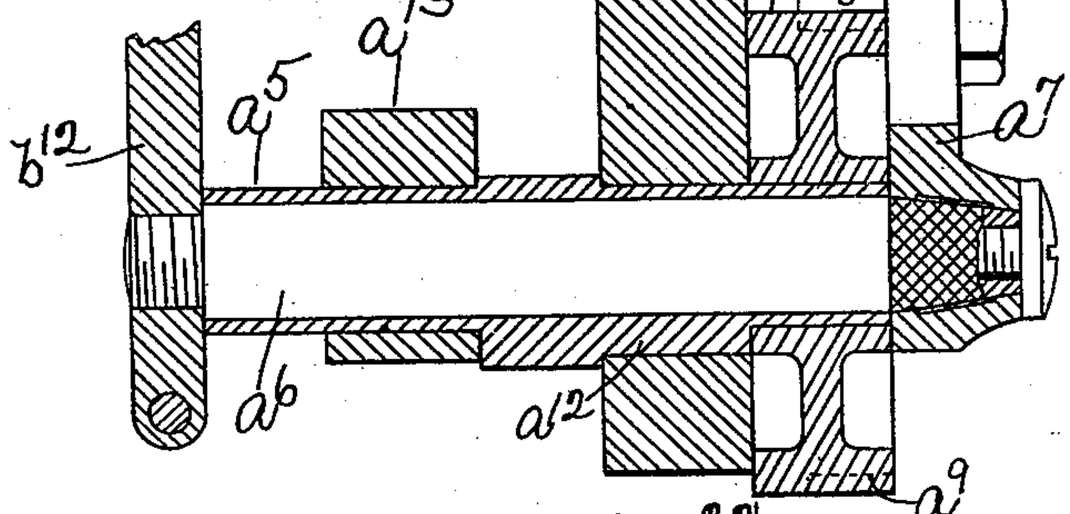

Fig. 21.

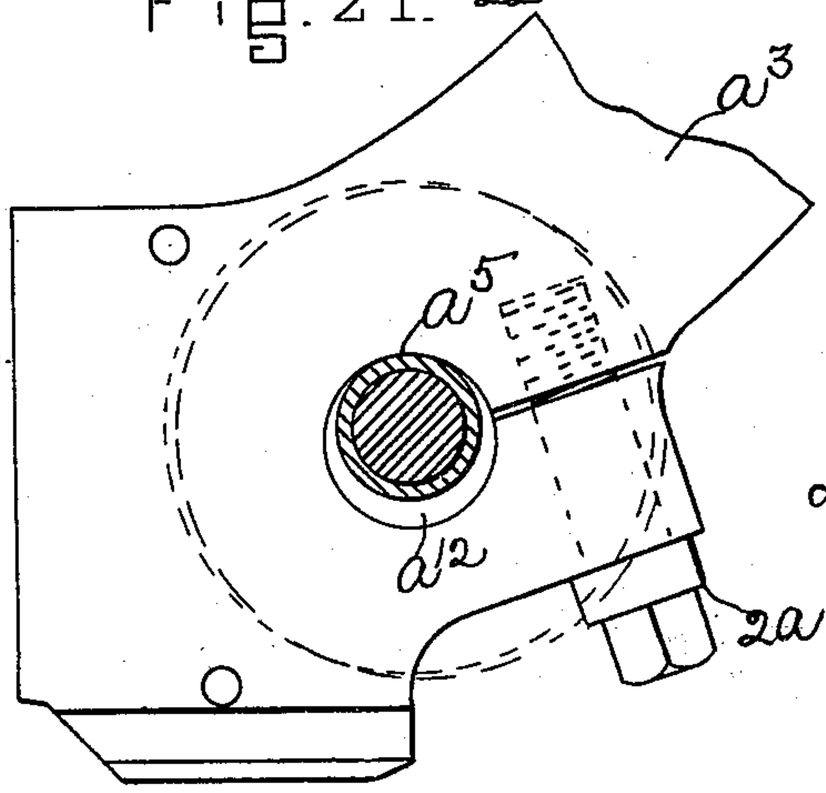

Fig. 22.

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UNITED STATES PATENT OFFICE.

LOUIS H. GODDU, OF WINCHESTER, MASSACHUSETTS.

NAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 583,046, dated May 25, 1897.

Application filed July 6, 1896. Serial No. 598,104. (No model.)

To all whom it may concern:

Be it known that I, LOUIS H. 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 nailing-machines such as are employed in the manufacture of boots and shoes and is herein shown as embodied in a nailing-machine more particularly designed and adapted for the insertion of nails or slugs into the top lift of the heel.

This invention has for its object to provide a machine of the class described which is simple, highly efficient, durable, and of a minimum number of parts, and one which requires a minimum expenditure of money for maintenance at the desired or required standard.

In accordance with this invention the nails or slugs are formed individually from a wire or metal strip of the desired or proper shape in cross-section, which wire is carried by a guide movable with relation to a throat, which is itself stationary or fixed with relation to a driver by which the slug or nail in the said throat may be driven into the heel or other work, as will be described. The driver referred to may and preferably will have two functions, one function being that of an awl to prick the heel or other work and form a small hole for the entrance of the slug or nail, and the other function being that of a driver proper by which the nail or slug may be driven into the said hole. This double function may be imparted to the driver in a manner as will be described.

The machine is further provided with a novel construction of wire-feed mechanism and with a novel adjustment by which the amount of feed may be determined, according to the length it is desired the nail or slug should be, as will be described.

The machine also embodies a novel construction of wire-cutting mechanism, and is also provided with a novel work-support and work-feed, as will be described.

The machine further embodies a novel starting and stopping mechanism, as will be described.

Another feature of this invention consists in a novel construction by which the horn is automatically lowered a positive distance after the nail is driven into the stock.

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

Figure 1 is a front elevation of the upper portion or head of a nailing-machine embodying this invention, the said figure also showing a portion of the base and work-support or horn; Fig. 2, a side elevation of the machine shown in Fig. 1, looking toward the left, with part of the head broken away; Fig. 3, a side elevation, with parts broken away, of the base of the machine, which figure is to be read with Figs. 1 and 2; Fig. 4, a detail of the work-support or horn to be referred to; Fig. 5, a sectional detail on the line 5 5, Fig. 3; Fig. 6, a detail of the work-support to be referred to; Fig. 7, a side elevation of the machine shown in Fig. 1, looking toward the right; Fig. 8, a transverse vertical section on the line 8 8, Fig. 7, looking toward the right; Fig. 9, a transverse vertical section on the line 9 9, Fig. 2, looking toward the left; Fig. 10, a transverse vertical section on the line 10 10, Fig. 2, looking toward the left; Fig. 11, a transverse vertical section on the line 11 11, Fig. 2, looking toward the right; Fig. 12, a sectional detail of the starting or clutch mechanism, the section being taken on the line 12 12, Fig. 2, looking toward the left; Fig. 13, a detail in front elevation of the driver-operating cam to be referred to; Fig. 14, a detail in front elevation and on an enlarged scale to enable the operation of the machine to be more readily understood; Fig. 15, a sectional detail on the line 15 15, Fig. 14, looking toward the right; Fig. 16, a sectional detail on the line 16 16, Fig. 14, looking down; Fig. 17, a sectional detail on the line 17 17, Fig. 14; Fig. 18, a sectional detail on the line 15 15, Fig. 14, looking toward the left; Figs. 19 and 20, details of the work-feed mechanism to be referred to; Fig. 21, a sectional detail of the wire-feed mechanism to be referred to; Fig. 22, a sectional detail on the line 22 22, Fig. 21, looking toward the left; and Fig. 23, a detail to be referred to.

The operating parts of the machine herein shown as embodying this invention are supported by a suitable framework, which, as

herein shown, comprises, essentially, a base A, (see Fig. 3,) a hollow post or upright A′, secured to or forming part of the base, and a head A^2, resting on the post or upright A′ and secured thereto, as herein shown, by bolts A^4.

The head A^2 supports or carries the main operative parts, which in the present instance include a stationary throat or guide for the nail or slug, a feed mechanism for the wire to be formed into nails or slugs movable with relation to the said throat, a cutting mechanism which operates to sever a portion of the wire after it has been fed the desired amount into the said stationary throat, and thereby form the nail or slug, a driver in line with the said throat and by which the nail or slug is driven into the heel or other stock, and mechanisms by which these operative parts are actuated, as will be described.

The wire-feed mechanism referred to may and preferably will be made as herein shown, and consists, essentially, of two members, one of which is movable bodily with relation to the other. The movable member is made, as herein shown, in the form of a rotatable disk or wheel a, preferably provided with a milled or other biting or gripping periphery, (see Figs. 2, 14, 15, and 21,) and the other or fixed member being shown as a block a', secured to a movable carrier for the wire-feed mechanism and herein shown as a lever a^3, having its pivot pin or stud a^4 (see Fig. 15) supported in bearings in the front portion of the head A^2. The feed wheel or disk a is loosely mounted on a sleeve a^5, supported by the lever a^3, (see Figs. 21 and 22,) through which the said sleeve extends and is frictionally secured thereto, as herein shown, by a set-screw 2^a, extended through a split portion of the said lever. The sleeve a^5 forms a bearing for a rock-shaft a^6, which is provided at its front end, as herein shown, with an arm a^7, carrying a pawl a^8, loosely mounted on said arm and coöperating with the teeth of a ratchet wheel or disk a^9, herein shown as integral with the feed wheel or disk a, the said pawl being kept in engagement with the said teeth by a suitable spring a^{10}. (See Fig. 14.)

The feed-wheel a is bodily movable toward and from its coöperating member a', and this bodily movement may and preferably will be accomplished by means of an eccentric a^{12} on the sleeve a^5, the said eccentric turning within the lever a^3, as clearly shown in Figs. 21 and 22. The sleeve a^5 may be turned, as herein shown, by means of an arm a^{13}, fastened to the said sleeve, it being shown in Fig. 2 as clamped thereon by a set-screw a^{14}. The rotation of the feed-wheel a by means of the pawl a^8 will be hereinafter more fully explained. The lever a^3 constitutes a movable carrier for the wire-feed mechanism, and it also, preferably, constitutes a like carrier for a guide for the wire after the said wire has passed the feed mechanism.

The wire-guide referred to may and preferably will be made as herein shown, and consists of a slot, channel, or passage a^{15} (see Fig. 14) in a metal piece or block a^{16}, secured to the lever a^3, as by a set-screw a^{17}, the said block also, preferably, constituting a holder for a cutting tool or knife a^{18}, which is extended, as herein shown, substantially at right angles to the direction of the passage a^{15} and is adjustably clamped between the holder a^{16} and the lever a^3. The slot or passage a^{15} is made in the block a^{16}, so that it is closed at its sides and open only at its ends, whereby the wire a^{90}, inserted through the said slot, is positively moved with the guide-block a^{16}.

The guide-block and holder a^{16} is provided, as herein shown, (see Fig. 14,) with a projecting portion or nose a^{19}, having a substantially vertical guideway or passage a^{15a}, forming a continuation of the guideway a^{15}, which, as herein shown, is inclined, (see Fig. 14,) the substantially vertical guideway being in line with a passage a^{20} in a throat a^{21}, which is firmly inserted into an opening in a throat-plate a^{22}, secured to the head A^2, as by a screw a^{23}, the said throat being detachably fastened in the said plate, as herein shown, by a set-screw $a^{\times}$. (See Fig. 2.) The throat a^{21} may be and in the present instance is made longer than the thickness of its plate a^{22}, and may be secured to the said plate so that its lower end is flush or substantially flush with the lower surface of the said plate, to thereby leave a smooth surface against which the work may bear, the upper end of the throat being preferably extended above the said plate, as herein shown. (See Figs. 14 and 15.)

The cutter a^{18} being carried by the movable lever a^3, as described, constitutes a movable cutter and coöperates, as herein shown, with a stationary or fixed cutter a^{25}, (see Figs. 1 and 14,) secured in a holder, shown as a block or piece a^{26}, fastened, as by a set-screw a^{27}, to a block or piece a^{28}, secured to or forming part of the head A^2, it being represented in the present instance as fastened to the head A^2 by a countersunk screw a^{30}. (See Fig. 14.) The cutters a^{18} a^{25} are oppositely beveled, as herein shown, (see Fig. 14,) so that when they act upon the wire a substantially V-shaped point may be formed on the end of the wire left uncut, while a flat or smooth surface may be formed on the cut portion or nail. The cutter-holder a^{26} may and preferably will be formed, as herein shown, with an offset upper portion a^{31}, extended beyond a vertical line through the center of the throat a^{21} and provided with a substantially vertical passage a^{32}, (see Fig. 16,) constituting a guideway for a tool a^{33}, preferably having, as in the present instance, the double function of an awl and a driver, but which for sake of simplicity will be hereinafter referred to as the "driver."

The driver a^{33} is designed in practice to pass through the guideway a^{32} into the throat a^{21}, and to enable this to be accomplished in the construction of the machine herein shown the wire-guideway is made movable with re-

lation to the throat, which is itself stationary or fixed with relation to the driver.

The movements of the wire-guide and of the driver will be hereinafter more fully explained.

The cutters a^{18} a^{25} may be removed from their holders or adjusted therein by loosening upon the clamping-nuts a^{17} a^{27}. The driver a^{33} is secured to a reciprocating bar or carrier b, which may be accomplished, as shown in Figs. 1 and 15, by means of a clamping-block b', secured to the bar b by a set-screw b^2. The driver-bar or carrier b may be provided, as represented in Figs. 1 and 2, with side ribs b^3 b^4, which enter suitable guideways in a cap, plate, or front piece b^5, detachably fastened to the head A^2, as by the screws b^6 b^7 b^8.

The wire-feed mechanism, the movable member of the wire-cutting mechanism, and the driver are operated by suitable cams, which in the present instance are shown as formed on one disk B, (see Fig. 13,) fast upon the main shaft b^9, supported in suitable bearings in the head A^2. The disk B is provided on its rear face with an inclined projection b^{10}, (see Fig. 10,) which coöperates with and is adapted to engage a crank or arm b^{12}, (see Figs. 7 and 10,) fast on the shaft a^6, as shown in Fig. 21, the said arm at its upper end being provided, as herein shown, with an anti-friction-roller b^{13}, mounted upon a stud or pin b^{14}, carried by the said arm, the said roller normally projecting into the path of movement of the cam B^{10}, so that when the disk B is rotated, as in the direction indicated by the arrow 20, Fig. 10, the cam b^{10} will strike the roller b^{13} and depress the end of the lever b^{12}, so as to rock the shaft a^6 in such a direction as will carry the pawl a^8 from what may be regarded as its normal position (shown in Fig. 14) back over the teeth of the ratchet-wheel a^9, the arm a^7, carrying the said pawl, moving in the direction indicated by the arrow 21, Fig. 14.

The pawl-carrying arm a^7 is moved in the direction indicated by the arrow 21 as long as the cam b^{10} remains in engagement with the roller b^{13}, and as soon as the said cam in the rotation of the disk B in the direction indicated by the arrow 20 passes off from or out of engagement with the roller b^{13} the arm b^{12} is returned to its normal position, as herein shown, by means of the spring b^{16}, having one end fastened to a stationary part of the machine and its other end fastened to the crank or arm b^{12}. The return movement of the arm b^{12} by the spring b^{16} rocks the shaft a^6 in the opposite direction, and the pawl a^8 being in engagement with a tooth of the ratchet-wheel a^9 carries the said wheel in a direction opposite to that indicated by the arrow 21, Fig. 14, which rotary movement of the ratchet-wheel effects a like movement of the feed-wheel a, and thereby moves or feeds the wire a^{90} in the direction indicated by the arrow 22, Fig. 14. This feed movement of the wire is continued until the shaft a^6 is arrested in its rocking movement in the direction opposite to that indicated by the arrow 21, and the said rock-shaft may be arrested in its return movement at any desired point by means of an adjustable stop, herein shown as a set-screw b^{18} inserted through the arm b^{19} of the lever b^{12} and adapted to strike or abut against the framework or head A^2 of the machine, as clearly shown in Fig. 10.

The disk B is provided on its periphery with suitable cam-surfaces to effect the proper positioning of the movable wire-guide a^{16} with relation to the stationary throat a^{21}, so that the said guide may be brought in proper position with relation to the throat to direct the free end of the wire into the throat when the feed mechanism above described is operated. The particular portion or cam on the surface of the disk B which effects the proper positioning of the wire-guide a^{16} is represented in Fig. 13 between the points 50 51. The disk B is further provided on its periphery with a cam portion or surface between the points 52 53, by which the movable cutter and its holder are carried or forced across a plane in a vertical line with the throat, so as to sever the portion of the wire in the throat from the length of the wire carried by the guide, and thereby form a nail or slug having a flat or smooth head or upper surface, and at the same time provide the free end of the wire carried by the guide a^{16} with a substantially V-shaped point. The disk B from the point 53 returns back to its normal circle or size, so as to permit of the return movement of the movable carrier or lever a^3, which return movement may and preferably will be effected, as herein shown, by a spring b^{90}, (see Figs. 2 and 10,) one end of the said spring being fastened to the head A^2 and the other end to the lever a^3.

The disk B is provided on its front face with a cam-groove b^{20}, into which projects a stud or roller b^{21}, carried by the driver-bar b, and represented in Figs. 1 and 13 by dotted lines. The cam-groove b^{20} is designed in the present instance to effect two reciprocations or movements of the driver-bar b and its attached driver a^{33} during one complete cycle of the cam-disk B, the first of which reciprocations is to prick the leather or other material and form a small hole for the reception of the point of the nail or slug, in which it is properly centered and positioned, and which nail or slug is driven into the stock or work by the second reciprocation of the driver-bar and its attached driver. The first movement or reciprocation of the driver-bar may be effected, as herein shown, by the portion of the cam-groove between the points 60 61, (see Fig. 13,) and the second reciprocation may be effected by the portion of the cam-groove from the point 62 to the point 60. The downward movement of the first reciprocation is effected while the portion of the cam from the point 60 to the point 65 is

passing by the stud or roller b^{21}, (see Fig. 23,) and from the point 65 to the point 61 the return movement of the first reciprocation is taking place. While the cam is traveling from the point 61 to the point 62 the driver-bar remains at rest, as the stud or roller b^{21} is on a true circle, but when the point 62 of the cam meets the roller b^{21} the said roller and its driver-bar are depressed, thereby effecting the downward stroke of the second reciprocation, which continues until the point 66 passes by the stud or roller b^{21}, and while the portion of the cam-groove from the point 66 to the point 60 is traveling by the stud or roller b^{21} the latter and the driver-bar are raised and held in their elevated position. These various cams are properly located or positioned and timed with relation to each other to accomplish their specific duties in sequence and at the proper time. The peripheral cams of the disk B may and preferably will act upon a roller b^{30}, loose on a stud b^{31}, carried by the arm or lever a^3, (see Figs. 2 and 14,) and to which in the present instance the spring b^{90} is fastened, to enable the said spring to effect the return movement of the lever a^3.

The work or material into which the nail or slug is driven, as just described, is supported upon a horn b^{40}, preferably of the construction herein shown, (see Figs. 3 and 6,) it consisting of a substantially straight bar provided at its lower end with a threaded shank or stem b^{41}, extended through a threaded sleeve b^{42} on an arm b^{43}, resting upon the upper end of a non-rotatable shaft or rod b^{44} and adjustably secured thereto by a clamping bolt or screw b^{45}, extended through an elongated slot b^{46} in the arm b^{43} and into a threaded socket b^{47} in the upper end of the rod or shaft b^{44}. The horn b^{40} is preferably provided at its upper end with a revoluble cap or tip b^{50}, (see Figs. 3 and 4,) having its stem b^{51} fitted into a socket b^{52} in the end of the horn and secured therein against longitudinal movement, as by a pin b^{53}, extended through a suitable hole in the side of the horn into an annular groove b^{54} in the stem b^{51}. The revoluble tip or cap b^{50} enables the work to be fed forward with a minimum friction.

The horn b^{40} in its operative position is elevated, which may be accomplished by one or more springs b^{60}, made of wire rods bent into substantially the form shown in Fig. 3, and having one end stationary and its opposite end engaging the under surface of a roller b^{61}, mounted on a stud or shaft b^{62}, having bearings in a sleeve or suitable support, (not herein shown,) which is secured onto a link or rod b^{64}, firmly fastened, as by a lock-nut b^{65}, to the lower end of the shaft or rod b^{44}, the said link being pivotally connected at its lower end to a lever b^{66}, (see Fig. 5,) loosely mounted on a shaft or arbor b^{67}, supported in bearings in a bracket or arm b^{68}, depending from a cross-bar b^{69}, connecting the front legs b^{70} of the base A. The horn b^{40} is lowered a predetermined distance after the insertion of each slug or nail, which result may be effected by means of a cam-disk b^{71}, fast on the main shaft b^9, the said cam having in one of its faces a cam-groove b^{72}, (see Fig. 8,) into which projects a stud or roller on an arm b^{73} of a lever b^{74}, pivotally mounted in the head A^2, and having its other arm b^{75} (see Fig. 8) pivotally connected to a link b^{76}, extended down through the hollow post or upright A', as herein shown, and pivotally connected at its lower end to an arm b^{77} of the lever b^{66}. The pivotal connection between the upper end of the link b^{76} and the arm b^{75} of the lever b^{74} may be effected, as herein shown, by means of a hanger or forked arm b^{80}, secured to the lever-arm b^{75} by a screw b^{81} and supporting a shaft or pin b^{82}, upon which is clamped the split upper end of the link b^{76} by the screw b^{84}.

The operation of the horn-depressing mechanism is as follows: The cam-groove b^{72} in the revolution of the cam-disk b^{71} in the direction indicated by the arrow 40, Fig. 8, acts on the stud or roller carried by the arm b^{73} and turns the said arm in the direction indicated by the arrow 41, Fig. 8, thereby turning the lever b^{74} on its pivot and moving upward the lever-arm b^{75}, the link b^{76}, and the arm b^{77} of the lever b^{66}, which movement lowers the opposite arm of the lever b^{66} and thereby lowers the link b^{65}, the horn-shaft b^{44}, and the horn b^{40}, the horn being in its lowermost position when the highest point 70 of the cam (see Fig. 8) is in engagement with the lever-arm b^{73}. With the construction of the cam herein shown the horn is maintained in its lowered position while the surface from the point 70 to the point 71 is in engagement with the lever-arm b^{73}, and the throw of the cam is of such extent as will lower the horn away from the throat-plate a sufficient distance to afford plenty of room for the operator to put on and remove the work from the horn, which movement of the horn is more than sufficient to permit of the automatic feed of the work. The automatic feed of the work may and preferably will be accomplished by the mechanism herein shown and as will now be described. The work-feed mechanism herein shown consists, essentially, of an arm or bar c, (see Figs. 1, 2, 9, 19, and 20,) located below the throat-plate a^{22} and secured to or forming part of a rack-bar c', (see Fig. 19,) the bar c in the present instance being shown as adjustably secured to the rack-bar c' by the screws c^{2a}. The rack-bar c' is dovetailed into the lower arm 75 of a lever c^2, provided with a pivot stud or pin c^3, (see Figs. 7 and 9,) which has a bearing in a socket or hub c^4 of the head A^2, and in which hub the pivot-pin c^3 is free to move longitudinally for a purpose as will be described. The lever c^2 is provided at its upper end, as hereinafter shown, with two arms c^5 c^6, the arm c^5 being adapted to be engaged by a cam projection c^7 (see Fig. 9) on the periphery of a cam-disk c^8, the arm c^5, as herein shown, carrying a stud or roller c^9, which is projected into the path of movement

of the cam projection c^7 and which effects a rocking of the lever on its pivot or stud c^3 to effect a positive movement of the feed-arm c in one direction. The arm c^6 of the lever c^2 is provided, as herein shown, with a roller c^{10}, (see Figs. 7 and 9,) which is adapted to be engaged by a projection or cam c^{12} on one face of the cam-disk c^8, which engagement of the cam or projection c^{12} with the roller c^{10} effects a longitudinal movement of the lever c^2, which movement is toward the front of the machine or in the direction indicated by the arrow 50, Fig. 7, so as to bring the end of the feed arm or bar c into engagement with the work, and when so engaged the cam or projection c^7 will meet the roller c^9 and rock the lever c^2 on its pivot in a direction to effect a feed movement of the work, which movement will be toward the left (viewing Fig. 1) in the arrangement of the parts as herein shown.

After the work has been fed forward or toward the left (viewing Fig. 1) the desired or required distance to effect a proper spacing of the nails or slugs it is practically essential that the feed arm or bar c should be withdrawn from engagement with the work in such a direction as will not disturb the work from the position into which it has just been moved, and this withdrawal of the feed-bar c may and preferably will be accomplished by means of a spring c^{15}, herein shown as an inclined wire spring fastened at one end to the framework or head A^2 and having its other or lower end in engagement with a collar or head c^{16} on the stud c^{17}, carried by the lever-arm c^5 and upon which the roller c^9 is mounted.

By reference to Fig. 2 it will be seen that the upper end of the spring c^{15} is located out of line with its lower end, which causes the said spring to withdraw or move the lever c^2 bodily in a rearward direction to thereby move the pivot-pin or shaft c^3 in its sleeve or hub c^4 in a direction opposite to the arrow 50, Fig. 7, and the said spring at the same time bearing on the stud c^{17} throws the arm c^5 of the lever c^2 toward the head of the machine until it is arrested by a suitable stop, which movement of the arm c^5 carries the lever c^2 backward into its normal position—that is, toward the right, viewing Fig. 1. The extent of the said backward movement of the lever c^2 may be regulated by an adjustable back-stop, shown as a screw c^{20}, carried by the arm c^5 of the lever c^2 and adapted to engage the head A^2 of the machine. The motion of the work-feed mechanism partakes of what is commonly known as a "four-motion" feed. The feed-bar c is adjustable in its lever c^2, so as to properly position the engaging end of the lever with relation to the work, and this adjustment may be accomplished, as herein shown, by providing the arm 75 of the lever c^2 with a transverse circular socket c^{22}, through which is extended a shaft c^{23}, provided with a pinion c^{24} in mesh with the rack-bar c', the shaft c^{23} being held from rotation, except when positively moved, by means of a spiral spring c^{25}, encircling the shaft c^{23} between the lever c^2 and check-nuts c^{26}, the said spring acting to keep a head or collar c^{27} on the shaft c^{23} in engagement with one side of the arm 75 of the lever c^2. The adjustment of the feed-bar c may be accomplished, as herein shown, by means of a crank or handle c^{30}, attached to one end of the shaft c^{22}.

The parts of the machine heretofore described are operated from the main shaft b^9 of the machine, and the rotation of the shaft may and preferably will be controlled by a clutch mechanism, as will now be described. As herein shown, the shaft b^9 has fast on it a wheel or disk d, provided with a suitable friction-surface d', (see Fig. 2,) with which cooperates a pulley d^2, normally loose upon the shaft b^9 and continuously revolved by a suitable belt (not herein shown) or in any other suitable manner. This construction of the clutch mechanism as thus far described may be of any usual or suitable make, such as now commonly employed, but in the present instance the loose pulley d^2 is positively engaged with the disk or wheel d by what I prefer to designate as the "starting" device or mechanism for the machine, which starting device consists, as herein shown, of a collar or yoke d^3 (see Figs. 2 and 12) on the hub d^4 of the loose pulley d^2, the said collar being provided with a beveled face d^5, (see Fig. 2,) with which coöperates a beveled face d^6 of a yoke d^7, encircling the hub d^4 of the loose pulley and having its rear face d^8 engaging, as herein shown, a bearing-hub d^9, forming a stationary part of the machine. The yoke d^7 is provided, as herein shown, with a shank d^{10}, to which is connected in any suitable manner the upper end of a link d^{12}, extended down through the hollow upright A' and connected at its lower end to an arm d^{13} of a foot treadle or lever d^{14}, (see Figs. 3 and 5,) the lever d^{14} being mounted upon the shaft b^{67}.

The operation of the starting mechanism may be briefly described as follows: The operator depresses the treadle d^{14}, which movement elevates the arm d^{13}, the link d^{12}, and the yoke d^7, thereby moving the beveled face d^6 of the said yoke upward with relation to the beveled face d^5 of the collar d^3 and into substantially the position shown in Fig. 2, the movement of the yoke d^7 being in a vertical plane by reason of its abutting against the hub d^9, and consequently as the yoke is moved upward its beveled face d^6 forces the beveled collar d^3 against a collar or enlargement $d^\times$ on the hub of the loose pulley d^2 and carries the said loose pulley into engagement with the friction-surface d' of the disk or wheel d, thereby rendering the constantly-driven pulley d^2 fast on the shaft d^9, and thereby setting the said shaft in rotation when released, as will be described.

In order to stop or arrest the shaft b^9 in its rotation substantially in an instant when the

loose pulley d^2 is disengaged from the wheel or disk d, I have provided a novel stopping or brake mechanism consisting, essentially, as herein shown, of a brake-wheel d^{20}, preferably provided with a substantially V-shaped annular groove d^{21} and herein shown as forming part of the disk or wheel d. The brake-wheel d^{20} has coöperating with it a brake-shoe d^{210}, fastened on the end of a lever d^{22}, extended into a slot d^{70} (see Fig. 2) in the upper portion of the head A^2, as herein shown, and pivoted to the said head, as at d^{23}, the said lever having its shorter or rear arm 80 upwardly spring-pressed, so as to normally depress the long arm of the lever d^{22} and engage the brake-shoe d^{210} with the brake-wheel d^{20} when the front end of the lever d^{22} is lowered by the spring d^{25}, (shown in Fig. 2,) which spring is located within a suitable socket d^{71} in the head A^2.

The movement of the front end of the lever just described may be automatically controlled, so as to enable the operating parts to perform their work, by means of the brake-wheel d, with which coöperates, as herein shown, a roller d^{30}, loosely mounted on the front end of the lever d^{22}, the disk or wheel d being of a sufficiently large diameter to elevate the front end of the brake-lever d^{22} when the full portion of the periphery is in engagement with the roller d^{30} and keep the brake-shoe disengaged from the brake-wheel, and in order to permit of the movement of the brake-lever d^{22} by its spring d^{25}, so as to engage the brake-shoe d^{210} with the brake-wheel d, the said wheel d on its periphery is provided with a cam recess, notch, or depression d^{31}, (see Fig. 11,) into which the roller d^{30} is adapted to drop a sufficient distance to engage the brake-shoe d^{210} with the groove d^{21} in the brake-wheel d^{20}, and thereby automatically stop the rotation of the shaft d^9 and the operation of the machine at the proper time, and substantially in an instant, as will be described.

The brake-lever d^{22} may be positively operated to release the brake-shoe d^{210} from engagement with the brake-wheel, and this result may be effected by a releasing device under control of the operator and which is herein shown as a pin or rod e, extended through a suitable hole in the head A^2 (see Fig. 2) and resting upon the yoke d^7, the said rod or pin being adapted to have its upper end brought in contact with the brake-lever d^{22} to turn said lever on its pivot and lift the roll d^{30} out of the recess or depression d^{31} in the brake-wheel, and thereby permit the brake-wheel and the shaft b^9 to revolve. The upward movement of the releasing pin or rod e is effected, as herein shown, by the yoke d^7 when the foot-treadle d^{14} is depressed by the operator. The pin or rod e may be lowered, as in the present instance, by gravity. To compensate for wear in the brake-shoe d^{210} and consequent change in position of the lever d^{22}, an adjustable device or stop on the lever d^{22} is provided, which is herein shown as a screw e', extended through the lever d^{22} in line with the release pin or rod e, for it will be seen that, as the release-pin has a fixed limit to its upward movement, which range of movement remains the same, the screw e' is adjusted so as to engage the upper end of the pin or rod e irrespective of the change of position of the lever d^{22} due to wear upon the brake-shoe.

The recess or depression d^{31} in the periphery of the brake-wheel is made of such depth as will permit the roll d^{30} to drop into it without interfering with the engagement of the shoe with its wheel d^{20}. When the brake-shoe is in engagement with its wheel, as represented in Fig. 2, the loose pulley d^2 is withdrawn from engagement with the wheel d, which may be effected in any usual or suitable manner. The recess d^{31} in the wheel d may and preferably will be longer than the diameter of the friction-roll d^{30}, so as to allow for a certain amount of movement or rotation of the brake-wheel due to its momentum after the engagement of the brake-shoe with the said wheel.

The pressure or force with which the brake-shoe d^{21} is applied may be regulated as desired, which regulation may be effected in the present instance by means of an adjusting-screw d^{50}, extended through the rear end of the lever and acting upon the spring d^{25}.

The complete operation of the nail-driving machine herein shown will now be briefly described. Let it be supposed that the wire a^{90} has been properly placed in the guideway a^{15} a^{15a}, which may be accomplished by the operator rotating or turning the sleeve a^5 by moving the finger-piece or lever a^{13} downward from the position shown in Fig. 14, so as to turn the eccentric a^{12} in its bearing in the lever a^3 and move the feed-wheel away from the stationary member a', thereby affording sufficient room for the insertion of the wire between the members of the feed mechanism into the guideway a^{15} a^{15a}. After the wire is properly placed in its guide the sleeve a^5 is rotated in the opposite direction to firmly grip the wire by the operator turning the lever a^{13} up into the position shown in Figs. 1 and 14. Let it further be supposed that the machine has progressed from its starting position, which will be hereinafter fully described, to the position shown in Fig. 1, which is accomplished by the operator first depressing the treadle d^{14}, which moves the yoke d^7 upward into substantially the position shown in Fig. 2 and engages the loose pulley d^2 with the fast disk or wheel d. At the same time the yoke d^7 raises the releasing pin or rod e and lifts the lever d^{22}, which withdraws the brake-shoe from engagement with the brake-wheel and permits the main shaft of the machine to be started in its rotation. As the main shaft rotates it causes the cam-disk b^{71} to first elevate the horn, so as to bring the work firmly up against the throat-plate, and

at or about the time the work has been brought firmly against the throat-plate the driver-operating cam B operates on the driver to effect what may be termed the "first reciprocation of the driver-bar," which reciprocation is effected by the portion of the cam-groove b^{20} from the point 60 to the point 61. On this first reciprocation of the driver-bar the driver is carried through the throat (see Fig. 23) and into the top lift or work, so as to form or prick a hole into which the nail is to be driven on the second reciprocation of the driver-bar, as will be described. After the hole is pricked in the work the driver-bar is raised to its full upward limit and into the position represented in Figs. 1 and 14, in which position it remains while the wire is being fed into the throat and the nail or slug formed.

While the driver-bar is reciprocated to impart to it the functions of an awl, as above described, the wire-guide a^{16} is out of the path of movement of the said driver to leave a clear path for the passage of the driver into the throat a^{21}. After the driver has pricked the hole and returned to the position shown in Fig. 1 the wire-guide a^{16} is moved into the path of movement of the driver and its guideway a^{15a} is placed into alinement with the throat a^{21}, and this movement of the wire-guide is effected, as above described, by the portion of the cam-disk B between the points 50 51, Fig. 13, acting on the roller b^{30}, carried by the lever a^3. After the lever a^3 has been turned on its pivot, as described, so as to place the wire-guide in alinement with the throat, the feed of the wire takes place, which is effected, as above described, by the cam b^{10} engaging the arm or lever b^{12}, fast on the shaft a^6, so as to move the pawl-carrying arm a^7 backward a number of teeth on the ratchet-wheel a^9 sufficient to produce the feed desired, and the actual feed of the wire in the present instance is effected by means of the spring b^{16} returning the lever or arm b^{12} back to its normal position, (represented in Fig. 10,) which return movement of the arm b^{12} rocks the shaft a^6 and moves the feed-wheel a in the direction opposite to the arrow 21, Fig. 14, and feeds the wire down into the throat a^{21}. The length of the wire fed into the throat may be regulated by means of the adjusting-screw b^{18}, which positions the end of a lever b^{12} with relation to the under surface of the cam b^{10}, so that a greater or less length of the cam will engage the lever b^{12}. The longer the engagement of the lever b^{12} with the under surface of the cam b^{10} the greater the movement of the pawl-carrying arm a^7 in the direction indicated by the arrow 21, and consequently the greater the rotation of the feed-wheel in the direction opposite to the arrow 21.

While the wire is being fed into the throat, as described, the carrier or lever a^3 remains stationary until the wire-feed mechanism has accomplished its work. At or about the time the wire-feed mechanism has finished its work the portion of the cam B between the points 52 53 acts on the roller b^{30} and turns the lever or carrier a^3 on its pivot, so as to move the wire-guide farther in the same direction across the path of movement of the driver and thereby bring the cutters into action, the movable cutter a^{18} shearing the portion of the wire in the throat, so as to form a substantially smooth surface on the nail in the throat and a substantially V-shaped point on the portion of the wire remaining in the guide. The nail or slug cut from the wire is now in the throat and is in position to be driven, but in order to enable it to be driven the wire-guide a^{16} must be withdrawn from the path of movement of the driver, which may be effected by the spring b^{90}, as herein shown, acting on the carrier or lever a^3 as soon as the point 53 on the cam-disk B passes by the roller b^{30} on the said lever. The spring b^{90} carries the lever a^3 and its attached parts back into their starting position. (Substantially represented in Fig. 1.) The path of movement of the driver is now clear, and the second reciprocation of the driver is effected by the cam-groove b^{20} between the portions 62 and 66, (see Fig. 13,) which moves the driver-bar and its attached driver downward, so that the end of the driver will force the nail into the hole in the top lift formed by the driver on the downward movement of its first reciprocation, and the said driver is arrested in its downward movement at or about the time the point 66 of the cam engages the roller b^{21}, and when the driver-bar is so arrested or stopped the end of the driver is preferably substantially flush with the under surface of the throat-plate, in which position it remains while the portion of the cam-groove b^{20} from the point 66 to the point 60 is in engagement with the roller b^{21}. As soon as the nail has been driven into the top lift the horn commences to be lowered, and at the beginning of the movement of the horn away from the throat-plate the feed of the work takes place. The downward movement of the horn, as above described, is effected by means of the cam-groove b^{72} in the cam-disk b^{71}, while the four-motion work feed is accomplished by means of the cams c^{12} c^7 and the spring c^{15}, as above described, acting on the lever c^2. The work having been fed, the horn continues to descend, and at or about the time the horn has reached its lowermost position the cam recess or depression d^{31} in the brake-wheel comes in line with the roller d^{30} on the brake-lever d^{22}, and if the releasing-pin e is in its lowered position out of contact with the brake-lever d^{22} the latter will be turned on its pivot by the spring d^{25}, so as to engage the brake-shoe d^{210} with the brake-wheel d^{20}, and thereby automatically stop the machine with the horn in its lowered position. If, however, it is desired to continue the operation of the machine, the operator will maintain his foot on the treadle d^{14} and thereby keep the releasing pin or device e in engagement with the brake-lever d^{22}, and consequently hold the brake-shoe d^{210} out of en-

gagement with the brake-wheel while the recessed portion of the periphery of the disk or wheel d is passing by or under the roller d^{30}. When the machine has made one complete cycle of movements and the shaft b^9 is automatically stopped with the roller d^{30} in the cam-recess d^{31}, the rotation of the driver-operating cam B is stopped with the point 60 of the cam-groove b^{20} in engagement with the roller b^{21}, (see Fig. 23,) which is the starting position of the machine, so that, as above described, when the operator first starts the machine the first operation will be the throwing down of the driver-bar beyond the lower face of the throat and into the material to punch a hole therein, after which it is returned to the position shown in Fig. 1 and the remaining successive operations performed, as above described.

By means of the threaded shank b^{41} on the horn the latter may be adjusted vertically with relation to the throat-plate to compensate for different thicknesses of heels or other material, and a lateral adjustment may be obtained by the elongated slot b^{46} and screw b^{45} to enable the tip of the horn to be adjusted with relation to the counter of the shoe to compensate for heels of different sizes.

I claim—

1. In a machine of the character described, the combination of the following instrumentalities, viz: a reciprocating driver, a throat having a fixed position with relation to said driver, a wire-guide provided with a passage a^{15} having closed side walls and movable with relation to said throat, a movable carrier for said wire-guide, a wire-feed mechanism supported by said carrier, a cutter attached to said carrier, a coöperating cutter located on the opposite side of the path of movement of the said driver, means to move said carrier and bring the wire into line with the said throat, means to operate the wire-feed mechanism and carry the wire into the said throat, and means to again move the carrier to bring the cutter attached to it into operation to sever the wire in the throat, means to return the carrier to its normal position, and means to operate the driver and carry it into the said throat, substantially as described.

2. In a machine for inserting nails into boots and shoes, the combination of the following instrumentalities, viz: a vertically-movable horn or work-support, a rotatable shaft, a cam on said shaft to effect movement of the horn downward a uniform distance beyond what is necessary to permit the work thereon to be fed or moved over the said horn, intermediate mechanism connecting said horn with said cam, and a brake mechanism to stop the rotation of the cam-shaft and adjusted with relation to the said cam to operate to stop rotation of the said shaft when the point of greatest throw of the horn-lowering cam is acting upon the said intermediate mechanism to lower the horn a uniform distance and beyond what is necessary to permit the work to be fed on the horn, whereby the work may be taken off and placed on the horn, substantially as described.

3. In a machine of the character described, a wire-feed mechanism consisting of two members, one of which is rotatable and movable bodily toward the other to adjust it to the size of wire used, a carrier for the rotatable movable member in which the said movable member is eccentrically supported, means to secure the eccentrically-supported and rotatable movable member in its adjusted position with relation to its coöperating member, and means to produce an intermittent rotation of the movable member after its eccentric support has been secured or rendered stationary in its adjusted position, substantially as described.

4. In a machine of the character described, a reciprocating driver, a rotatable shaft, and a cam mounted on said shaft to rotate therewith and acting on the said driver to produce a plurality of reciprocations of the said driver and move it different distances in the same direction in one revolution of the said shaft to impart to the said driver the double function of an awl and a driver, substantially as specified.

5. In a machine for inserting nails into boots and shoes, a work-feed mechanism consisting of an arm to engage the work, the lever c^2 carrying said arm and provided with the pivot-stud c^3 movable longitudinally in a bearing c^4 and rotatable therein, arms c^5 c^6 on said lever, cams acting on said arms to turn said pivot-stud in its bearing and to move it longitudinally in said bearing, and means to move said pivot-stud and its lever in the reverse directions, substantially as described.

6. In a machine for inserting nails into boots and shoes, a horn or work-support, a lever, means to connect said horn with one arm of said lever, a pivoted cam-operated lever, means to connect one arm of the cam-operated lever with the lever to which the horn is connected, and a rotatable shaft, a cam mounted on said shaft and provided with a cam-groove of a throw sufficient to lower the horn a distance greater than that necessary to permit the work to be fed on the horn, a stud or roller on the other arm of the cam-operated lever extended into said cam-groove to positively lower and elevate the said horn a uniform distance, and a brake mechanism, to stop the rotation of the cam-shaft and adjusted to operate with relation to the said cam-groove to stop rotation of the said shaft when the greatest throw of the groove is in engagement with the said stud or roller and the horn is in its lowered position beyond what is necessary to permit the work to be fed on the horn, whereby the work may be taken off and placed on the horn, substantially as described.

7. In a machine of the character described, a wire-feed mechanism consisting of two members, one of which is rotatable and bodily

movable toward the other, a sleeve upon which said movable member is loosely mounted, an eccentric on said sleeve, a carrier in which the said sleeve is eccentrically mounted, a rock-shaft extended through said sleeve, means to secure the eccentric sleeve in its adjusted position in the said carrier, and render it fixed or stationary therein, means attached to said rock-shaft and engaging the rotatable member of the said feed mechanism, and means to rock said shaft in said sleeve and produce intermittent rotation of the said movable member, substantially as described.

8. In a machine for inserting nails into boots and shoes, the combination of the following instrumentalities, viz: a wire-feed mechanism provided with an eccentrically-supported and rotatable movable member, a movable carrier in which the movable member of the wire-feed mechanism is eccentrically supported, a wire-guide attached to said carrier to move therewith, and means to intermittently rotate the movable member of the wire-feed mechanism and move the wire in its guide, and means to move said carrier, substantially as described.

9. In a machine for inserting nails into boots and shoes, the combination of the following instrumentalities, viz: a wire-feed mechanism provided with an eccentrically-supported movable member, a movable carrier in which the movable member of the wire-feed mechanism is eccentrically supported, a wire-guide attached to said carrier to move therewith, and means to operate the wire-feed mechanism and move the wire in its guide, and means to move said carrier, substantially as described.

10. In a machine for inserting nails into boots and shoes, the combination of the following instrumentalities, viz: a wire-feed mechanism provided with an eccentrically-supported movable member, a movable carrier in which the movable member of the wire-feed mechanism is eccentrically supported, a wire-guide attached to said carrier to move therewith, a cutter-holder attached to the said carrier, a cutter in said holder, a second cutter coöperating with the cutter in the said holder, a holder for said second cutter, means to operate the wire-feed mechanism and move the wire through the wire-guide, and means to move said carrier and bring the cutter movable with it into engagement with the portion of the wire projecting from the wire-guide to sever the said projecting portion of the wire, substantially as described.

11. In a machine of the character described, a reciprocating driver, a rotating shaft, and a cam on said shaft provided with a cam-groove shaped to effect the movement of the driver different distances in the same direction during one revolution of the said shaft to impart to the driver the double function of an awl and a driver, and means on the said driver to engage said cam-groove, substantially as described.

12. In a machine of the character described, a reciprocating tool having the double function of an awl and a driver, and means to effect the reciprocation of the said tool and alternately move it different distances in the same direction to impart to the single tool the alternate functions of an awl and a driver, substantially as described.

13. In a machine of the character described, a wire-feed mechanism provided with a rotatable member, a sleeve on which said member is mounted, an eccentric on said sleeve, a movable carrier in which said eccentric is supported to turn therein, a rock-shaft supported in said sleeve and provided with a pawl-carrying arm, a ratchet-wheel movable with the said rotatable member, means to rock said shaft in one direction and means to rock it in an opposite direction, substantially as described.

14. In a machine of the character described, a wire-feed mechanism provided with a rotatable member, a sleeve on which said member is mounted, an eccentric on said sleeve, a movable carrier in which said eccentric is supported to turn therein, a rock-shaft supported in said sleeve and provided with a pawl-carrying arm, a ratchet-wheel movable with the said rotatable member, means to rock said shaft in one direction and means to rock it in an opposite direction, and means to control or adjust the extent of movement of the said rock-shaft, substantially as and for the purpose specified.

15. In a machine of the character described, a horn, an arm in which said horn is vertically adjustable, an elongated slot in said arm, a horn-shaft provided at its upper end with a threaded socket, and a screw or bolt extended through the said slot into said socket, substantially as described.

16. In a machine of the character described, the combination of the following instrumentalities, viz: a driver having independent movements of different length in the same direction to prick a hole in the material by one of said movements and to drive a nail into the hole thus made by the other of said movements, a wire-feed mechanism, a cutting mechanism, and means to effect the operation of the wire feed and cutting mechanisms intermediate of the independent movements of the said driver, substantially as and for the purpose specified.

17. In a machine of the character described, the combination of the following instrumentalities, viz: a reciprocating driver, a wire-feed mechanism, a wire-cutting mechanism, a rotatable shaft, means to operate said wire feed and cutting mechanisms, and a cam mounted on said shaft to operate said driver and effect two movements of the said driver in the same direction in one revolution of the said shaft, one of said movements being ac-

complished previous to the operation of the wire feed and cutting mechanisms, and the other of said movements being accomplished after the operation of the cutting mechanism, substantially as described.

18. In a machine of the character described, the combination of the following instrumentalities, viz: a work-feed mechanism consisting of a feed-arm, a supporting-lever therefor provided with a pivot-pin mounted to rotate and to move longitudinally, cams to effect the said rotary and longitudinal movements of the said lever and its pivot-pin in one direction, and means to effect corresponding movements in an opposite direction, substantially as described.

19. In a machine of the character described, the combination of the following instrumentalities, viz: a reciprocating driver, a throat substantially in line therewith and having a fixed position with relation thereto, a pivoted carrier normally out of the path of movement of the driver, a wire-guide attached to said pivoted carrier and through which the wire is fed to the throat, a wire-feed mechanism supported by said pivoted carrier and consisting of two members, one of which is rotatable and eccentrically mounted in said carrier to permit of bodily movement of the rotatable member toward and away from its coöperating member, a cutter attached to said pivoted carrier, a coöperating cutter located on the opposite side of the path of movement of the said driver, means to move said pivoted carrier to bring the wire-guide into line with the said throat, means to operate the feed mechanism and effect the feed of the wire from its guide into the throat, means to again move the pivoted carrier to bring the cutter attached to it into operation to sever the portion of the wire in the throat from the wire in the guide, means to return the carrier to its normal position, and a cam to operate the driver and carry it into the said throat to drive the cut portion of the wire therein, substantially as described.

20. In a machine of the character described, a wire-feed mechanism consisting of two members, one of which is movable bodily toward the other to adjust it to the size of wire used, and a carrier for the movable member in which the said movable member is eccentrically supported, and means to secure the eccentrically-supported movable member in its adjusted position with relation to its coöperating member; substantially as described.

21. In a machine of the character described, a wire-feed mechanism consisting of two members, one of which is movable bodily toward the other, a sleeve upon which said movable member is mounted provided with an eccentric, a carrier in which the said sleeve is eccentrically mounted, and means to secure the eccentric sleeve in its adjusted position in the said carrier; substantially as described.

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

LOUIS H. GODDU.

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