No. 654,911. Patented July 31, 1900.

J. J. MORRISSEY.

NAIL MAKING MACHINE.

(Application filed Dec. 9, 1899.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1

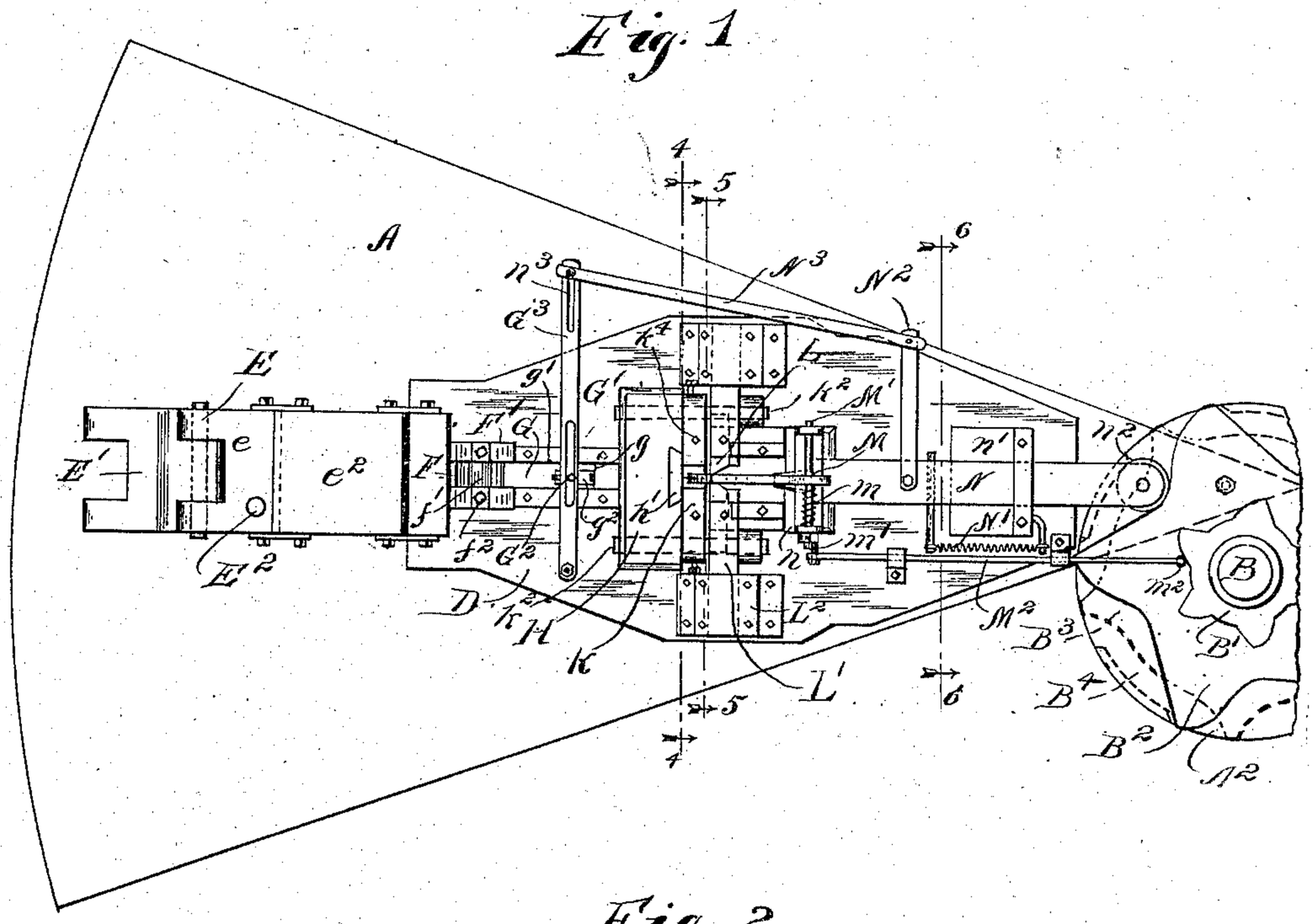

Fig. 2

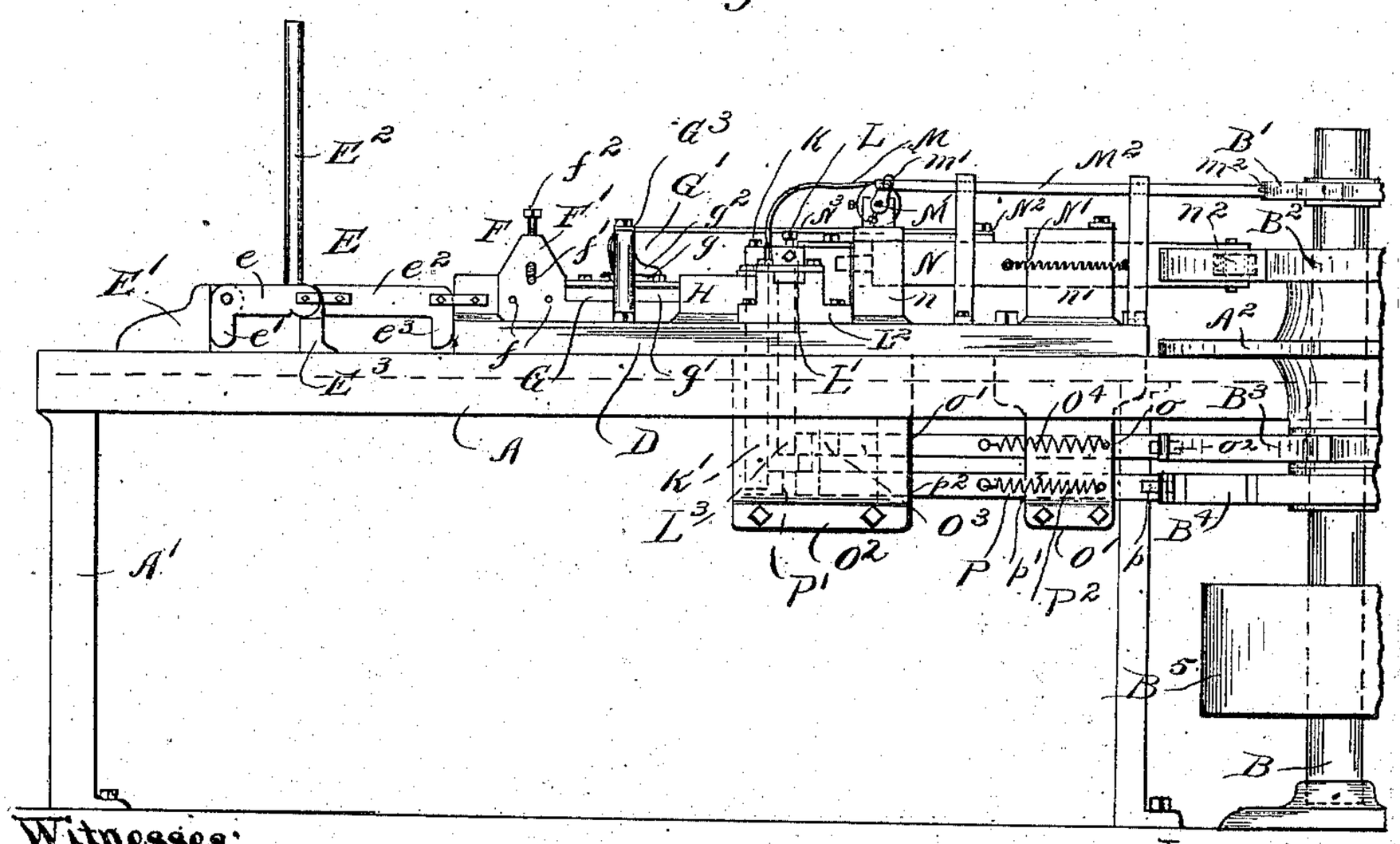

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Fig. 3

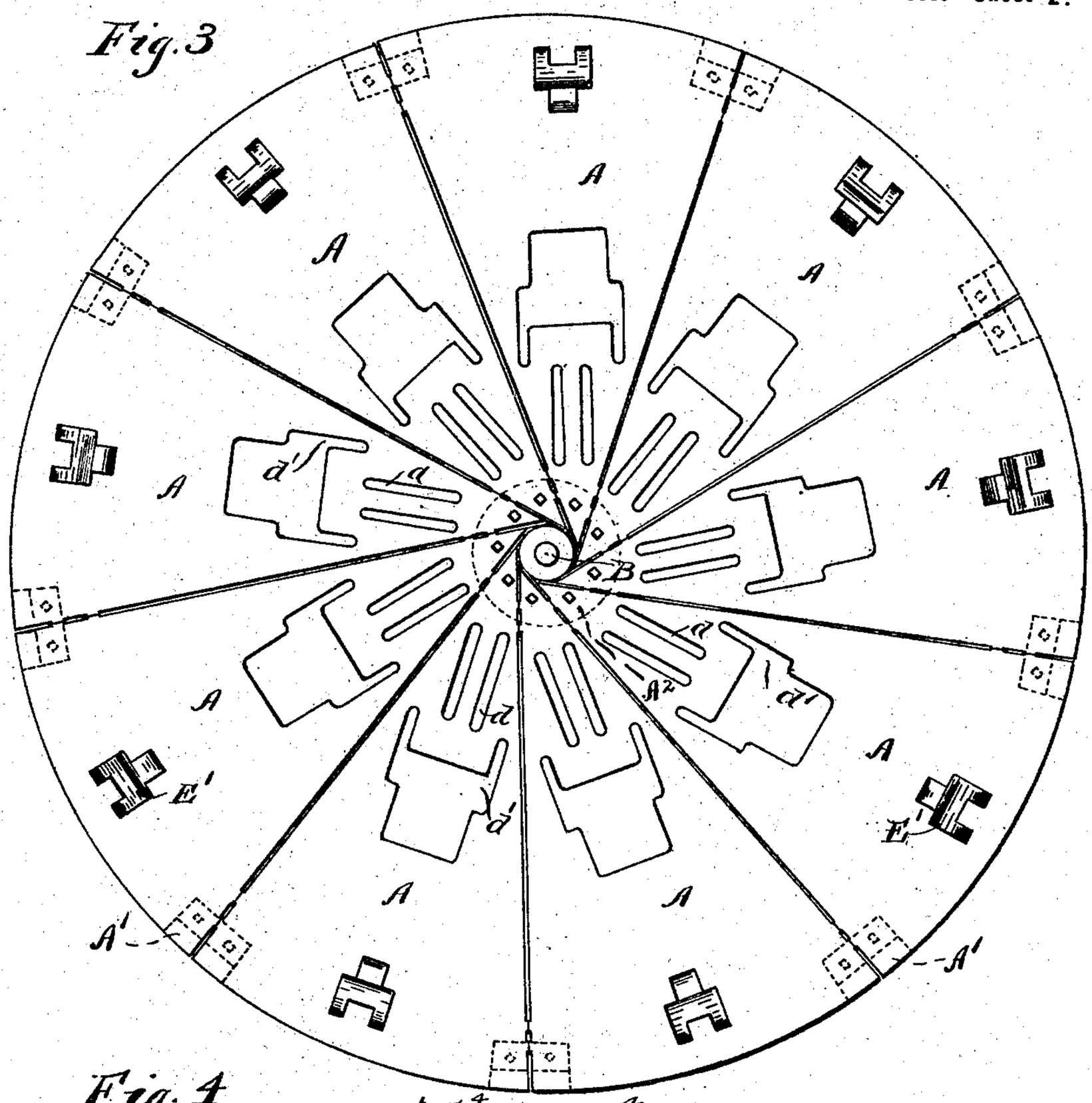

Fig. 4

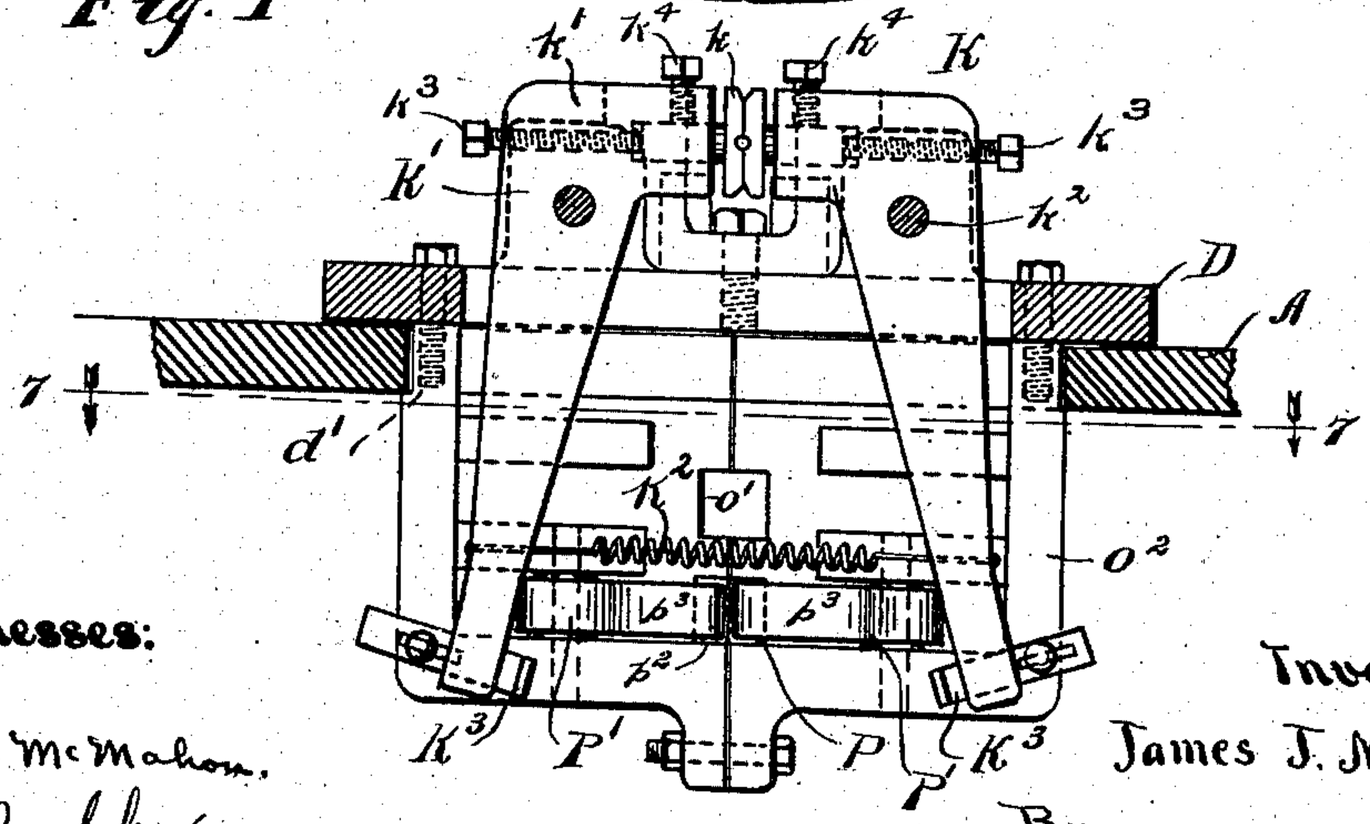

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Fig. 5.

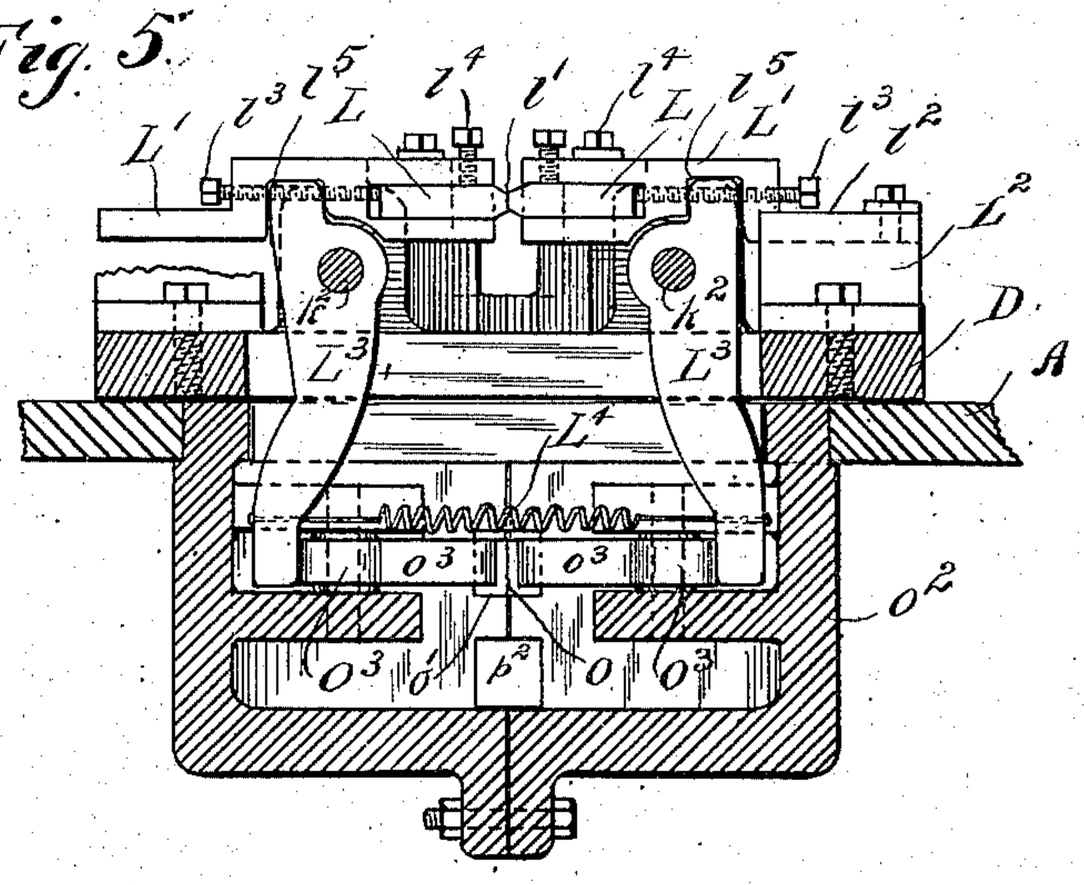
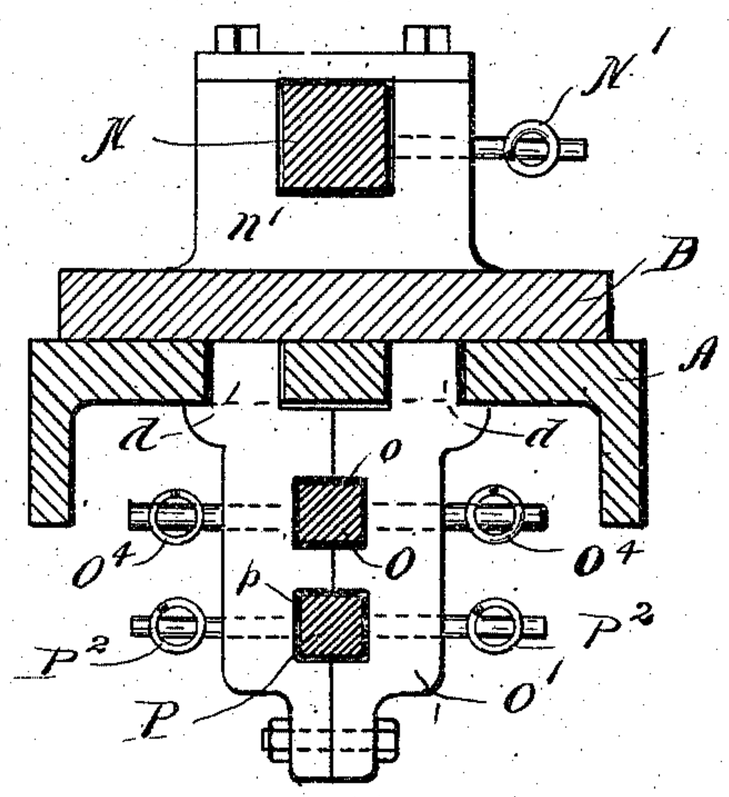


Fig. 6



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(No Model.) 5 Sheets—Sheet 4.

Fig. 7

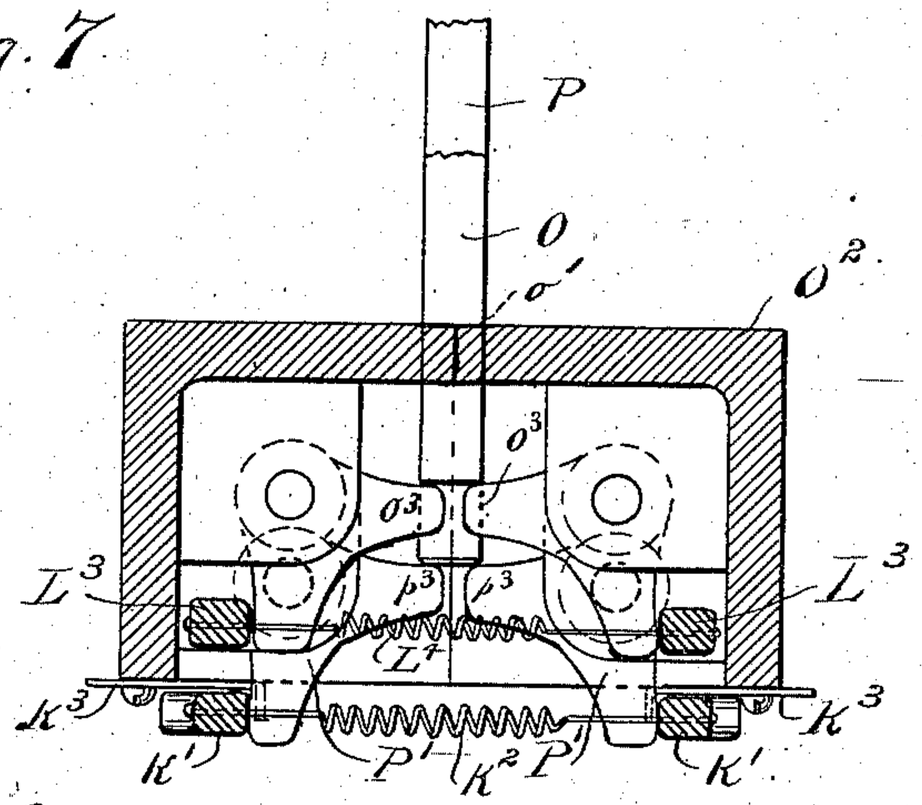

Fig. 8

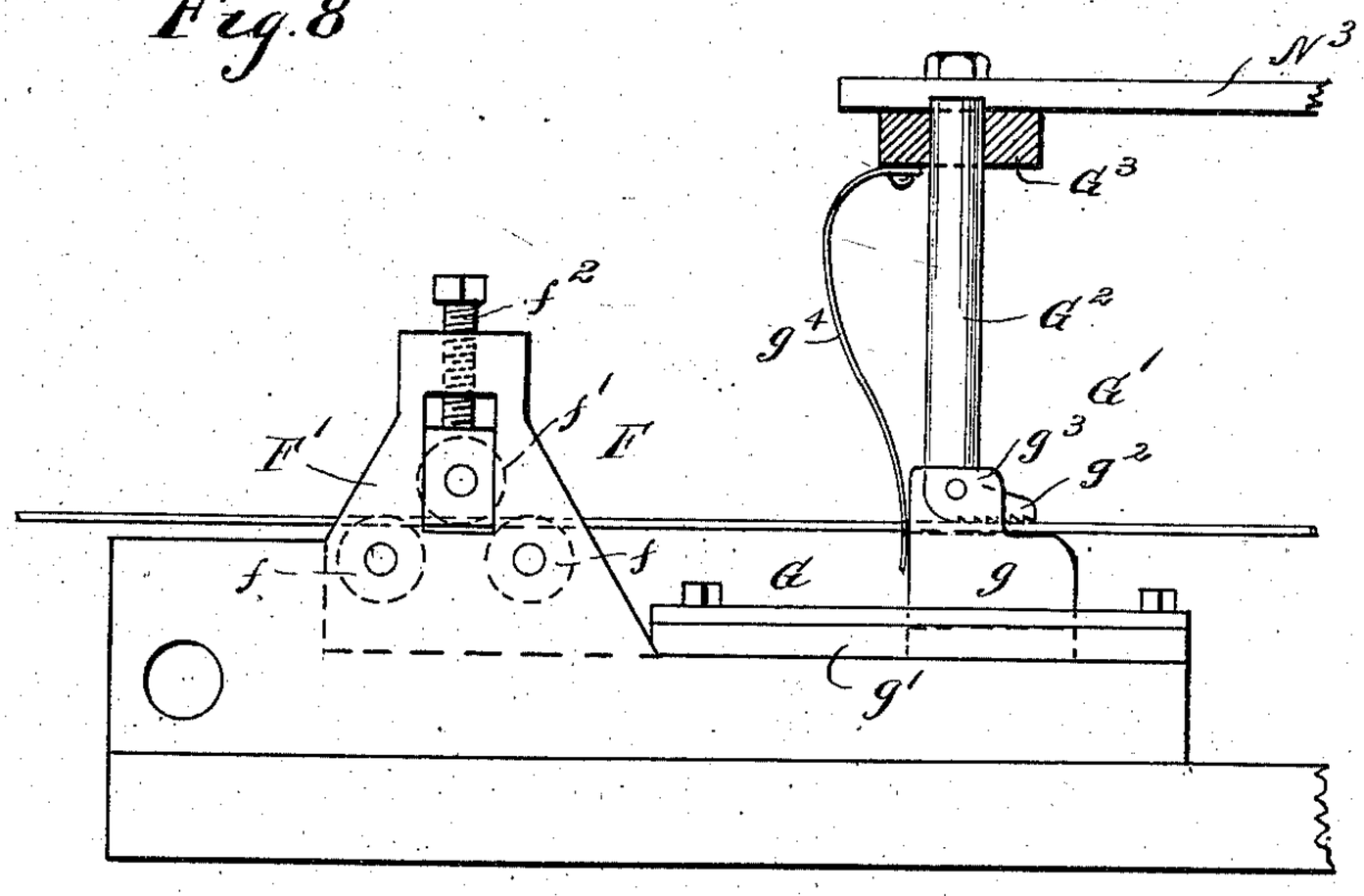

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Fig. 12.

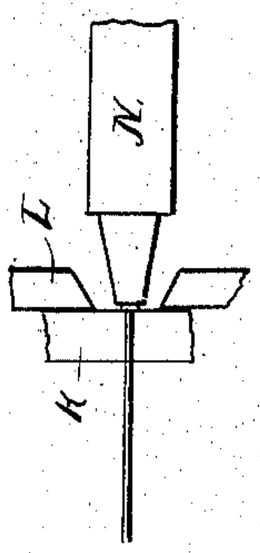


Fig. 11

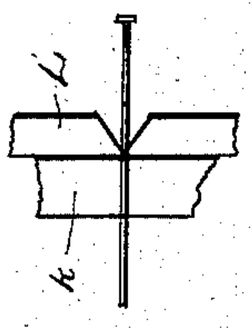


Fig. 10

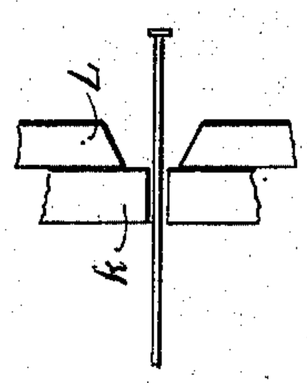
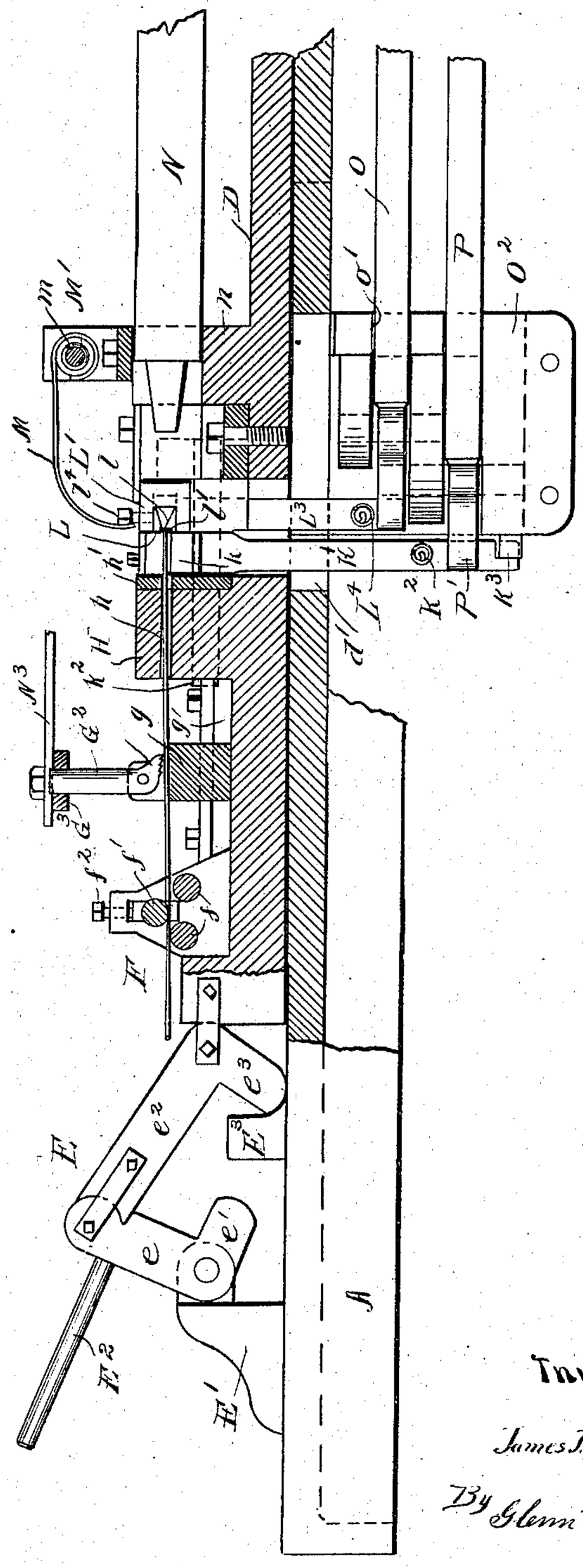


Fig. 9



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UNITED STATES PATENT OFFICE.

JAMES J. MORRISSEY, OF CHICAGO, ILLINOIS.

NAIL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 654,911, dated July 31, 1900.

Application filed December 9, 1899. Serial No. 739,786. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. MORRISSEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Nail-Making Machines, of which the following is a specification.

My invention relates to mechanism for the automatic manufacture of nails, spikes, brads, tacks, and the like from wire, and has for its object to simplify the construction of such machines, to increase their capacity, to bring a plurality of nail-forming throats into small compass within the limits of a single unitary machine and independently control the grade of the output of each, and to introduce various other features, all as will be understood from the ensuing description.

In the drawings, Figure 1 is a top plan view of one section of a machine embodying my invention, consisting of a simple throat and accessory mechanism, constituting, in connection with mechanism common to all of the other throats, a complete operating device. Fig. 2 is a side elevation of the apparatus shown in the foregoing figure, it being understood that this is a prototype of all the sections and that each is driven by actuating instrumentalities intercommon to all. Fig. 3 is a plan view of the machine-frame, showing all of the throat-sections assembled around the common operating-shaft. Fig. 4 is a vertical transverse section through one of the throats on the correspondingly-numbered line in Fig. 1, the shearing or severing jaws being removed and the nipping jaws or vise exposed. Fig. 5 is a similar section on line 5 5 of Fig. 1 with the severing-jaws in place and closed. Fig. 6 is a similar section on the line 6 6 of Fig. 1, detailing the guide blocks and ways for the operating-bars of a single throat-way-section. Fig. 7 is a horizontal sectional detail on the line 7 7 of Fig. 4 to explain the immediate mechanism for operating the shearing device and nipping or clamping jaws. Fig. 8 is an enlarged detail in elevation, showing the straightening-rolls and feeding agency for a single throat-section; Fig. 9, an enlarged sectional view through the center of a throat-section with the wire in position, showing, among other things, the means for engaging the throat with or disengaging it from the common actuating agencies; and Figs. 10, 11, and 12 are details representing, respectively, the relation of wire and forming instrumentalities immediately after the end of the feed-stroke with a nail already headed thereon at the stage of pointing and severing the completed nail and at the moment the upsetting hammer or plunger has completed its movement to form the head of the next nail.

Since each throat-section is formed alike, provided with the same accessory mechanism and coupled to the common operating agencies in the same way, it will be sufficient for an understanding of the nail-forming mechanism proper to describe that appertaining to any given section, explaining in connection therewith the relations of all sections to their mutual actuating source.

A represents a triangular bench fixedly supported at its out end by a leg or legs A′ and at its inner end secured to a table A^2, encircling a vertical shaft B, which constitutes the single and common driving-shaft of the whole machine. Advisably the apex of each bench is secured to the central table tangentially to the shaft, thus not only obtaining a broader overlap and firmer joint, but by bringing the longitudinal axis of each bench along which the forming and actuating agencies are arranged to a tangent to said shaft obtaining additional advantages in the way of economical and effective operation of parts, such as will hereinafter appear.

Upon the shaft D are fixed cams of differing size and of varying outlines suitable to their office, as clearly indicated in Figs. 1 and 2. The upper cam B′ operates an ejector in each throat for striking off and discharging any nail which may not have been completely severed, so as to fall by its own weight. The second cam B^2 moves the hammer or heading plunger of each throat and incidentally therethrough operates the wire-feed. The third cam B^3 actuates the shearing or severing jaws of each throat, and the lower cam B^4 moves the nipping or clamping jaws or vise against which the hammer heads the nail. A pulley B^5 affords means for driving the shaft.

In the bench are formed longitudinal slots *d d′*, which serve to guide and direct a frame-

plate D, carrying the feeding, nipping, severing, heading, and ejecting mechanism and its immediate accessories, along the before-mentioned tangential path toward and from the central shaft. This frame-plate, supporting the above-mentioned instrumentalities, may be forced in toward the shaft by means of a toggle E, the rear member *e* of which is hinged to a bracket E′, rising from the bench, is operated by lever E², and has a heel extension *e′*, which abuts against the inner vertical face of the bracket when the toggle is extended and locked, while the forward member *e*², hinged to the rear of said base-plate, is stayed by its heel extension *e*³ against a stop-lug E³ from the bench when the toggle-lock is broken.

F represents the straightening-rolls collectively, mounted in suitable bearings in standards F′ near the rear end of the base-plate, the two lower rolls *f* being mounted in fixed bearings and the upper intermediate roller *f′* in vertically-sliding bearings adjustably pressed downward by means of screws *f*², as shown. Succeeding the straightening-rollers and directly in advance thereof along the throatway G, afforded by the frame-plate, is the feed G′, comprising a wire-supporting block *g*, sliding in ways *g′* longitudinally of said throatway and overhead feed-dog *g*², pivoted to the ears *g*³, upstanding from said block, a shank G², rigid with the dog, and a slotted lever G³, taking over the upper end of said shank and connected, as presently explained, to move the block to and fro at suitable intervals, opening the dog in the rearward movement and closing it in the advancing movement. A spring *g*⁴, interposed between the lever and the block, prevents the dog from being thrown back without carrying the block along with it. Next to the feed G′ comes an anvil-block H, having a guide-aperture *h* for the wire and faced on the farther side with a removable hardened plate *h′* to resist the blow of the upsetting instrument. Working in contact with and parallel to this plate *h′* is a vise K, composed of the nipping or clamping jaws *k*, mounted in the upper opposing arms *k′* of elbow-levers K′, pivoted on journal-shafts *k*², supported by the slidable frame-plate. The nipping-jaws are adjustable in the carrying-arms of the elbow-levers by means of set-screws *k*³, by which they may be moved toward each other, and binding-screws *k*⁴, by which they are securely held in any position to which they may be set. The lower arms of the elbow-levers are under the constant tension of a spring K², which tends to draw them constantly toward each other and against stops K³, which may be adjustable, thus opening the vise. Means are provided, as will appear in due course, whereby these arms are at the proper time forced apart against the stress of the spring to close the vise and nip the wire for the heading or upsetting process.

Parallel with the nipping-jaws and on their further side are the pointing and severing jaws L, with beveled recesses *l* to form the point of the nail or tack and knife-edges *l′* to sever it from the body of the wire. These jaws are carried in slide-blocks L′, working in transverse ways *l*² on brackets L² on the frame-plate, and are adjustable in said slide-blocks by set-screws *l*³ and binding-screws *l*⁴, whereby wear may be taken up. The slide-blocks are recessed beneath at *l*⁵ to receive the upper ends of actuating-levers L³, pivoted on the aforementioned journal-shafts *k*² and drawn toward each other at their lower ends by the force of a spring L⁴ to normally hold the jaws open. Above the pointing and severing jaws is the ejector M, secured to rock-shaft M′ and normally held out of the path of the jaws by the spring *m*, coiled about said rock-shaft. This ejector is actuated after the operation of the severing-jaws by means of crank *m′*, thrust-rod M², and roller *m*² on the end of said thrust-rod, traveling on cam B′ of the central shaft.

Sliding longitudinally of the throatway G in suitable guides *n* and *n′* on that side of the two pairs of nipping and severing jaws toward the central shaft is the upsetting plunger or hammer N, which acts against the proximate faces of the nipping-jaws after the severing-jaws open to upset and head the wire for the formation of a fresh nail. This plunger is normally retracted by means of spring N′, but is urged forward at the proper time by roller *n*², journaled in its heel end and traveling on the periphery of the star-cam B² of the central shaft. An arm N² from the plunger-bar is connected by link N³ with the power end of the feed-lever G³, and thereby throws back the feed-block and dog to take a new grip as the plunger advances and moves them forward as the plunger retreats to feed a fresh length of wire. The connection between the link and lever is made adjustable by means of slot *n*³, whereby the lever-arm can be lengthened or shortened to vary the distance of feed and the consequent size of the nails to be made. Now referring to Figs. 5, 6, 7, and 9, the shear-levers controlling the pointing and severing jaws are operated to close said jaws by means of the reciprocating actuating-bar O, mounted in guides *o o′* in hangers O′ and O² from the slidable frame-plate. The bar is moved by a roller *o*² upon its end adjacent to the central shaft traveling upon the periphery of the cam B³ of the outline shown, and at its opposite end engages the converging arms *o*³ of toggles O³, which act upon each advancing movement of the bar to force apart the pendent arms of the shear-levers against the stress of their spring, thereby bringing the jaws together, compressing a point upon the nail, and severing it from the body of the wire. As the spring L⁴, acting upon the shear-levers, may not be sufficient alone to force the reciprocating actuating-bar O back after its advancing stroke, retraction-springs O⁴ may be arranged on

either side of the bar of sufficient strength to cause its roller to constantly follow the contour of the actuating-cam. Referring to the same figures, the nipper-jaws are operated to close upon the wire immediately after the feeding movement, remain closed while the pointing and severing jaws act and until the upsetting-hammer has made its effective movement, and then opened for a fresh forward feed of the wire by means of the reciprocating actuating-bar P, riding by its roller p upon the periphery of the actuating-cam B^4, playing in ways p' and p^2 in the above-mentioned hangers O' and O^2 and engaging with converging arms p^3 of toggles P', which act at each advancing movement of the bar to force apart the lower pendent arms of the nipper-levers and close said nipper-jaws. Like the bar O, this bar P may be held in effective contact with its cam by retraction-springs P^2, arranged on each side thereof, so that after each advancing movement it may be drawn back as soon as it runs off of the thrusting reach of the cam and permit the spring K^2 to act and open the jaws.

It will be observed that a number of bench-sections—in the present instance nine—are arranged around the single central driving-shaft, each adapted to carry a slidable frame-table and accessories in such manner that the rollers of their actuating-rods, plungers, and bars engage with the same relative cam on said central shaft, whereby corresponding instrumentalities carried by each frame-plate are successively moved by the same cam. It will also be observed that the number of actuations for each revolution of the driving-shaft is dependent upon the number of salient tracks upon each cam, five being the number herein shown, and that consequently the number of the nails manufactured for each revolution will equal the product of the number of sections by the number of actuating-tracks on said cams, or forty-nine in the example proposed. It will further be observed that each throat-section may be adjusted to turn out nails of length or sizes differing from those turned out by the other sections and that by simply operating the retracting-lever any section may be withdrawn from action and left idle without interference with the action of the others. As already stated, it is preferred to arrange the sections so that all the reciprocating actuating and operating bars or plungers are tangential to the driving-shaft, and consequently to the pitch-line of the cams. This brings the thrust of the cams more nearly in line with the trend of said bars, facilitates a longer reciprocating impulse and easier ascent of the outward tracks, and almost entirely obviates lateral or torsional strains upon said bars or plungers, such as would be the inevitable result were said bars radial to the shaft.

Having thus described my invention, I desire to be understood as not limiting myself to specific features and details of construction, except as hereinafter definitely pointed out; but

What I claim, and desire to secure by Letters Patent, is—

1. The combination with the central shaft carrying actuating-cams, of a plurality of frame-plates mounted therearound, wire feeding, nipping, heading and pointing and severing mechanisms carried by each of said plates, and reciprocating actuating-bars for said mechanisms provided with rollers on their ends adjacent to the shaft and each engaging with the same relative cam.

2. The combination with the central shaft carrying actuating-cams, of a plurality of frame-plates mounted therearound to slide convergingly theretoward, wire feeding, nipping, heading and pointing and severing mechanisms carried by each of said plates reciprocating actuating-bars for said mechanisms, the bars for each plate adapted to engage endwise with the same relative cam on the central shaft, and means for moving each plate with its freighted group of mechanisms toward or away from said shaft to throw said mechanisms into or out of action.

3. The combination with the central driving-shaft carrying actuating-cams, one for each serial group of mechanisms, of frame-plates mounted therearound, wire feeding, nipping, heading and pointing and severing mechanisms carried by each of said plates, reciprocating actuating-bars for said mechanisms, the bars for each serial group of mechanisms adapted to engage endwise with the same relative cam on the central shaft, and independent means carried by each frame for controlling the length of feed thereon.

4. The combination with the central driving-shaft carrying actuating-cams, one for each serial group of mechanisms, of frame-plates mounted therearound, wire feeding, nipping, heading and pointing and severing mechanisms carried by each of said frame-plates, reciprocating actuating-bars for said mechanisms mounted to move in guides in said plate tangentially to the shaft or pitch-line of the cams, and rollers on the proximate ends of said bars, riding upon the periphery of the same relative cam traveled by the actuating-bars of all the series of the same group.

5. The combination with the central driving-shaft carrying actuating-cams, one for each serial group of mechanisms, of frame-plates arranged therearound to slide in guides tangential to the shaft or pitch-line of said cams, reciprocating actuating-bars borne by said plates, one for each individual mechanism thereon, rollers on the proximate ends of said bars, traveling upon the same relative cam engaged by the actuating-bars of the other mechanisms of like rank carried by the remaining frame-plates, and means for independently advancing said frame-plates toward or retracting them from said cams.

6. The combination of the central driving-

shaft, the table encircling it, the triangular bench-sections tangentially secured to said plate, the frame-plates mounted in guides therein to slide toward and from said shaft, the feeding, nipping, heading and pointing and severing mechanisms carried by said frame-plates, the reciprocating actuating-bars, also carried by said plates, the cams upon said shaft, one for each actuating-bar of a like serial group of mechanisms, and the locking-toggles with their levers for independently projecting and withdrawing each plate.

7. The combination of the central driving-shaft, the frame-plates encircling it, the wire-feed carried by each frame-plate, the upsetting-plunger and intermediate connections by which said feed is actuated, the cam on said central shaft common to all of said plungers, the nipping-jaws also carried by each frame-plate, the reciprocating bars by which they are operated, the cam on said central shaft common to all of said bars, the pointing and severing jaws likewise carried by said frame-plates, the reciprocating bar for actuating them and the cam on said central shaft common to all of said bars.

8. The combination of the central driving-shaft, the frame-plates encircling it, the wire-feed carried by each frame-plate, the upsetting-plunger and intermediate connections by which said feed is actuated, the cam on said central shaft common to all of said plungers, the nipping-jaws also carried by each frame-plate, the reciprocating bars by which they are operated, the cam on said central shaft common to all of said bars, the pointing and severing jaws likewise carried by said frame-plates, the reciprocating bar for actuating them, the cam on said central shaft common to all of said bars, the ejectors with their rock-shafts and actuating-rods further carried by said frame-plates, and the cam common to all of said rods.

9. The combination of the nipper-jaws, adjustably held in the ends of the elbow-levers, the spring attached to the opposite ends of said levers, adjustable stops to limit the throw of said levers, elbow levers or toggles engaging the ends of said levers and adapted to forcibly spread them, the reciprocating actuating-bar engaging the arms of said toggles, and the cam.

10. The combination of the pointing and severing jaws, adjustably held in slides arranged transversely of the throatway, the levers having their ends engaging said slides and adapted to move them, the spring engaging the opposite ends of said levers, the elbow levers or toggles adapted to spread the ends of said levers, the reciprocating actuating-bar engaging the arms of said toggles, and the cam.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES J. MORRISSEY.

Witnesses:
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DANIEL A. DEAN.