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PATENTED APR. 28, 1903.

G. PURPER, J. MOSER & R. BOEKLEN.

GEM CUTTING AND POLISHING MACHINE.

APPLICATION FILED MAR. 28, 1902. RENEWED MAR. 17, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

FIG. 3.

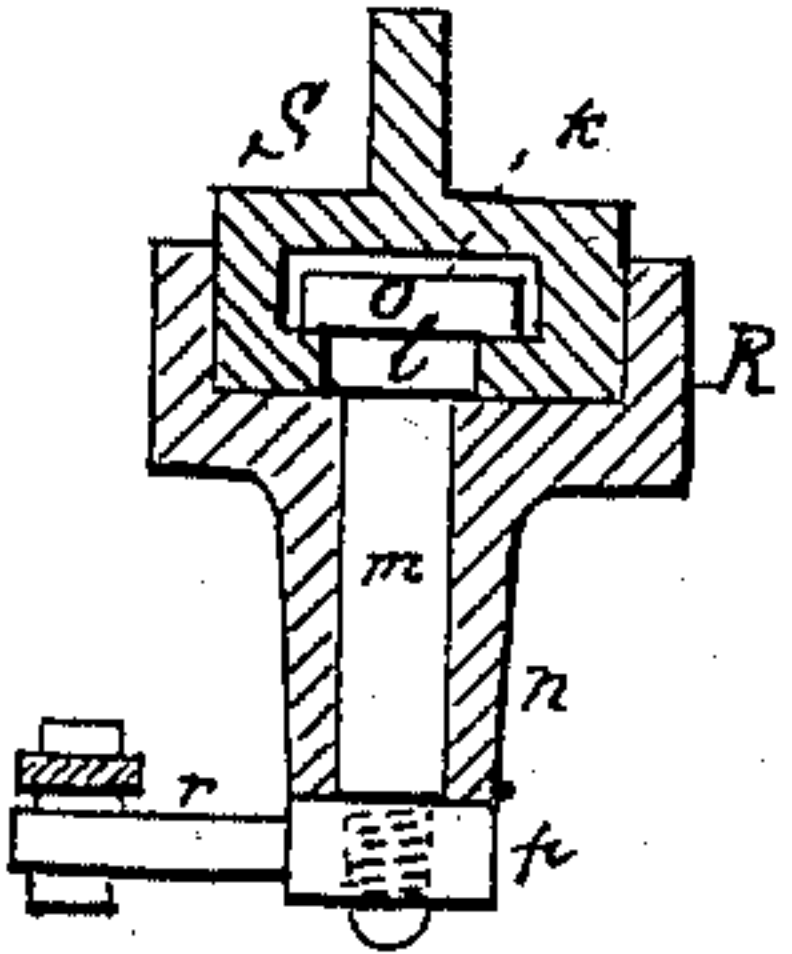


FIG. 1.

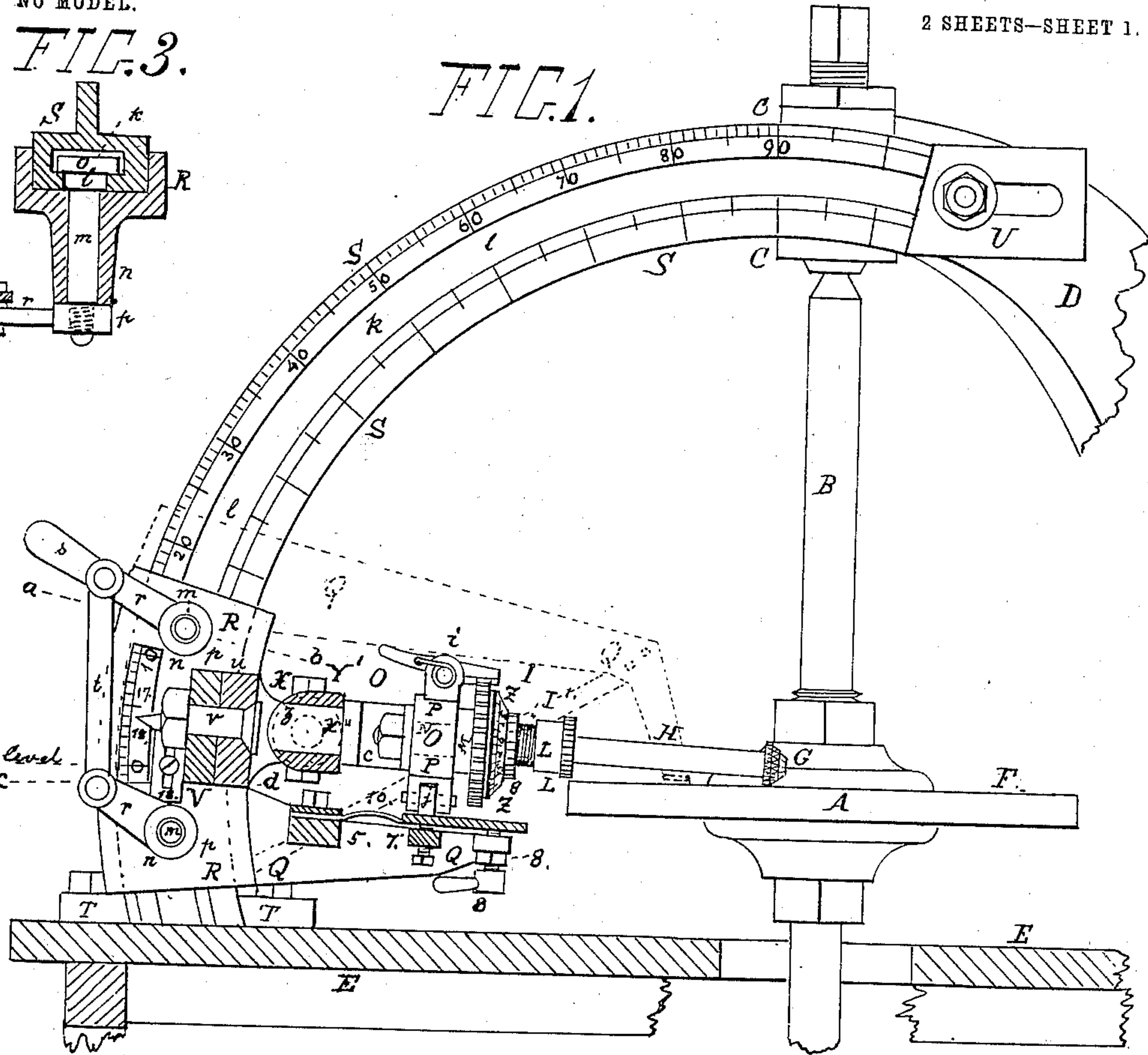
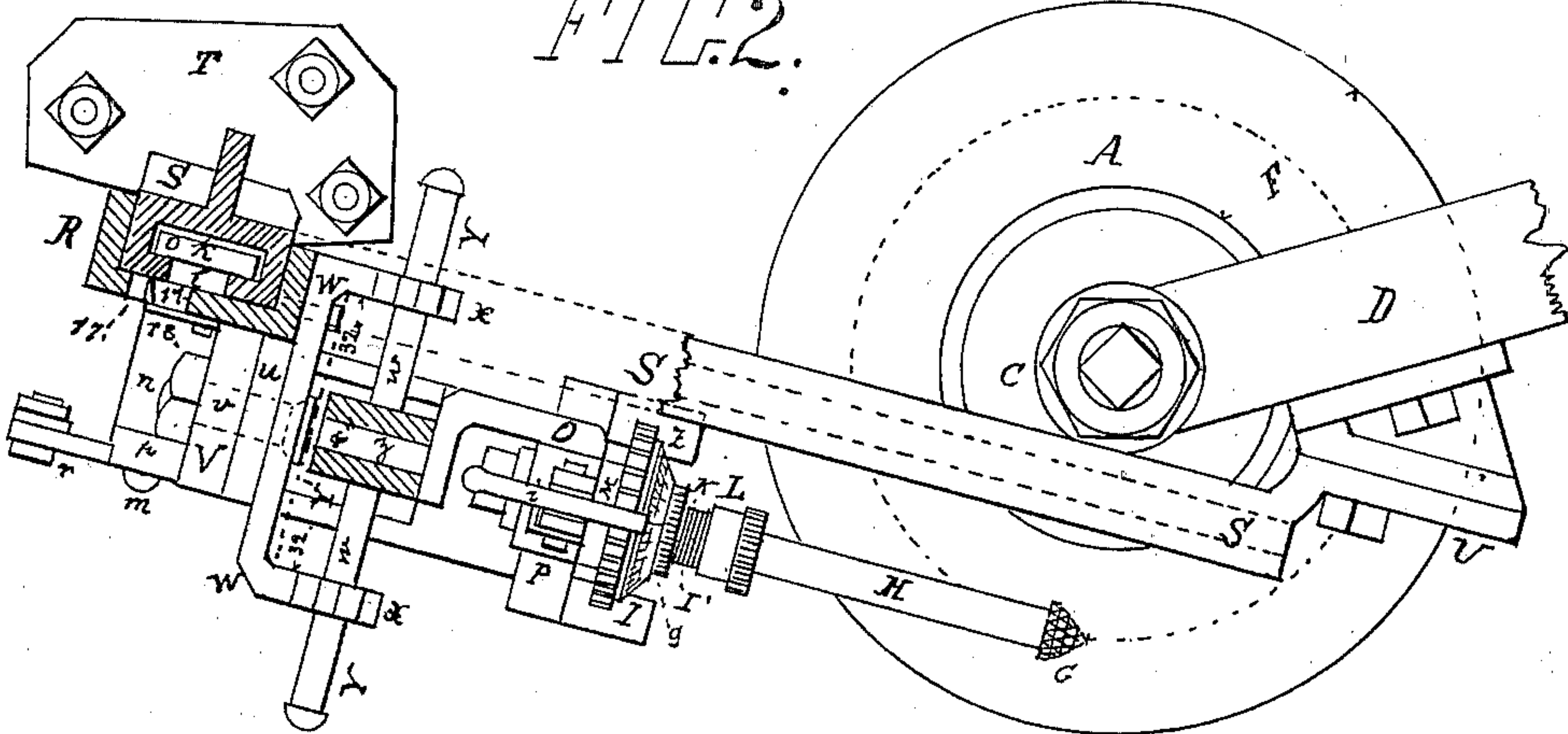


FIG. 2.



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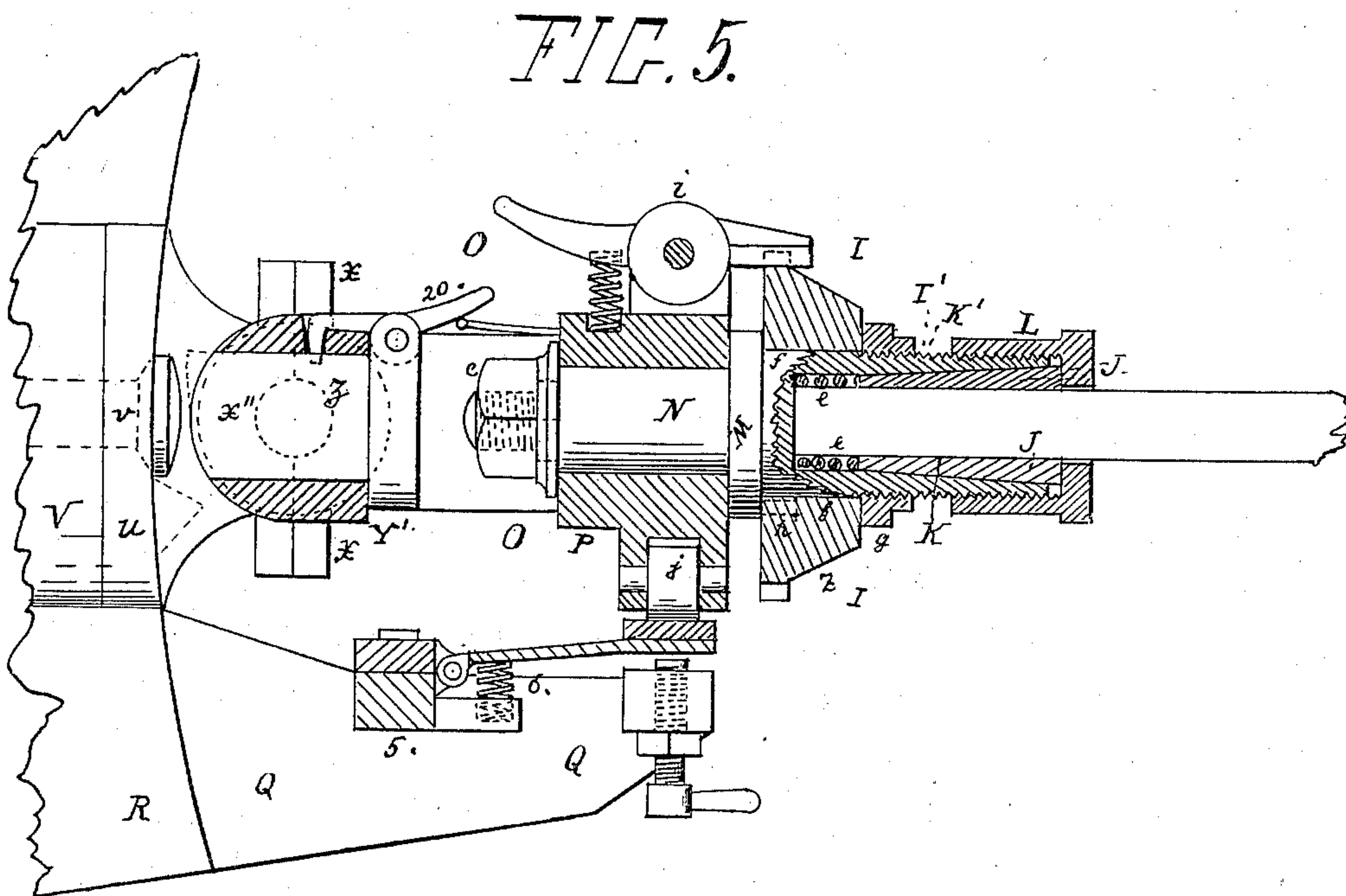
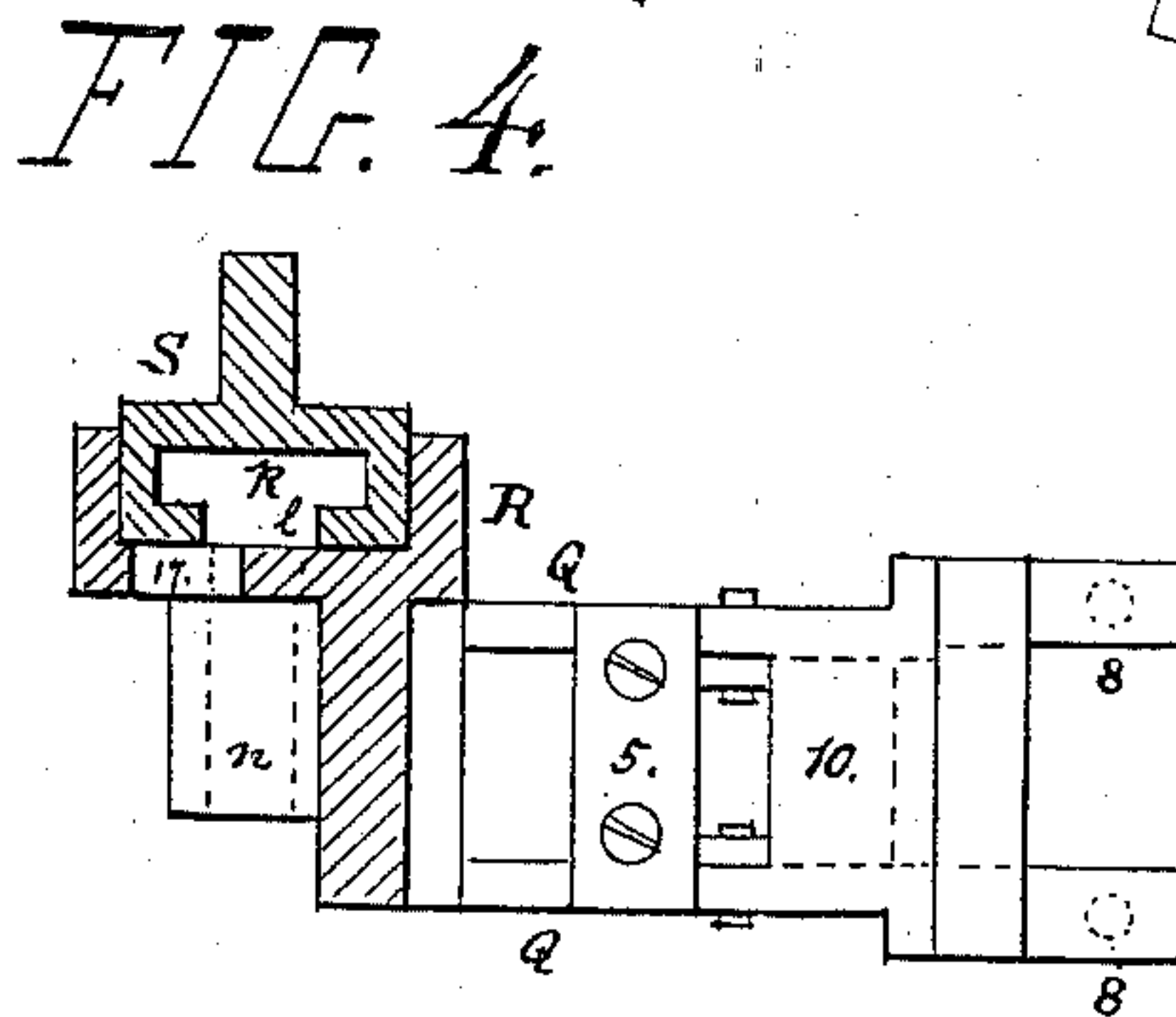
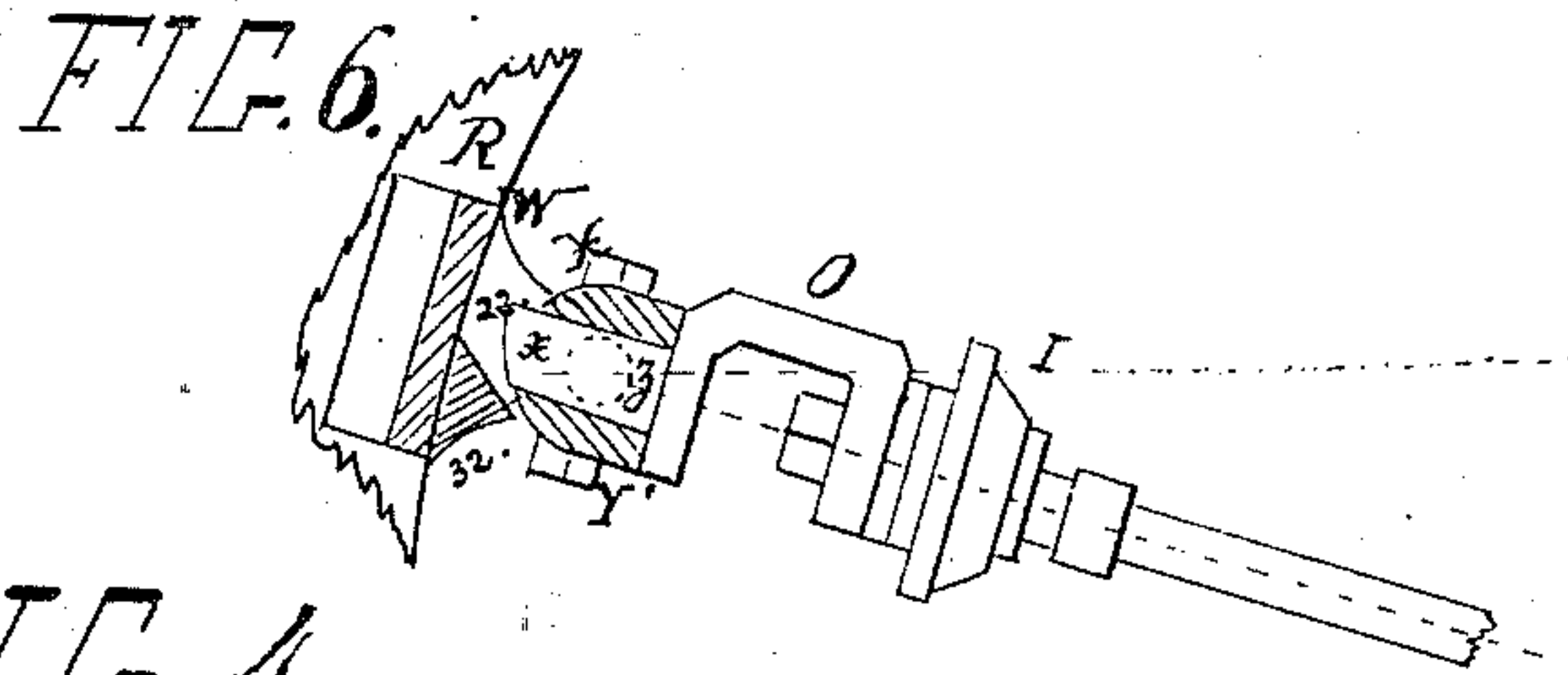
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2 SHEETS—SHEET 2.



Witnesses  
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# UNITED STATES PATENT OFFICE.

GUSTAV PURPER AND JACOB MOSER, OF NEW YORK, AND REINHOLD BOEKLEN, OF BROOKLYN, NEW YORK.

## GEM CUTTING AND POLISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 726,458, dated April 28, 1903.

Application filed March 28, 1902. Renewed March 17, 1903. Serial No. 148,277. (No model.)

*To all whom it may concern:*

Be it known that we, GUSTAV PURPER and JACOB MOSER, residing in the borough of Bronx, and REINHOLD BOEKLEN, residing in the borough of Brooklyn, in the city of New York, State of New York, citizens of the United States, have invented a new and useful Improvement in Gem Cutting and Polishing Machines, of which the following is a specification.

This invention relates to an improvement on a former application upon the same subject-matter by the same inventors and which application was filed October 31, 1901, with Serial No. 80,698, and was allowed January, 1902.

The object of this invention is to cut and polish the surface of the gem with a possible great number of symmetrical prismatical facets to gain high brilliancy with the least reduction of weight of the gem by reason that its value depends upon its brilliancy and weight.

Therefore one essential feature of this invention relates in a gem cutting and polishing machine to a construction and combination comprising with a horizontal lapidary grinding or polishing surface and over said surface in a vertical plane a curved graduated arc guide-rail with a center upon said surface and with a slide over it to which is pivoted a horizontal movable and radial and detachable working arm carrying a radial gem-stick holder and gem-stick with a gem, with a longitudinal axis in the axis of the gem and said gem-stick, the gem-stick holder and working arm with said slide being adjustable to all degrees from a horizontal to a vertical position on said rail and the pivots and bearings of said slide being provided for horizontal reciprocating motion of said gem-stick, gem-stick holder, and working arm, and said gem-stick holder being revoluble in said working arm and provided upon it with a fixed ratchet or graduated and toothed wheel and its teeth engaged by a spring-pawl to grind graduated polygonal facets upon the periphery of the gem, and by these means enabling to cover the gem with a large number of minute facets to gain high brilliancy.

A secondary essential feature of the inven-

tion relates in said gem cutting and polishing machine to a combination, with said lapidary-surface and said arc guide-rail and its slide adjustable to all graduations of said rail and said working arm pivoted to the slide and carrying said gem-stick holder, of a fixed arm or arms on said slide projecting out under the working arm or a part attached therewith to come in contact with said working arm, and thereby providing a support and stop the grinding of the facet beyond its desired depth.

Other essential features are pointed out in the following specification and claims.

In the annexed drawings, Figure 1 represents a sectional elevation of the machine, the observer facing the quadrant or arc guide-rail front of the machine centrally. Fig. 2 is a top view of the same, showing parts of the top of said quadrant removed to exhibit parts below them and showing the machine in a position as located before the operator when in use. Fig. 3 is a detached horizontal cross-section of the quadrant guide-rail and its slide at the portion thereof having a bolt to secure said slide to the rail, the line *a b* of section being indicated in Fig. 1. Fig. 4 is a secondary detached horizontal cross-section through a portion of said slide and rail between its bolt-fastenings and the line *c d* in Fig. 1, indicating the section, and this figure exhibiting a top view of the support for gauging the depth of the facet. Fig. 5 represents a detached longitudinal section, on an enlarged scale, of the gem-stick holder, its ratchet, its spring, pawl, and the gem-stick chuck. Fig. 6 represents a modification of the disengaging device of the working arm.

The letter A of reference indicates the horizontal lapidary wheel, which is secured upon the vertical spindle B. The top bearing C for the spindle is provided in the head of the vertical bracket D, secured upon the table E. The bottom bearing of said spindle is provided in the head of a bracket E', secured to the underside of the table. (Not shown.) The lower portion of the spindle is furnished with a driving-pulley E<sup>2</sup>. (Not shown.)

F represents the surface of the lapidary wheel A, upon which the gem G is cut, and H represents the gem-stick, to the end of



which the gem is cemented and is held with its axis in the axis of the gem-stick and the gem projecting suitably beyond the stick to cut about one-half of its surface.

5 I represents the gem-stick holder, which has on its lower loose end a central longitudinal center chuck I', with wedge-shaped keys J in the socket-opening K, in which the shank of the gem-stick is pinched by said longitudinal keys J, and a screw-cap L is employed over the treaded periphery K' of said socket K and contracting the keys J upon said shank of the gem-stick, all shown in Fig. 5. By these means the shank of the gem-stick is very solidly held in the gem-stick holder and is clamped centrally. The part of the gem-stick holder above the socket-opening K consists of a flange-shoulder M and a shank N, with a screw-nut c, provided on its top end. In the rear part of the opening in the socket K is employed a spiral spring e to press the keys J outward against the cap L to release the gem-stick H, and upon the periphery of the socket K, close to the downward side of the shoulder M, is provided a shank f, upon which is employed a graduated and toothed ratchet-wheel Z, held to the said shoulder by a screw-nut g over the said socket. Said ratchet-wheel Z is held fixed by a key or pin h to the shank f and holder. Said ratchet-wheel is made removable to exchange it with others of other graduations suitable for the work. Over the shank N is employed the lower part of a working arm O, consisting of a socket P, in which the shank N and gem-stick holder is guided to revolve the ratchet-wheel and gem-stick, all clearly shown in Figs. 1, 2, and 5, and, as shown in Figs. 1 and 2, said socket P has a slotted projection on its upper side, in which is pivoted a longitudinal spring-pawl i, engaging the teeth of the ratchet-wheel Z, and the lower opposite side of said socket P has a slotted projection in which is pivoted a lateral friction-roller j, below which is employed an arm or arms Q, attached or cast and forming part of the slide R, hereinafter described, and stopping the down motion of the working arm and cutting of the facet.

50 S represents a hollow vertical quadrantal arc-rail having its center upon the lapidary grinding-surface and in a vertical plane with the face of said rail, preferably somewhat on the left side of the center of the wheel, and said rail showing all degrees or graduations from a horizontal to a vertical line upon its front side, and its bottom end is provided with a suitable foot-plate T for securing the same upon the lapidary-table E and having its horizontal degree-line at a level with the lapidary cutting-surface, and said rail having beyond its vertical or ninety-degree graduation-line a suitable extending flat plate U for bolting the same to a part on the side of the top bearing-support D shown. Said rail is made with a curved longitudinal flat core-opening k and a

curved or arc central slot l from the face of the rail to the core k and both parallel with the peripheries of the rail. R represents a slide fitted over the peripheries of the rail 70 and to its face and is adjustable and securable to each of its graduations by means of the bolts m m, passing through the horizontal hubs n n, located opposite the slot l in the rail S and cast on the outer side of the slide R. Said each bolt m has a square neck fitting in the slot l and having each a head o, passing in the core-opening k. Said each bolt is furnished with a screw-nut p over its threaded end projecting from said hub n. Both said 80 nuts are provided each with an arm r, and said arms are connected with a connecting-rod t and one having a handle s, by which both nuts are operated. The slide R has a vertical arm V, projecting from the front side, 85 and to the right side of said arm is bolted a horizontal lateral double bearing-support W, having a central vertical flange u, which is jointed and bolted to the vertical arm V by a central bolt v. Said support W has two 90 equal horizontal and lateral projecting arms from its base or flange u and each carrying an equal dimension bearing X, which both are in one horizontal plane through the radial axis-line of the gem-stick holder I and the 95 working arm.

Y represents a horizontal cross-head bar constructed with a central slotted head Y', having a trunnion-bar end or arbor w, extending from each of the two vertical opposite 100 sides of said head in one horizontal center line and guided in said bearings X X, and the upper or rear portion of the working arm O extends longitudinally on one side of its socket toward the head Y' and extends across 105 and is jointed to said head and terminates with a tongue x'', fitted closely into the slotted aperture z in the head Y', so it may be withdrawn when required for inspecting the work or to change for another gem to be cut. 110 It may be preferred to construct the tongue x'' to be locked into the said head Y'. A suitable locking device 20 may be provided, as shown in Fig. 5, or a disengaging device 22, (shown in Fig. 6,) in which is the end 22 of 115 the tongue x'', comes in contact by raising the working arm from line 30 to 31 and engages the lateral longitudinal projecting cam bar or rail 32, secured or cast and projecting along the support W. (All shown in Fig. 6.) 120

For operating this machine it is assumed that the lapidary is adjusted to be in a perfect horizontal plane. By the construction of the working arm and gem-stick holder with devices for a horizontal reciprocating motion 125 for the operator's hand and grinding the gem upon an accurate horizontal lapidary surface the work can be executed with greater accuracy and superior brilliancy than heretofore.

The slide R is constructed, as before mentioned, with one or two arms Q, extending 130 from the slide R below the working arm O for



the purpose to provide an adjustable support under the working arm to all desired depths of the cut of the facets, thereby gaining time and obtaining higher brilliancy. Said arms

5 Q extend under or beyond the friction-roller *j*, as shown in Figs. 4 and 5. Upon a cross-bar 5, cast or secured between the arms Q on their rear portion, are supported two opposite spiral springs 6, (shown in Fig. 5,) resting on a projection of said bar, and over the springs 6 is provided a flat plate 10, which is hinged to the cross-bar by eyes thereon provided, and said plate 10 rests upon said springs with its loose portion. Under the friction-roller *j* is furnished and secured a strong flat lateral rail 7 for a pad for the travel of said roller. Each end of the arms Q under the roller *j* is provided with a vertical set-screw 8 to adjust and stop the rail 7 and the cutting at the desired depth of the facet being cut. The construction of said adjustment to stop the support of the working arm may be varied, as shown in Figs. 1 and 5. The front side of the slide R has an opening 17, showing the degrees marked on the face of the rail, which are shown in said opening from "0°" to "10°" in placing the slide R with the radius of the working arm O in a level position with the top surface of the lapidary wheel or to placing the indicator-hand 18 on "0°," which hand is also secured on the slide R, as shown in Figs. 1 and 2. Instead of providing the slide R with a supporting-arm Q on its lower portion its supporting-arm may be on its upper portion, as shown in dotted lines, and in such case the arm may extend to rest the forward part of the gem-stick, as shown, and said supporting-arm may also be constructed to connect with both ends of the said slide R.

40 What we claim, and desire to secure by Letters Patent, is—

1. In a gem cutting and polishing machine the combination comprising with a horizontal lapidary grinding or polishing surface and over said surface in a vertical plane a curved graduated arc guide-rail with a center upon said surface and having a slide over it to which is pivoted a horizontal movable and radial and automatic detachable working arm carrying a radial gem-stick holder with a radial gem-stick with a central gem with a longitudinal axis in the axis of the gem and said gem-stick, the gem-stick holder and said working arm with said slide being adjustable to all degrees from a horizontal to a vertical position on said rail and the pivots and their bearings on said slide being provided for horizontal reciprocating motion of said gem-stick, gem-stick holder and working arm and said gem-stick holder being made revoluble in said working arm provided upon it with a fixed ratchet or graduated and toothed wheel and its teeth engaged by a spring-pawl to grind graduated polygonal facets upon the periphery of the gem and by these means enabling the operator to cover the gem with a

large number of minute facets and thereby gain a high brilliancy upon the gem, substantially as and for the purpose herein set forth.

2. In a gem cutting and polishing machine a combination with said horizontal lapidary grinding-surface and said arc guide-rail with its adjustable slide to the graduation of said rail and said working arm pivoted to the slide and carrying said gem-stick holder, of a fixed arm on said slide projecting out under the said working arm or an extremity therefrom and provided to come in contact therewith as a support to stop the grinding as soon as reaching the desired depth of the facet, substantially as and for the purpose herein set forth.

3. In a gem cutting and polishing machine the combination with said horizontal lapidary grinding-surface and said arc guide-rail and its adjustable slide to the graduations of the rail, a working arm pivoted to the slide and movable in a horizontal plane and means for attaching and detaching said working arm from the slide, substantially as herein set forth.

4. In a gem cutting and polishing machine the combination with the said lapidary grinding-surface and said arc guide-rail and its adjustable slide over said rail to its graduations, a working arm pivoted to the said slide and said slide with a horizontal cross-head with a central slotted head to join the tongue on the end of the working arm and said working arm carrying the gem-stick holder and gem-stick and being guided in horizontal bearings of the slide, substantially as and for the purpose herein set forth.

5. In a gem cutting and polishing machine the combination with said horizontal lapidary grinding-surface and said graduated arc guide-rail and its adjustable slide over said rail to its graduations, a working arm pivoted on said slide and reciprocal in a horizontal plane and furnished on the lower side of its socket with a pivoted lateral friction-roller *j* and said slide provided with one or more fixed arms projecting under said socket and its friction-roller and said arm or arms carrying a pivoted spring bearing-plate with its loose end bearing under said roller and the ends of the said arms provided with vertical set-screws for the purpose to provide an adjustable contact and stop for grinding the facet, substantially for the purpose set forth.

In testimony whereof we, GUSTAV PURPER, JACOB MOSER, and REINHOLD BOECKLEN, have signed our names to this specification, in the presence of two subscribing witnesses, this 20th day of March, 1902.

GUSTAV PURPER. [L. S.]  
JACOB MOSER. [L. S.]  
REINHOLD BOECKLEN. [L. S.]

Witnesses:

DAVID MUELLER,  
ADAM GEBHARDT.