

(No Model.)

2 Sheets—Sheet 1.

D. C. STOVER.
NAIL MACHINE.

No. 359,522.

Patented Mar. 15, 1887.

Fig. 1.

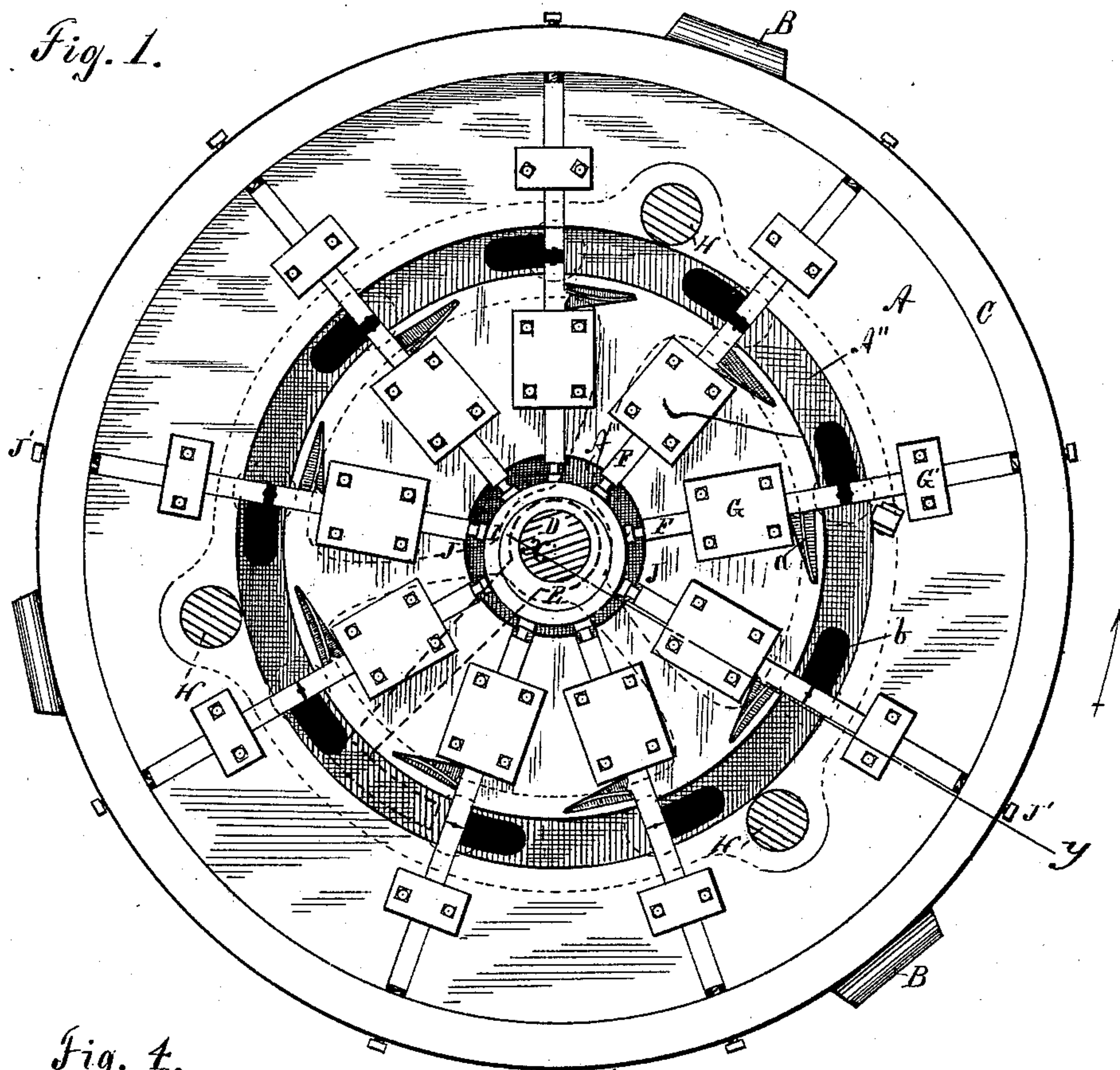


Fig. 4.
(a)

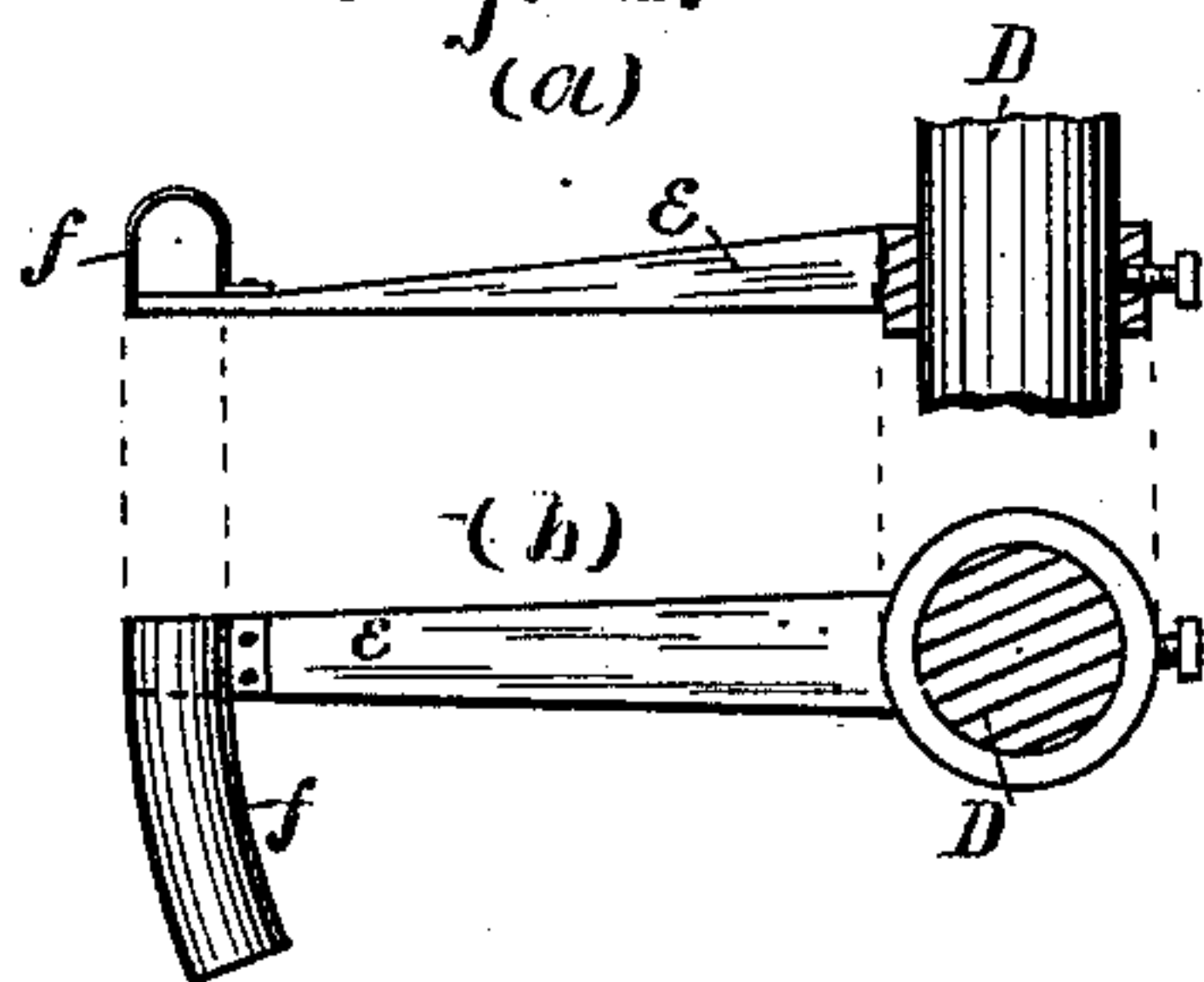
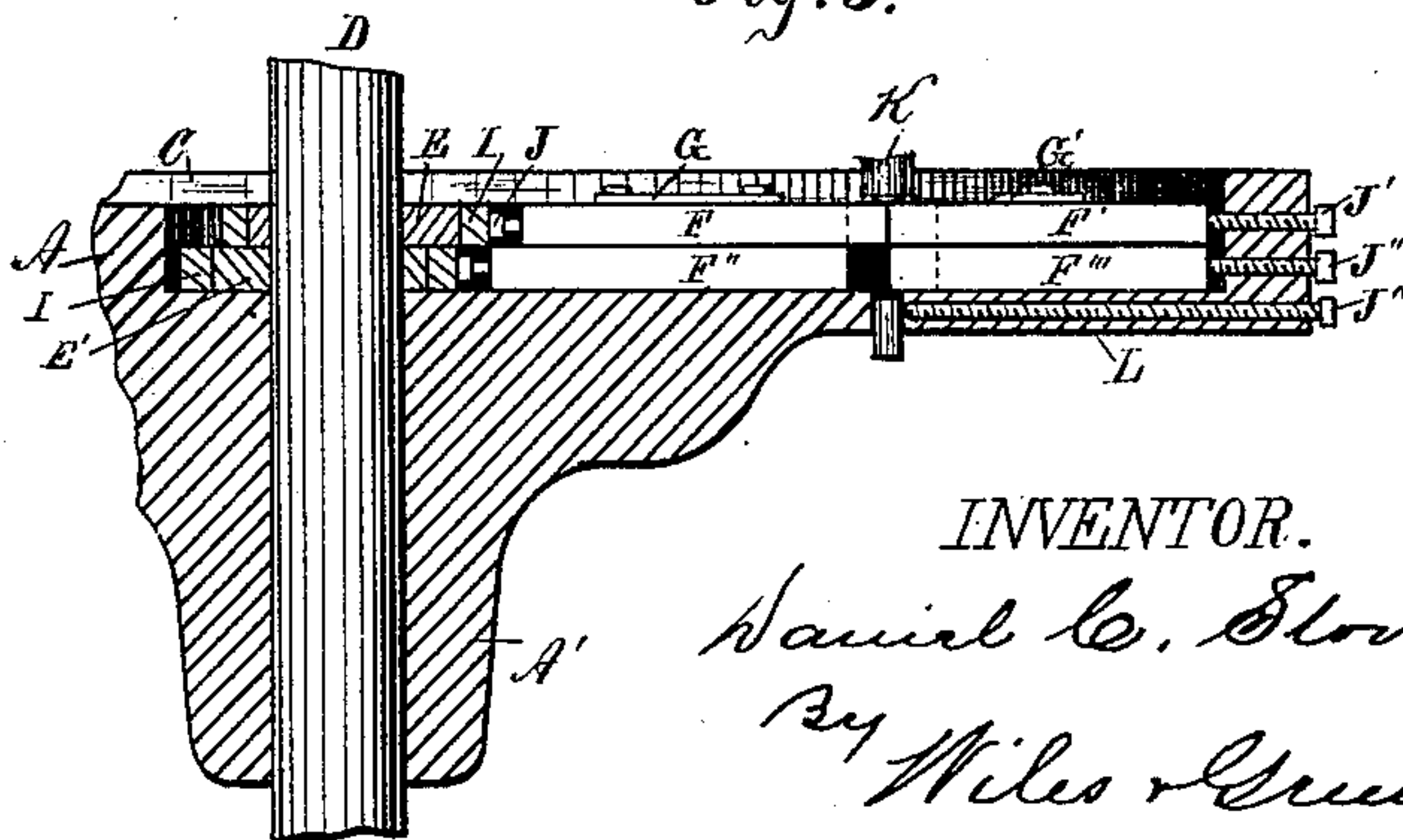


Fig. 3.



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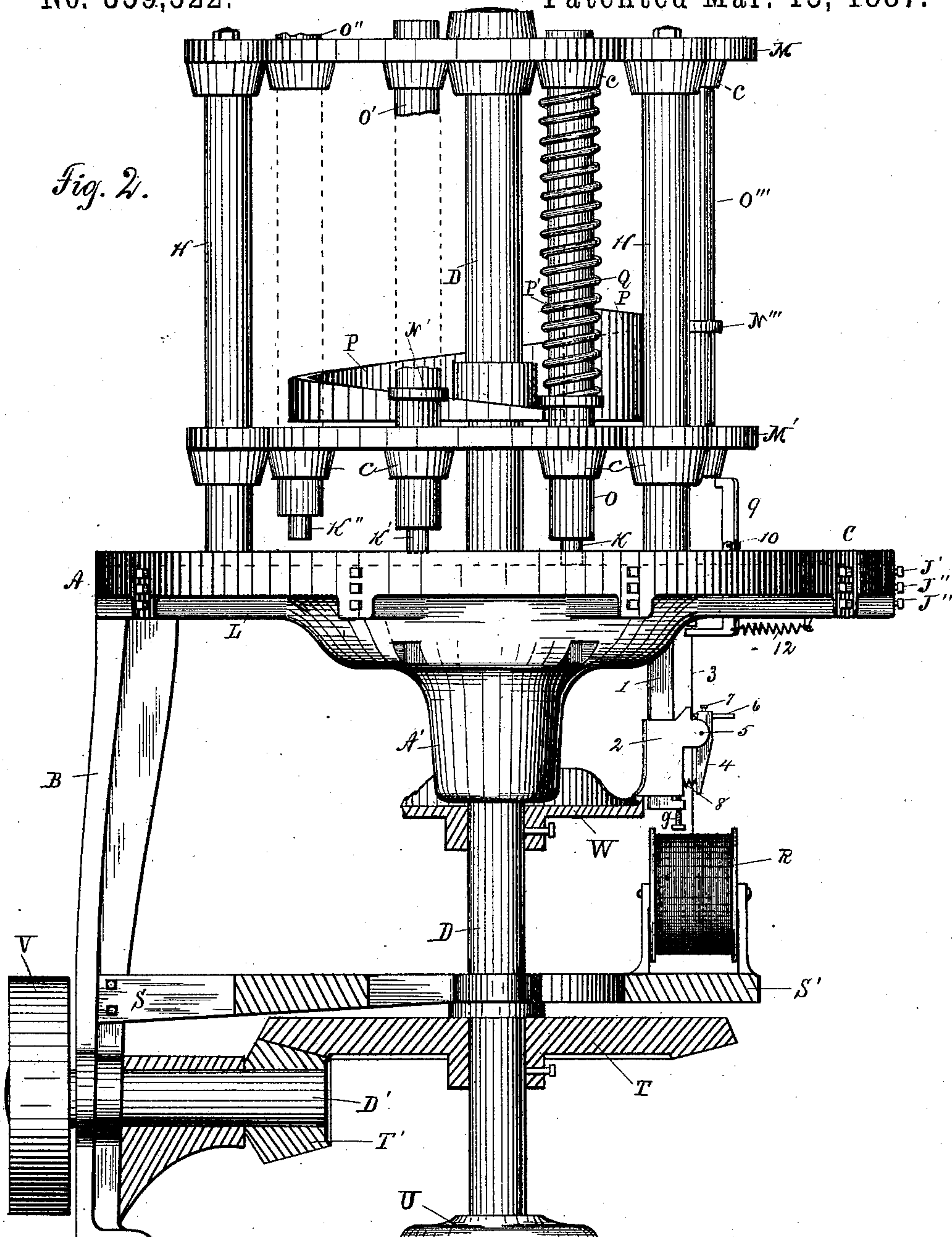
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

DANIEL C. STOVER, OF FREEPORT, ILLINOIS, ASSIGNOR TO THE STOVER MANUFACTURING COMPANY, OF SAME PLACE.

NAIL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 359,522, dated March 15, 1887.

Application filed January 16, 1886. Serial No. 188,728. (No model.)

To all whom it may concern:

Be it known that I, DANIEL C. STOVER, a resident of Freeport, in the county of Stephenson and State of Illinois, have invented certain
5 new and useful Improvements in Nail-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the
10 same.

My invention relates to machines for making wire nails, tacks, rivets, and similar products, and is adapted to secure nearly uniform use of power and very high producing capacity.
15

Briefly, my machine consists of a horizontal bed suitably supported and forming one bearing for a vertical shaft, which passes through its center, and is provided with a feed-cam, a
20 cutting-eccentric, a gripping-eccentric, and a hammer-raising cam, all rigidly attached thereto, a series of similar nail-forming combinations equidistant from each other, and also from the central shaft, which actuates each of
25 them independently of the others, a nail-removing arm carried by the central shaft, and suitable means for imparting motion to said central shaft.

As the nail-forming and wire-feeding devices
30 are exact counterparts of each other, such parts of this specification as describe the construction or operation of one apply to all, and in the accompanying drawings, to which reference is had in this specification, much is
35 omitted as not essential to illustrate my invention—*e. g.*, one only of the nine feeding devices contemplated in Fig. 1 is shown.

In the drawings, Figure 1 is a plan of the machine with the upper part or heading devices removed. Fig. 2 is a view, partly in elevation, partly in central section, showing the bed and the method of supporting it, together with the heading and feeding mechanism, and the means for applying power to the
45 machine as a whole. Fig. 3 is a section on the line *xy*, Fig. 1; and Fig. 4 shows the nail-removing arm with its attached hood.

In Fig. 1, A is a circular bed with plane upper surface, provided with a central circular depression, A', an annular depression, A'', and a

raised annular strengthening-rim, C. Movable gripping-dies F and fixed gripping-dies F' lie in radial grooves in the bed A flush with its surface and retained by plates G G'. D is a vertical shaft; E, an eccentric rigidly mounted thereon and surrounded by the lower ring, I, both being in the plane of the dies F F'. J are adjusting-screws in the ends of the dies F, and J' similar screws working against the ends of the dies F'. Springs *a*, pressing against lugs upon the longitudinally-movable dies F, keep said dies or the screws in their ends always in contact with the ring I. In the bottom of the channel A'' are apertures *b*, through which the completed nails drop into suitable receptacles or
65 conveyers below the bed A. H H are posts rigidly attached to the bed and supporting heading mechanism, hereinafter described.

Fig. 2 shows the feeding mechanism, consisting of spools R, of wire, placed upon a rigid frame, S S, attached to the legs or supports B, below the bed A—one spool for each set of gripping-dies shown in Fig. 1. The wire is fed intermittently by means of a side cam, W, upon the shaft D. Bars 1 project downward from the bed A, to which they are rigidly attached, and on each bar is a slide, 2, in which is pivoted a lever, 4. Through the top of the lever passes a chisel-edged bar, 6, which is held in place by the set-screw 7, and whose edge is pressed lightly against the wire 3 by the action of the spring 8 against the opposite end of the lever. Now, when the cam W raises the slide 2, which rests upon it, the wire is carried upward with it; but when the cam allows the slide to fall it slides freely on the wire.
85

Fig. 2 also shows a part of the hammers O O'. These are cylindrical bars provided with steel striking-heads K K', &c., and moving longitudinally in bearings in the annular guide-plates M M', whose thickness is increased by bosses *c c*. The position of both hammers and guide-plates is indicated by dotted lines in Fig. 1.
95

Rigidly attached to the shaft D, at a suitable height above the bed, is a cylinder, P, whose surface oscillates with the surface in which lie the outermost points of the hammer-spring. This cylinder is cut spirally, so that its upper

end, passing under collars or projections $N N'$, &c., upon the hammers, may in its rotation raise the hammers from the lowest to the highest point of the spiral, and as the cylinder is cut so that the highest point of the spiral is vertically above or overhangs the lowest point, when the lug on any hammer reaches the highest point it is suddenly released and driven downward by its own weight and the elastic force of the spring A , resting on the collar N and reacting against the guide-plate M .

Figs. 1 and 2 show a device for automatically securing the parts beneath the hammer from being struck when no wire is in place to be headed. A vertical lever, 9, bent inward at each end and pivoted near the surface of the bed, lies normally with its upper end just outside the path of the hammer and its lower end in the path of the wire, which passes through a notch or perforation in that end. A spring, 12, supported from the bed A and attached to the lower end of the lever, tends constantly to rotate it upon its pivot, a tendency constantly resisted by the rigidity and tension of the wire. If, however, the wire break or be exhausted from the spool, the lever, no longer restrained, is drawn back by the spring, and its upper end thereby thrown beneath the raised hammer; or, if the hammer be not at the moment above the top of the lever, it is pressed against the hammer, and passes under it as soon as it is sufficiently raised, and always in time to prevent another blow. Provided with this device the machine may be operated continuously while one or more of its counterpart combinations is inactive and no injury results. A weight may evidently be substituted for the spring.

Fig. 3 shows a section on the line xy , Fig. 1, and indicates the depth of the depression A''' in the bed-plate A and the position of the cutting-dies $F'' F'''$ just below the gripping-dies, to which they are similar in form, adjustment, and movement, save only that the faces meeting the wire are of a form usual in such dies. They are actuated by the eccentric E' , lying just below the eccentric E and in contact or nearly in contact with it, and which is surrounded by the loose ring I' , resting on the bottom of the depression A''' . The two eccentrics are so placed that their points of greatest eccentricity lie upon opposite or nearly opposite sides of the shaft D , whereby the gripping and simultaneous heading occur while another nail is being severed on the opposite side of the bed, although, owing to the uneven number (nine) of wires, the instant of greatest pressure is not the same in the two operations. If the number of wires be even, the same result may be reached by varying the position of the eccentrics. In this figure the nail is shown with the head formed, but with the hammer yet in contact therewith. The rib E is necessary, since the groove for the dies nearly equals in depth the thickness of the bed. Through it also passes a set-

screw for retaining and adjusting the thimble or wire-guide.

Fig. 4 shows, partly in section, the nail-removing arm e , which is rigidly attached to the shaft D just above the cam E , its vertical position being such that as it rotates with the shaft it passes over the plates G and under each hammer when fully raised, and its length being such that its outer end is somewhat farther from the shaft D than the inner ends of the stationary dies F' . This arm insures the removal of each severed nail before the wire is again fed upward, and the light hood f , which it bears, prevents the nail from flying out of place during the cutting and pointing by the dies $F'' F'''$.

The working of the machine and the sequence of the various operations described above is, for each nail-forming combination, substantially as follows: The wire is fed upward by the action of the cam W until enough to form a head projects above the gripping-dies $F F'$, when it stops and is instantly seized between these dies, the former having been driven forward by the eccentric E . At the instant of greatest pressure the hammer $O K$, released by the cam P , forms a head from the projecting wire end, and at once begins its reascent. The die F , gradually released by the eccentric, is forced back by the spring a , and the wire, bearing a completed head, follows the retreating hammer to a distance predetermined in forming the cam W . At the same time the rotation of the lower eccentric, E' , advances the cutting-die F'' , and at the moment when the forward movement of the wire again ceases the wire is caught between the dies $F'' F'''$ and the nail is severed and pointed with a steady and gradual movement of the die F'' . The die immediately begins a return movement precisely similar to that of the gripping-die F , already described, and an instant later the nail, if not already fallen, is swept out of position by the arm e and drops through the opening b . At the time when this operation is completed on one nail the same operation is in eight different stages of advancement at the eight remaining wires. All the hammers are raised by the same cam, all the wires fed by the same cam, all the movable gripping-dies actuated by the same eccentric or cam, and all cutting-dies by the same eccentric or cam, E' .

It will be observed that whatever the length of nail to be made the first part of the feed of the wire must always be the same—that is, from the severing-edges of the cutting-dies to a point just above the gripping-dies—so that in forming nails or rivets of a length less than this distance the cam W must be changed, and the lower dies may be omitted or unemployed, while the remaining dies perform the office of both sets. The second part of the feed in making use of both sets varies with the length of nail desired, and may be changed from a longer to a shorter distance by simply raising

the pin or stop *g* at the bottom of the bar 1, thus regulating the distance that the slide 2 and its bar 6 can fall when unsupported by the cam *W*.

5 Although I use nine wires in this machine, and prefer an odd number, any number greater or less than nine, and either odd or even, may be placed in each machine.

10 In practice an ordinary straightening device is placed above each spool of wire; but it has not been thought necessary to introduce it in the drawings.

15 Having now explained the construction and operation of my invention; what I claim as new, and desire to secure by Letters Patent, is—

20 1. In a machine of the class described, the combination of a bed-plate, a central shaft at right angles to the bed-plate, a series of duplicate nail-forming devices supported by the bed-plate, and a cam rigidly mounted on said shaft and adapted to successively operate the corresponding parts of said nail-forming devices.

25 2. In a machine of the class described, the combination of a stationary bed-plate, a central shaft journaled in said bed-plate and at right angles thereto, a series of wire-feeding devices connected with the bed-plate at points about the shaft, a series of cutting dies connected with the bed-plate and adapted to operate on the wires fed by said feeding devices, and two cams rigidly mounted on the shaft and adapted one to successively operate said feeding devices and the other to successively operate said cutting-dies.

30 3. In a machine of the class described, the combination of a suitable bed-plate, a central shaft at right angles thereto, a series of wire-feeding devices connected with the bed-plate at points about the shaft, a series of dies connected with the bed-plate and adapted to grip the wires fed by said feeding devices, and two cams rigidly mounted on said shaft and adapted one to successively actuate said feeding devices and the other to successively actuate said gripping-dies.

35 4. In a machine of the class described, the combination of a suitable bed-plate, a central shaft passing through and at right angles to the bed-plate, a series of wire-feeding devices connected with the bed-plate at points about the shaft, a corresponding series of wire-cutting dies, a corresponding series of wire gripping dies, a corresponding series of hammers adapted to head the respective wires fed by said feeding devices and gripped and cut by said dies, and a set of cams rigidly mounted on the central shaft and adapted one to successively operate said feeding devices, one to successively operate said cutting-dies, one to operate successively said gripping-dies, and one to successively operate said hammers.

5. In a machine of the class described, the combination of a bed-plate, a central shaft

journaled in the bed-plate and at right angles thereto, a series of approximately radial cutting-dies attached to the bed and stationary with reference thereto, a series of reciprocating cutting-dies coacting with said stationary dies, a cam rigidly mounted on the shaft and adapted to successively actuate said reciprocating-dies, and springs adapted to hold said reciprocating-dies in constant contact with said cam.

6. In a nail-machine, the combination, with a bed-plate, a central shaft journaled in the bed-plate, and a series of nail-forming mechanisms attached to the bed-plate at points about the central shaft, of an arm rigidly fastened to the central shaft and adapted to pass successively said nail-forming mechanisms, and to displace the nails formed thereby, substantially as shown and described, and for the purpose set forth.

7. The combination, with the table *A*, the shaft *D*, and the series of nail-forming devices placed about the shaft, of the nail-displacing arm *e*, fastened to the shaft *D* and provided with the hood *f*, substantially as shown and described, and for the purpose set forth.

8. In a nail-machine, the combination, with a wire-feed and any one of the nail-forming parts, of an oscillating stop held out of engagement with said nail-forming part by the wire fed to the machine, but when released by the breakage of the wire engaging with said nail-forming part and stopping the same.

9. The combination, with the hammer *O K*, means for feeding a wire thereto, and a pivoted stop, 9, adapted to be held out of engagement by the wire, of a spring, 12, acting on the stop and adapted to throw it into engagement with the hammer when released by the breakage of the wire, substantially as shown and described, and for the purpose set forth.

10. The combination of the bed *A*, shaft *D*, dies *F F'* and *F'' F'''*, cams *E E'*, hammers *O O'*, cam *P*, and the cam *W*, actuating a series of feeding devices, substantially as and for the purpose set forth.

11. The combination of a horizontal table, *A*, a vertical shaft, *D*, journaled in the table, means for feeding a wire vertically through the table, horizontal gripping and cutting dies *F F' F'' F'''*, a vertically-reciprocating hammer, *O K*, a cam, *W*, rigidly mounted on the shaft and adapted to operate the wire-feed, eccentric cams *E E'*, rigidly mounted on the shaft and adapted to operate the gripping and cutting dies respectively, and a spiral cam, *P*, rigidly mounted on the shaft and adapted to raise and drop the hammer *O K*, substantially as and for the purpose set forth.

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

DANIEL C. STOVER.

Witnesses:

J. A. CRAIN,

CHAS. GILBERT.