

D. ARMSTRONG.
Nail-Forging Machine.

No. 226,437.

Patented April 13, 1880.

FIG. 1.

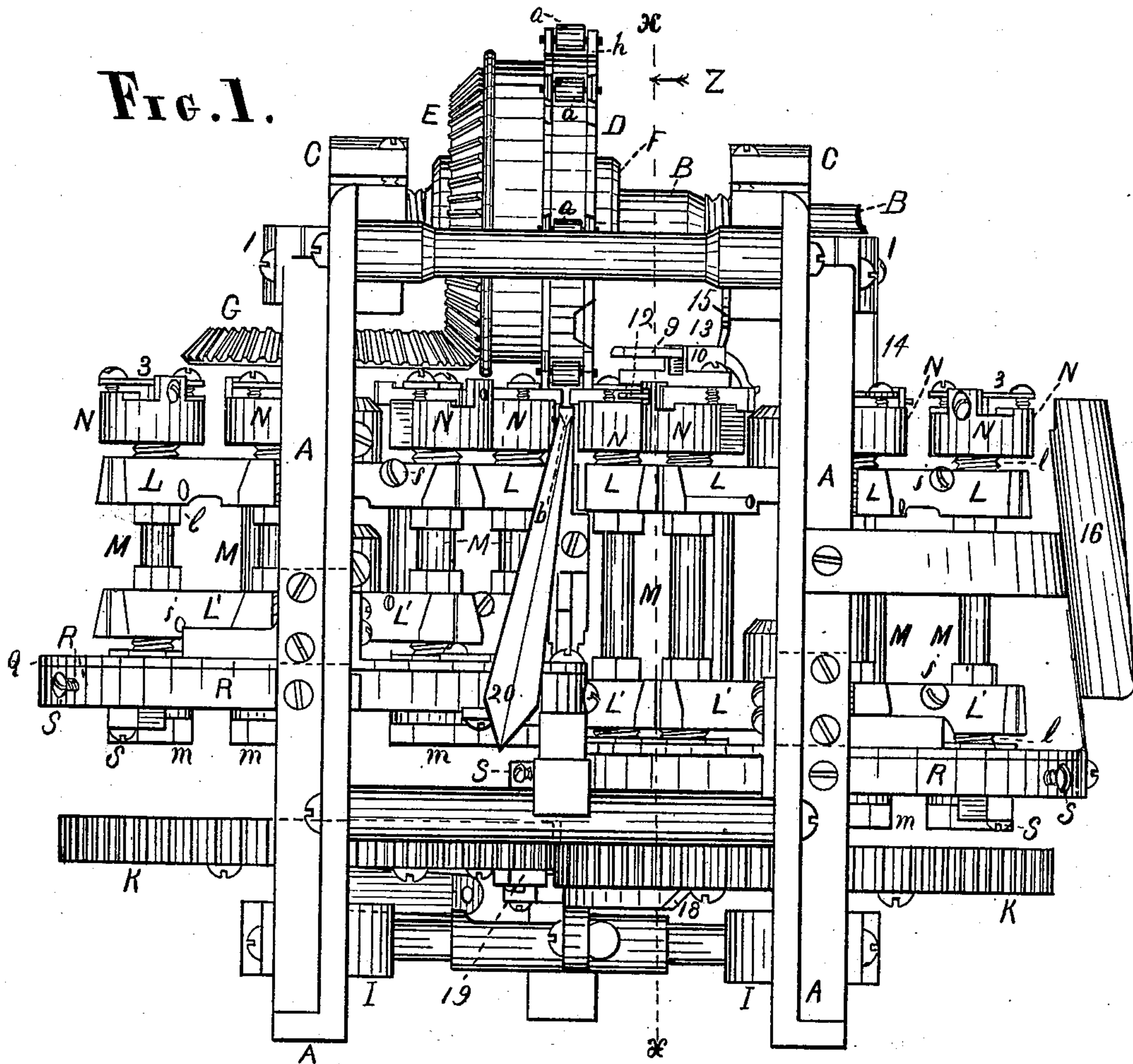
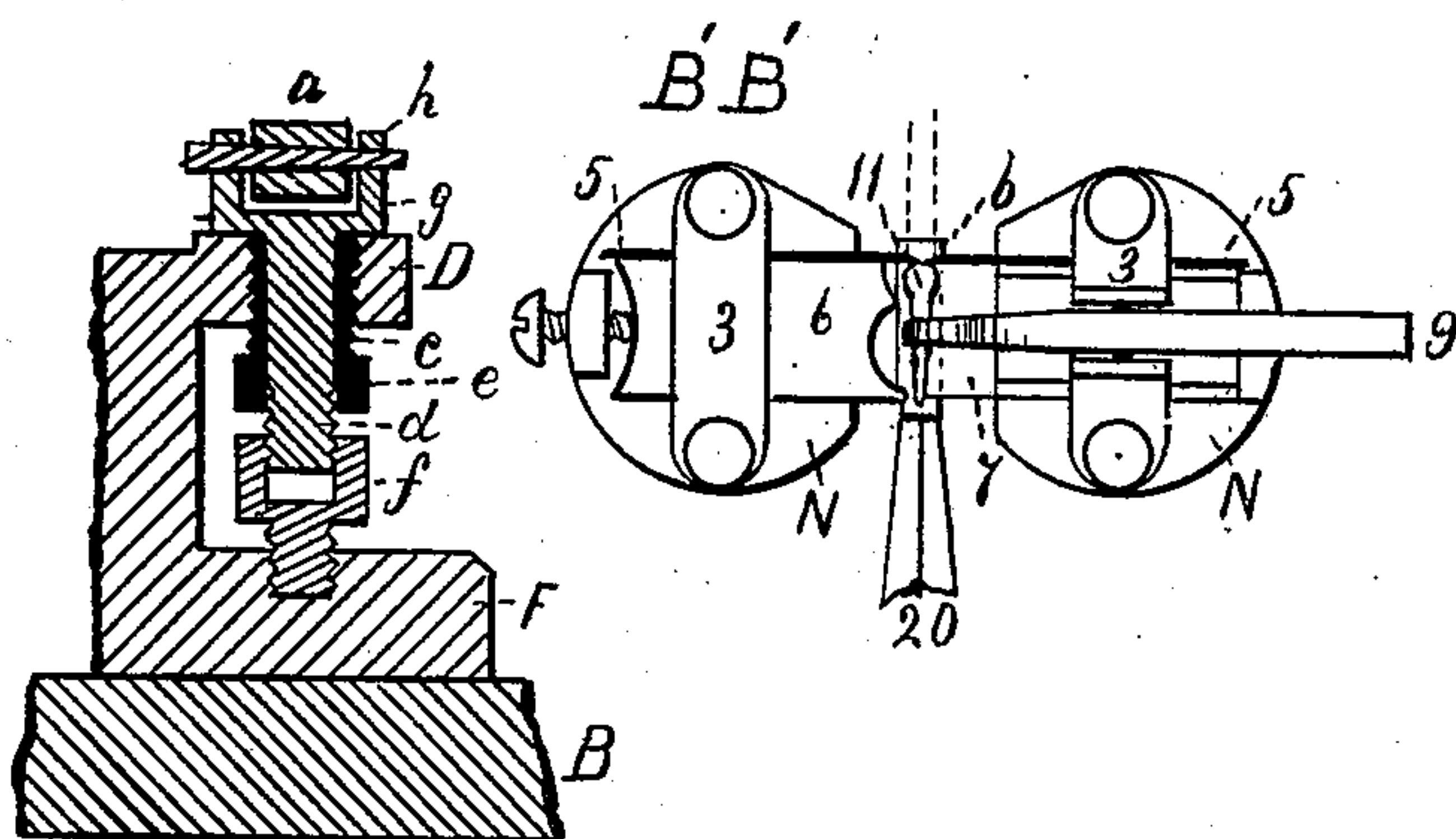


FIG. 7.



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FIG. 2.

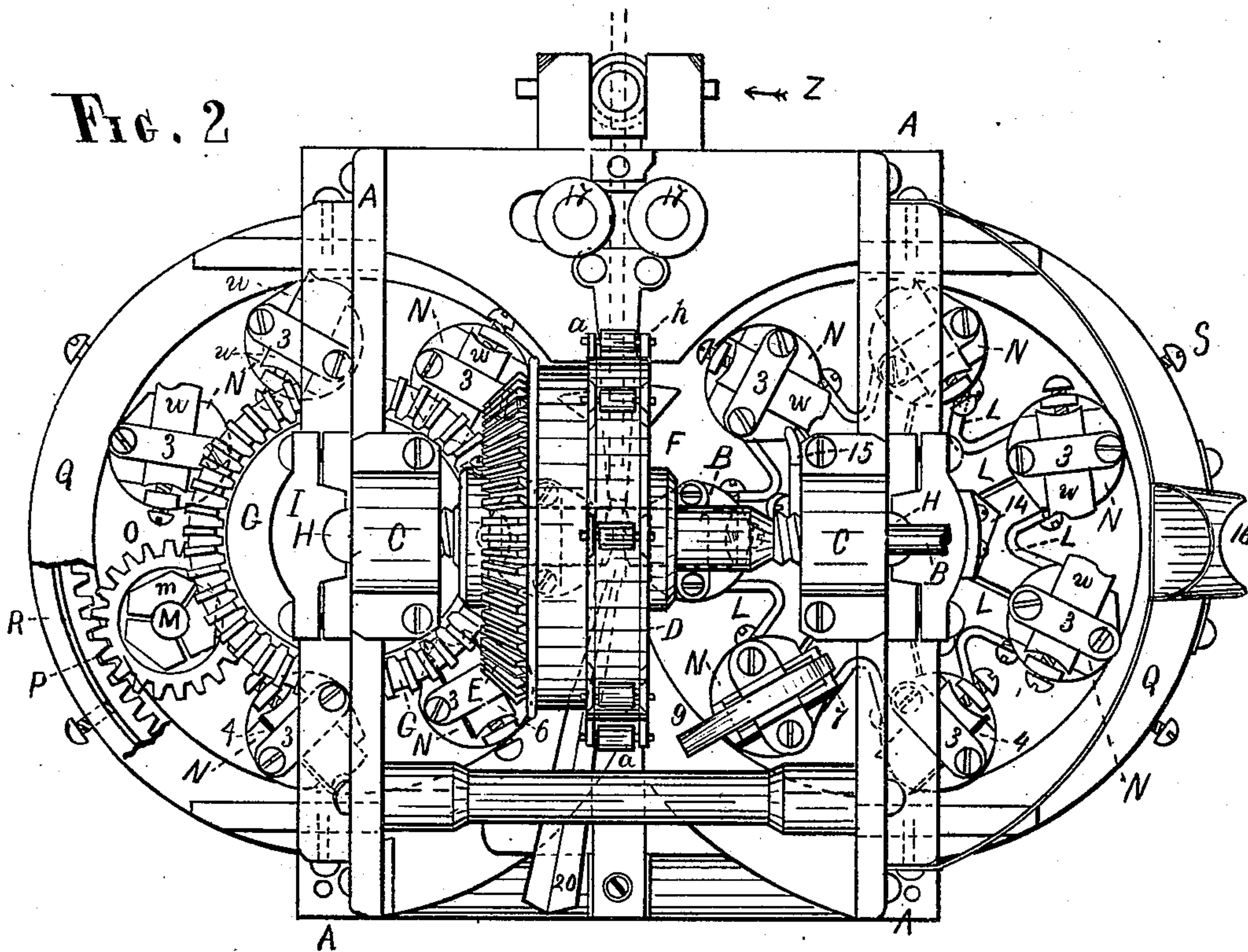


FIG. 3.

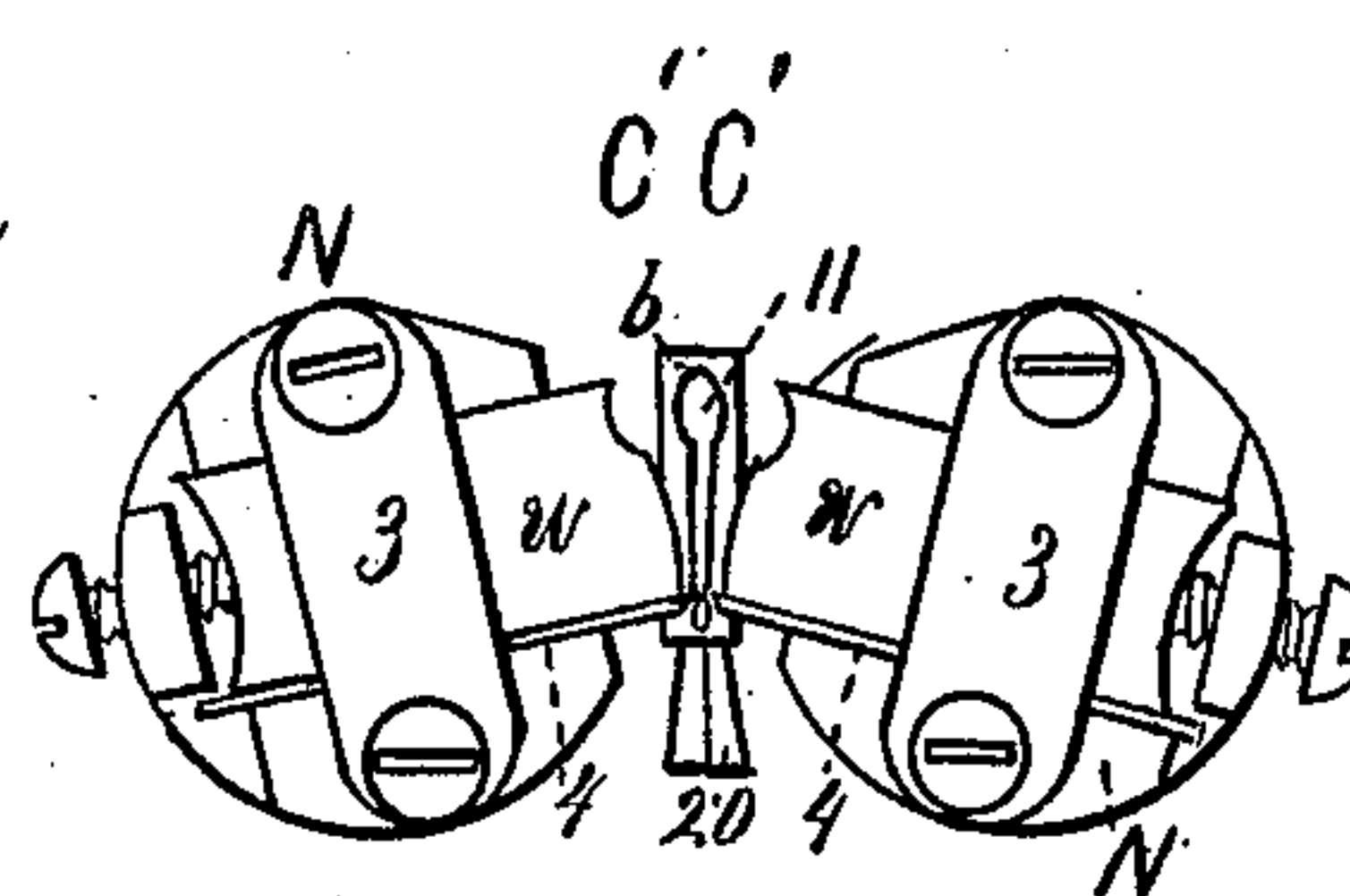
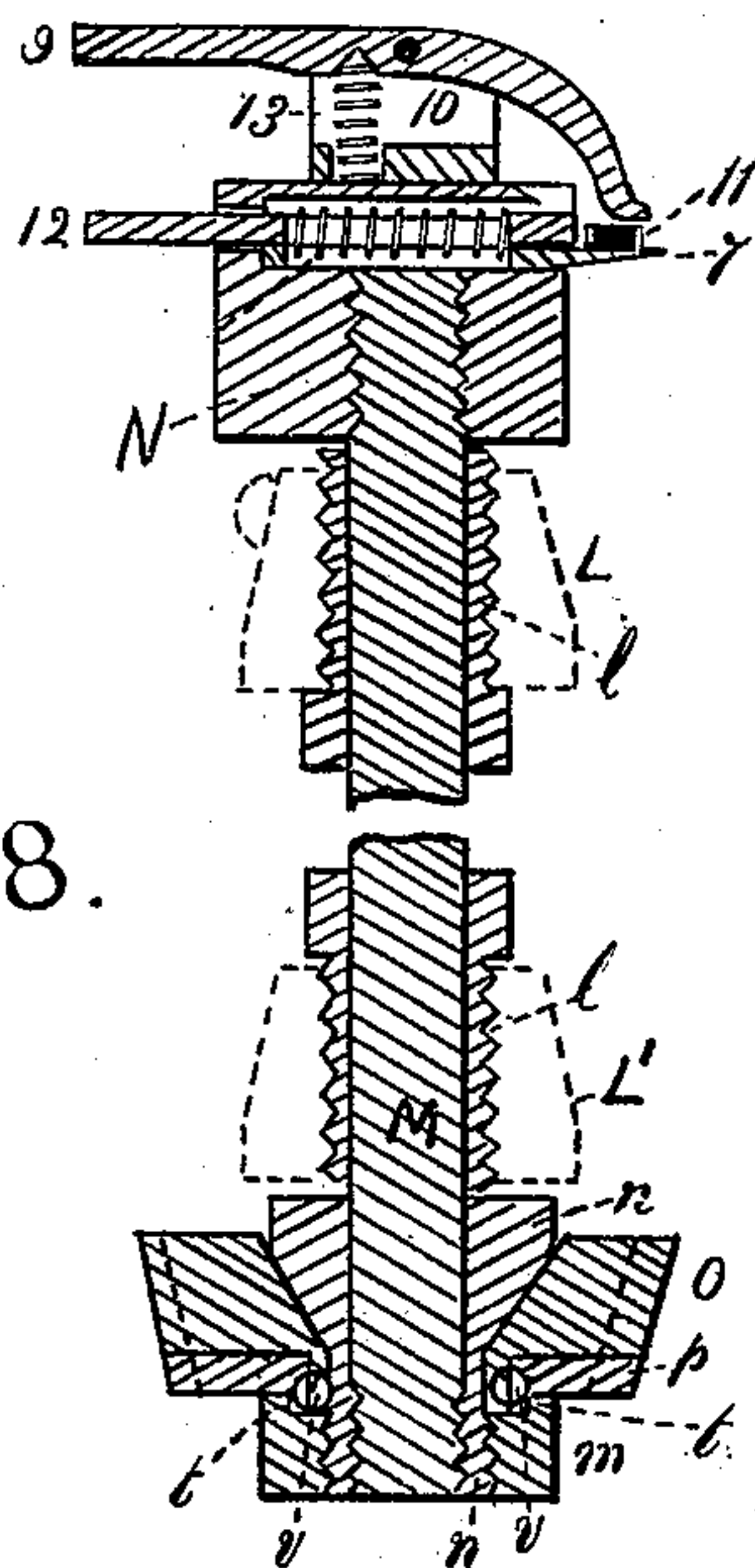
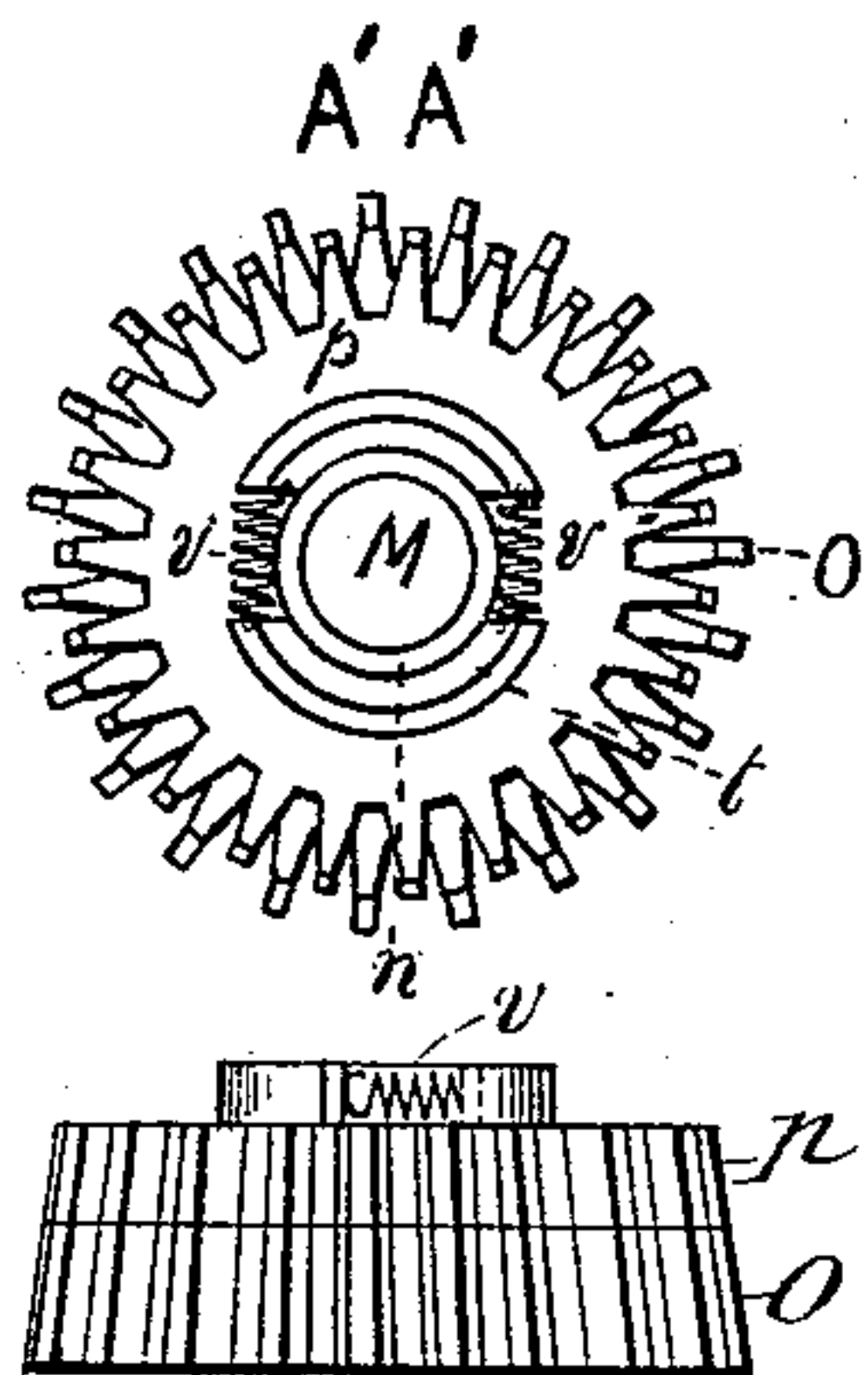
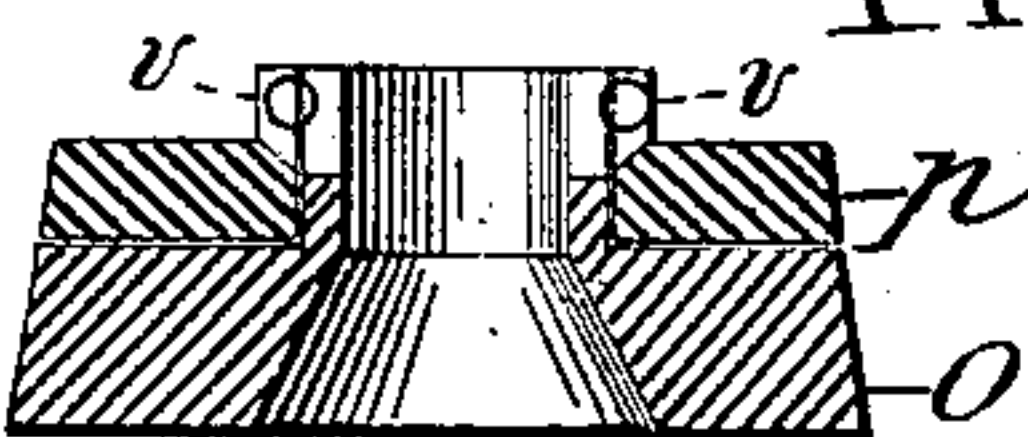


FIG. 8.



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FIG. 4.

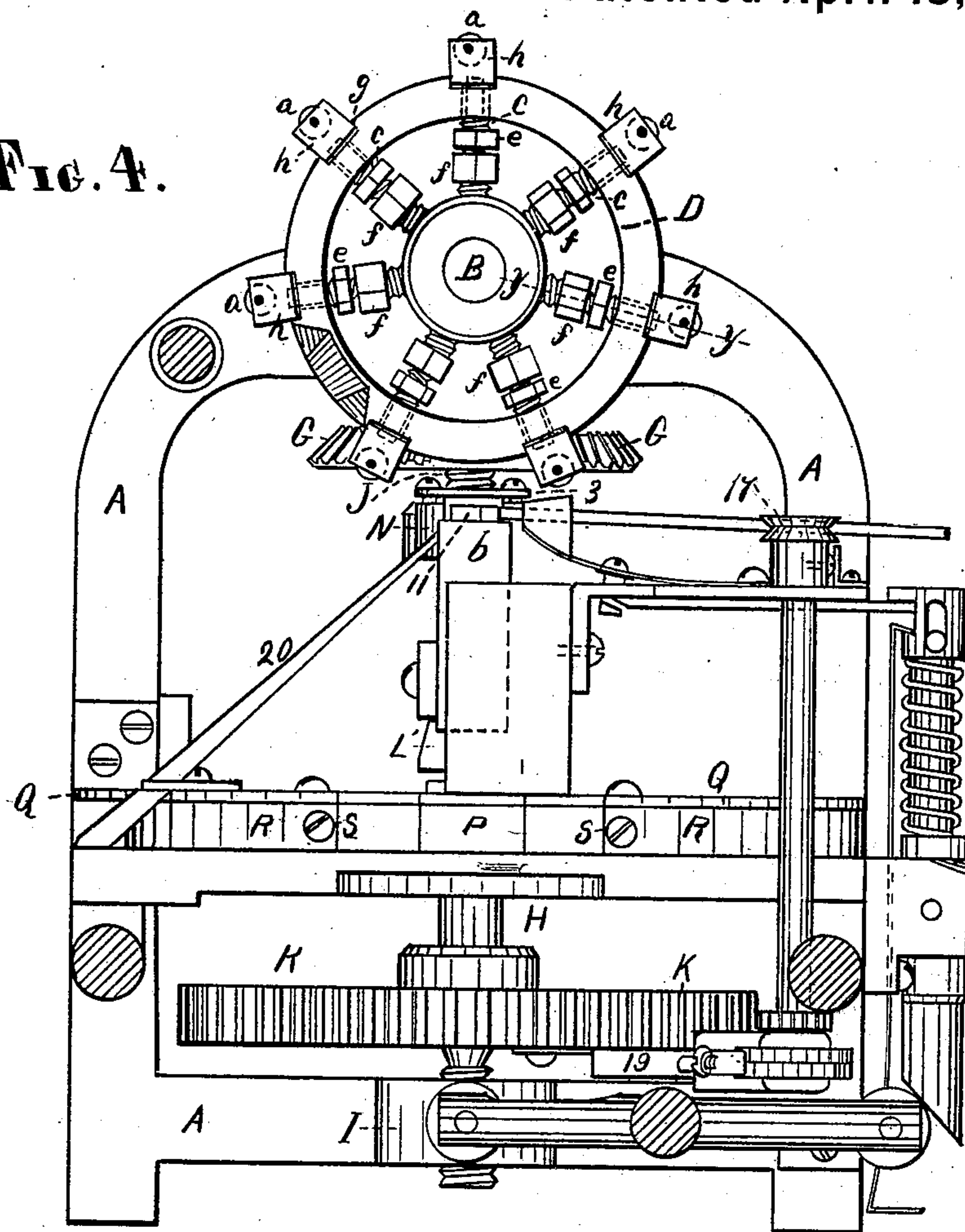
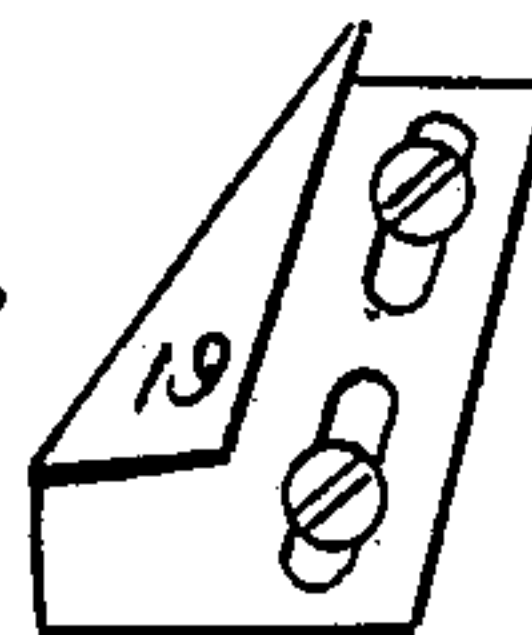


FIG. 5.



FIG. 6.



WITNESSES.

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UNITED STATES PATENT OFFICE.

DANIEL ARMSTRONG, OF CHICAGO, ILLINOIS.

NAIL-FORGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 226,437, dated April 13, 1880.

Application filed May 26, 1879.

To all whom it may concern:

Be it known that I, DANIEL ARMSTRONG, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Nail-Forging Machines, of which the following is a specification, reference being had to the accompanying drawings, illustrating the invention, in which—

Figure 1, Sheet 1, is a rear-side elevation of a nail-forging machine embodying my improvements; Fig. 2, Sheet 2, a top or plan view thereof; Fig. 3, Sheet 2, a vertical sectional elevation of the rotating device which removes the nails after they are swaged removed from the other parts of the mechanism; Fig. 4, Sheet 3, a vertical sectional elevation taken on line *x x*, Fig. 1, and looking in direction of dart *z*, a portion of the mechanism being removed; Fig. 5, Sheet 3, an inverted view of the cam which operates the feed-rolls to release the nail-rod; Fig. 6, Sheet 3, an inverted view of the cam which operates the pawl and ratchet to feed the nail-rods; Fig. 7, Sheet 3, an enlarged broken section taken on line *y*, Fig. 4. Fig. 8 is a further detail drawing of the double pinion.

The object of the present invention is to provide a machine for forging wrought nails, but especially horseshoe-nails.

The nature of the invention, in brief, consists of a fixed central anvil, on which the nail-rod is carried by suitable mechanism, and between which and rotating dies pivoted to a rotating wheel the upper and lower parts of the nails are swaged. The sides of the nails are swaged between a double series of dies. Each series of dies rotate around a separate shaft, and each die is rotated on its axis so as to present a proper swaging-surface to the nail-rod over the anvil, the dies proper having such forms as to shape a desired nail, two or more of each series of dies being used to shape the nail, the same being the case as to employing two or more of the dies on the cylinder to swage the upper and lower surfaces of the nails; and, further, in novel mechanism for feeding the nail-rod to the dies, cutting the nail, and delivering it from the machine.

A A, &c., represent a strong iron frame, the construction of which being suitable to support the mechanism hereinafter described in

detail, so as to show the relation of the parts to the frame. B represents a horizontal shaft, to which power is applied to operate the machine, and which has suitable bearings C C, on the top of the frame A, to rotate in, and to which is attached a bevel-gear, E, and cylinder D.

To the cylinder D are pivoted a series of rotating dies, *a*, the axis of each of which lies parallel to the shaft B. The function of these rotary dies is to forge the upper sides of the nail while the nail-rod lies on the anvil *b*.

In order to forge nails of different thicknesses and to adjust the rotary dies *a* so that each die may perform its part of the forging these dies are pivoted to ear-lugs *h*, the shanks *d* of which pass radially through sleeves *c*, which are tapped into cylinder D and pass inward about one-third the distance to the hub F.

The sleeves *c* are adjustable longitudinally in the cylinder D by means of a right-hand screw-thread, and burrs *e* are formed on their inner ends, that a wrench may be placed thereon to turn the sleeves out or in.

The shanks *d* of the rotary-die attachments are provided with left-hand screw-threads which turn in nuts *f*. These nuts are provided at their inner ends with shanks on which are formed right-hand screw-threads turning into the hub F. By turning the nuts *f* the rotary dies *a* will be thrown to or from the shaft B, and by turning the sleeve *c* in the cylinder D it will act as a jam-nut against the base *g* of the flanges *h*, and hold the dies *a* in fixed positions for use.

The bevel-gear E is fixed to shaft B, and meshes into a similar gear, G, on a vertical shaft, H, Fig. 4. There are two of these vertical shafts, (but only one has the bevel-gear F,) and they have bearings at their lower ends in steps placed in boxes I I, which are attached to the lower cross frame-work, A, in the ordinary manner of providing bearings for vertical shafts. The upper ends of these shafts have bearings on ordinary screw-pivots J, Fig. 4, projecting down centrally from the under sides of the top parts of the curved frame-pieces. By turning the screw-pivots J down the shafts H are prevented from having longitudinal movement.

Fixed to each shaft H is a spur-wheel, K,

the two wheels meshing into each other at the center of the machine. Each shaft H is provided with fourteen slotted arms, L L', the arms L' being placed below the arms L to form 5 bearings for seven rotary heads, N, to each shaft H.

The object of the slots in the arms is that by means of set-screws *i* the shafts M may be tightly boxed where they pass through the 10 arms.

The lower ends of the shafts M of the rotary heads N are all provided with pinions like the one shown at O, Figs. 2 and 3, Sheet 2, where the upper part of the shaft M, Fig. 2, and its 15 attachments are removed to show this part of the mechanism. A stationary internal cog-rack, P, Fig. 2, is formed concentrically round each shaft H in such a position that the pinions O will travel thereon and be rotated, said 20 cog-rack being held in position relative to the said pinions by being placed in a circular frame, Q R, somewhat larger than the outside of the rack P, and secured by set-screws S S S, &c. The cog-rack P is beveled downward 25 and inward on its inside to fit the pitch of the pinions O, (a section of one of the latter being shown at Fig. 3, Sheet 2,) so that when pinions O are lowered down by loosening the jam-nut *m* and turning a bushing, *n*, down 30 on the shaft they will fit the rack P more closely. To hold the parts firmly, as before this movement, the collars *l* must be turned down in the arms L'.

To prevent backlash of the pinions, 35 they are made each of two parts, O *p*, the smaller part *p* having a bearing on an annular shoulder, *t*, Fig. 3, formed on the smaller end of the main part O, the teeth of both parts coinciding when in use. The cogs of these two 40 parts are first set so that the cogs of one part will be opposite the intercogs of the other part, and in that position a channel is cut horizontally through the base of the part *p* and through the shoulder *t* of the larger part; and in this 45 channel, on both sides of the shaft M, is placed a coil-spring, *v*, in the position of a chord. (See detail A' A', Sheet 2.) Now, when these cogs are brought in line, if there shall be a 50 tendency to backlash on one part of the two-part pinion the other part resists this tendency with an equal force, so the gear runs steadily, as by positive force. This is of great importance in the perfect working of the machine.

The circular frame Q R is firmly secured to 55 the upright frame A. To the top surface of the heads N are attached the dies which form the edges of the nails, the die or chisel for cutting the nails off, and the clamp for carrying the nail to the delivery-spout, and the punch 60 for pushing the nail out of the clamp.

w represents the dies which swage the edges of the nail or blank, they being formed so that when rotated against the blank a nail of the required form will be produced, so far as 65 the edges thereof are concerned. The position of the dies *w* is such that one die, *w*, of one of the series comes opposite to a die of the other

series, the two opposing dies passing onto the anvil *b* when the forging or swaging is done.

The dies are adjustable longitudinally in 70 clamps 3, which are secured by screws to the top of the die-heads N. By this means the dies *w* may be graduated so that each one will perform its proper amount of the forging. One die, also, in each series is provided at its edge 75 with chisel 4, for the purpose of cutting off the point of the nail, as shown more clearly in detail C' C', the points falling into a spout, 20.

Two rotating heads are provided with a 80 chisel, 5, each head being of the opposite series, for the purpose of cutting off the blank or nail from the rod; and by the side of one of these chisels, and on one rotary head, is placed an adjustable holder, 6, with a notch in its end, to permit the jaws of a nipper, 9, to bear 85 on the nail. The object of this holder is to press the blank 11 into a nail-seat in the opposite rotary head so soon as the blank is severed from the rod.

The nail-seat consists of a thin piece of 90 metal, 7, (see detail B' B' and Fig. 3,) projecting out from its rotary head and onto the anvil *b*, and under the nail far enough to enable the nippers 9 to hold the nail in a fixed position to be carried to a place of delivery. This 95 nipper 9 is pivoted to a bridge, 10, on the top of the rotary head N, and its jaw is held on the nail 11 by means of a spring, 13, Fig. 3, Sheet 2.

The means for engaging the nipper with 100 nail or blank consists of a cam, 15, Figs. 1 and 2, which is supported by the frame A, and depresses the shank of the nipper as the latter passes under it, the nipper being disengaged at the proper time from the cam to grasp the 105 nail.

The nail is removed from under the nipper 9 by means of a punch, 12, which lies directly under the nipper and on a level with the seat 7, and is slotted out in its middle part; and 110 placed in the slot is a coil-spring to hold the punch back from the nail till the latter is to released.

To the upper part of the frame A is attached a cam, 14, Figs. 1 and 2, against which the 115 punch strikes, and is pushed forward to remove the nail from under the nipper 9, the nail falling into spout 16.

The anvil *b* is of ordinary construction, and its top lies level with the dies *w*. 120

The nail-rod is fed by rollers 17 in the ordinary manner of such mechanism in horse-nail machines.

The means for operating the rollers consist of the ordinary cam 19, attached to the under 125 side of one of the spur-wheels and made to operate the ordinary ratchet, which is so well known as to need no description.

The power to open the feed-rollers 17 to receive the nail-rod comes from one of the spur-wheels K, through the cam 18 and other ordinary mechanism. 130

In practice more or less rotary heads, with their respective dies and chisels, may be em-

ployed; but I find that the number shown answer the purpose and are the best balanced for the graduation.

I know that stationary rollers have been employed in a rotating wheel for forging nails. I therefore, in that regard, confine myself substantially to the construction shown.

I claim and desire to secure by Letters Patent of the United States—

10 1. The combination of the two revolving series of separately-rotating die-heads *N* and the anvil *b*, as set forth.

2. The combination, with the separately-revolving die-heads, of the dies *w*, as shown.

15 3. The combination, with the separately-rotating die-heads and dies *w*, of the chisels for clipping the points of the nails.

4. The combination, with the rotating die-heads, of the nail-holding dies and the cutters
20 for severing the nail from the rod.

5. The combination of the rotating die-heads, the dies, and the chisels with the anvil and the forging-hammers.

6. The double pinion *O p*, combined with the shaft *M*, springs *v v*, bushing *n*, nuts *m* *L*, sleeves *l l*, and rotating heads *N*, as set forth. 25

7. In combination with the rotary heads having cutters therein, the nipper 9 and seat 7 for grasping and carrying the nail 11 to the discharge-spout 20, as specified. 30

8. The nipper 9, pivoted to a rotating and concentrically-revolving cutter-head, in combination with the cutter 5, for severing the nail from the rod, and with the punch 12, for removing the nail from under the nipper 9, as set forth. 35

9. The cylinder *D*, having holes through it to receive the shanks *d* for the support of the ear-lugs *h g*, in combination with screw-sleeve *e* and nut and screw *f*, for adjusting the rotary dies *a* so as to graduate them in reducing the blank, as specified. 40

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Witnesses:

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