

No. 865,188.

PATENTED SEPT. 3, 1907.

R. F. KUNZE.

FLUTING MACHINE.

APPLICATION FILED APR. 9, 1903. RENEWED APR. 15, 1907.

4 SHEETS—SHEET 1.

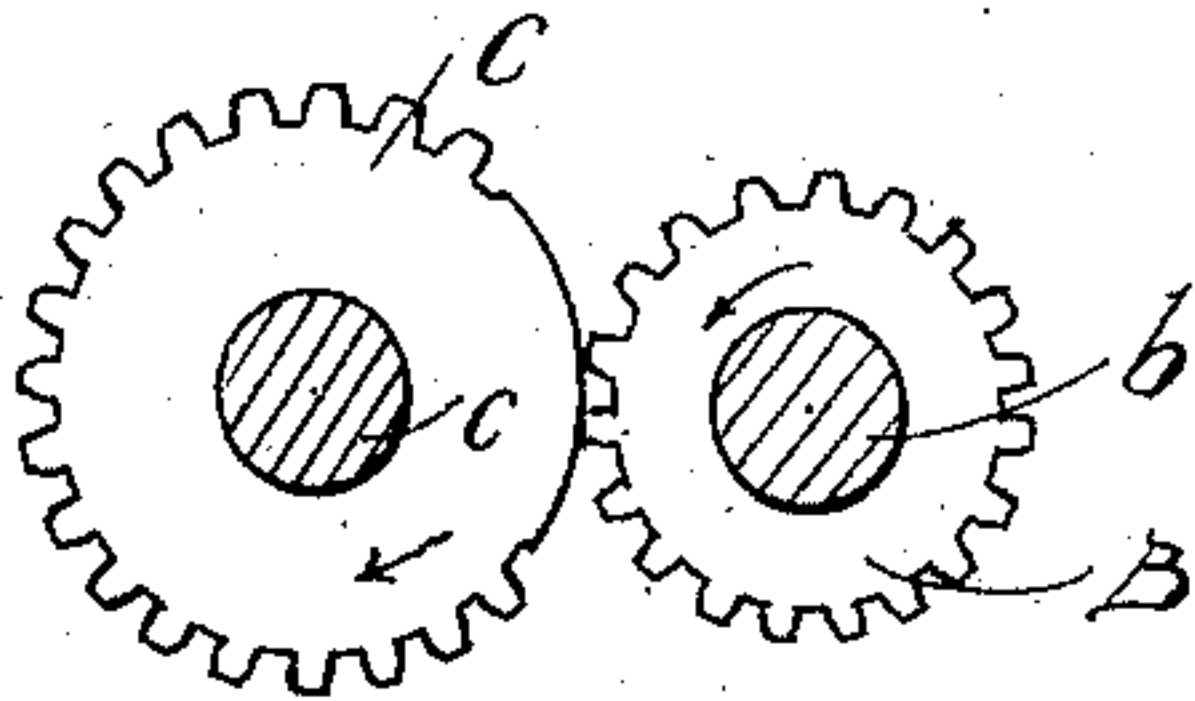


Fig 6.

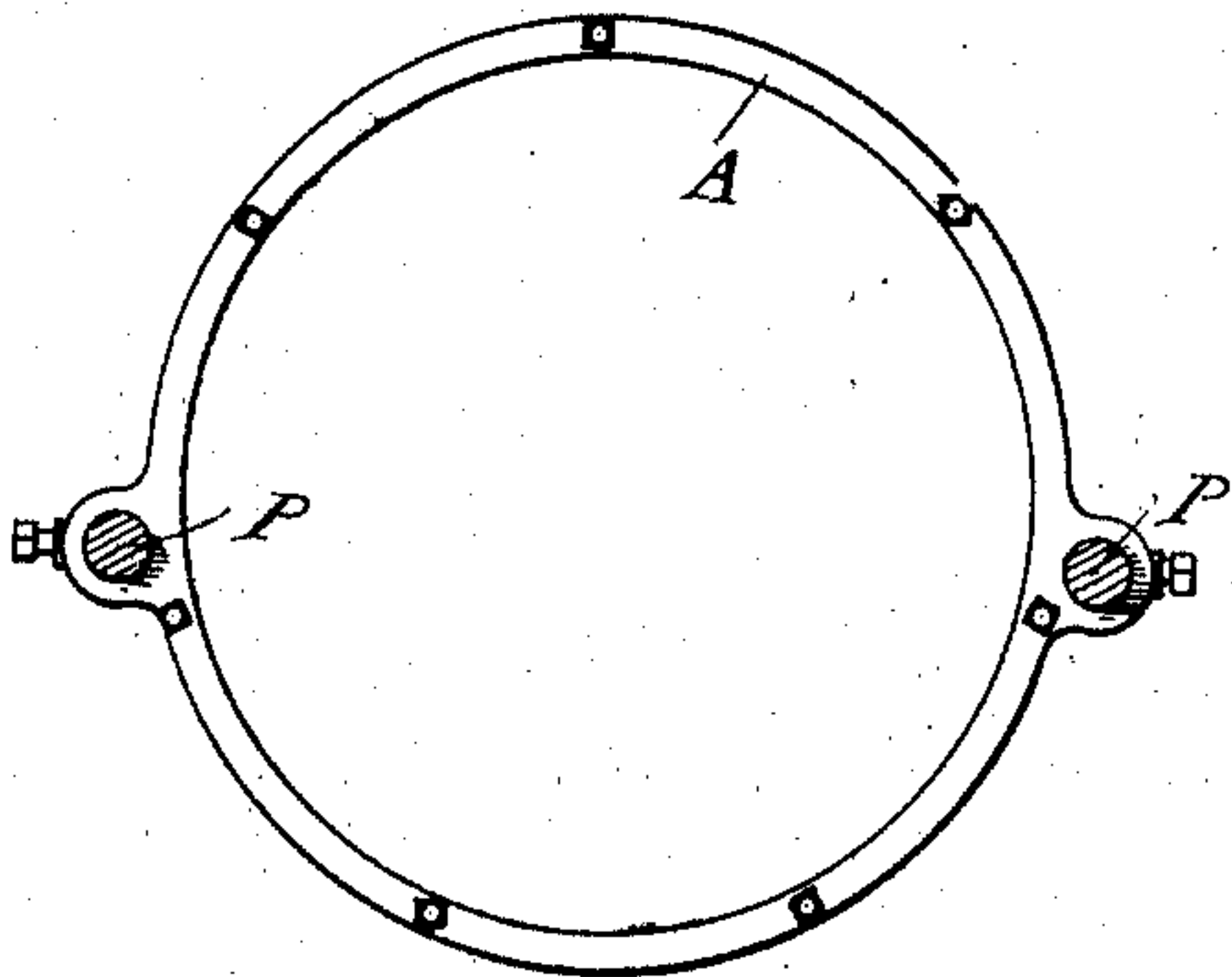
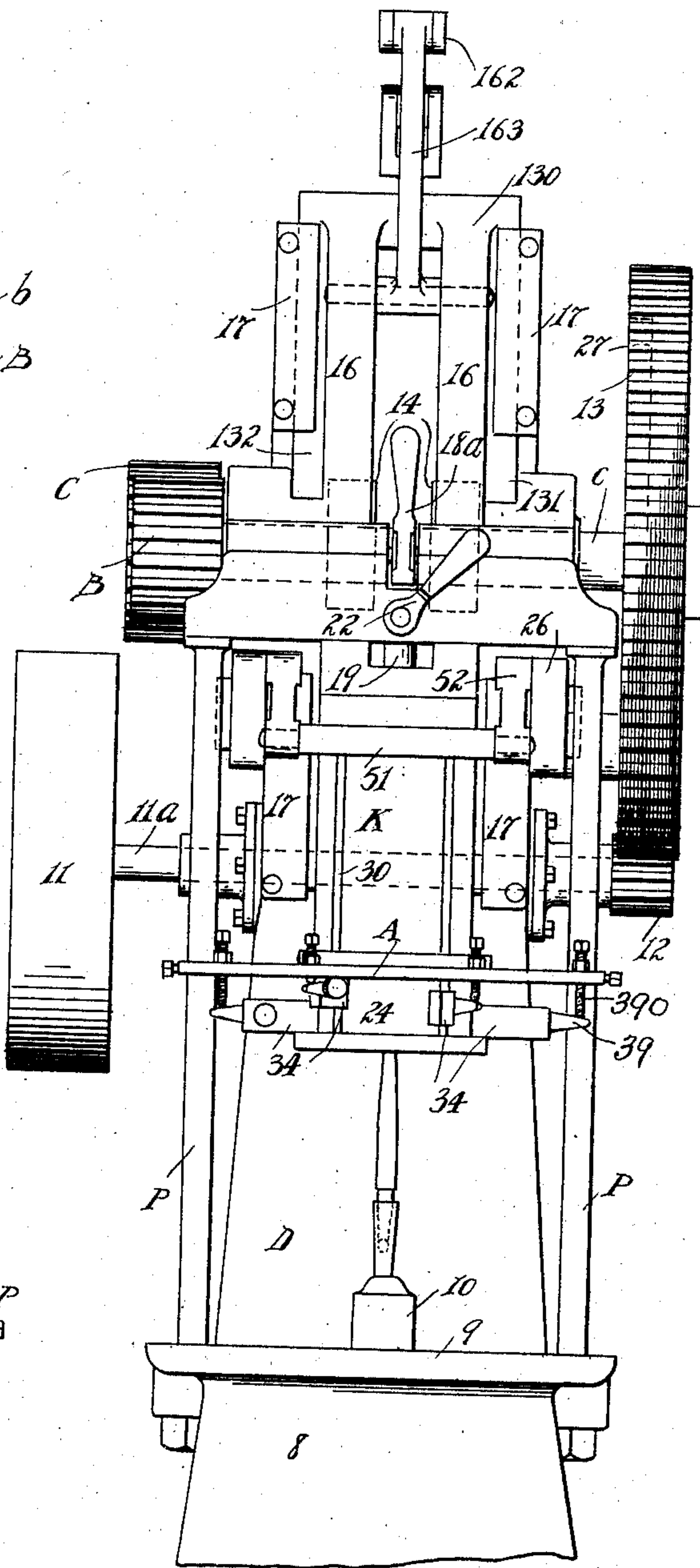


Fig 5.



Figl.

WITNESSES
Lotta Lee Hayton.
J. G. Massey.

INVENTOR
Reinhart F. Kanze
By Parker & Dutton
Attorneys.

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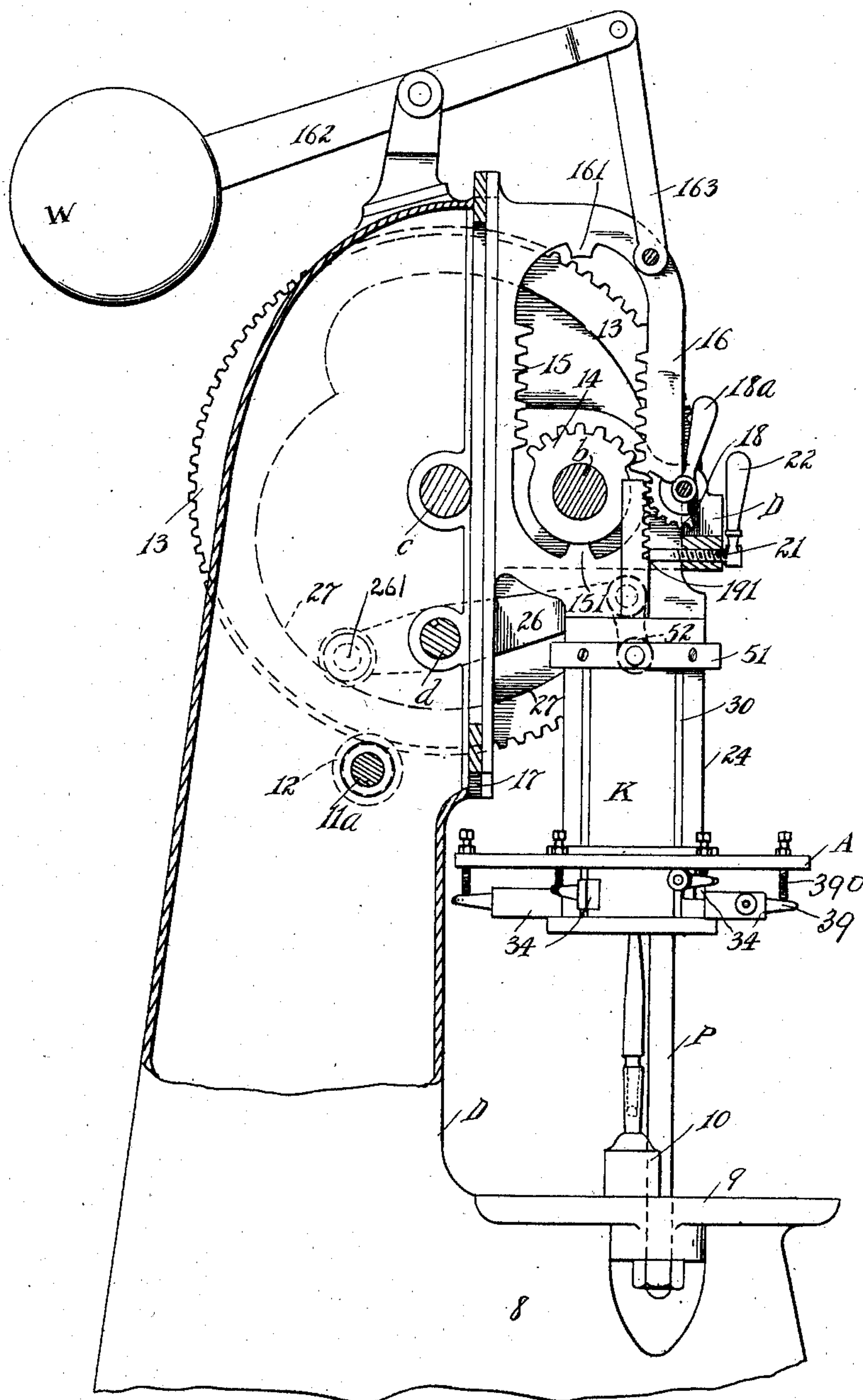


Fig. 2.

WITNESSES
Lotta Lee Hayton.
T. J. Mearns

INVENTOR
Reinhardt F. Kunze
By Parker & Burton
Attorneys.

No. 865,188.

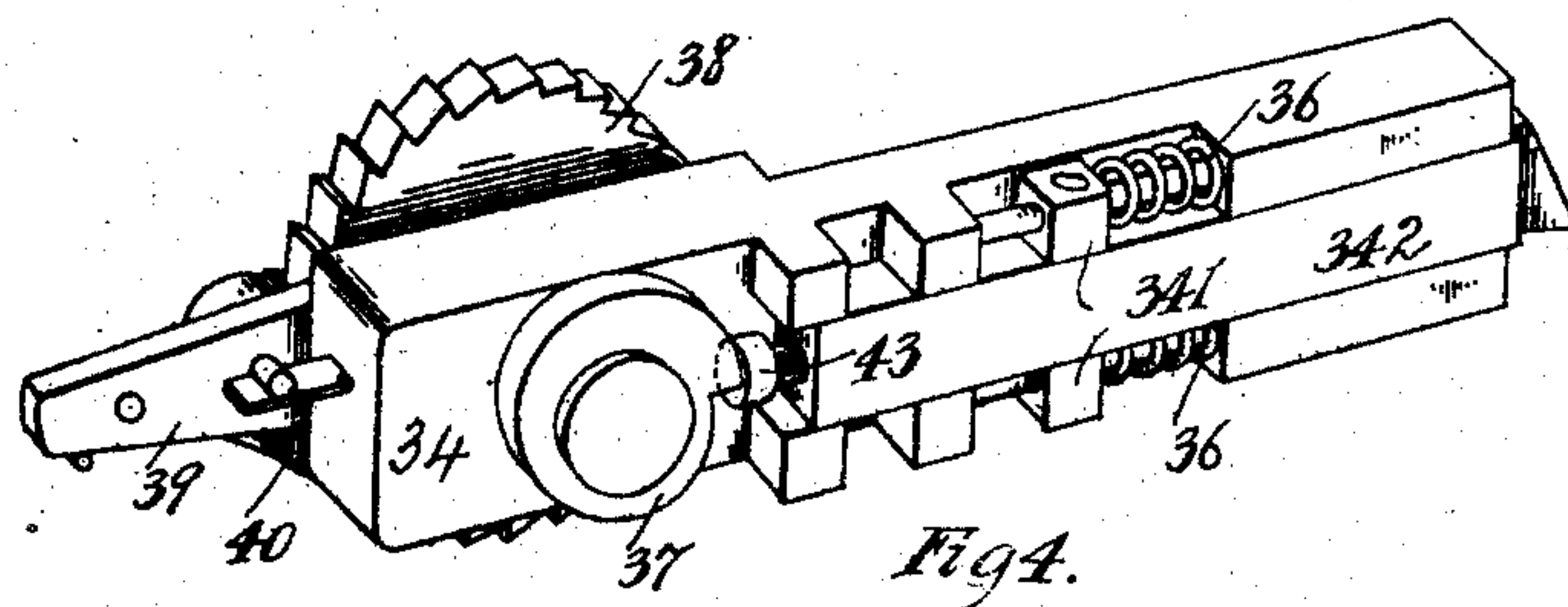
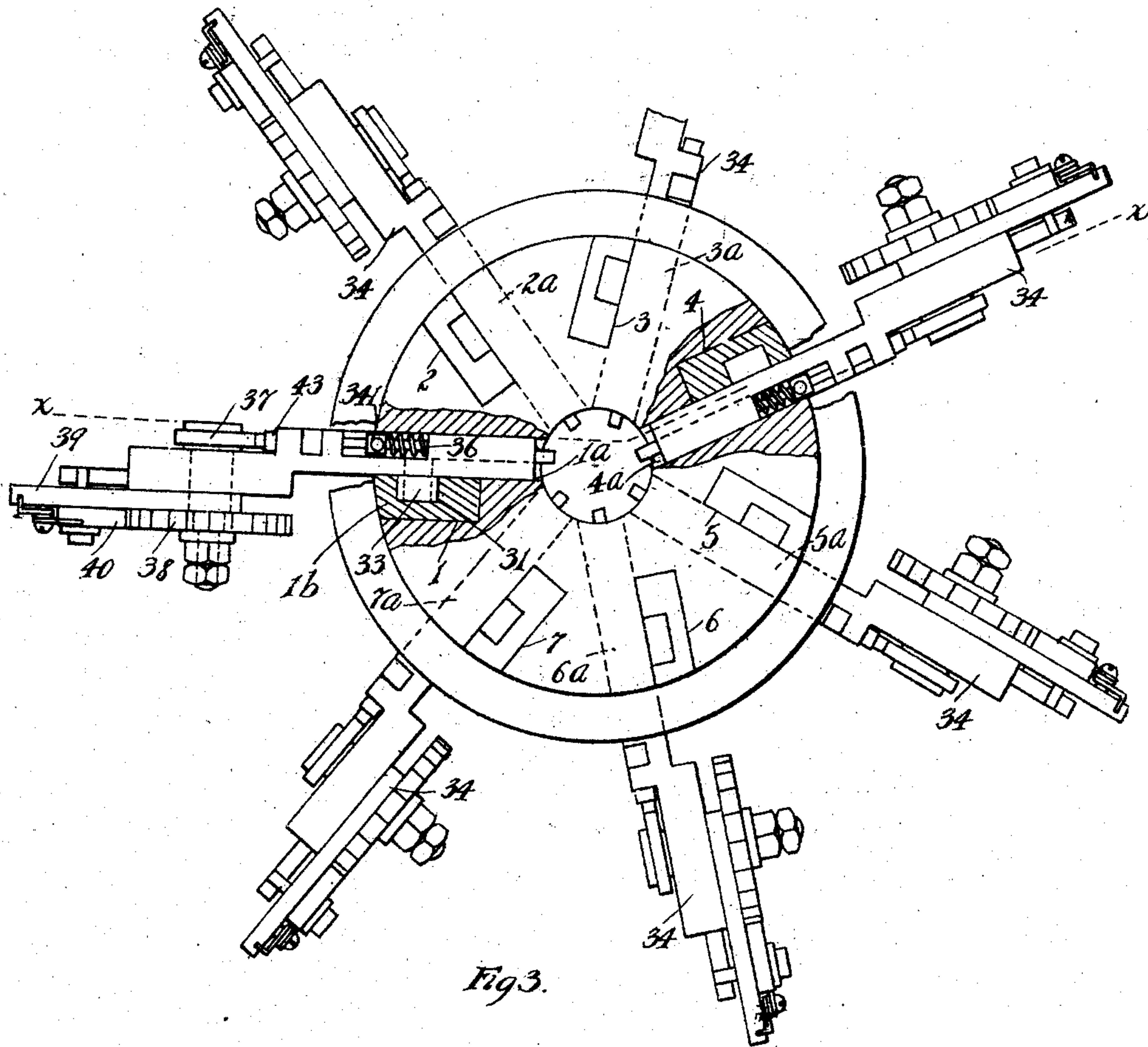
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4 SHEETS—SHEET 3.



WITNESSES
J. H. Mason
Lotta Lee Hayton.

INVENTOR
Reinhard F. Kunze
By Parker & Burton
Attorneys.

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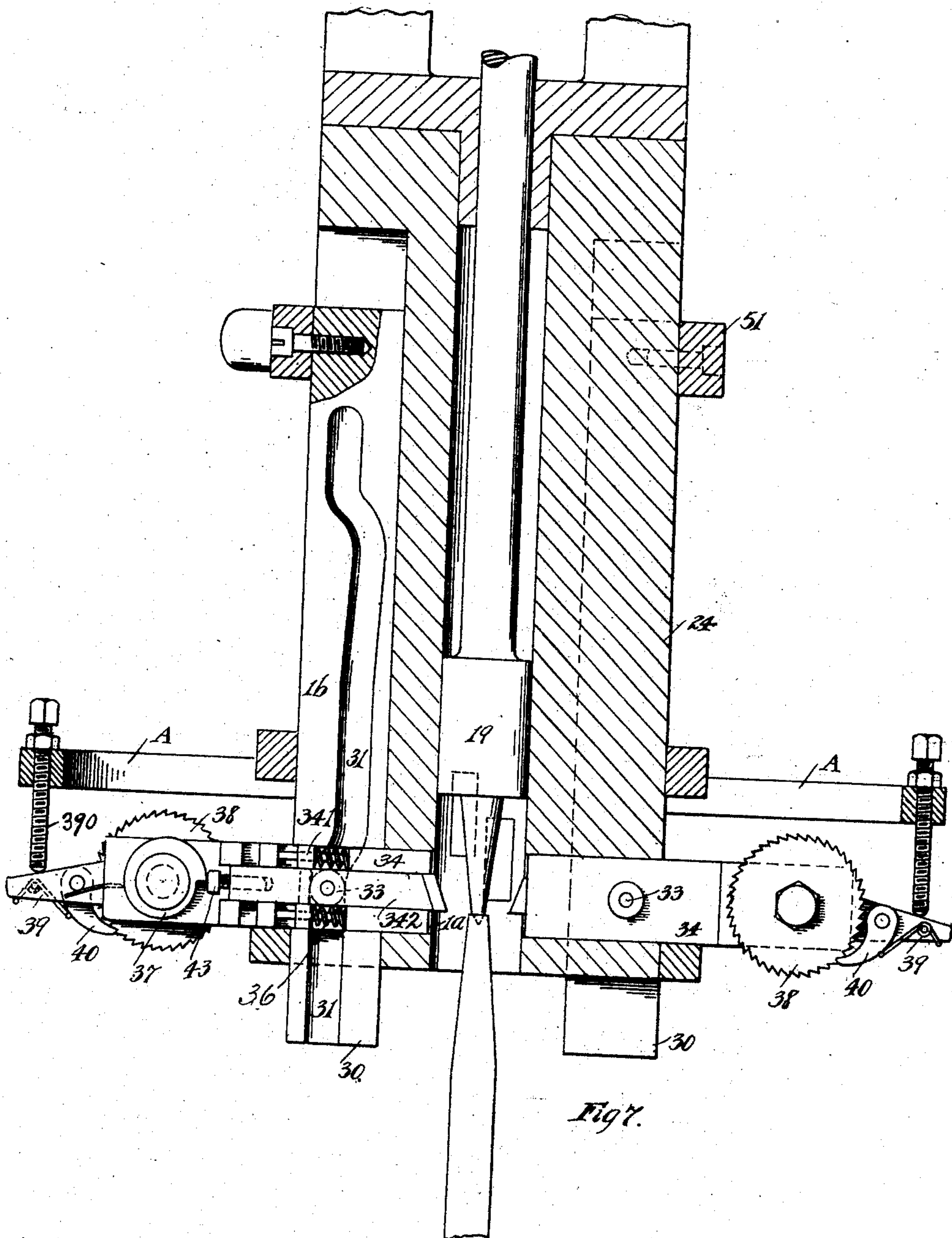


Fig. 7.

WITNESSES

Lotta Lee Hayton.
J. H. Massey

INVENTOR

Reinhard F. Kunze

By Parker & Burton

Attorneys.

UNITED STATES PATENT OFFICE.

REINHART F. KUNZE, OF DETROIT, MICHIGAN.

FLUTING-MACHINE.

No. 865,188.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed April 9, 1903, Serial No. 151,722. Renewed April 15, 1907. Serial No. 368,246.

To all whom it may concern:

Be it known that I, REINHART F. KUNZE, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Fluting-Machines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to shaping machines, and has for its object an improved shaper intended to cut the grooves or interdental spaces of a conical or partly conical reamer.

In the machine which is explained in the following description, the cutting parts are seven in number, and are arranged to cut the seven grooves of a seven fluted reamer, but the general idea embodied in the machine may be employed with any number of cutters.

In the drawings:—Figure 1, is an elevation of that part of the machine which is above the table. This will be considered as a front view. Fig. 2, is an elevation (the casing parts in section) as seen by one standing at the left of Fig. 1. Fig. 3, shows the bottom of the tool holder as it would appear to one looking at it from below; parts are broken away to show sections of the slide in the groove. Fig. 4, is a detail on a larger scale of the feed mechanism employed to feed the tools to their work. Fig. 5, is a plan view of the ring A of Figs. 1 and 2. Fig. 6, is a diagram showing the relative position of wheel B and a mutilated driving wheel C, which actuates it. Fig. 7, is a vertical section of the carriage by which the tools are carried, the view is taken on the line $x-x$ of Fig. 3. Both the tool holder and grooved slides hereinafter mentioned are here shown at the uppermost limit of their travel.

8 indicates a pedestal which supports a table 9; vertically above the table projects a tail stock 10 which holds the tang of the blank under treatment.

A bracket D rises from the pedestal behind the table, and extends upward and partly overhangs the table; the bracket has bearings for several parallel shafts b , c , d , and 11^a ; of those 11^a , is the driving shaft. A belt wheel 11 is keyed to shaft 11^a and a pinion 12 on the same shaft meshes with a cam wheel 13 on shaft c ; cam wheel 13 is provided with a heart cam 27, on one face. On the end of shaft c , opposite the wheel 13 is a mutilated pinion C, which intermittently meshes with a pinion B on shaft b ; the shaft b has secured to it intermediate its ends a mutilated pinion or a pair of mutilated pinions 14. The pinion or pinions 14 mesh alternately with the racks 15 and 16 of a vertically reciprocating pitman connected to the tool carriage K. The carriage and the rack connected with it travel in verti-

cal grooves under plates 17. The carriage consists of the tool holder 24, and a cross head 130; the cross head has an oval opening with the two rack sections 15 and 16 parallel to the long axis of the opening; the flanges 131, 132, travel in ways between the body of the bracket and holding plates 17.

The tool holder 24 is cylindrical and tubular, and provided with a number of deep, nearly rectangular, longitudinal grooves that are shown in plan in Fig. 3, and are indicated by numbers 1 to 7 inclusive. Near the bottom end of the tool holder are openings that reach entirely through from the outside to the central passage within; these openings are rectangular in cross section and are radial with respect to the tool holder. Each of the radial openings (indicated on Fig. 3, by the characters 1^a to 7^a inclusive), opens into or communicates with one of the longitudinal grooves 1 to 7. There are as many of these longitudinal grooves and as many radial openings for tools as it is desired to produce flutings or grooves on the blank in course of manufacture, and as they are all alike a complete understanding of the entire tool holder will be reached from a consideration of the groove 1, the individual tool holder in the opening 1^a , and the parts that are appurtenant to it.

In each of the grooves there is a slide; the slide connected with the groove 1 is indicated at 1^b . All the slides are secured to a ring 51, and the ring is provided with trunnions and connected by a pair of links 52 to a pair of levers 26; the levers 26 are pivoted on shaft d ; a cross bar 261 connecting the free ends of the levers 26 is provided with a contact roll that engages against the heart cam 27; the cam actuates the levers 26 to produce at certain times a movement of the slide 1^b , that is independent of the movement produced by the rack and pinion; the cycle of action of both parts is explained hereinafter.

The slide 1^b (and each of the similar slides) is provided with an irregular guide groove 31 running lengthwise of it, and in the groove is located contact wheel 33, which projects on a stud from the side of the individual tool holder 34. The individual tool 342 is held in an individual holder 34 in the opening 1^a and has a reciprocating motion, radial with respect to the main tool holder; it also has a feed motion radial with respect to the main tool holder, and is capable of adjustment in the individual holder along the path of its reciprocating motion; the tool moves with the individual tool holder which is guided and controlled in its reciprocation by the engagement, and consequent limitation of movement, of the roll 33 in the guide groove 31 in the slide 1^b ; these slides 1^b partake of the main reciprocatory movement of the tool holder only on the upstroke. The advance motion of the tool

in the individual holder is effected by the revolution of a cam 37; on the shaft of ratchet wheel 38, whose rotation will be hereinafter explained; the return motion of the tool in the individual holder is effected by the springs 36 hereinafter more fully described; the adjustment of the tool is effected by varying its length by means of a screw 43 inserted in the end of it, which engages the face of the cam 37.

Posts P rise from the table 9, supporting the overhanging part of the bracket D, and a ring A, which is located somewhat above the lower end of the tool holder and above the place at which the individual tools therein come to rest when the tool holder is at the upper end of its stroke. The ring A, is provided with adjustable abutments 390 against which the tail of a ratchet lever 39 engages at the end of each upstroke. This ratchet lever 39 is pivoted to a shaft which projects from the side of the individual tool holder and which carries a ratchet wheel 38 actuated by pawl 40, which is pivoted to the ratchet lever. The shaft also carries a scroll cam 37 that engages against the adjustable abutment 43, in the end of the individual tool 341. At each successive upstroke of the tool holder, the abutment 390 engages the lever 39 and actuates the wheel, producing a regular feed of the tool forward toward the center of the main tool holder until an entire revolution of the ratchet wheel 38 has been accomplished. The amount of the feed at each upstroke is determined by the curvature of the scroll cam used, and the swing of the lever 39.

When the tool holder nears the uppermost point of its travel, the teeth of the mutilated gear 14 pass out of engagement with the rack 15 and the teeth of the mutilated gear C cease to engage with those of the gear B; during the period of this disengagement the high point of the cam 27 passes under the end of lever 26 and forces the ring 51 and the grooved slides 1^b which it carries down until the extreme upper portion of each (immediately below the ring 51) engages or is closely adjacent to its corresponding roll 33. As soon as the end of the lever 26 passes the high point on the cam 27, the mutilated gear C again engages the pinion B, and the mutilated gear 14 engages the rack 16 and begins to force the tool holder down; this continues until the cutting stroke is finished; on the down stroke of the tool holder, the individual tool holders are controlled by the groove 31, and make a cut to correspond therewith. As the tool holder reaches the extreme lower part of its stroke, the individual tool holders are retracted by the outlying part of the groove 31 at the lower end of the holder, and while in this retracted position the holder makes its return upstroke, carrying the slides, and with the cutters free from the blank, because of the engagement of the roll 33 in the outward curve at the lower end of the groove 31. At the end of the upstroke, the cutters receive their feeding actuation hereinbefore described.

After the main tool holder has traveled upward and before it begins to again travel downward, the ring 51 is caused to travel downward and carries with it the slides 1^b in which are the grooves 31; the upper ends of these grooves are curved outward similarly to the lower ends so as to retract or draw outward the tool sufficiently to render it certain that its point will clear

the work; when the end of the piece of metal that is being treated has been reached the upstroke preparatory to the next working stroke is begun; although this is not an essential feature of the machine, it has been found a safe and useful means of avoiding the possibility of breaking the point of a tool.

The blank is held by the tail stock 10, which engages the lower end of the blank and by head stock 19, that is held within the central cavity of the tool holder 24. The upper end of the head stock 19 is provided with a rack 191, that engages with a toothed quadrant 18, and the toothed quadrant is actuated by a handle 18^a; the head stock is held in position by a set screw or jam screw 21, actuated by a handle 22. The cross head containing the racks 15 and 16 is provided at its upper and lower ends with stops 151 and 161, which engage against the smooth part of the wheel 14, and a counter-weight W is hung on a lever 162, pivoted to the frame and connected by a link 163, to the cross head which contains the racks 15 and 16; the weight balances the tool carriage and its appurtenances.

The grooved slides which guide the radially arranged individual tool holders, are held by the ring 51, that is sleeved on the outer surface of the cylinder 24 which constitutes the main tool holder. They are capable of, and are arranged to have a motion along the axis of the tool holder that is independent of the tool holder, and this independent action is one of projection downward, the return movement upward is in connection with the main tool holder to which the guides are held by friction and by the pressure exerted by the roller 33 against the walls of the groove 31 in which it travels.

The individual tool 34 is provided with a cross head 341, and springs 36 are provided and inserted between the cross head and an abutment on the individual tool holder to hold the tool under tension against the scroll 37.

What I claim is:—

1. In a machine for grooving a blank, in combination with means for holding the blank, a tool holder carriage, means for actuating the tool holder carriage along the axis of the blank, individual tool holders held radially in the carriage, guides in sliding relation to the carriage provided with means for actuating the tool radially contemporaneously with the travel of the carriage, substantially as described.

2. In a machine for grooving a blank, the combination of means for holding the blank, a tool holder carriage, means for actuating the carriage, individual tool holders held radially in the carriage, guides slidingly held to the carriage engaging the individual tool holders and causing each to move radially contemporaneously with the travel of the carriage, substantially as described.

3. In a machine for grooving a blank, in combination with means for holding the blank, a tool holder carriage, means for actuating the tool holder carriage to travel along the axis of the blank, individual tool holders held radially in the carriage, means for producing radial travel of the individual tool holders with respect to the carriage, and means for advancing the tool with respect to the individual holder, substantially as described.

4. In a machine for grooving a blank, in combination with a tail stock and its support, a head stock, a tool holder carriage arranged for travel along the axis of the head stock, means for holding the head stock, individual tool holders held in radial openings through the tool holder carriage, guides in sliding relation with the carriage for the individual tool holders, means for producing

an independent motion of said guides along the axis of the main tool holder, and means for advancing the individual tool holders along a radius of the carriage, substantially as described.

- 5 5. In a machine for grooving a blank, in combination with means for holding the blank, a tool holder carriage, individual tool holders carried by the carriage, means for producing movement of the individual tool along the individual tool holder, an intermitting actuator for the

carriage, guides for the individual tool holders held in 10 sliding relation to the carriage, and an independent intermitting actuator for the guides, substantially as described.

In testimony whereof, I, sign this specification in the presence of two witnesses.

REINHART F. KUNZE.

Witnesses:

CHARLES F. BURTON,
MAY E. KOTT.