

(No Model.)

3 Sheets—Sheet 1.

E. BEALS.
RATCHET DRILL.

No. 371,407.

Patented Oct. 11, 1887.

Fig: 1.

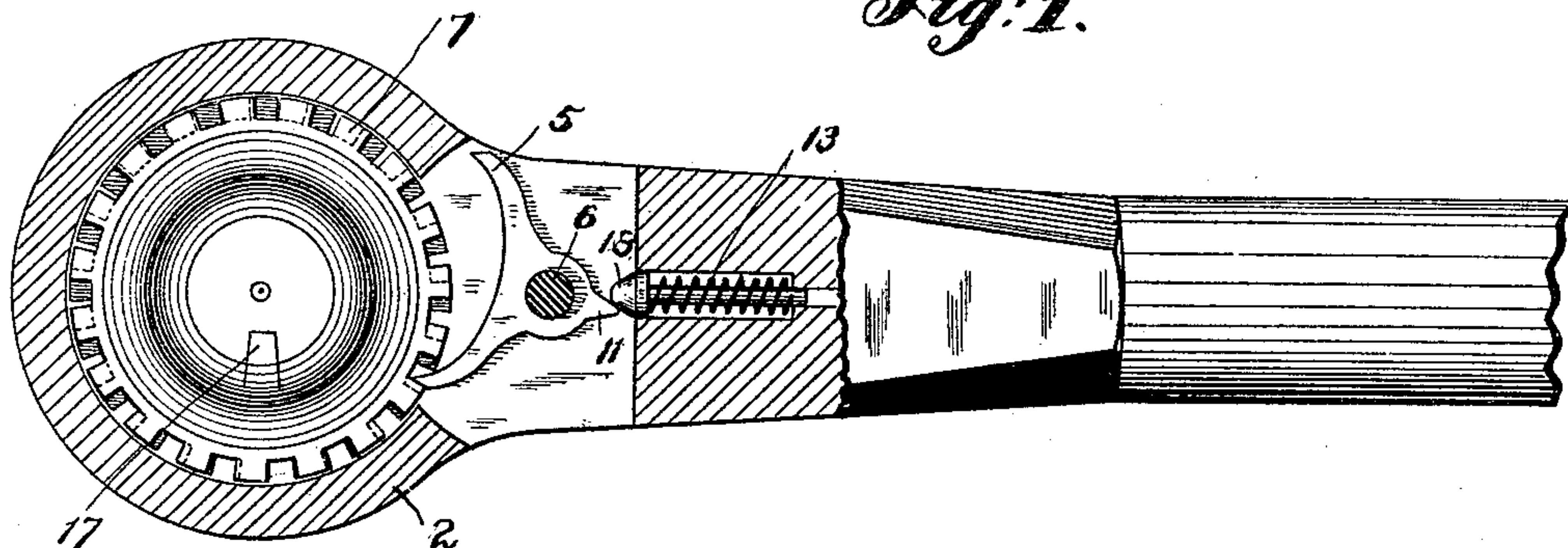
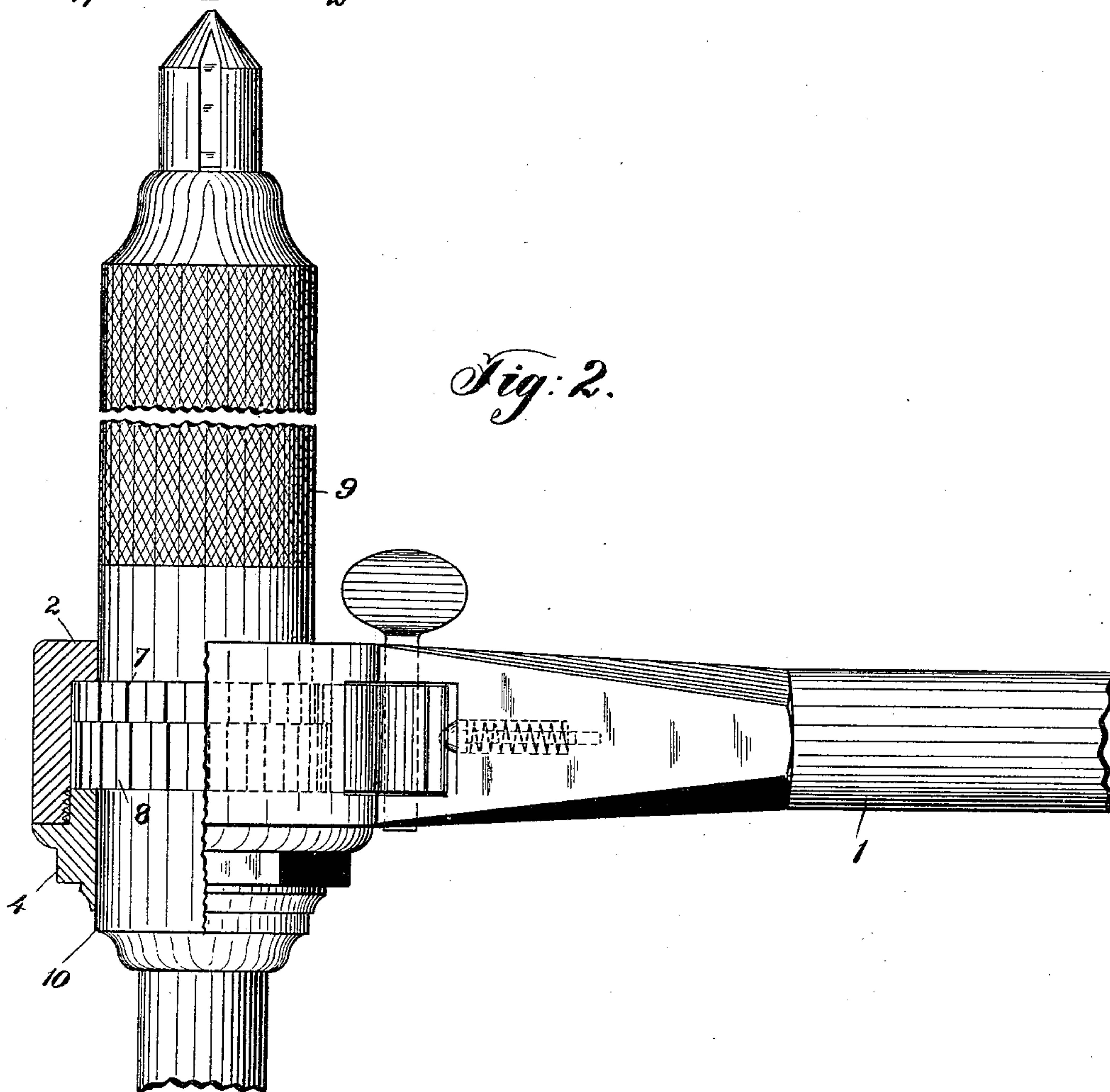


Fig: 2.



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Fig: 3.

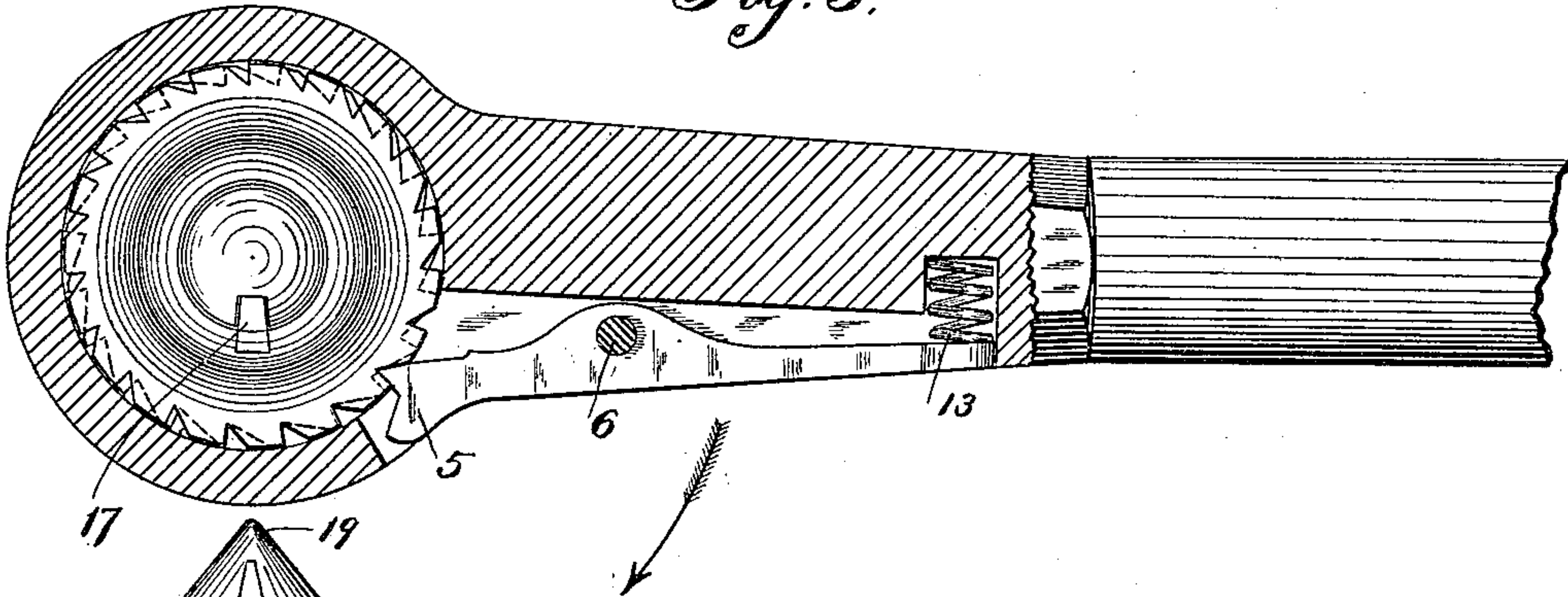


Fig: 9.

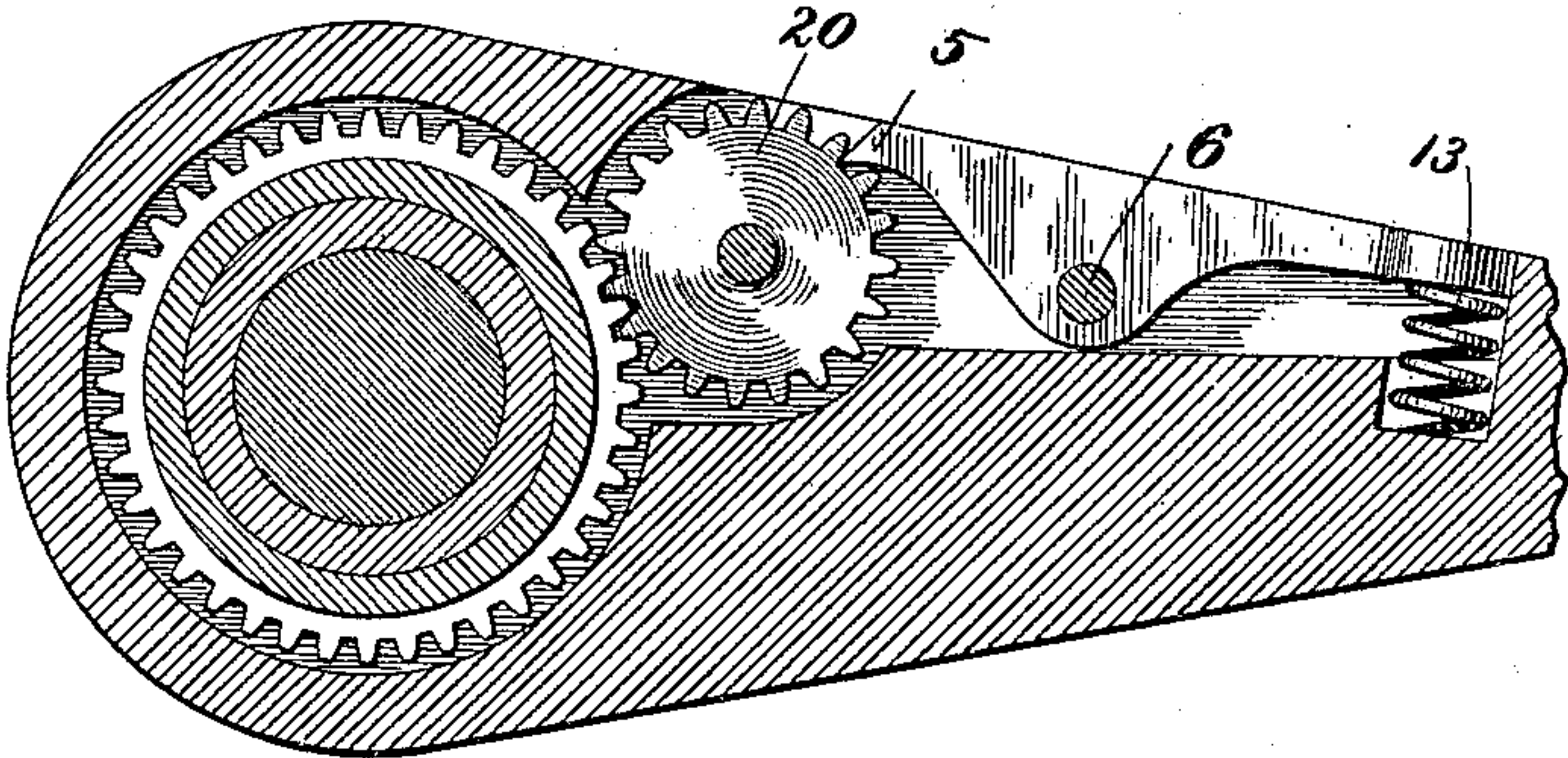
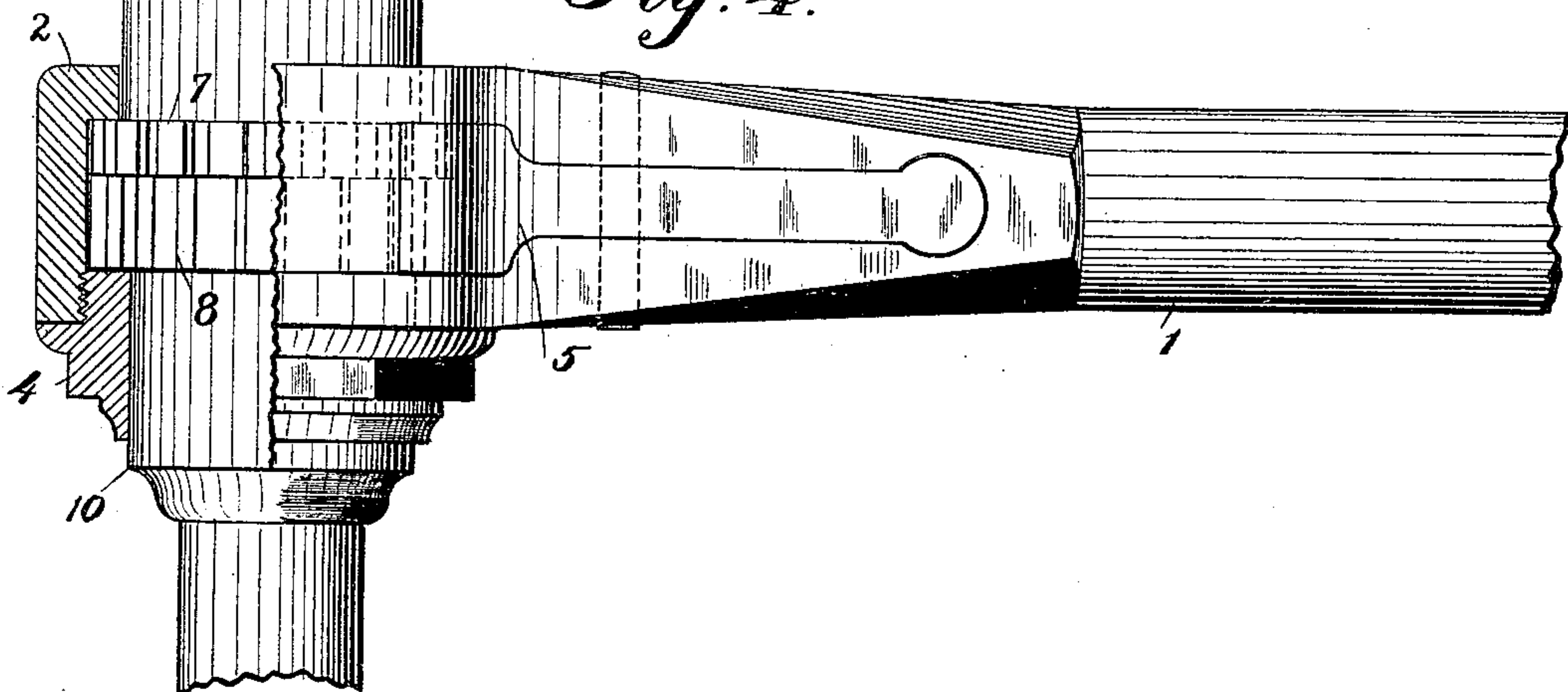


Fig: 4.



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Fig. 5.

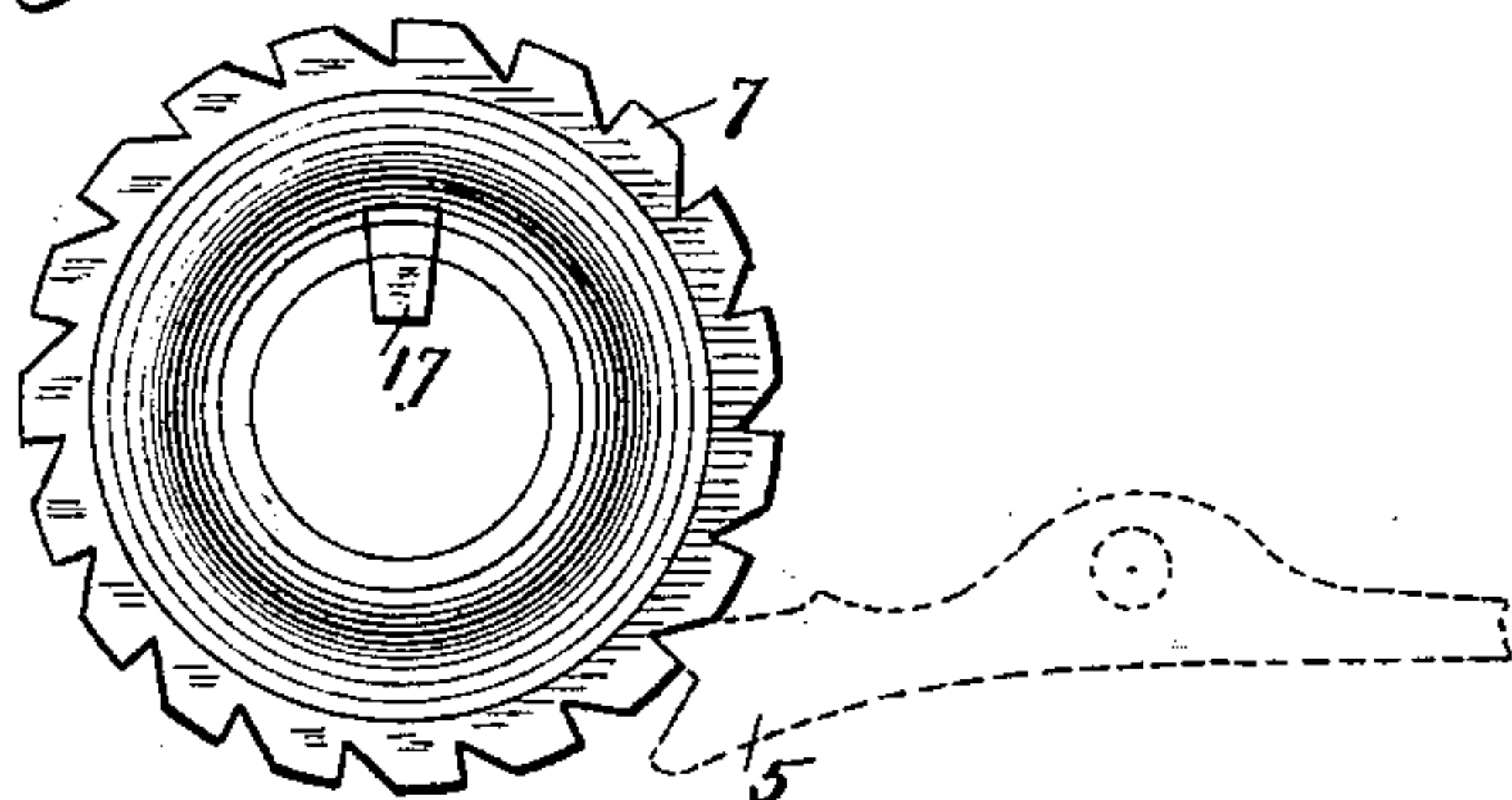


Fig. 6.

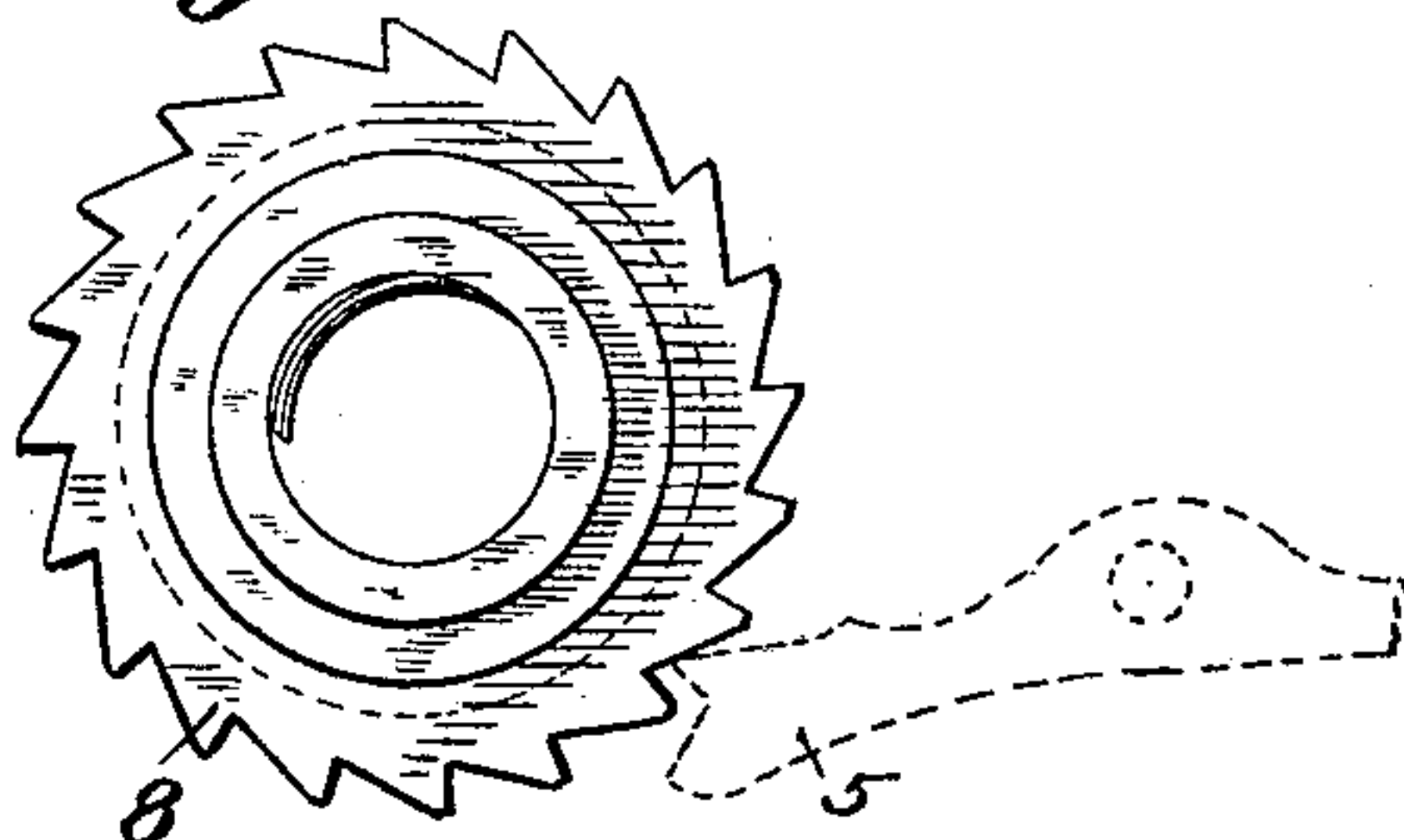


Fig. 7.

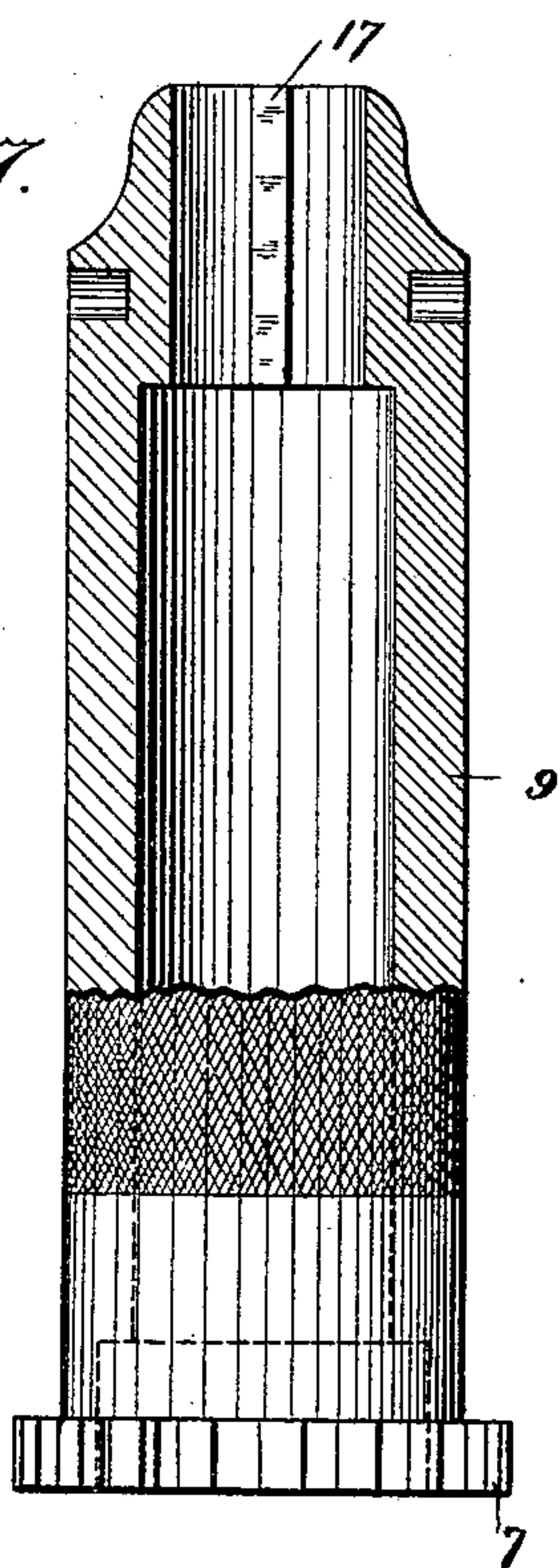
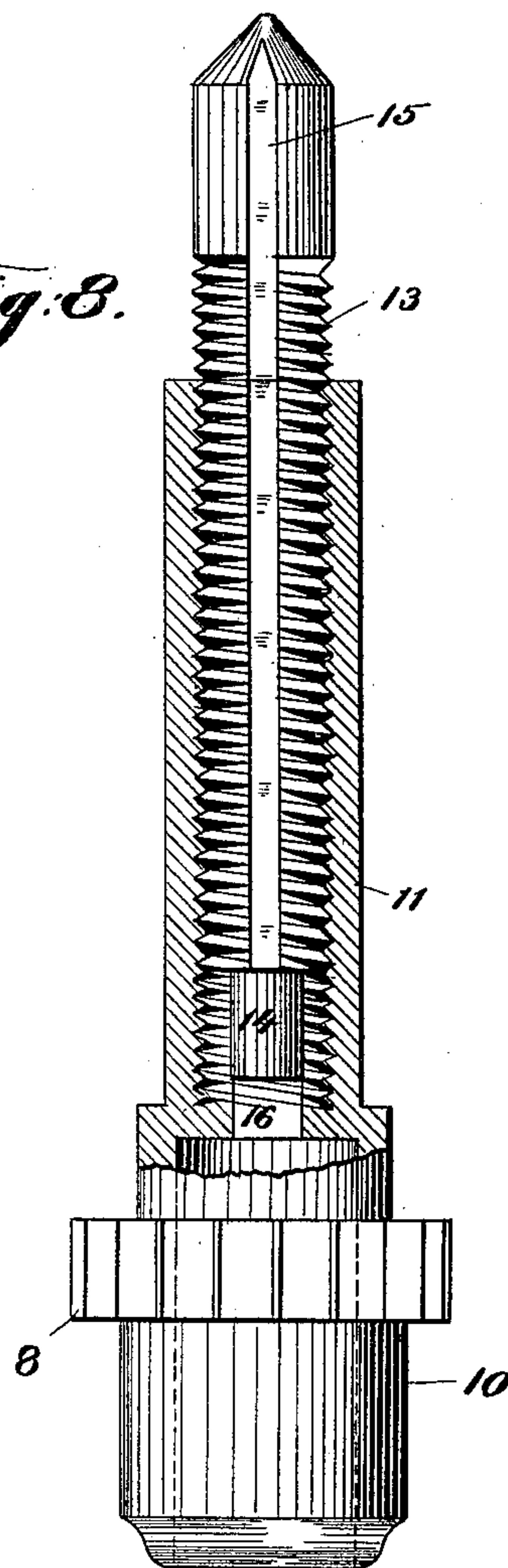


Fig. 8.



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UNITED STATES PATENT OFFICE.

EBENEZER BEALS, OF NORWICH, NEW YORK.

RATCHET-DRILL.

SPECIFICATION forming part of Letters Patent No. 371,407, dated October 11, 1887.

Application filed July 2, 1887. Serial No. 243,283. (No model.)

To all whom it may concern:

Be it known that I, EBENEZER BEALS, a citizen of the United States, residing in Norwich, county of Chenango, State of New York, have
5 invented certain new and useful Improvements in Ratchet-Drills, of which the following is a specification.

My invention relates to a drill whose rotary movement is derived from a pawl or ratchet
10 mechanism actuated by the ordinary operating-lever having a back-and-forth or intermittent movement, the pawl engaging the teeth of the ratchet when the operating-lever is pushed in one direction and slipping over the teeth when
15 drawn backward.

My particular invention consists in a mechanism for feeding the drill automatically, the amount of said feed corresponding exactly with the extent of the throw and the direct
20 throw of the operating-lever immediately preceding the feeding operation.

My invention is what I term a "differential" feed, inasmuch as it automatically adjusts itself to the varying extent of the throw of the
25 operating-lever, as will be hereinafter more fully explained.

My invention consists, also, in the particular mechanism for carrying the above principle into effect, and is formed preferably of two
30 concentric ratchet-wheels whose peripheries are co-extensive, the said ratchet-wheels being located preferably one above the other. One of these ratchet-wheels is the feed-wheel and the other is the operating-wheel. The feed-wheel is provided with a certain number of
35 teeth, (in the present case I have shown nineteen,) while the operating-wheel is provided with one more tooth than the feed-wheel, and in the present case twenty of such teeth are
40 shown upon said operating-levers. The pawl which is pivoted to the operating-lever is of sufficient breadth to engage with the teeth of both wheels, so that on the backward movement it will move over the edge of both ratchet-
45 wheels, and in the direct thrust it will engage with the teeth of both wheels. The pawl, however, will not engage with both wheels simultaneously, for the reason that the differentiation in the number of the teeth is such
50 that there will be only one point where the teeth exactly correspond, this point being a place where the pawl is occupied during the

latter part of the direct thrust. When the operating lever carrying the pawl is thrown backward, the pawl will ride over the faces of
55 the teeth, and presumably from one-quarter to one-third of the circumference of the ratchet-wheels, (that being the ordinary movement,) to which point, when the direct movement takes place, the pawl will drop first behind
60 the tooth and the ratchet-wheel connected with the feed. The slight additional movement will bring the pawl, carrying the feed-wheel with it, to the first tooth of the operating ratchet-wheel. From this point forward all the parts
65 will turn together. It will be thus seen that the feed operation is performed automatically at the commencement of every stroke and that the amount of said feed depends upon the length of the stroke.
70

I will now proceed to describe my invention in relation to the accompanying drawings, which form a part of this specification.

Figure 1 is a plan view of the preferred form of my invention. Fig. 2 is a side elevation, partly in section. Figs. 3 and 4 are similar
75 views showing my improved ratchet-drill with a modified form of ratchet-wheels and pawls. Figs. 5 and 6 are detail views of the pawl and ratchets. Fig. 7 is a detail view of a sleeve
80 which holds the feed-ratchet wheel. Fig. 8 is a detail view of the sleeve holding the operating-ratchet wheel. Fig. 9 is a modified form.

1 is the handle or lever, having a ring at one end, with the flange 2, which rests on the
85 ratchet, and internal screw-threads, 3, into which screws the ring 4, which holds the handle against upward movement.

5 is the pawl, pivoted at 6 to the handle and held normally in contact with the ratchets
90 8, the former having the greater number of teeth and being the feeding-ratchet, while the other is the drilling-ratchet, they being secured, respectively, to the sleeve 9 and the drill-stock 10.
95

The pawl and ratchet shown in the first two views of the drawings are capable of operation in both directions. The ratchets are square-toothed, the pawl being double or having
100 prongs, one of which is held normally in contact with the ratchets by a pin, 18, which is pressed forward against the cam 11 by a spring, 13.

In the upper end, 11, of the bit-stock 10

works a screw, 13, having a tenon at its lower end and a key seat or groove, 15, which extends throughout its entire length. At the lower extremity of the internal screw-thread in the piece 11 are shoulders, between which the tenon 14 passes, and against which the screw 13 abuts, thus limiting its downward motion.

The sleeve 9, which receives the upper end, 11, of the stock 10, has a feather or key, 17, which works in the groove 15 in the feed-screw 13, and thus causes the latter to revolve in unison with it.

From the description thus far given it will be readily seen that when the pawl is caused to engage the teeth the sleeve 9 will be revolved slightly in advance of the bit-stock by reason of the teeth of the ratchet 7 always being a little in the rear of those of the ratchet 8. The drill, having its bite in the material, will of course offer a greater resistance than the conical bearing-point 19, and hence it will not be revolved by ratchet 7. By revolving the sleeve 9 the screw 13 is likewise caused to revolve in the piece 11 by virtue of the attachments 15 17, and thus produce the feed by screwing upward and lengthening the distance between the point of the drill and the point 19.

In the form shown in Fig. 9 I deviate a little from the others, in that I use a spur-wheel, 20, which engages with both of the ratchets 7 8, the former ratchet having its teeth closer together than the latter, which is not shown in the drawings. The pawl 5 in this instance engages with the spur-wheel 20. The operation of this device is identical with that just described.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a ratchet-drill, the combination, with the operating and feeding ratchets, of a single pawl for engaging with said ratchets, whereby the feed produced is proportionate with the length of the stroke.

2. In a ratchet-drill, the combination of the feed-ratchet and the working-ratchet, having a greater number of teeth than the feed-ratchet, and a single pawl for engaging said ratchets,

whereby the feed is produced while the drill is at rest.

3. A ratchet-drill provided with a ratchet-wheel upon the operating sleeve and another ratchet-wheel upon the feed-sleeve, said ratchet-wheels being adapted to operate differentially, substantially as shown and described.

4. A ratchet-drill provided with an operating-lever having a pawl, a sleeve for operating the drill and provided with a ratchet-wheel, and a second sleeve for operating the feed and provided with a ratchet-wheel having one less tooth than a wheel on the operating-sleeve, whereby they will operate differentially, substantially as shown and described.

5. In a ratchet-drill, the combination of the operating sleeve connected to the drill, provided with a ratchet-wheel having a certain number of teeth, with a second sleeve connected to the feed and having a ratchet-wheel with one less number of teeth, and a feed-screw located within an operating sleeve and having a recess extending in the direction of its length, and a lug formed upon a feed-sleeve which travels in said recess and operates the feed-screw, substantially as shown and described.

6. In a ratchet drill, the combination of the operating-lever provided with a double pawl, for the purposes described, and the operating-sleeve provided with a ratchet having a certain number of teeth, with a feed-sleeve, also provided with a ratchet having one less number of teeth than the other, the teeth upon the feed-sleeve having broader faces than those of the operating sleeve, as and for the purposes set forth.

7. In a ratchet-drill, the combination of the feed-screw and ratchet therefor and the drill and a ratchet therefor, the former of said ratchets having a less number of teeth than the latter, and a pawl for engaging both of said ratchets, substantially as set forth.

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Witnesses:

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