(No Model.) 6 Sheets—Sheet 1.

L. GODDU.

NAIL MAKING MACHINE.

No. 478,054. Patented June 28, 1892.

Fig. 1.

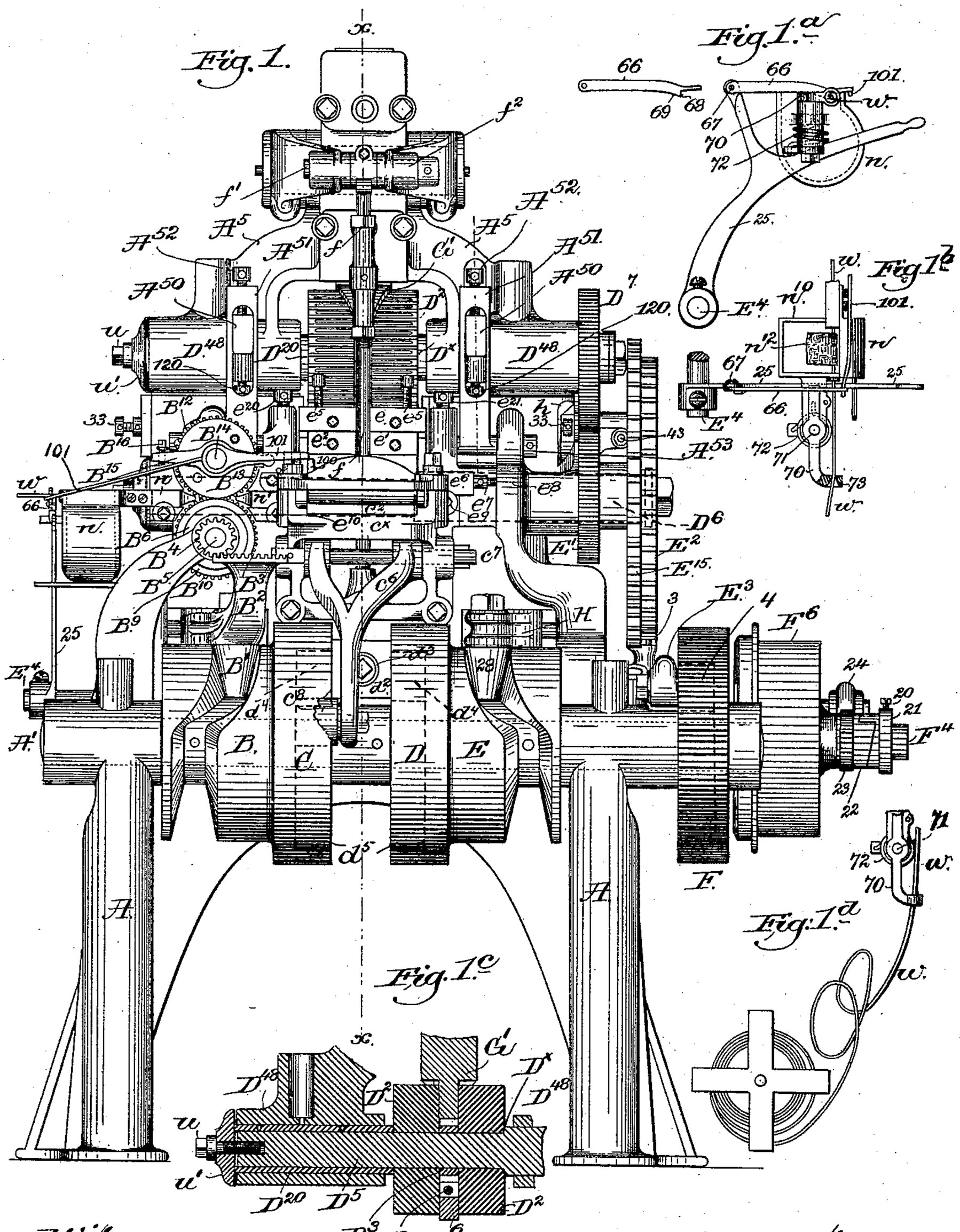

Fig. 1a.

Fig. 1b.

Fig. 1c.

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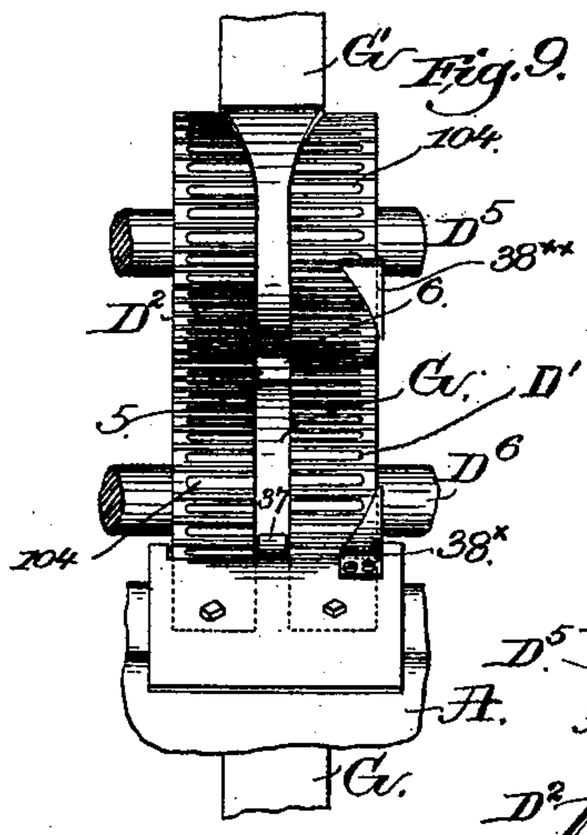

Fig. 9.

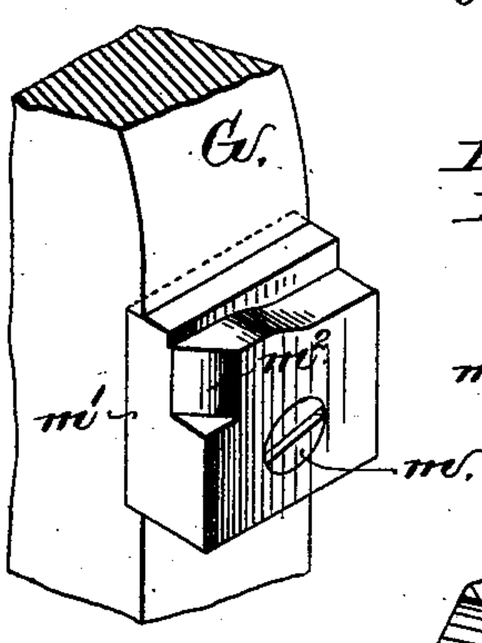

Fig. 2b.

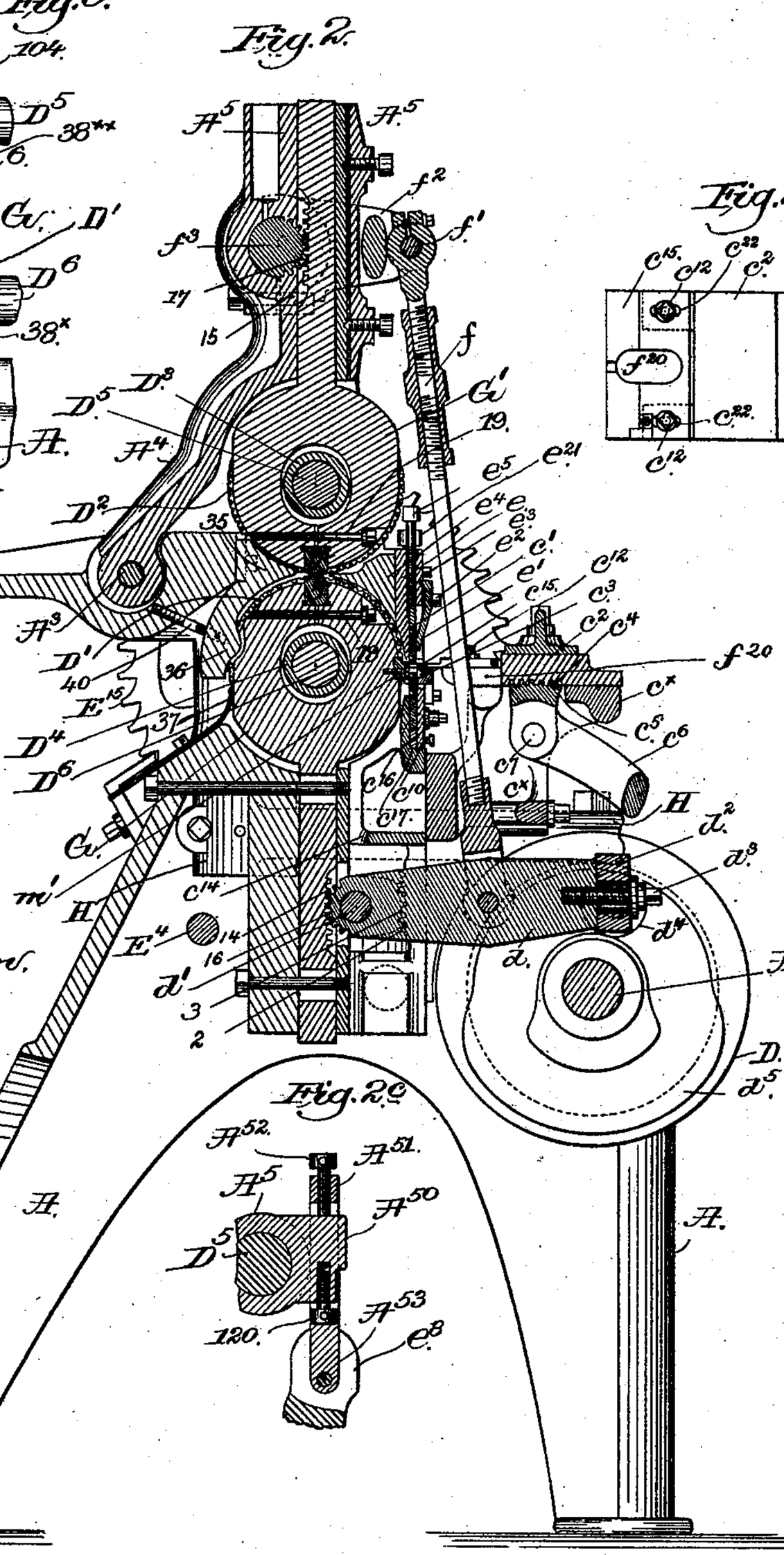

Fig. 2.

Fig. 2a

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Fig. 3.

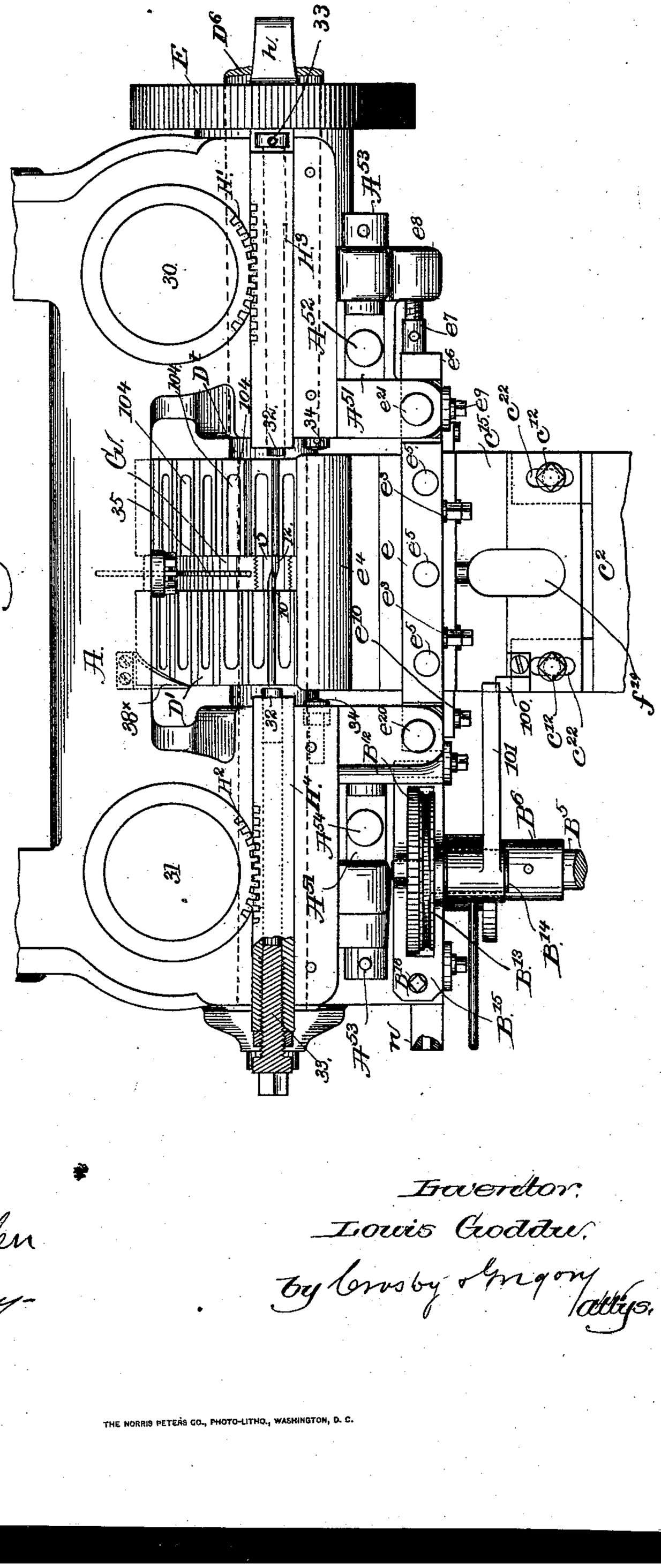

Fig. 3b

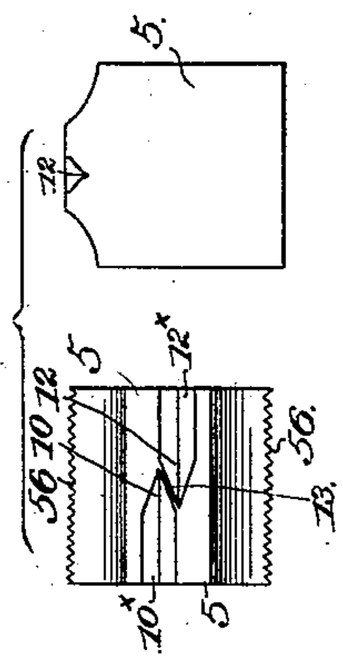

Fig. 3c

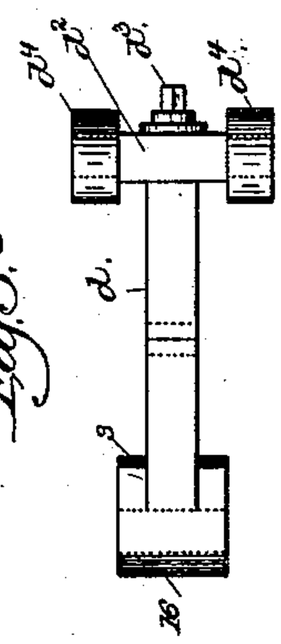

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Fig. 4.

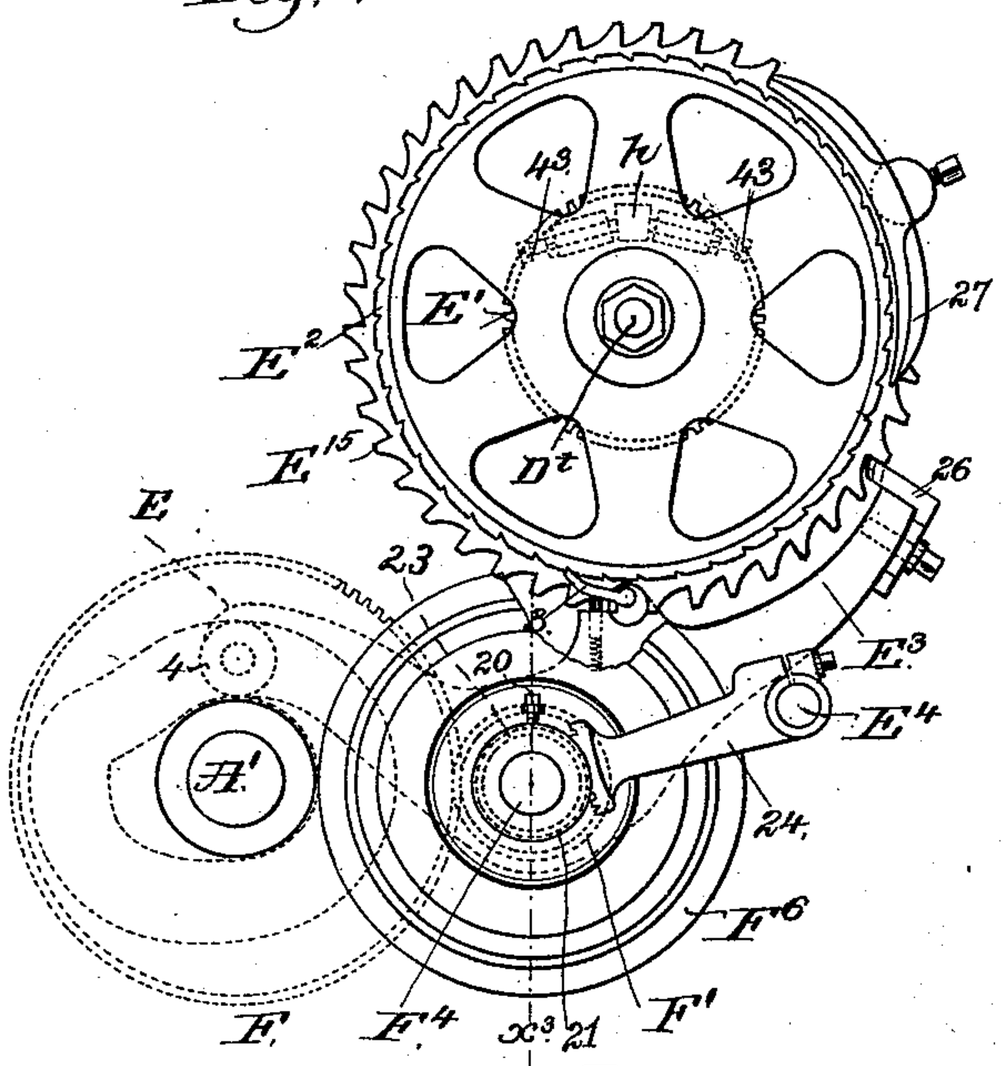

Fig. 5.

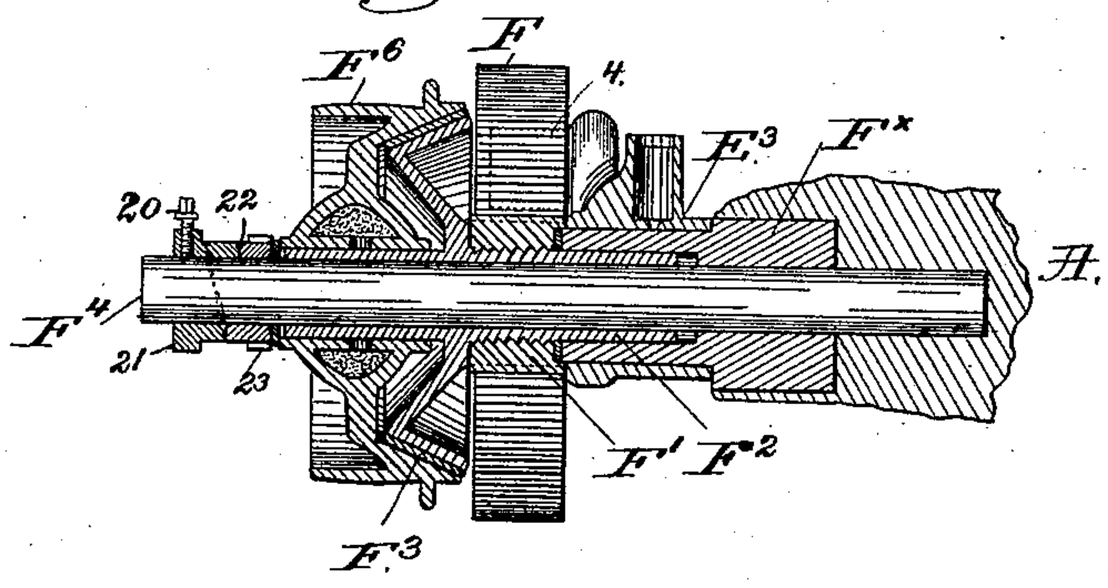

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Fig. 6.

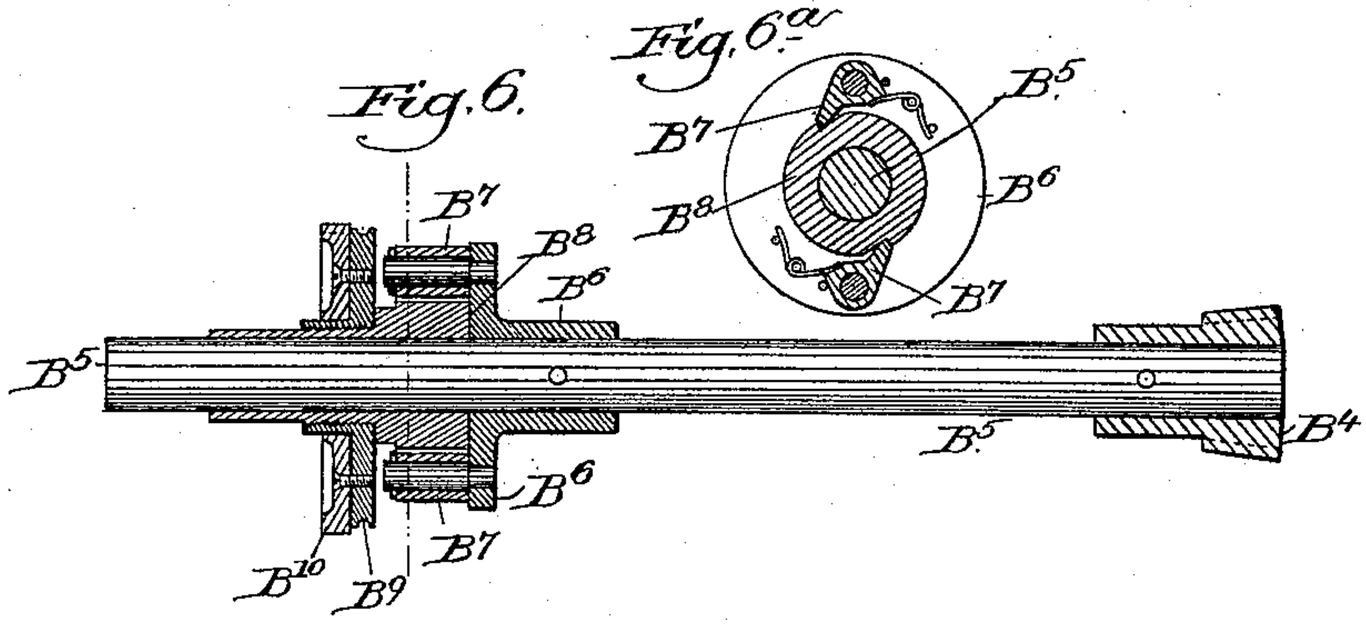


Fig. 6a.

Fig. 7.

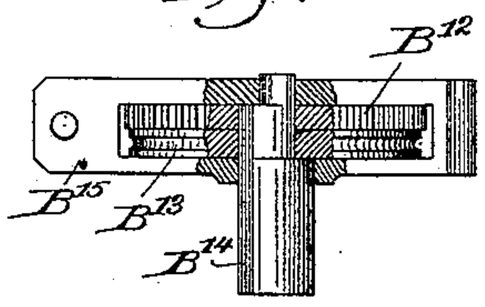
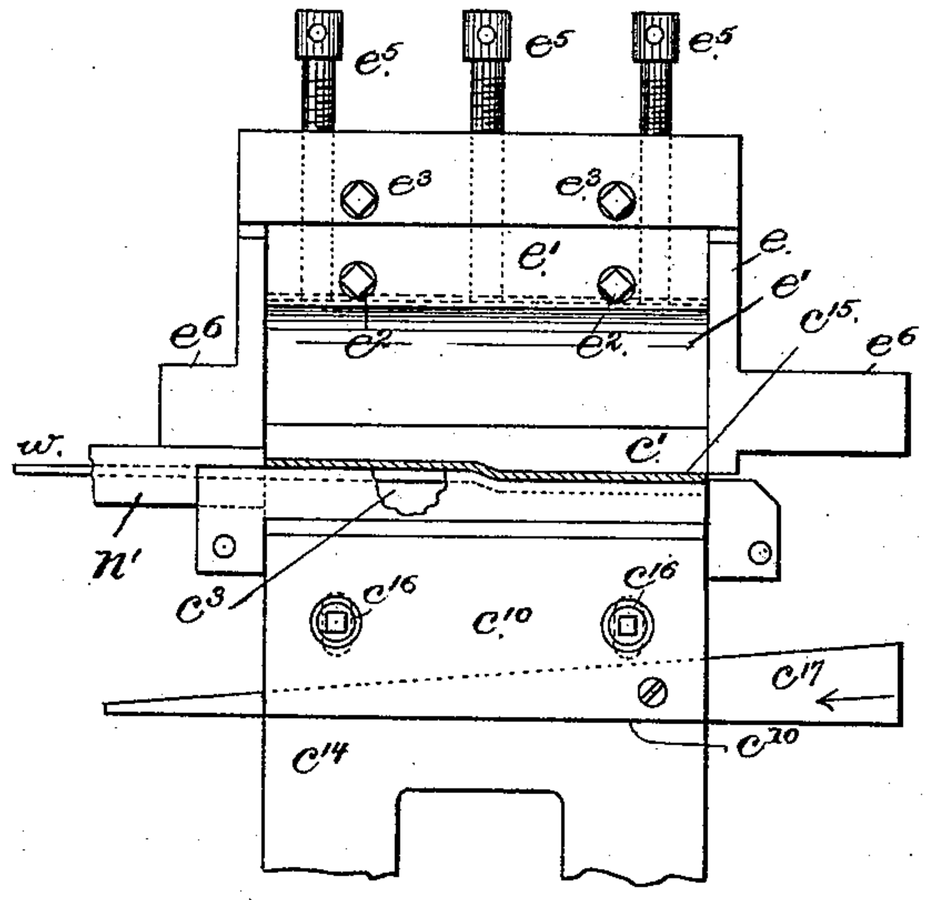


Fig. 7a.

Fig. 8.



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NAIL MAKING MACHINE.

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Fig: 10.

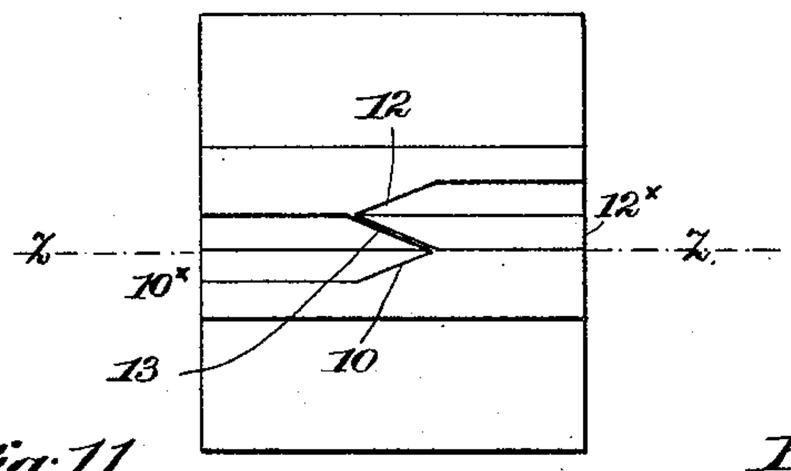


Fig: 11.

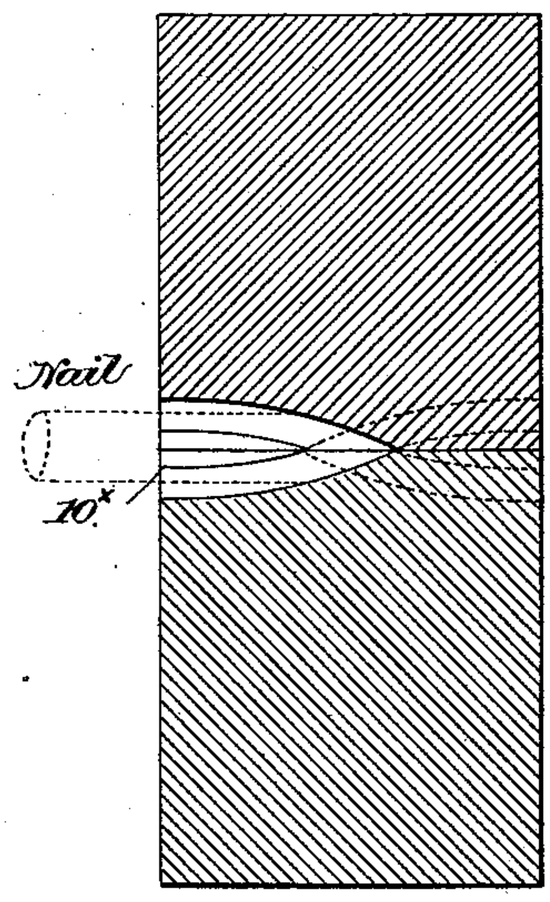
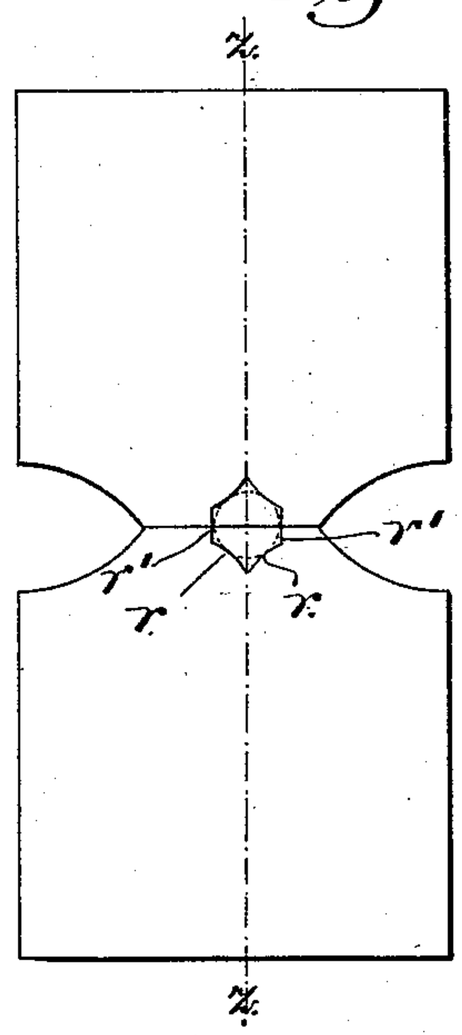


Fig: 12.



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UNITED STATES PATENT OFFICE.

LOUIS GODDU, OF WINCHESTER, ASSIGNOR TO JAMES W. BROOKS, OF CAMBRIDGE, AND FRANK F. STANLEY, OF SWAMPSCOTT, MASSACHUSETTS, TRUSTEES.

NAIL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 478,054, dated June 28, 1892.

Application filed December 12, 1890. Serial No. 374,425. (No model.)

To all whom it may concern:

Be it known that I, LOUIS GODDU, of Winchester, county of Middlesex, State of Massachusetts, have invented an Improvement in Nail-Making 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 has for its object to improve the construction of that class of nail-making machines shown in United States Patent No. 398,891, dated March 5, 1889.

In this my present invention I have so far simplified the construction of the mechanical parts that the pointing and heading of the nails are effected upon or between one and the same pair of rolls and the same rolls into which the offset blank is fed. As herein shown, the nails are to be made from a wire fed intermittingly to the machine by feeding devices shown as rolls, the said wire being cut off to form blanks of a length sufficient for two nails, the blank being offset or bent at or near its center, all substantially as in the said patent.

One part of my invention consists, essentially, in an organized machine for manufacturing nails, it comprehending sectional die-rolls arranged in pairs, the grooves in the sections of each roll of the pair being out of line for the reception of a double blank offset between its ends, a transferrer to place a blank in the grooves of one of the said die-rolls, point-forming dies or cutters to sever the blank through its offset portion, carriers for the said dies, and heading tools or devices cooperating with the said pair of rolls, whereby each nail is pointed and headed in its own groove; also, in the die-rolls and the carriers having the point-forming cutting-dies and means to actuate the said carriers, combined with a nail-breaker to separate the nails in case the blank should not be fully severed by the point-forming dies, substantially as will be described.

Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 of the drawings represents in front elevation a nail-making machine embodying my present invention; Fig. 1^a, a detail taken from the left of Fig. 1 and relating to the wire-stop motion; Fig. 1^b, a top view of Fig. 1^a. Fig. 1^c is a partial longitudinal section through one of the die-rolls, its shaft and sleeves, and one of the bearings D^{48}; Fig. 1^d, a detail to be referred to. Fig. 2 is a vertical section thereof in the line *x*, Fig. 1; Fig. 2^a, a plan view of the transferrer and the carriage to which it is attached; Figs. 2^b and 2^c, details to be referred to. Fig. 3 is a partial top or plan view, on a larger scale, of the machine shown in Fig. 1, but with the head carrying the upper roll and its attached parts turned back and removed; Fig. 3^a, a plan view of the lever *d*. Fig. 3^b shows one of the point-forming dies in plan and elevation. Fig. 4 is a partial right-hand side view of the machine shown in Fig. 1, the belt-pulley being partially broken out. Fig. 5 is a longitudinal section taken through the friction-pulley device and its attached parts in the line x^3, Fig. 4, looking toward the left, said figure showing in elevation the gear on the main shaft. Figs. 6 and 6^a are details relating to the wire-feeding mechanism, said figure showing the lower feed-roll; Figs. 7 and 7^a, details, enlarged, appertaining to the upper feed-roll; Fig. 8, a detail showing the bending mechanism, the transferrer for transferring the bent blank into one of the sectional rolls in which it is to be pointed and headed being shown in section. Fig. 9 shows the two sets of die-rolls in rear elevation, with the cutter-carriers between and with the stripper and the clearers. Fig. 10 is an enlarged face view of one of the point-forming dies. Fig. 11 is a vertical section taken through both the upper and lower dies in the dotted line *z*, Figs. 10 and 12. Fig. 12 is a view of the dies shown in Fig. 11, looking from the right.

The frame-work A is and may be of any suitable shape to support the working parts.

The main or cam shaft A′ of the machine has mounted upon it a series of cams B C D E and a toothed gear F, the said gear being engaged by a pinion F′ (see Figs. 4 and 5) upon a sleeve F^2, connected with the driven member F^3 of the friction-pulley device, to be de-

scribed, the said member turning upon a stud F^4. The driving member or portion F^6 of the friction-pulley, which receives the usual driving-belt, is mounted loosely upon the sleeve-hub F^2 of the pulley member F^3, before referred to. The stud F^4, which receives upon it the hub F^2, is extended through a bearing-hub F^x, which is driven into a hole drilled for it in the frame-work, the outer end of the hub being turned externally and bored internally, the internal bore receiving the hub F^2, while the external portion receives upon it a lever E^3, to be described. This stud at its outer end has fastened to it by a screw 20 (see Figs. 1, 4, and 5) a collar 21, having a cam-face, and between the said collar and the end of the hub of the loose pulley is arranged a second cam-hub 22, (see Figs. 1 and 5,) provided with a toothed gear 23, the gear being shown by dotted lines in Fig. 4. The gear 23 is engaged by a toothed sector 24, fast upon a starting and stopping rod E^4, extended, as shown, across the frame-work and provided with a handle 25, so that the operator may rotate the cam-collar and engage or disengage the friction-pulleys to start and stop the machine, as desired.

Instead of the particular friction-pulley device I may use any suitable known equivalent. The frame-work A is carried above the said shaft and has an extension A^2 (see Fig. 2) located at or near the upper side of the lowermost die-roll, to be described, the said extension having pivoted upon it at A^3 a leg or web A^4, forming part of a head A^5, the said head constituting a hinged or pivoted part of the frame-work.

The cam B receives a roller or other stud B′, attached to an arm or bar B^2, provided with rack-teeth B^3 of suitable shape to engage a beveled pinion B^4, (see Figs. 1, 6, and 6^a,) fast on the shaft B^5, to which is secured the hub or plate B^6, having studs, upon which are pivoted the pawls B^7, which engage the teeth of and rotate a hub B^8, loose upon the shaft B^5, but having fast upon it the lowermost feed-roll B^9, which engages the wire *w* to be made into nails, the said feed-roll having bolted or fixed to it in suitable manner a gear B^{10}, which engages with a gear B^{12}, (see Figs. 1, 3, and 7,) to which is attached by suitable screws or otherwise secured the upper feed-roll B^{13}, which in shape is the same as the feed-roll B^9. The upper feed-roll and its attached gear B^{12} rotate upon an eccentric stud B^{14}, mounted loosely in a yoke B^{15}, pivoted at one end in a suitable part of the frame-work, (see the right-hand end of the said yoke in Fig. 1,) the left-hand end of the yoke receiving through it an adjusting-screw B^{16}, which is screwed into a fixed part of the frame, the rotation of the said screw regulating the effective pressure of the pair of feed-rolls upon the wire being fed into the machine. The wire acted upon by the wire-feeding rolls, which are substantially the same as in my said patent, will be fed forward into position between the formers or benders c^3 and c' (see Figs. 2 and 8) and may be cut off, as provided for therein, and after this the bender c^2 will be depressed or moved toward the bender c', which remains stationary.

Referring to Fig. 8, it will be seen that the left-hand edge of the bender c^3 in its vertical movement passes closely against the inner end of the guide n', through which the wire *w* is led, so that the bender in rising against the wire to bend it also acts as one member of a cutter, the other member being the end of the guide n' next the bender.

Each former or bender (shown as a plate) presents two acting faces located in different horizontal planes, the said faces being connected by an inclined portion, (see Fig. 8,) so that the metal blank clamped between the acting faces of the benders is offset or bent substantially midway between its ends, the said metal blank when so offset being acted upon by a transferrer c^{15}, (shown in section, Fig. 8, and in plan, on a smaller scale, Fig. 2^a,) which is suitably shaped at its edge to act upon the blank and push it out from between the bending devices into grooves of the die-rolls, to be described.

The bending or offsetting devices and the transferring device are substantially the same as in my said patent; but herein they are actuated by different mechanism, to be described — as, for instance, the transferrer (shown best in Figs. 2 and 2^a) is secured to a reciprocating frame c^2, mounted on a stand c^x, having at its under side a series of rack-teeth c^4, which are engaged by a rack-bar c^5, connected to or forming part of a lever c^6 and adapted to turn upon a pivot c^7, the said lever having a suitable roller or other stud c^8, (see Fig. 1,) which enters a cam-groove at one side of the cam-wheel C. It is essential that this transferrer be accurately placed upon the carriage or frame c^2, and this I have done by means of screws c^{12}, extended through slots c^{22} in the transferrer; but to provide against smashing parts in case two blanks or pieces of wire should happen to get in front of the transferrer these screws are not set down so firmly but that the transferrer may slip back on the carriage on the occurrence of such an accident. The lower bender-plate c^3 is adjustably held between a lip of a vertically-movable carriage c^{14} and a cap-plate c^{10}, secured thereto by set-screws c^{16}, which are passed from the said cap-plate through slots in the said bender and are screwed into the said carriage.

To adjust the bender-plate c^3 vertically, I have provided an adjustable wedge c^{17}, which rests at its lower edge upon the said carriage, the upper beveled edge of the wedge acting against the lower beveled edge of the bender-plate, adjustment of the wedge in the direction of the arrow thereon when the screws c^{16} are loosened elevating the bender-plate.

The carriage c^{14}, adapted to slide up and down in suitable guides or grooves made in

the frame-work, has a series of rack-teeth at 2, which to reciprocate the carriage are engaged by rack-teeth 3, attached to or forming part of a lever *d*, (shown in section in Fig. 2 and detached in Fig. 3ª,) the said lever having its fulcrum upon a rod or stud *d'*, fixed with relation to the frame-work. The lever *d* referred to is provided at its outer end (see Figs. 1, 2, and 3ª) with a cross-bar or roll-carrier d^2, adjustably connected thereto, as will be described, by a set-screw d^3, the said cross-bar having at its opposite end suitable like rollers or other studs d^4, (see Figs. 2 and 3ª,) which enter like cam-grooves d^5 in the faces of the hubs C and D, the shape of the grooves being shown in the hub D, Fig. 2.

The upper bender-plate *c'*, which may be considered as the anvil on which the blank is bent, remains in fixed position during the operation of offsetting the blank. The said bender-plate is held in position against a bed-bar *e* by means of a clamping-bar *e'*, held in place by set-screws e^2, the said bed-bar having attached to its inner side by screws e^3 a shield or cover e^4 to extend over the blanks contained in the grooves of the lower sectional die-roll D', the said die-roll carrying the blanks fed into its grooves by the transferrer from the benders into position to be pointed and headed.

It will be understood that the upper and lower die-rolls D' D^2, both alike, are each made in sections, and, as herein represented, each of said rolls is composed of two sections (shown as circular blocks) separated by a collar D^3 or D^4, surrounding a rotating shaft D^5 or D^6, the said shafts each being provided with a shoulder D^x (see Fig. 1ᶜ) and having a threaded hole at its end and extended through a like tube D^{20} within the bearing D^{48}, a screw *u*, extended through a washer *u'* and screwed into the shaft, causing the washer to act on the tube D^{20} and clamp the two sections of the die-roll firmly between the tube and shoulder D^x. The outer face of the inner section of each die-roll abuts against the shoulder D^x, and between the two sections of each roll are placed, respectively, the collars D^3 and D^4, the said collars surrounding the reduced portions of the shafts. The sections of each roll are so placed with relation to each other that the longitudinally-arranged peripheral blank-receiving grooves of one section are slightly out of line with relation to the blank-receiving grooves of the fellow section on the same shaft, the said grooves being so located out of line in order to adapt them for receiving blanks offset between their ends, as provided for in my said patent, the said blanks, properly fed into the grooves of one of the sectional die-rolls, being both pointed and headed therein, as will be described, both operations being effected, as herein provided for, when the said blanks are brought into place to be engaged between the lower and upper die-rolls. In my said patent the die-rolls having the grooves referred to arranged out of line were mounted on independent shafts, each shaft having an attached gear, the sides of the die-rolls abutting against the die-carriers; but in this present invention the sections making up the lower roll and the sections making up the upper roll are clamped on the two shafts referred to and I am enabled to do away with a number of gears.

The die-carriers G and G', to be described, are provided with elongated central openings (see Fig. 2) to embrace the collars D^4 D^3 referred to.

The head A^5 referred to (see Figs. 1 and 2ᶜ) carries the shaft D^5 of the upper die-roll, and the head when in the position in said figures must be held down, so that the upper roll will be held in position to co-operate with the lower die-roll in holding the blanks. To insure this result, the head A^5 is provided with ears A^{50}, having, preferably, stop-screws 120. These ears are engaged by loops A^{51}, pivoted at A^{53} on the stands or lugs e^8 of the frame-work, each of said loops having an adjusting-screw A^{52} to act on an ear A^{50} when the loops are turned up, as in Figs. 1 and 2ᶜ, and keep the head A^5, with the die-roll D^2, in correct working position with relation to the lower die-roll D', the stop-screw meeting the lower end of the slot in the loop and preventing the too great movement of the die-roll D^2 toward the die-roll D'. The upper edge of the bender-bar *c'* is acted upon by suitable positioning-screws e^5. Provision has to be made for adjusting the bed-bar *e* horizontally, and to do this the said bar has been provided with feet e^6, (shown best in Figs. 1, 3, and 8,) the said feet entering suitable grooves in lugs made in the frame-work, the end of one foot being acted upon by an adjusting-screw e^7 screwed into an ear e^8 of the frame-work, (see Fig. 3,) so that the rotation of the said adjusting-screw moves the bed-bar longitudinally. The bed-bar is held in adjusted position by means of the set-screws e^9 and e^{10}, extended through washers, which act upon the said feet, and by set-screws e^{20} and e^{21}. The adjustment of the bed-bar horizontally enables the wire to be acted upon with more or less pressure at just the point where it is offset or bent.

The horizontal portions of the benders may and preferably will be so set with relation to the diameter of the wire and the inclined portions connecting them as to produce less pressure upon the ends of the blank than upon that part of the blank which is to be offset or bent.

The journal D^t at one end of the die-roll D' is extended (see dotted lines, Fig. 1) through the frame-work sufficiently far to receive upon it a toothed gear E' and the ratchet-wheel E^2 (see Figs. 1 and 4) and detent-wheel E^{15}, the teeth of the ratchet-wheel E^2 corresponding, substantially, in number with the grooves in the said die-roll. The ratchet-wheel E^2 derives its step-by-step motion from a pawl 3, mounted upon the lever E^3, pivoted on hub F^x, the said lever having a roller or

other stud 4, which enters a cam-groove at one side of the toothed gear F, the said roll and the shape of the said groove being shown in Fig. 4 by dotted lines. The lever E^3 has an extension, which is provided with a dog 26, which engages teeth of the detent-wheel E^{15}, arranged at one side of the ratchet-wheel E^2, the said dog acting as a detent to prevent any overmotion of the said wheel and die-roll due to momentum. The ratchet-wheel E^2 is also acted upon by a friction-brake 27, which also tends to prevent any motion due solely to momentum.

In the patent referred to the offset blank was fed into grooves of two die-rolls and was cut through the offset portion thereof while held between said rolls and two other die-rolls above them, and the separate nails were then fed into grooves in a third roll, and when brought opposite a fourth roll the said pieces of pointed wire were operated upon to form heads for the nails.

In the present invention but one pair of rolls is used and the heading and pointing operations are both carried on in the same grooves into which the offset blanks are first fed, thus saving many parts and simplifying the machine.

The journals of the shaft D^5 of the uppermost die-roll D^2 rotate in bearings D^{48}, forming part of the head A^5 of the frame, and one of the said journals has fast upon it a toothed gear D^7, (see Fig. 1,) which is engaged and rotated by the toothed gear E′, fast on the shaft D^6 of the lowermost die-roll, the said die-rolls rotating at the same surface speed and in unison. Each die-roll is provided with a like number of horizontal grooves, into which are fed in succession the blanks cut off from the wire and offset, as described in my said patent; but I desire it to be understood that it is not essential that both rolls be of the same diameter or that they have exactly the same number of grooves, for one may have more or less grooves than the other and yet be rotated at the same surface speed, so that their grooves will properly match and form pockets to receive and hold the blanks. In the spaces between the two sections of each die-roll are placed the slotted carriers G G′, which carry the point-forming dies 5 and 6, one of which dies is shown enlarged in Fig. 3^b, the said carriers fitting closely and accurately the said spaces, so as to obviate any possible lateral springing of the die-rolls or their journals during the heading operation. The carriers (see Fig. 2) are split to receive the dies 5 and 6, serrated at their sides, as at 56, (see Fig. 3^b,) so that they may be engaged by a corresponding surface of the carriers, screws 18 19 clamping the carriers on the said dies and holding them fixedly in place.

The point-forming dies are of a length to fit closely between the inner surfaces of the die-roll sections, each point-forming die having two body-grooves 10^x and 12^x and two recesses 10 and 12, (see Fig. 3^b, where the recesses are shown enlarged, separated by a thin cutting-edge 13,) the bottoms of the said recesses being shaped to correspond with one-half of the point of the nail to be made.

The point-forming and wire-severing dies shown in the patent referred to were produced by cutting notches in the edges of the die-blocks by means of a V-shaped cutting-tool; but with such dies in use the body of the nail at or beyond the junction of the point and body was liable to be bent or twisted out of shape, and to obviate this I increased the length of the die and provided the same with grooves in extension of the recesses, the said grooves receiving the body of the nail beyond its offset portion which was to be severed in the formation of points; but I found when forming the said dies by means of a V-shaped cutter that the latter left the recessed die in such shape that the cutting-edge 13 was not perfectly uniform in thickness, but was thinner at one point than another. In seeking to obviate this difficulty, as for practical work the cutting-edge must be of uniform thickness, I devised a cutting-tool having the inclined or beveled parts of its edge somewhat concaved, and by the use of such a tool I found that the body-receiving groove was left with a portion of its bottom convexed at opposite sides, but the point-receiving grooves were by the tool brought to such uniform points that the thin cutting-edge 13 was left of uniform thickness. With this form of die cheaply made by the action of a tool the body of the blank is in no way distorted or bent or twisted or marred beyond the offset portion which is severed for the formation of the points. Fig. 10 shows one of these dies greatly enlarged, and Fig. 12 shows an end view of two of the dies brought together, wherein it will be seen that the portions r of the body-grooves are convexed, the body-grooves having small vertical walls r'.

In Fig. 11 I have shown the dies in section, with a piece of wire placed between them, the wire being also shown by dotted lines in Fig. 12. Viewing Fig. 12 it will be seen that the side walls and the central portions of the convexed parts support the body of the wire beyond the junction of the tapered point to be formed in the point-forming recesses and by the action of the edge-cutter 13. By altering the shape of these recesses 10 and 12 the nails may be diamond, pyramidal, or other shape, as desired, the cutting operation being such, as described in my former patent, to separate the offset portion of the nail at nearly right angles to the center line of the wire at that point, the cut so made serving to form parts of the points for two different nails.

The shanks of the carriers G G′, guided in suitable ways in the frame-work, are provided at opposite sides, respectively, for part of their length with rack-teeth 14 15, (see Fig. 2,) the rack-teeth of the lowermost carrier being engaged by rack-teeth 16 at the inner end of the lever d, before referred to, the said le-

ver having pivoted to it a suitable adjustable connecting-rod *f*, attached at its upper end to a pin or rod *f'*, carried by arms f^2, connected to a rock-shaft f^3, having proper teeth 17, which engage the teeth of the upper carrier G', the said carriers in their operation having a slight backward movement, just enough to partially release the offset portion of the wire after separating the same to form two points, this slight release taking place just before the heading operation.

The carriers G G' are moved to and from each other in opposite directions to enable the dies carried by them to sever the blank at its offset portion just before the heading devices, to be described, operate upon the ends of the two nails formed by separating the blank.

The adjustment of the cross-bar or roll-carrier d^2 upon the lever *d* and the adjustment of the connecting-rod *f* enables the positions of the carriers when the point-forming dies or cutters act to sever the offset portion of the wire to be governed to a nicety, so as to enable each die to cut to the center of the wire, each doing its own part of the work.

The cam-hub E receives within it a roller or other stud 28, connected to a lever H. The lever H and the lever B^2 are each at their inner ends connected with suitable vertical rock-shafts 30 and 31, provided, respectively, with toothed gears or plates H' H^2, which engage, respectively, the header-carriers H^3 and H^4, each provided with a like header 32, one or both, the said headers being made adjustable longitudinally in the said header-carriers by any usual or suitable devices, as a screw 33. (Shown in Fig. 5 as combined with header 32.)

The adjustment of the headers in the header-carriers provides for making heads of greater or less size and for adapting the headers to the wires of different diameter.

The frame-work of the machine is provided with gages 34, against which the ends of the offset blanks strike if the said blanks are out of position in the die-rolls, thus placing the said blanks with their offset portions in exactly the proper position to be acted upon by the point-forming dies or cutters before the said blank comes into position directly between the two die-rolls, so as to be separated, as it will be understood that the blanks are not clamped between the two die-rolls except when the points are to be cut and the heading is to be done. By disconnecting the link *f*, which passes through a hole f^{20} (see Figs. 2 and 3) in the transferrer c^{15}, from the pin *f'* the head A^5 may be turned over, removing the roll D^2 from above the roll D'. The headers, acting upon the wire projecting slightly from the grooves in the die-rolls, act to head the nails.

In case the point-forming dies or cutters fail to completely sever the blank when making the points for two nails then the blank, nearly separated at its offset portion, will in the continued rotation of the die-rolls be carried under the nose or shield 35, Figs. 2 and 3, and under the point-breaker 36, Fig. 2, (shown as a projection standing in the central space between the two grooved parts of the lower die-roll,) which acts on the nearly-severed blank and separates it, leaving two separate nails. The breaker is steadied and held to its work by a screw 40.

The lower die-roll of the machine has been provided with a stripper 37, (see Figs. 2 and 9,) which stands partially in the central space of the said roll, to insure the discharge of each nail in case it for any reason should stick in the die-grooves. The stripper has at its right-hand end a clearer 38^x, having an inclined edge, which acts against the end of any short pieces of wire, pieces too short for two nails, and effects their discharge from the said grooves.

The gear E' is shown as provided with a projection *h*, which is acted upon at its opposite sides by like set or adjusting screws 43, (see Figs. 1 and 4,) inserted in hubs attached to the rear side of the wheel E^{15}, adjustment of the said screws in or out enabling said wheel E^{15} and the intermittingly-actuated ratchet-wheel E^2, both loose on the shaft D^6 of the lowermost die-roll, to be adjusted thereon with relation to the gear E' to correctly position the blank-receiving grooves not only with relation to each other and to the transferrer, but also to the headers.

The machine described in the aforesaid patent contained six rolls; but in this my present invention I have succeeded by much study in dispensing with all but one pair of sectional rolls, the blanks being headed in the same grooves into which they are fed from between the benders, thus greatly simplifying the machine, reducing the number of parts, and adding to its speed and efficiency of action.

In the patent referred to the transferrer was attached to a lever and moved in the arc of a circle; but in the machine herein described the said transferrer is connected to a horizontally-reciprocating carriage movable in firm guideways, such construction being much more serviceable than in the patent referred to.

It has been found desirable to oil the wire as it is fed into the machine and preparatory to entering the dies, and to do this I have provided the machine, as shown at the left in Fig. 1 and in Figs. 1^a, and 1^b with an oiling device, shown as a cup n^{10}, in which, as shown, is a piece of wicking, as n^{12}, which hangs over or contacts with the wire *w*, the oil passing from the said wicking onto the wire.

The shipper-lever 25, herein shown as fast on the rod E^4, has a feeler or latch 66, shown as pivoted thereon at 67, the said feeler being notched, as shown at 68, to bear on the wire and keep the shipper-lever in the position shown in Fig. 1^a and the machine running; but when the said wire breaks or runs out the said feeler, no longer supported by the wire, permits the shipper-lever to drop and turn the rod E^4 and effect the unclutch-

ing of the friction-pulleys to stop the machine. So, also, if it is desired to stop the machine when the wire is not broken the feeler 66 may be lifted and the lever 25 turned by hand. The feeler 66 is beveled at 69 and at that point rests on a lever 70, pivoted on a vertical post 71, a spring 72 acting normally to move the end of the lever 70 just below the feeler 66 toward the pivot 67. The opposite end of the lever 70 has a wire-guide 73, through which the wire *w* is led on its way to the feeding-rolls and the bender. The wire in the form of a coil or ball (see Fig. 1[d]) stands on one end at one side of the post 71 on a suitable reel or base, and as the wire leaves the coil or ball it hangs in spiral curves between the coil and lever 73, so that when the wire fails to be properly delivered from the coil or becomes tangled the extra strain put on the wire and acting on the lever 73 overcomes the stress of the spring 72 and turns the lever 73 to act on the incline 69 of and lift the feeler 66 and effect the stopping of the machine. The transferrer c^{15} is provided (see Figs. 1 and 3) with a rest 100 for the inner end of a lever 101, fast on the outer end of the eccentric stud B^{14}, on which the upper feed-roll B^{13} is mounted to rotate. The outer end of this lever 101 is extended under the feeler 66, and when the machine is working properly and but one blank is presented at a time in front of the transferrer the inner end of the lever is kept elevated; but should two wires or blanks get in front of the inwardly-moving transferrer then the transferrer in the inward movement of the carriage is arrested, while the carriage continues to move, and on the return of the carriage to its outer position the rest is entirely removed from below the inner or right-hand end of the lever 101, so that that end, due to gravity or otherwise, descends, lifting its outer end and the feeler 66 to effect the stopping of the machine, and at the same time the partial rotation of the eccentric stud B^{14} lifts the upper feed-roll sufficiently from the wire to prevent it from being fed toward the benders.

The carrier G at its front side has attached to it, as represented by a screw *m*, a directing-piece *m'*. (Shown on a large scale in Fig. 2^{b} and in section, on a much smaller scale, in Fig. 2.) The wire *w* emerges from a hole in a guide-block n^{x} just before it is caught by the feed-rolls, and after leaving the said rolls it enters a hole in a second guide-block *n'*, and the end of the wire leaving the block *n'* is to be fed into the space between the bender-plates and transferrer opposite one set of grooves. During this operation to prevent the possibility of the leading end of the wire striking against the inner side of the farthest section of the die-roll D' to the right I have provided a directing-piece *m'*, it lying partially in the space between the two sections of the said die-rolls and with its bevel face m^{2} in such position as to deflect the end of the wire outwardly into the space between the bender-plates. The top of the piece *m'* is shaped to correspond with the offset part of the wire, so as not to interfere with the placing of the wire blank into the die-grooves.

This invention is not limited to the exact construction of the wire-oiling mechanism, nor to the exact construction of the shipper-lever and the connections between the wire and the friction-pulleys, nor to the exact construction of the feeler or latch 66 or of the lever 70, as the said parts may be variously modified and other known equivalents used and yet come within the scope of my invention.

The faces of the die-rolls between the blank-receiving grooves are cut out at 104 (see Figs. 3 and 9) to leave a series of projections between them and the blank-receiving grooves of the rolls, which projections act as blades to cut off and break up any pieces of wire which become caught between the die-rolls or any blanks which get out of place in the rotation of the rolls. The upper die-roll may have a clearer 38^{xx}, like the one 38^{x}, co-operating with the lower die-roll.

In the machine described in the said patent the rolls first to receive the offset blank were four in number, as each grooved roll had its own separate shaft, and the die-carriers between the sides of the said rolls were provided with cutters having a cutting-edge to sever the offset part of the wire, and at opposite sides the said cutter the said dies had only point-receiving recesses—that is, the recesses in the dies were only long enough to receive the offset part of the blank.

In my experiments I discovered that to avoid the liability of bending the wire back of the offset part to form the points as the wire was being severed a part of the body of the wire must be held in the cutting-dies as the cutting-edge acts to sever the wire, and consequently I have made the like cutting-dies 5 and 6 (see the die 5, Fig. 3^{b}) broader, and besides the cutting-edge 13 and the point-receiving recesses 10 and 12, which may be as in said patent, I have provided the grooves 10^{x} and 12^{x} to receive a portion of the main body of the blank each side the said point-receiving recesses, the said grooves avoiding making bends in the body of the wire near the points as the offset wire is severed by the cutting-edge 13.

The dies 5 and 6 have their outer sides serrated and are engaged by the jaw-like lower ends of the die-carriers, which are split to form die-receiving jaws provided with suitable clamping-screws 18 19, by which the dies may be firmly clamped in place.

I claim—

1. An organized machine for manufacturing nails, it comprehending a pair of rotating die-rolls having grooves out of line, substantially as described, for the reception of a double blank offset between its ends, a transferrer made laterally movable toward and from one of said die-rolls to act on and move a blank later-

ally into the offset grooves of one of the said die-rolls, means to retain the said blank in the grooves of said die-roll until the said blank has been carried opposite the co-operating offset groove of the other of said die-rolls, point-forming dies or cutters to sever the offset blank through its offset portion, carriers for the said dies slotted to embrace the shafts of the die-rolls between their ends, and heading tools or devices set out of line and co-operating with the same pair of rolls to head the nails in the grooves of said rolls, the said nails being out of line with each other equal to the offset of the grooves, the said parts being arranged to operate substantially as described, whereby the nails are headed in the same grooves of the same pair of die-rolls in which they are pointed, as set forth.

2. The rotating die-rolls having grooves out of line for the reception of a double blank offset between its ends, a transferrer made laterally movable toward and from one of said die-rolls to act on and move a blank laterally into the offset grooves of one of said die-rolls, the carriers and their point-forming cutting-dies, and means to actuate the said carriers, combined with a nail-breaker to separate the nails point from point while yet in the die-grooves in case the blank should not be fully severed by the point-forming cutting-dies, substantially as described.

3. The die-rolls, the bending devices to offset the blank, a transferrer, a horizontally-sliding carriage to which the said transferrer is adjustably attached, guides for the said carriage, and means to reciprocate the said carriage horizontally, substantially as described.

4. The die-rolls, the carriers having point-forming cutters, and the carriage c^{14} and its attached bender c^3, combined with the lever d, its toothed portions 3 and 16 to actuate one of the said carriers, and the said carriage, substantially as described.

5. The bender c^3 and the carriage to which it is attached, combined with the bender e', and the horizontally-adjustable bed-bar e, and means to hold the said bed-bar in adjusted position, adjustment of the said bed-bar enabling the pressure to be more or less upon the metal blank at the point where it is offset, substantially as described.

6. The two die-rolls having offset-grooves, gears E′ and D^7 to cause the rotation of said rolls in unison, and the benders, combined with the ratchet-wheel e^2, adjustably mounted on the shaft of one of said die-rolls, and means to move the said wheel intermittingly, substantially as described.

7. The two die-rolls having offset grooves, gears E′ and D^7 to cause the rotation of said rolls in unison, and the benders, combined with the ratchet-wheel adjustably mounted on the shaft of one of the said die-rolls, the toothed wheel E^{15}, the pawl and dog, and means to actuate the said pawl, substantially as described.

8. Wire-feeding devices, and a feeler to bear on the wire, and a shipper-lever, and a rod to which it is attached, combined with friction-pulleys and means actuated by the said rod to cause the said pulleys to be engaged when the feeler bears on the wire or to be disengaged in the absence of the wire, substantially as described.

9. A feeler adapted to contact with the wire and shipper mechanism controlled by said feeler, combined with a lever controlled as to its position by the wire on its way to the feed-rolls, whereby when the wire fails to be delivered properly the said lever is moved to disengage the feeler from contact with the wire and stop the machine, substantially as described.

10. The combination, with a pair of sectional die-rolls, substantially as described, and double-point-forming cutters and their carriers, of means for actuating and connecting the said carriers and means to adjust said actuating and connecting means independently, as described, whereby the movement of the said carriers may be controlled with relation to the center of the wire to be cut, substantially as described.

11. The combination, with the sectional die-rolls, of a clearer 38^x to act upon and remove from the grooves of the said rolls any pieces of wire caught therein and not headed, substantially as described.

12. The die-roll made in sections, the point-cutting die-carrier arranged between the said sections, and the bender-plates and transferrer, combined with a directing-piece located between said sections to prevent the leading end of the wire from striking against the side of one of the said sections, substantially as described.

13. Wire-feeding devices, a feeler, a shipper-lever, a carriage, and a transferrer connected thereto frictionally and having a rest, combined with a lever supported at one end by the said rest and acting at its other end on the said feeler, whereby when two wires get wrongfully in place before the transferrer the latter slips on the carriage and permits the lever to act and lift the said feeler, substantially as described.

14. The feed-roll B^{13} and the eccentric stud to support it, combined with the transferrer and intermediate devices between it and the said stud to partially rotate the latter, and thereby remove the feed-wheel from feeding contact with and stop the feed of the wire when the transferrer meets with unusual obstructions, substantially as described.

15. The die-carriers having rack-teeth, as described, levers f^2 and d, and toothed surfaces actuated thereby and to operate the said carriers, combined with the cam D, an adjustable cross-bar or roll-carrier d^2, and means for adjustably connecting the said levers, whereby the meeting-point of the cutting-dies may be adjusted as desired.

16. An organized machine for manufacturing nails, it comprehending a pair of rotating

die-rolls having grooves out of line, substantially as described, for the reception of a double blank offset between its ends, a transferrer made laterally movable toward and from one of said die-rolls to act on and move a blank laterally into the offset grooves of one of the said die-rolls, means to retain the said blank in the grooves of said die-roll until the said blank has been carried opposite the co-operating offset groove of the other of said die-rolls, point-forming dies or cutters to sever the offset blank through its offset portion, carriers for the said dies slotted to embrace the shafts of the die-rolls between their ends, and heading tools or devices set out of line and co-operating with the same pair of rolls to head the nails in the grooves of said rolls, the said nails being out of line with each other equal to the offset of the grooves, combined with vertical shafts 30 and 31 and their toothed gears H′ and H² to operate the said headers, all substantially as and for the purpose set forth.

17. The pair of die-rolls, the cutter-carriers and cutters co-operating therewith, and the toothed header-carriers and headers arranged at the opposite ends of the said pair of die-rolls, combined with the vertical shafts 30 and 31 and their toothed gears H′ and H², and means to actuate said shafts and to actuate the cutter-carriers to separate them slightly to partially release the offset portion of the blanks as the headers act to head the said blanks for nails, substantially as described.

18. The lower die-roll, the benders, and transferrer, combined with the gages 34 to position the said blanks on their way into the grooves of the die-roll, substantially as described.

19. The die-rolls having grooves 104 in their faces between their die-grooves, to operate substantially as described.

20. The die-rolls having grooves out of line, as described, for the reception of the opposite ends of the offset blanks and gages to co-operate with the ends of the offset blanks to thereby place their offset portions in exactly proper position to be acted upon by the point-forming cutting-dies, combined with the die-carriers fitted into the space between the inner ends of the sections of the die-rolls and the cutting-dies having a cutting-edge, point-forming recesses, and body-grooves to receive part of the blank near and beyond the offset portion, substantially as described.

21. The two sectional or two-part die-rolls and two shafts, each receiving the two parts of one of said die-rolls, combined with die-carriers slotted to surround the said shafts and fitted to slide between the said sections and to cut a blank centrally as to its length and at its offset portion, substantially as described.

22. The sectional die-roll, the shouldered shaft common to both sections of the die-roll, and the bearing D⁴⁸, combined with the tube surrounding said shaft beyond the die-roll and extended through and beyond the bearing, the plate *u′*, and the screw extended through said plate into the shaft, to operate substantially as described.

23. In a nail-making machine, a feed-roll to act on the wire when the same is to be fed, and an eccentric stud on which the said feed-roll is mounted, a pivoted yoke to carry said stud, and means to adjust the yoke to regulate the effective pressure of said roll upon the wire, combined with means to turn said stud in the yoke and lift the feed-roll bodily from feeding engagement from the wire when the wire is not to be fed, substantially as described.

24. The feeler to bear on the wire, combined with the spring-controlled lever 70, adapted to lift the said feeler from the wire when the stress of the spring controlling the said lever is overcome by the wire as it approaches the said lever, substantially as described.

25. The slotted die-carriers, the sectional die-rolls between which they are placed, and the dies 5 6, having serrated sides, combined with the clamping-screws to retain the said dies in place, substantially as described.

26. The lower die-roll, the pivoted head A⁵, having the lugs A⁵⁰, and the upper die-roll carried by said head, combined with a set-screw A⁵², and a holding device for the said screw and engaging the said lug, rotation of the said screw holding the head and roll in proper position, and independent limiting-stops for said lugs, substantially as described.

27. The herein-described cutting-dies, having a cutting-edge of substantially uniform width, point-forming recesses, and body-grooves extending from the said recesses to the ends of the dies, and shoulders or side walls *r′*, substantially as described.

28. The herein-described cutting-dies, having a cutting-edge of substantially uniform width, point-forming recesses, and body-grooves extending from the said recesses to the ends of the dies, the said grooves having convexed surfaces *r*, substantially as described.

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

LOUIS GODDU.

Witnesses:
GEO. W. GREGORY,
EMMA J. BENNETT.