

(No Model.)

3 Sheets—Sheet 1.

P. M. BEERS.

MACHINE FOR POLISHING THE EYES OF NEEDLES.

No. 278,854.

Patented June 5, 1883.

Figure 1.

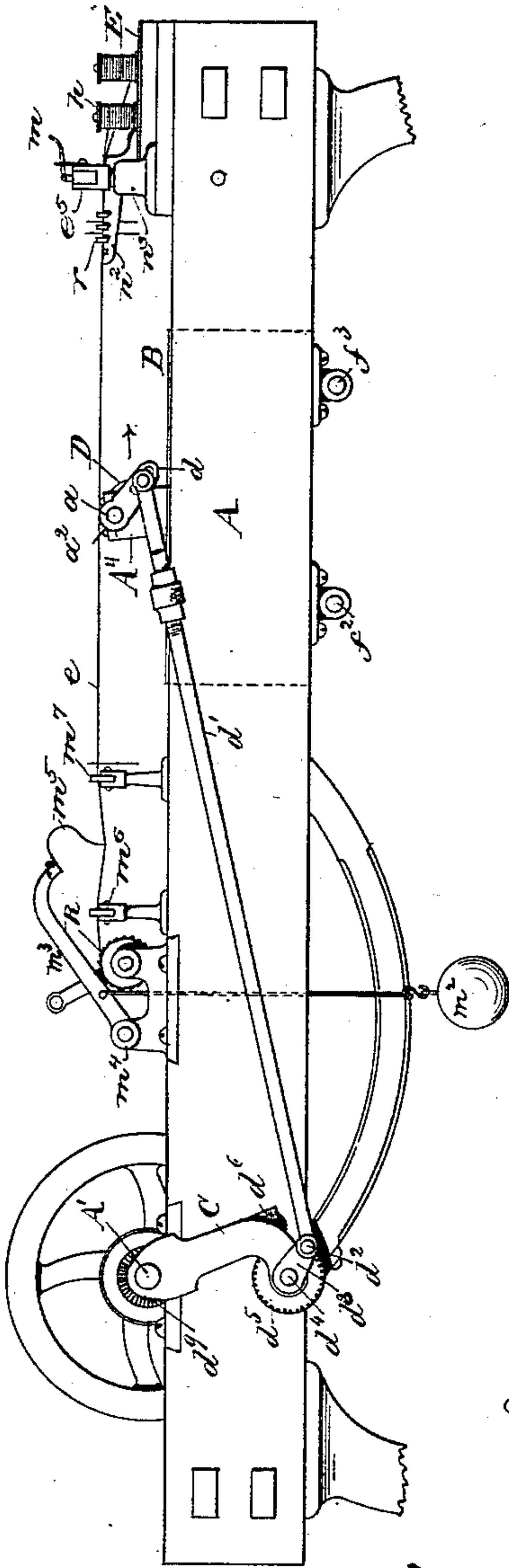


Figure 2.

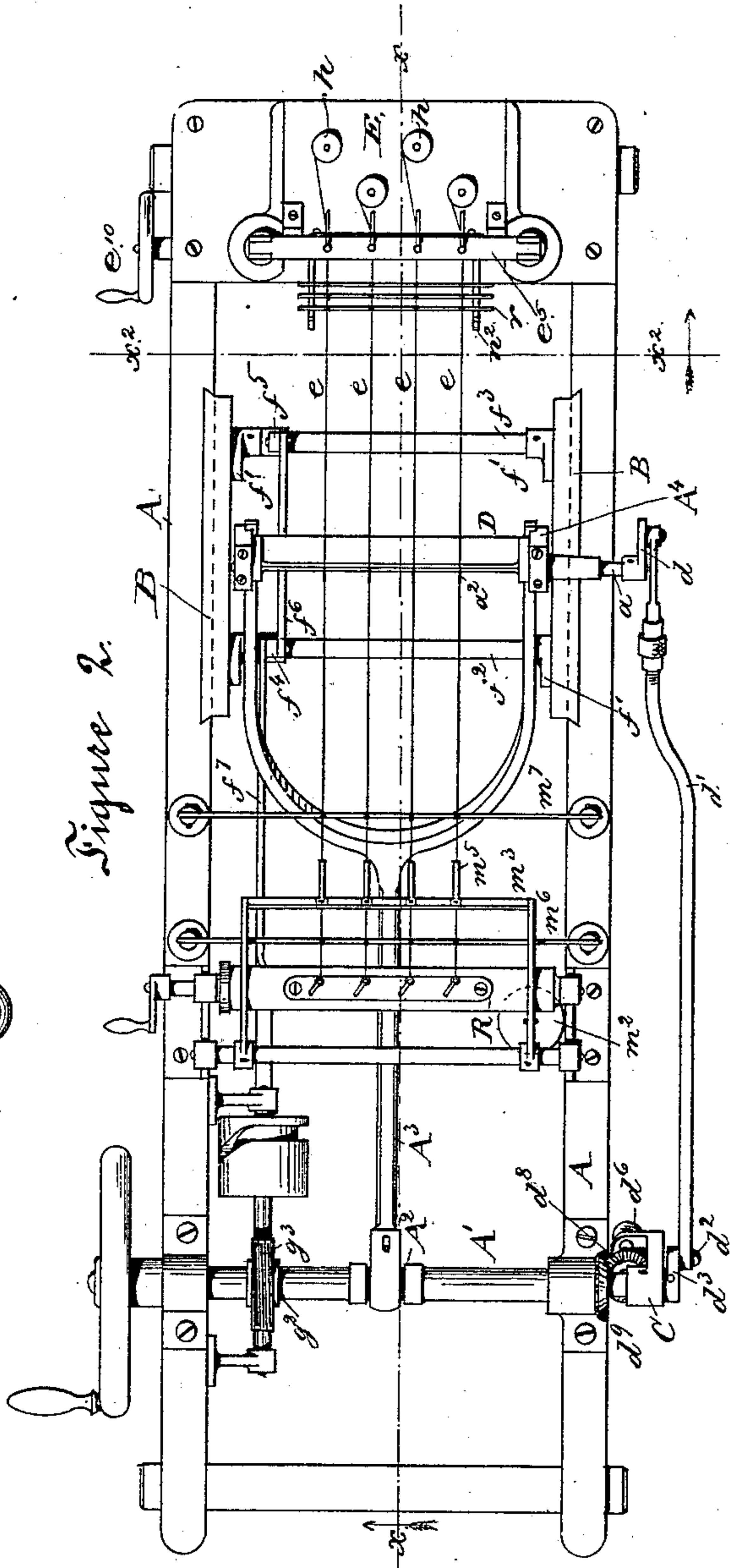


Fig. 10.

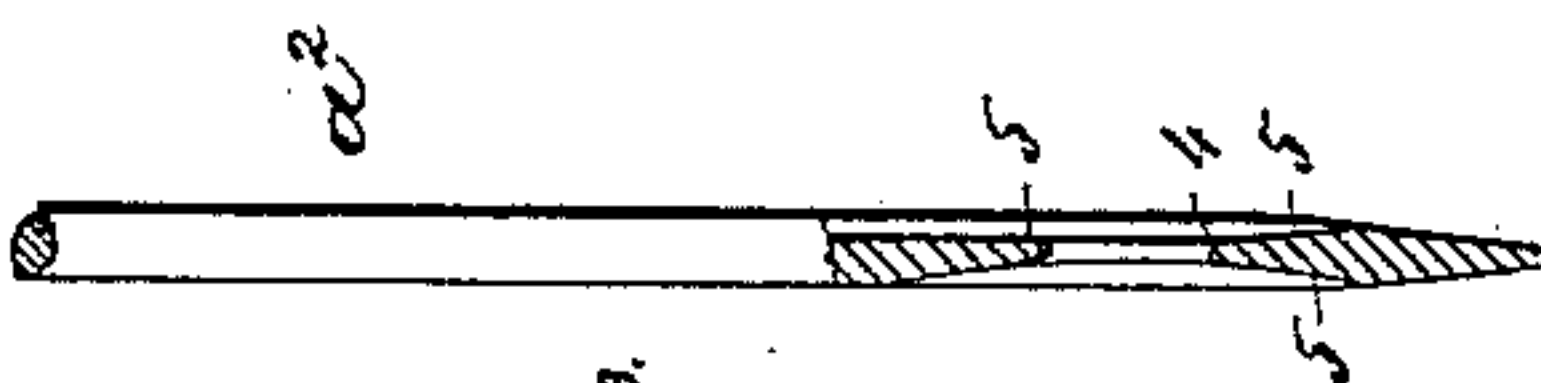
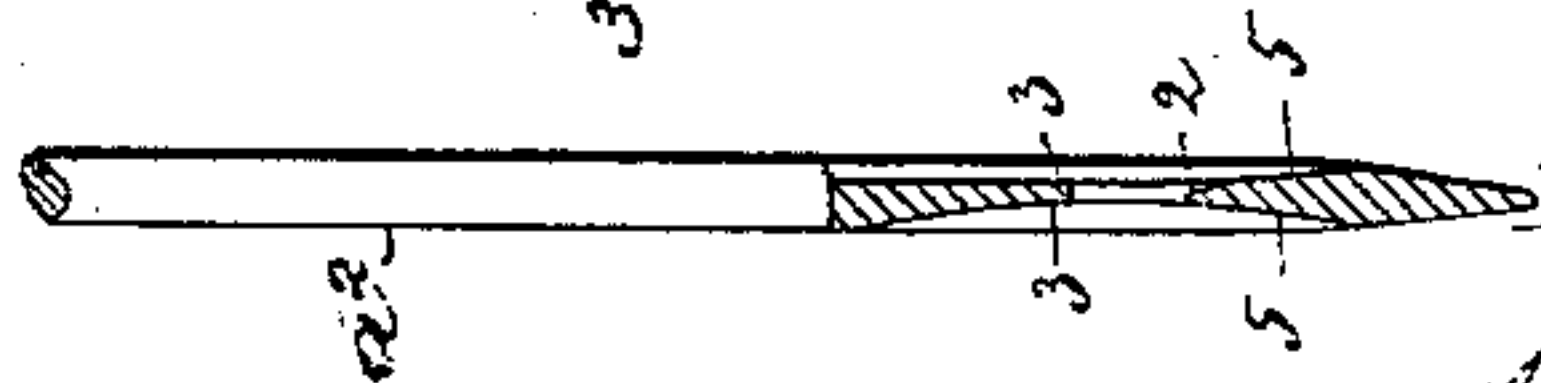


Fig. 9.



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John F. C. Reinkert

Inventor.

Philo M. Beers.

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(No Model.)

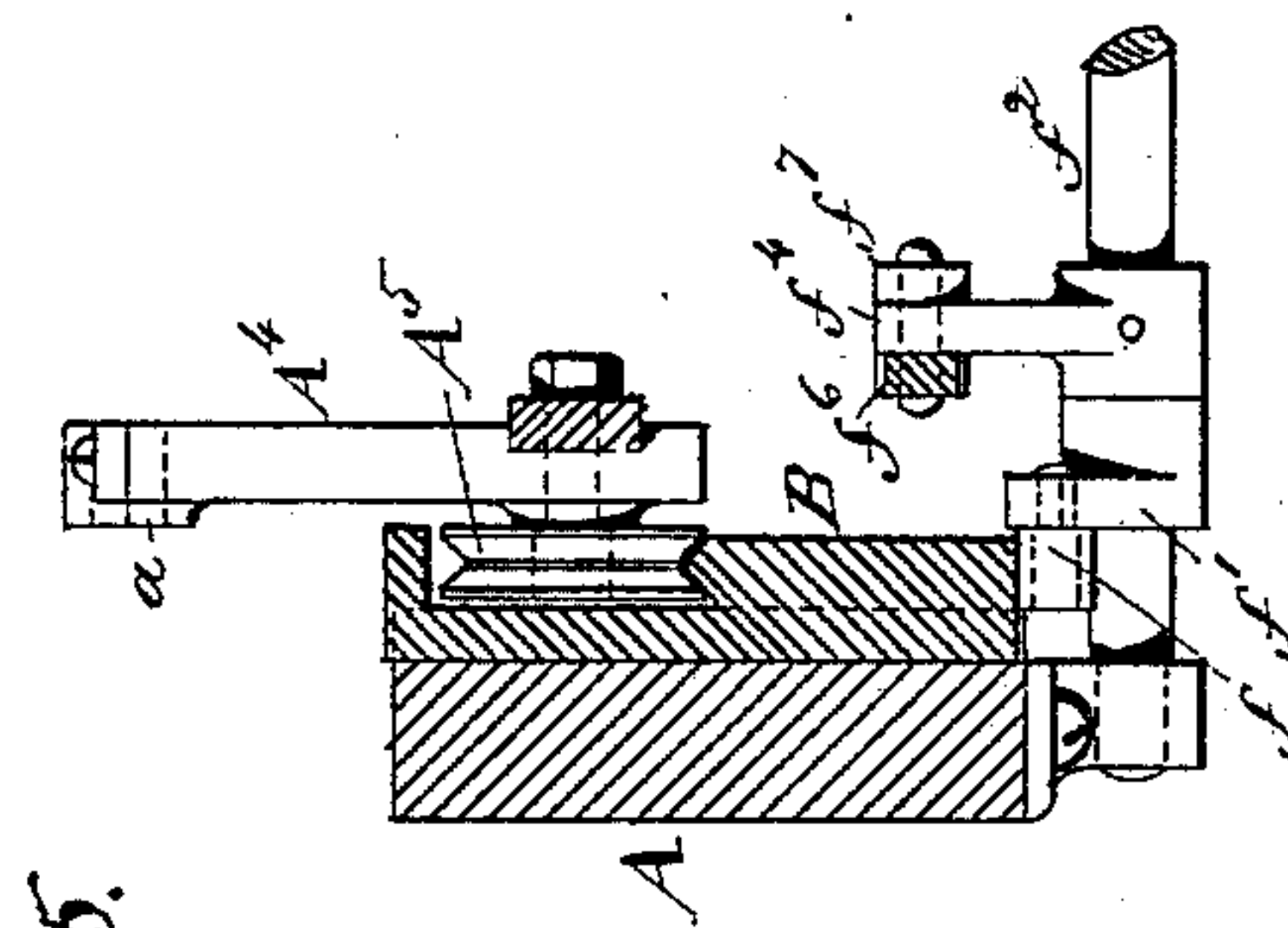
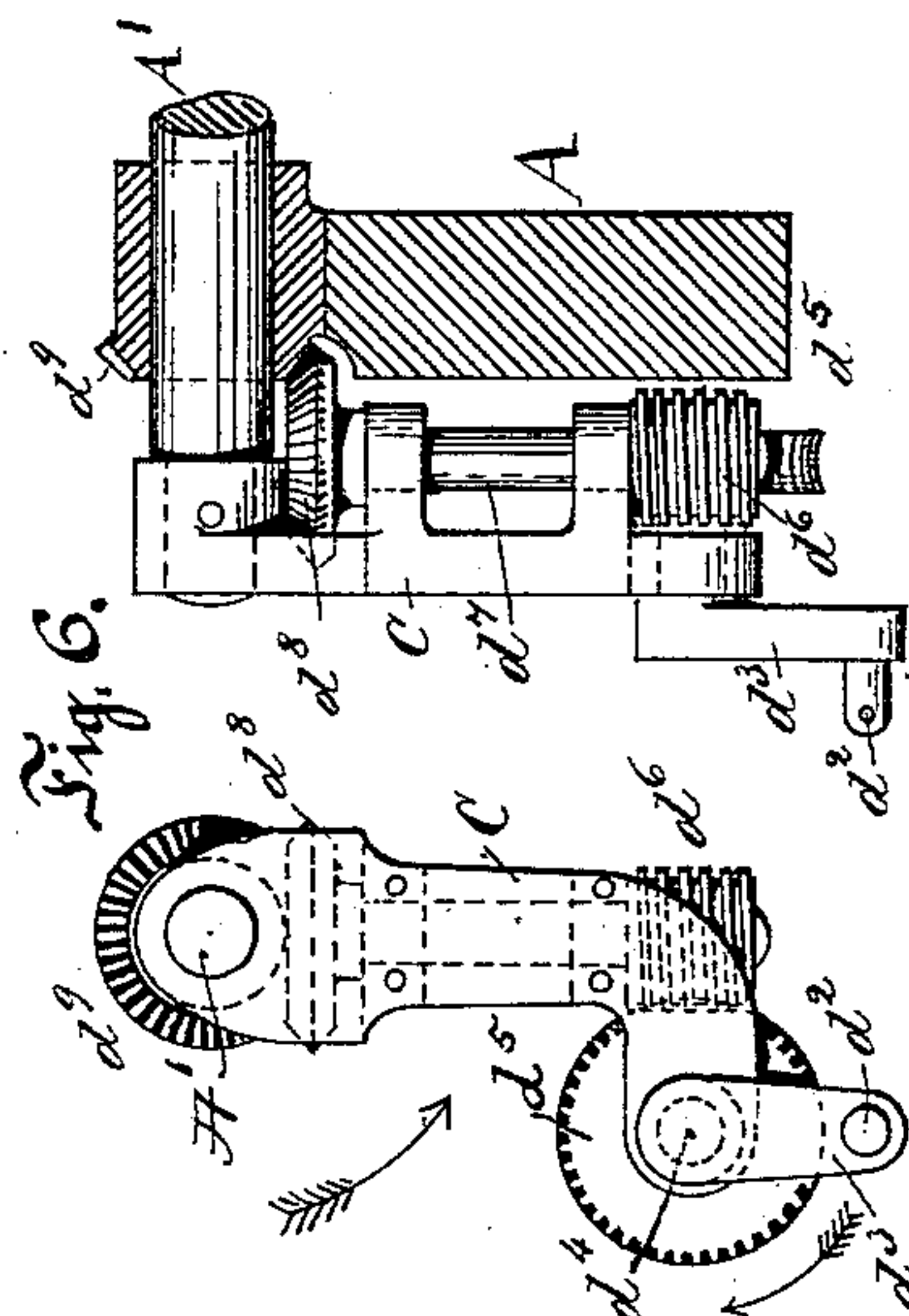
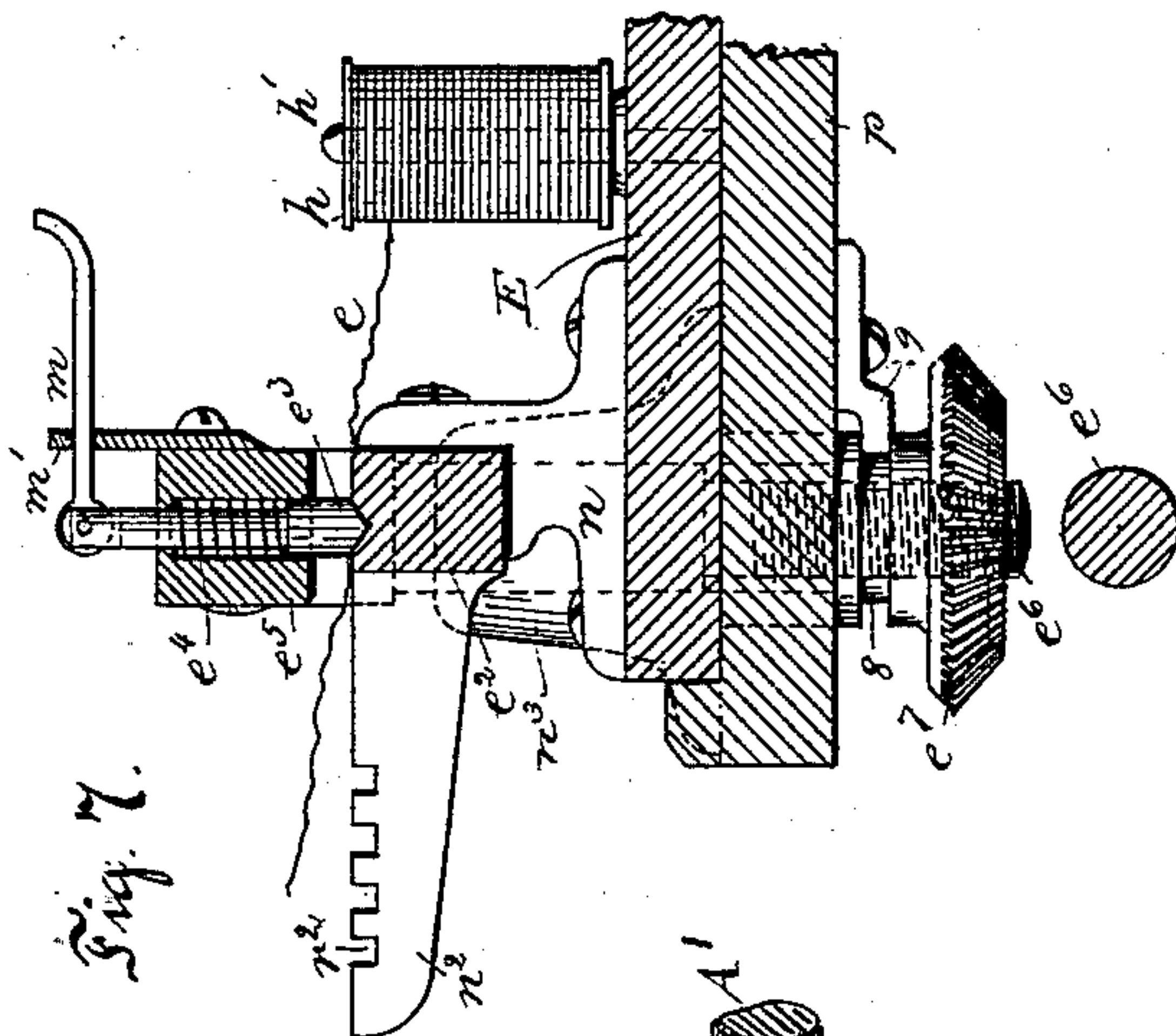
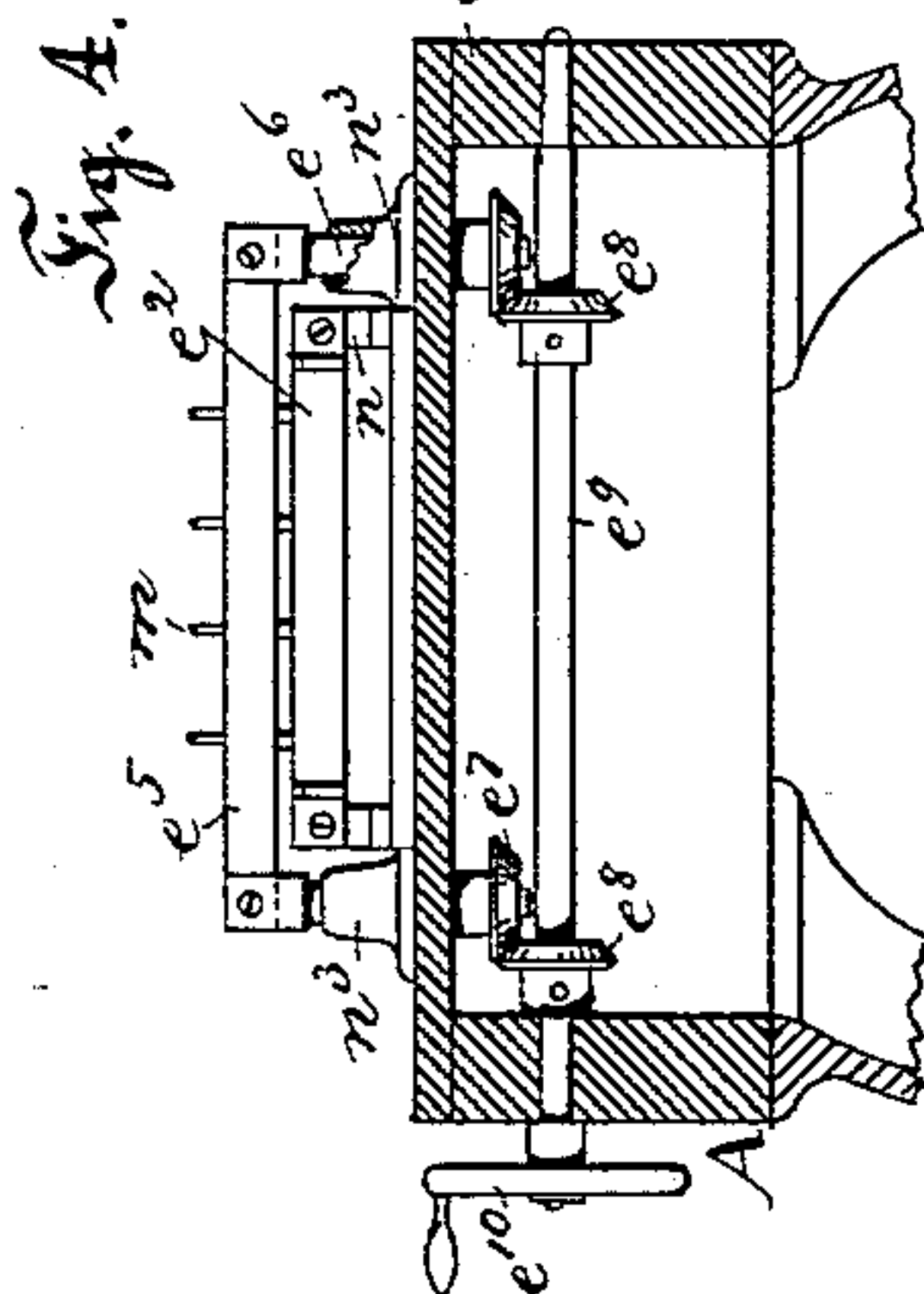
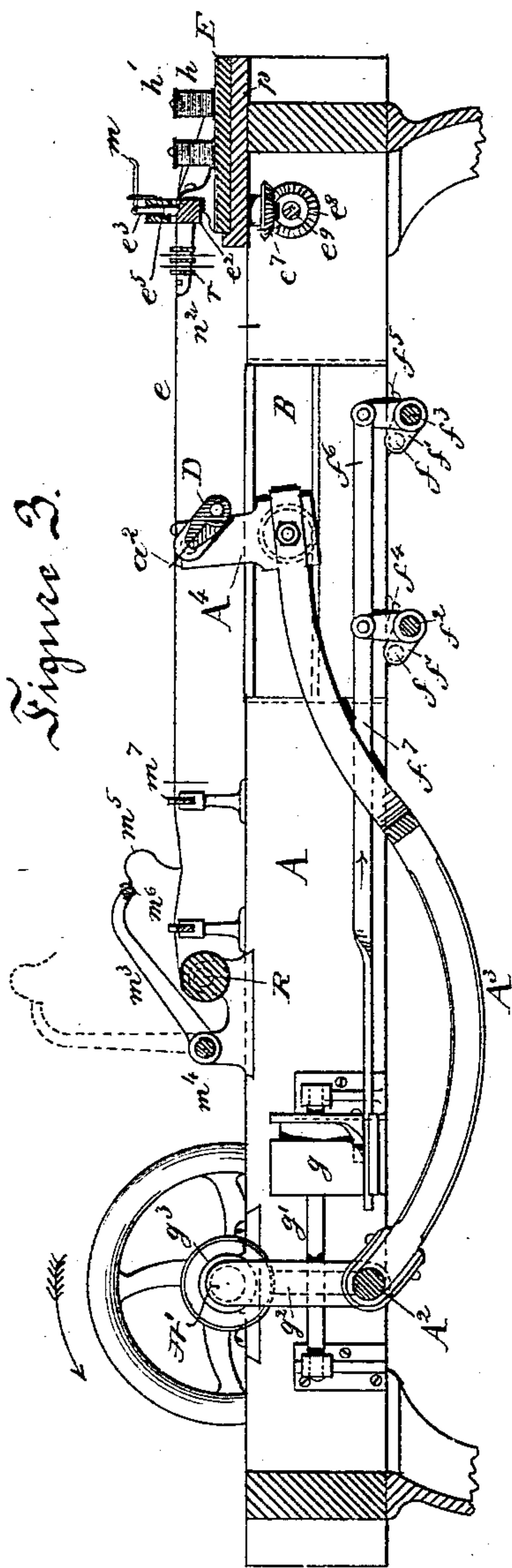
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# MACHINE FOR POLISHING THE EYES OF NEEDLES.

No. 278,854.

Patented June 5, 1883.



Witnesses:

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(No Model.)

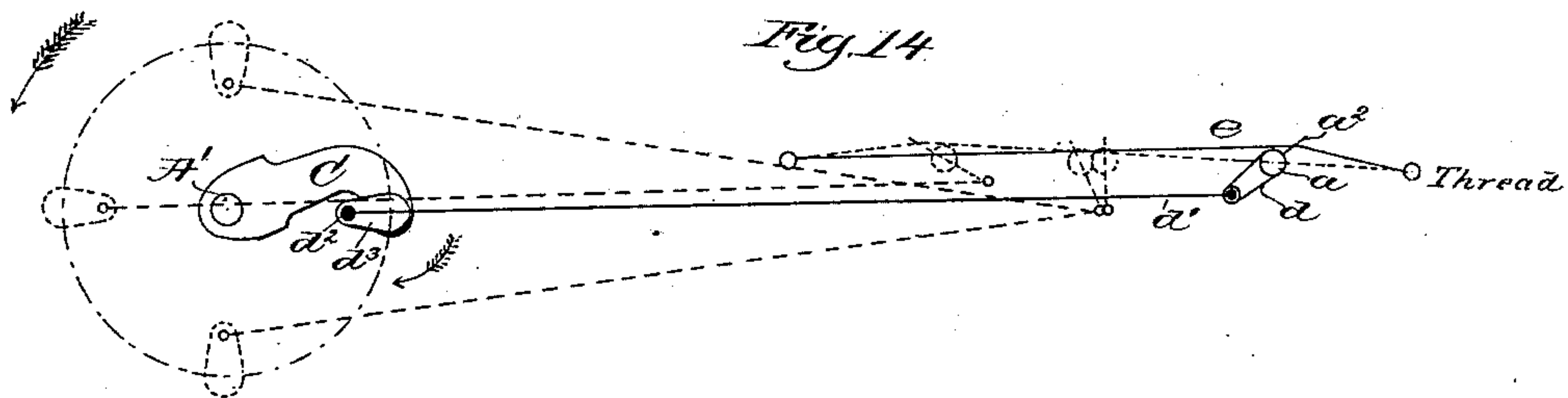
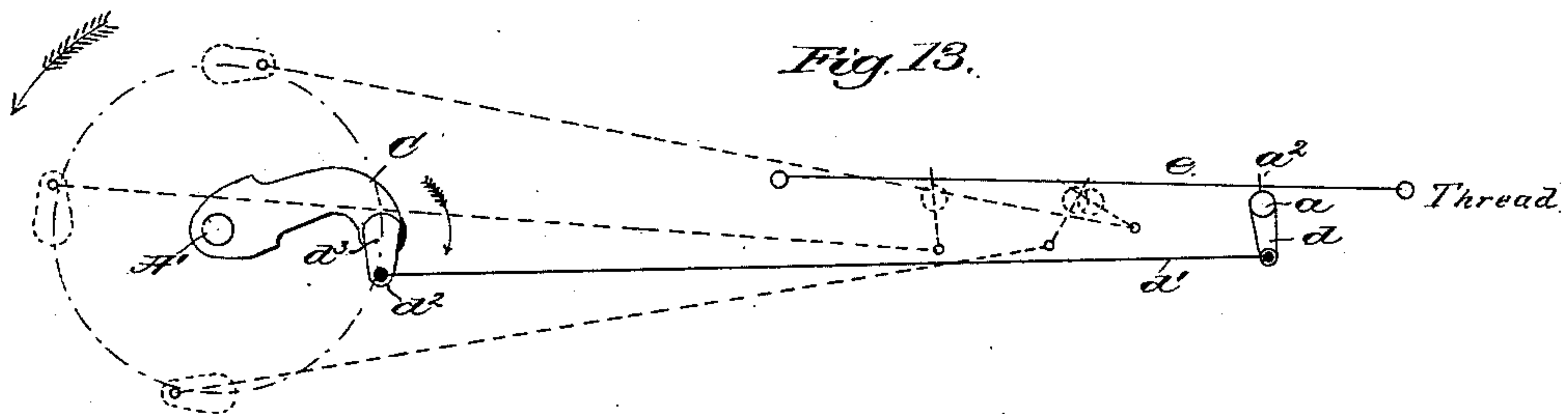
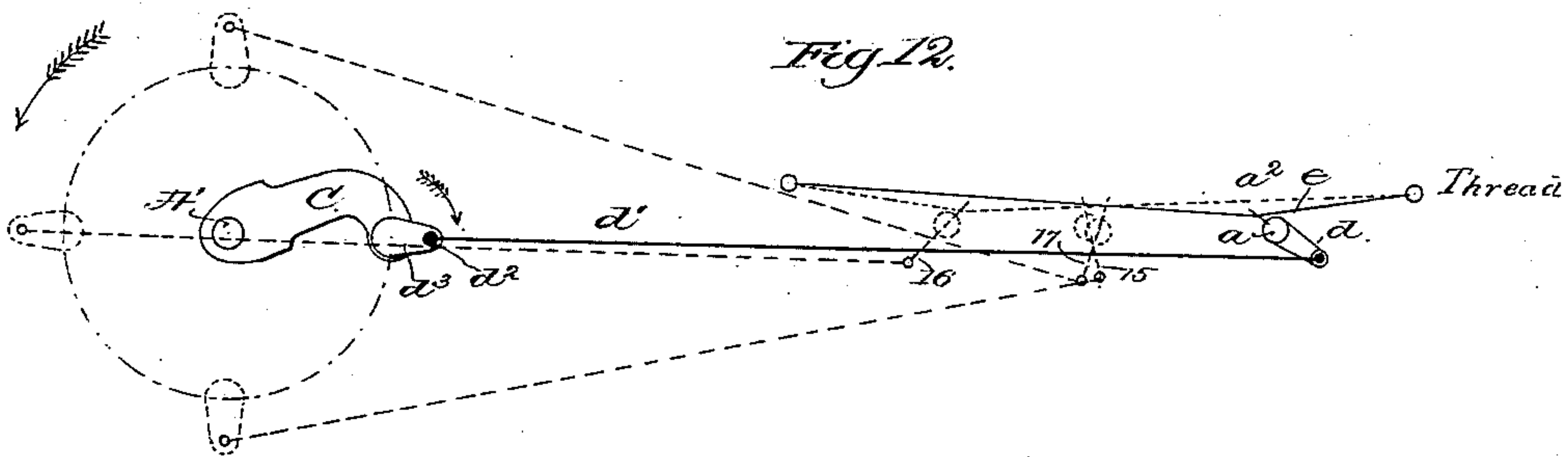
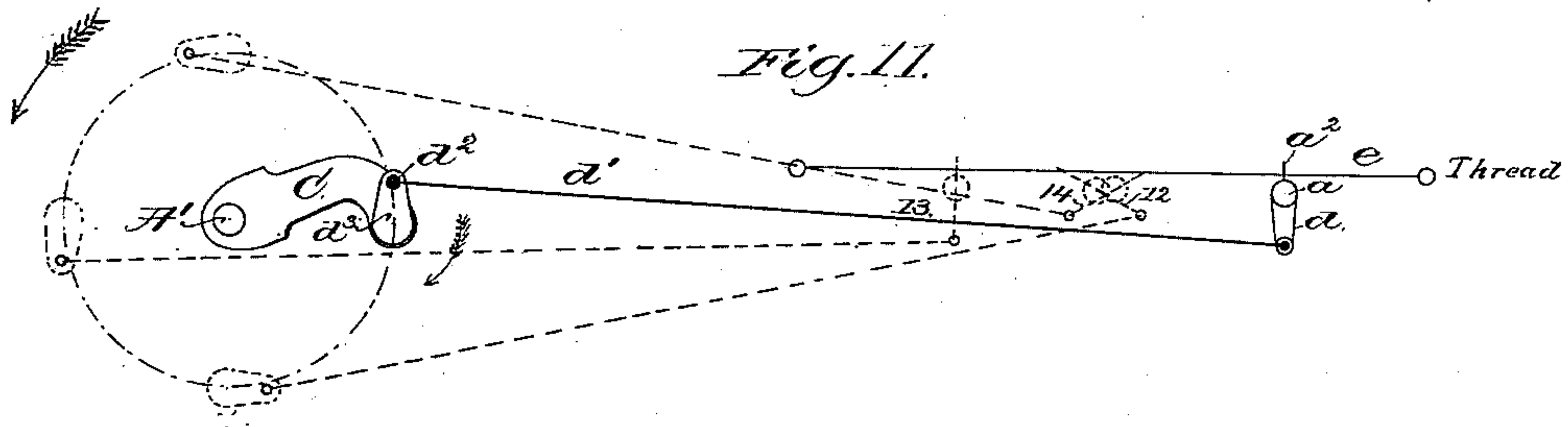
3 Sheets—Sheet 3.

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MACHINE FOR POLISHING THE EYES OF NEEDLES.

No. 278,854.

Patented June 5, 1883.



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# UNITED STATES PATENT OFFICE.

PHILO M. BEERS, OF BRIDGEPORT, CONNECTICUT.

## MACHINE FOR POLISHING THE EYES OF NEEDLES.

SPECIFICATION forming part of Letters Patent No. 278,854, dated June 5, 1883.

Application filed April 14, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, PHILO M. BEERS, of Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in  
5 Machines for Polishing the Eyes of Needles, of which the following description, in connection with the accompanying drawings, is a specification.

In machines such as now employed for polishing the eyes of needles, wherein the needles are held between reciprocating clamps which are caused to carry the needles backward and forward on the polishing-threads, as illustrated in the United States Patent No. 175,539, dated  
15 March 26, 1876, on which this patent is an improvement, the clamp which holds the gang of needles is rocked or tipped a uniform distance at the end of or during each stroke of the carriage, and the action of the polishing-threads  
20 is to abrade and polish the interior of the eye of the needle, so as to present flat or plane surfaces, which, meeting at the central part of the eye, form a square or abrupt sharp corner. The thinnest part of the eye of the needle  
25 should present a round surface, so as to obviate fraying or cutting the thread; and to insure the formation of such a surface, rather than one such as referred to and such as will be produced by using the machine described in the said  
30 patent, I have provided the polishing-machine with means to gradually increase the extent of tipping motion imparted to the needle-holding clamp as it is being moved in opposite directions, whereby the polishing-thread is  
35 gradually brought into contact with an additional or different portion of the interior of the eye of the needle at each stroke and an oval or round surfaced eye is insured, which will not cut or fray the thread. In the patented machine referred to the spools containing the polishing-threads had friction devices applied directly to them, one friction device for each pair of spools, and to move the threads in the said machine required considerable time  
40 and the manipulation of a number of adjusting-screws. In this my present invention the spools are left free to turn on their holding-pins, which are set closely together, and the threads are clamped near the spools by a series  
50 of spring pins or plungers co-operating with a common bar, and by one movement the press-

ure of the said thread-clamping mechanism on all the polishing-threads may be simultaneously altered as desired, and by means of small levers connected with the said plungers either  
55 one may be lifted separately to permit any one thread to be mended without disturbing the tension of any other thread, which makes considerable saving in time. Bringing all the polishing-threads compactly together under  
60 the control of one common tension device enables me to place the spools which hold the polishing-threads closer together than were springs used upon each spool, and, being able to increase the number of polishing-threads, I  
65 have been enabled to more than double the daily capacity of the machine.

Figure 1 represents in side elevation a machine for polishing the eyes of sewing-machine needles; Fig. 2, a top view thereof; Fig. 3, a  
70 longitudinal section on the line  $xx$ , Fig. 2; Fig. 4, a section of Fig. 2 on the dotted lines  $x^2 x^2$ ; Fig. 5, a sectional detail, showing part of the carriage for holding the needle-clamp and the vertically-adjustable guideway in which it  
75 moves, and means to adjust the guideway; Fig. 6, details of the crank and the devices for automatically varying the inclinations of the clamp; Fig. 7, an enlarged sectional detail of the clamping mechanism for the polishing-  
80 threads. Fig. 8 shows in partial longitudinal section a needle-blank with its eye as left by the punch. Fig. 9 shows in partial longitudinal section a needle with its eye as it will be left after the body of the blank has been scoured  
85 by means of the usual rotating wire-brush wheel; Fig. 10, a like section, showing the said eye finished in the machine herein described, and Figs. 11 to 14 are diagrams to illustrate the different positions of the carriage and needle-clamp and their actuating devices, as will  
90 be hereinafter described. Fig. 11, in full lines, shows the parts in position to commence the operation of polishing the eye; and Figs. 12, 13, and 14, in full lines, illustrate, respectively, 95 the position of the parts at the end of the ninth, eighteenth, and twenty-seventh rotations of the main shaft, the dotted lines in the said figures illustrating the points where the needle-clamp is tipped and the extent of its tipping  
100 motion during the first, ninth, eighteenth, and twenty-seventh rotations of the main shaft.



The frame-work A of the machine has proper bearings for the main shaft A', which may be driven by power in any usual manner. The shaft A' is bent near its center to form a long crank, A<sup>2</sup>, which is joined in usual manner by a strap with the link A<sup>3</sup>, connected with the carriage A<sup>4</sup>, having at each end a roller or sheave, A<sup>5</sup>, fitted to run upon a V-shaped track or edge of a vertically-adjustable guideway, B, fitted into a groove in the interior of the frame-work A, (see Figs. 2, 3, and 5,) the said crank and link reciprocating the said carriage backward and forward. The carriage A<sup>4</sup> has suitable bearings to receive the journals a of a needle-clamp, D, such as shown in the said patent, it being adapted to be supplied with and to hold needles a<sup>2</sup>, as described in the said patent. One of the journals of the needle-clamp has a crank-arm, d, (see Figs. 1 and 2 and 11 to 14,) connected by link d' with the crank-pin d<sup>2</sup> of the auxiliary crank d<sup>3</sup>, fast on a short stud, d<sup>4</sup>, sustained in the crank or arm C, fast on the main rotating shaft A'. The short stud, d<sup>4</sup>, has at its inner end a worm-gear, d<sup>5</sup>, engaged and turned by a worm, d<sup>6</sup>, on a shaft, d<sup>7</sup>, held in ears of the crank-arm C. (See Fig. 6.) The shaft d<sup>7</sup> has at its upper end a bevel-gear, d<sup>8</sup>, the teeth of which engage the teeth of the stationary bevel-gear d<sup>9</sup>, fast to the frame A, and forming one of the bearings for shaft A', the gear d<sup>8</sup> being rotated to rotate the shaft d<sup>7</sup>, the auxiliary crank d<sup>3</sup>, and crank-pin d<sup>2</sup>, as the gear d<sup>8</sup> is caused to travel about the circle of teeth of the stationary gear d<sup>9</sup>. The auxiliary crank d<sup>3</sup> and crank-pin d<sup>2</sup> and suitable means to operate them constitute the mechanism for varying the tipping movement or inclination of the clamp as the latter is being reciprocated. The crank-shaft A' is rotated thirty-six times while the crank-pin d<sup>2</sup> is rotated once, during which time the eye of the needle is completely polished at both ends. Each rotation of the shaft A' moves the carriage A<sup>4</sup> forward and backward once, and the crank C, connected with the said shaft by the link d', rocks or tips the clamp D on the carriage sooner or later during its stroke, as will be hereinafter described, owing to the slowly-changing position of the crank-pin d<sup>2</sup> with relation to the arm C as the latter is turned with the shaft A'.

The eye of each needle-blank, after being punched, will appear as in section Fig. 8.

In scouring the blank, as usual, the wires of the rapidly-rotating brush enter the grooves at the sides of the needle, and, acting on the walls 3 at the ends of the eye, (walls made by the punch,) wear them away, leaving the eye as shown in the section Fig. 9, wherein it will be seen that the wall at the point end of the eye is cut away, leaving a sharp edge, 2, which will cut the thread. Inspection of Fig. 8 will show that this wall of the eye was made square.

When the machine is started to polish the eyes of a series of needles, a<sup>2</sup>, held in the clamp D, having the attached arm d, the carriage B

is in its intermediate position, as in Fig. 11, so that the strain of the needles on the polishing-threads enables them to remain almost in a straight line.

In Fig. 11 the full lines show the starting-point of the machine, and it will be noticed that the arm d of the needle-clamp is in nearly vertical position. Rotation of the crank C in the direction of the arrow will tip the arm d and needle-clamp a little upon its bearings in the carriage A<sup>4</sup>, and will start the carriage on its backward motion, or toward the left of Figs. 1 and 11, and by the time that the carriage reaches its central position the arm d of the needle-clamp will be tipped so as to occupy the dotted position 12; but at the end of the backward stroke the clamp will occupy the position 13, and as the carriage again moves forward, the arm C then moving over its third quarter, the lower end of the arm d of the needle-clamp D will be carried ahead of the shaft or journal a, so that as the arm C completes three-fourths of its rotation about the center of shaft A' the arm d will occupy the dotted-line position indicated by 14. During this first rotation of the crank C the polishing-threads e acted upon the sharp portions 2 of the point ends of the eyes, and during the first rotation of the crank C the crank-pin d<sup>2</sup> was turned one thirty-sixth of a revolution about the center of d<sup>4</sup> by the shaft d<sup>7</sup> and its connected parts, hereinbefore described. At the end of the ninth revolution of the crank C the carriage B drops into its lowest position, as in Fig. 12, and in such lowered position of the carriage and changed position of the crank-pin d<sup>2</sup> with relation to the crank C the arm d of the needle-clamp, when the latter is in its extreme forward position, will occupy the position shown in full lines, Fig. 12; and during the next rotation of the crank C, as indicated by the dotted lines, Fig. 12, at the quarter-points, the arm d will occupy, respectively, the positions 15 16 17, wherein it will be seen that the arm d of the needle-clamp is tipped more at the ends of the stroke of the carriage than in Fig. 11, and at its center positions is tipped less than in Fig. 11. When the carriage was making the first stroke the arm d of the needle-clamp occupied its position nearest to a vertical line while the carriage was at the extremes of the stroke; but during the ninth rotation of the arm C the rotation of the auxiliary crank d<sup>3</sup> about its own center so moves the crank-pin d<sup>2</sup> that the arm d of the needle-clamp occupies a more nearly vertical position while the carriage is nearest the center of its travel, instead of at its ends, as in Fig. 11. So it will be understood that from the first to the ninth stroke of the carriage the arm d of the needle-clamp was tipped while the carriage occupied a different position in its stroke. At the end of the ninth stroke the guideway B remains stationary for several strokes of the carriage, after which the guideway is lifted, and at the end of the eighteenth stroke of the carriage



the polishing-threads are again in horizontal plane, as in Fig. 13, and the point end of the eye is supposed to be rounded or finished. From the ninth to the eighteenth reciprocation of the carriage the clamp is gradually tipped at a period nearer the center of the stroke of the carriage, so that at the end of the eighteenth stroke the clamp occupies its most nearly vertical position at the center of the stroke of the carriage, and is tipped as the carriage is at the center of its stroke. Commencing with the eighteenth stroke, the guide-way B is lifted to cause the shank ends of the eyes of the needles  $a^2$  to bear against the polishing-threads  $e$ , such lifting of the carriage and needles raising the threads  $e$  above their horizontal position, as in Fig. 14, thus causing the said threads to bear with greatest force against the shank ends of the eyes and polish and round the same, leaving them in the condition shown at 5, Fig. 10. As the crank  $d^2$  is slowly rotated on the rotating crank-arm C its position will be so changed with relation to the said arm C as to gradually rock or tip the clamp D at a different part of the stroke of the carriage and for different distances until the clamp is tipped its greatest distance.

While the point end of the eye is being polished the guide B will be held, as in Fig. 3, by the action of the rolls or studs  $f$  of arms  $f'$  of rock-shafts  $f^2 f^3$ , having arms  $f^4 f^5$ , connected by link  $f^6$ , the arm  $f^4$  being actuated by a slide-bar,  $f^7$ , having a pin or roll extended into the groove of the cam  $g$  on the shaft  $g'$ , the latter having a worm-gear,  $g^2$ , which is engaged with and driven by the worm  $g^3$  on the shaft A', (see Figs. 2 and 3,) the worm-gear  $g^2$  being shown in the latter figure by dotted lines. When the shank end of the eye is to be acted upon, the cam  $g$  acts on slide  $f^7$  and its connected devices to raise the guide B until the shank end of the eye strikes the lower side of the polishing-thread  $e$ , and the clamp, during its reciprocation with the needles, is gradually rocked or tipped, so that the polishing-threads act upon more and more of the shank end of the eye and gradually wear it rounding, as shown in Fig. 10.

The polishing-threads, carried by the spools  $h$  on pins  $h'$  of a removable bed, E, are extended forward over a grooved cross-bar,  $e^2$ , supported in standards  $n$ , rising from the said bed. These standards, extended forward as at  $n^3$ , serve to hold the separating-bars between the gangs of needles which are to be pushed forward to be placed in the clamp D, as in the said patent. Bar  $e^2$  forms the lower member of the clamping mechanism for the polishing-threads  $e$ , the other members being the plungers  $e^3$ , one for each thread. The plungers  $e^3$ , having their shanks extended through spiral springs  $e^4$  and through holes on the bar  $e^2$ , are kept pressed down upon the said threads by the said springs. Each plunger has a lever,  $m$ , by which it may be lifted independently when desired, the lever rocking over a fulcrum,  $m'$ . The bar  $e^2$ , carrying all these plungers, is attached at each

end to a screw-threaded rod,  $e^6$ , extended down through a hollow guide-post,  $n^3$ , where it receives upon it an internally-threaded bevel-gear,  $e^7$ , having an annular groove, 8, in its hub, (shown best in Fig. 7,) which is embraced by a yoke, 9, screwed to the under side of the cross-piece,  $p$ , of the frame-work. The gears  $e^7$  are engaged by bevel-gears  $e^8$  on a shaft,  $e^9$ , having a crank or hand-wheel,  $e^{10}$ , by which to turn it and rotate the gears  $e^7$ , and cause them, held by the fork, to move the rods  $e^6$  and bar  $e^5$  vertically, as it is desired to simultaneously adjust the pressure on all the threads  $e$ .

The outer end of the polishing-threads will be connected with a roller, R, substantially as in the said patent, and the tension on the threads  $e$  will be controlled by the spring  $m^5$ —one for each thread—the said springs being attached to a yoke,  $m^3$ , on a shaft,  $m^4$ , having a weight,  $m^2$ . (Shown in Fig. 2.) The springs  $m^5$  press on the threads  $e$  between the rests  $m^6 m^7$ .

The machine will have a number of plates, E, which, when the pins  $h'$  have had spools of thread applied to them, and the said threads have been inserted through the eyes of the needles to be polished, and the said needles in gangs have been separated by the plates  $r$ , (see Fig. 3,) placed in notches  $r^2$  (see Fig. 7) of arms  $n^2$ , may be placed in the machine. The operator may thus keep a lot of needles properly strung, ready to be operated upon when desired.

I claim—

1. In a machine for polishing the eyes of needles, a reciprocating carriage and clamp thereon, combined with means to gradually increase the rocking or tipping movement of the said clamp during the reciprocation of the clamp, and while polishing the eyes of the needles, substantially as set forth.

2. The sliding carriage and the clamp D, combined with the crank C, auxiliary crank or arm  $d^2$ , its pin  $d^2$ , means to rotate the said crank with relation to the said arm C, and the link  $d'$ , connecting the crank-pin and clamp, substantially as described.

3. In a machine to polish the eyes of needles, the rotating shaft A', stationary bevel-gear  $d^7$ , arm C, shaft  $d'$ , gear  $d^8$ , worm  $d^6$ , gear  $d^5$ , arm  $d^4$ , moved slowly by it, crank-pin  $d^2$ , link  $d'$ , and needle-clamp D, combined with the carriage and means to reciprocate it, substantially as described.

4. In a machine for polishing the eyes of needles, the cross-bar  $e^2$  and series of plungers to clamp and hold the polishing-threads between their spools and the parts of the said threads which polish the eyes of the needles held by the clamp, substantially as described.

5. In a machine for polishing the eyes of needles, the cross-bar  $e^2$ , the bar  $e^3$ , and its series of spring-pressed plungers, combined with means, substantially as described, to adjust the said bar and the pressure of the plungers on the polishing-threads, substantially as shown and described.

6. In a machine for polishing the eyes of



4.

needles, the cross-bar  $e^2$  and bar  $e^3$  and its series of plungers, combined with the series of independent levers  $m$  to lift the said plungers separately, substantially as described.

- 5 7. In a machine to polish the eyes of needles, the removable or independent plate  $E$ , to hold the series of spools, and its bar  $e^2$ , and the notched arm or bracket  $n^2$ , to hold the bars  $r$ , combined with a series of plungers to clamp

and hold the polishing-threads, substantially as described.

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

PHILO M. BEERS.

Witnesses:

A. R. LACEY,  
F. HURD.