

No. 706,597.

Patented Aug. 12, 1902.

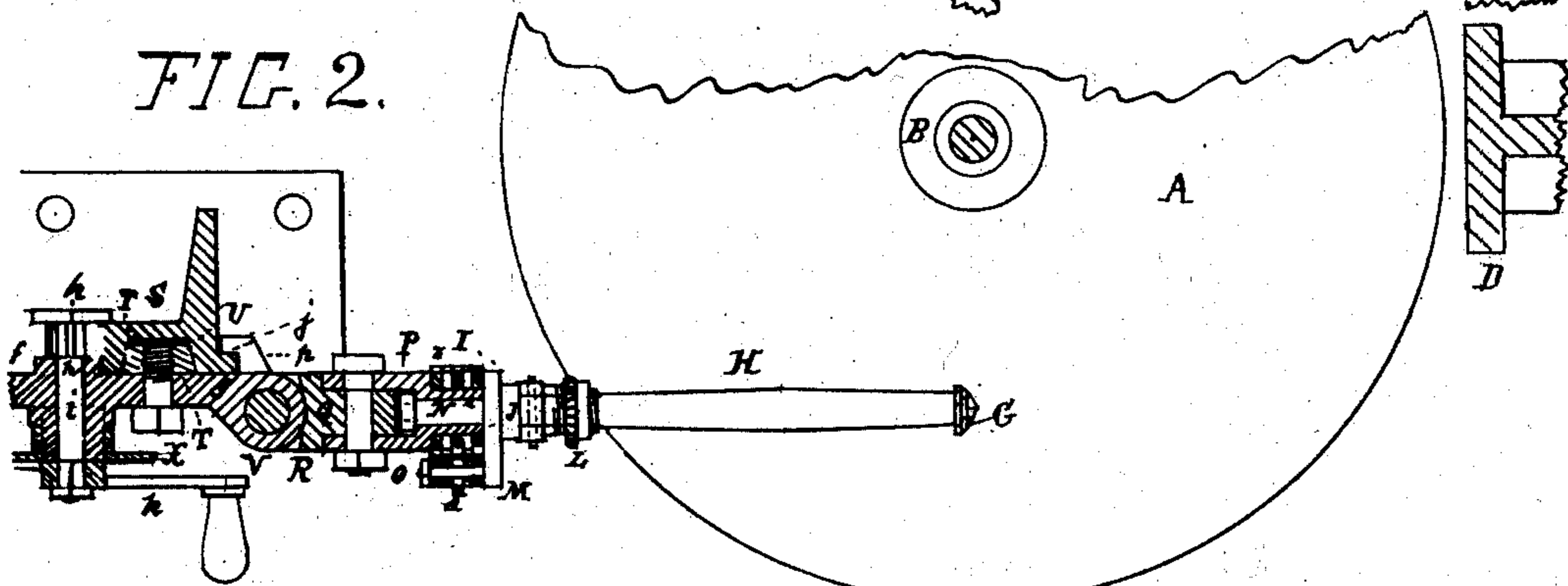
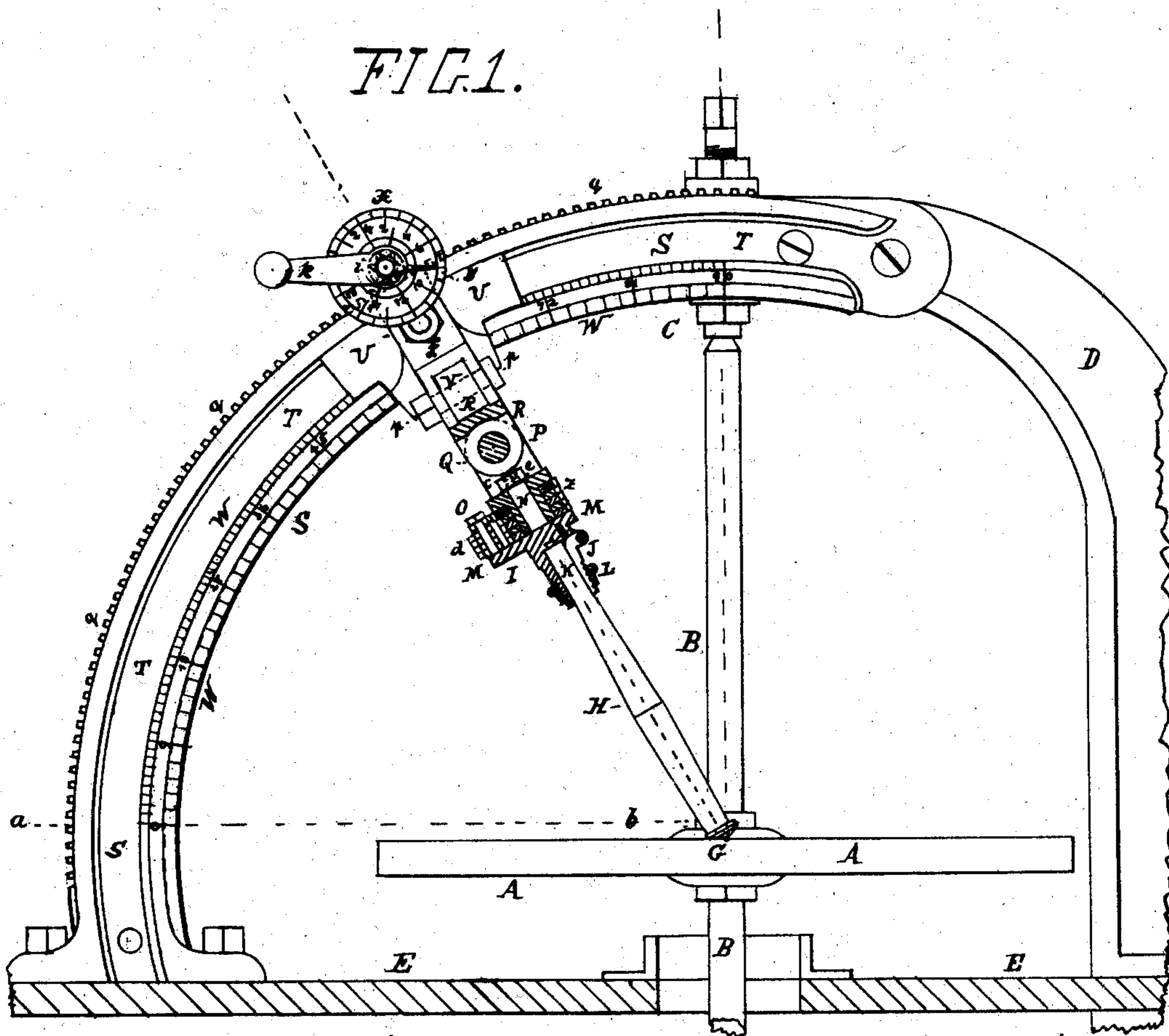
G. PURPER, J. MOSER & R. BOEKLEN.

GEM CUTTING MACHINE.

(Application filed Oct. 31 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses  
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3 Sheets—Sheet 2.

FIG. 3.

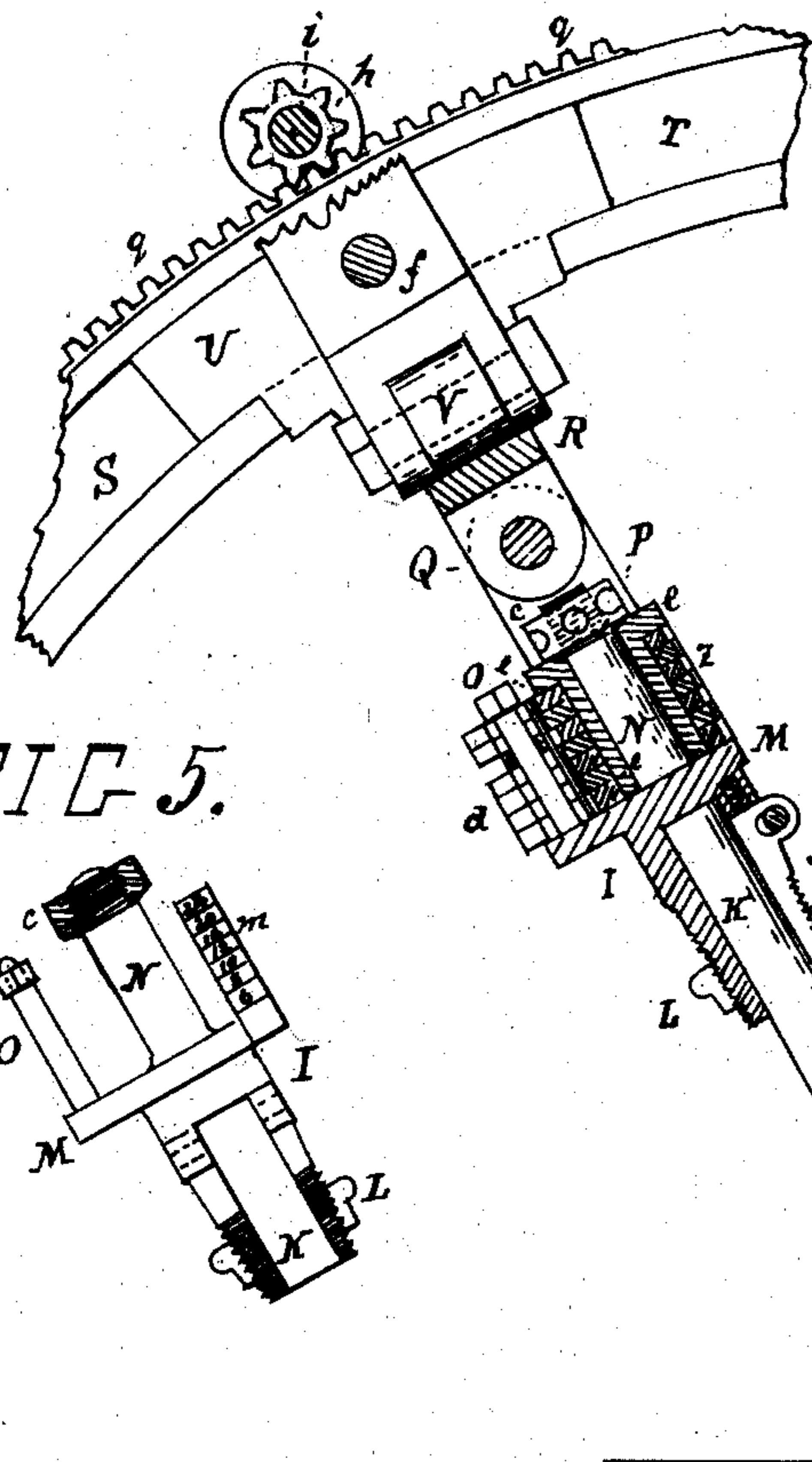


FIG. 4.

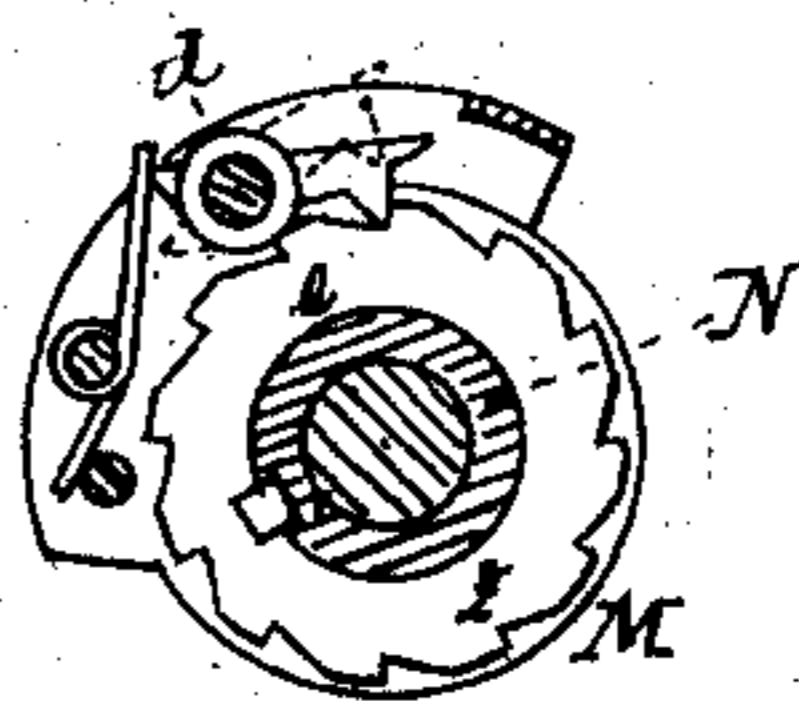


FIG. 6.

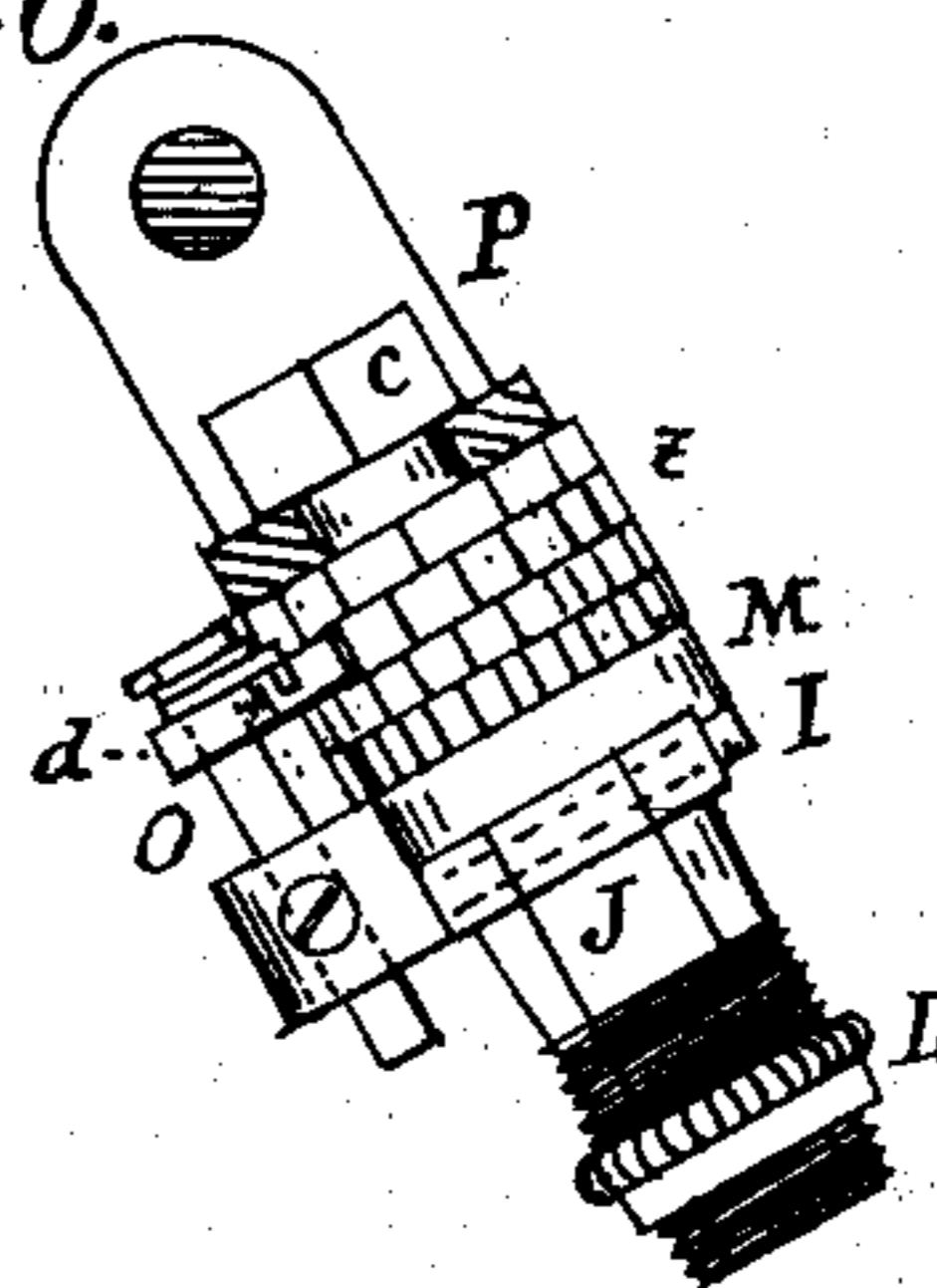
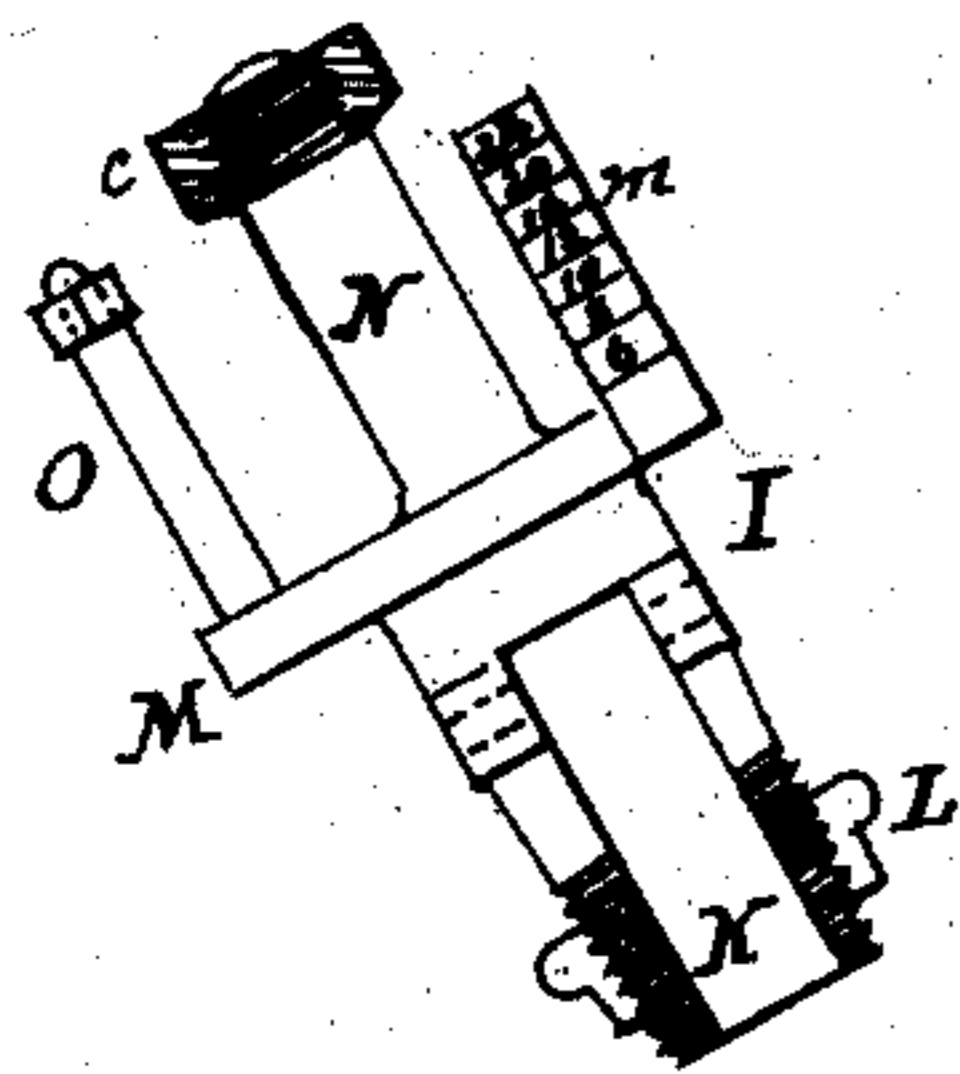


FIG. 5.



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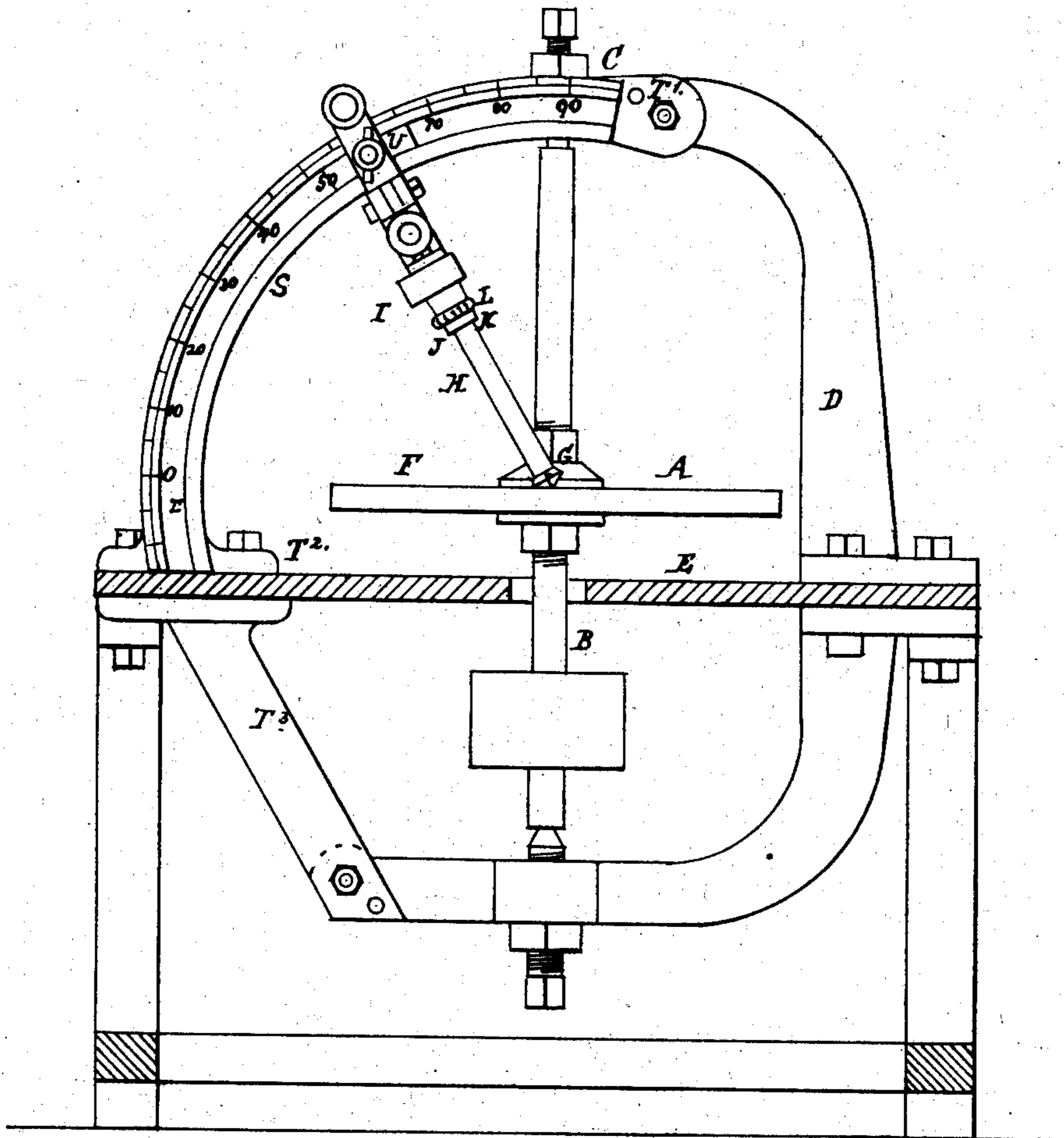
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3 Sheets—Sheet 3.

FIG. 7.



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# UNITED STATES PATENT OFFICE.

GUSTAV PURPER, JAKOB MOSER, AND REINHOLD BOEKLEN, OF NEW YORK, N. Y.

## GEM-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 706,597, dated August 12, 1902.

Application filed October 31, 1901. Serial No. 80,696. (No model.)

*To all whom it may concern:*

Be it known that we, GUSTAV PURPER, JAKOB MOSER, and REINHOLD BOEKLEN, citizens of the United States of America, residing at New York, county and State of New York, have invented a new and useful Improvement in Gem-Cutting Machines, of which the following is a specification.

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 in machines for cutting and polishing gems relates to providing a radially-arranged gem-stick and gem-stick holder in a vertical plane and with the center of the radius in the center of the gem, and with the periphery of the gem to engage the horizontal or right-angular cutting-surface with said plane of the lapidary-wheel, and providing for support of said gem-holder with a fixed peripheral quadrant curved guide-rail, to which said gem-holder is attached and made adjustable to be held to any radius and a tangent to the surface of the gem from a horizontal to a vertical in the same vertical plane. By these means a large number of small facets may be placed in longitudinal direction over the gem's surface, and thereby allowing room for placing a larger number of polygonal facets and gaining brilliancy with less reduction of weight.

A secondary essential feature of the invention relates to a gem-stick holder guided in a socket of the working arm to turn the gem on its axis, and said socket having one or more fixed ratchet-wheels over it, and the gem-stick holder carrying one or more spring-pawls over the ratchet periphery to engage its teeth at suitable intervals, and thereby stopping the gem at spaces to cut regular and minute polygonal facets.

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 lower part of the table being omitted. Fig. 2 is a horizontal section of the same, the

line of section being indicated at the line *a b*, Fig. 1, and the gem-stick and working arm being shown as placed in a horizontal position. Fig. 3 is a detached sectional side view of a portion of the quadrant guide-rail with the working arm and the gem-stick and its holder on a larger scale than with the former figures. Fig. 4 is a detached cross-section of the shank and spring-pawl of the gem-stick holder and the socket and ratchet-wheel on the socket engaged by the pawl. Fig. 5 is a detached side view of the gem-stick holder. Fig. 6 is a detached side view of the gem-stick and connected with the socket of the working arm and the ratchet-wheels and showing a modified construction of the spring-pawl holder. Fig. 7 represents a sectional front elevation of the machine, showing the bracing of the lapidary-bearings to avoid largely vibrations in the same contrary to produce accurate work by the lapidary.

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 secured to the underside of the table. (Not shown, except in Fig. 7.) The lower portion of the spindle is furnished with a driving-pulley. (Not shown, except in Fig. 7.)

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.

I represents the gem-stick holder, which has on its lower end a central longitudinal clamp-key J in the socket-opening K, in which the shank of the gem-stick is pinched by said longitudinal key J, and a screw-nut L employed over a threaded periphery of said socket and contracting the key J upon said shank of the gem-stick. By these means the shank of the gem-stick is very solidly held in the gem-stick holder. The part of the gem-stick holder above the socket-opening K consists of a flange M and a central shank N, with a screw-nut c pro-

vided on its top end, and from the flange M is provided a parallel projecting stud O, with the shank N to carry on said stud one or more spring-pawls *d*. Upon the shank N is employed a longitudinal slotted cross-head P with a socket *e* down and fitted closely and to turn freely upon the shank N, and is held thereupon by means of the screw-nut *c* aforesaid. Upon the exterior periphery of the socket *e* is or are employed one or more ratchet-wheels *z* with toothed peripheries for engaging the aforesaid spring pawl or pawls *d*. Into the slot of the cross-head P is jointed and horizontally pivoted the vertical tongue Q of a working arm R, which is pivoted to provide the motion of the gem across the cutting-surface of the lapidary-wheel. To support and guide the working arm, its pivot and the gem-stick holder and gem-stick, there is provided in a vertical plane at the central portion of the cutting-surface of the lapidary-wheel a quadrant curved or arc rail S above said wheel and secured with its lower end upon the table E and its upper end to the bracket D of the machine. Said rail S has a quadrant curved groove T, in which is employed a suitable slide U, guided in said groove T, which has a radius equal to its distance from it to the gem's center upon the cutting-surface, and the pivot-joint V of the working arm R extends with an arm *f* across the slide U and passes the rail S and terminating with a small bearing with an arbor *i*, carrying a pinion-gear *h*. (Shown in Fig. 3.) The arm *f* is bolted and secured to the slide U. The rail S on its extreme periphery is furnished with gear-teeth *q*, in which the pinion-gear *h* engages, and the arbor *i* on its front end is furnished with a crank-handle *k*. By these means in turning the crank-handle *k* the slide U with the working arm and the gem-stick holder are together moved radially upon the gem's center, and the slide U may be moved to any radial position on the rail which is indicated by the large scale W and for accurate and minute divisions on the scale X at the crank-handle *h* and Y and dial, and for equal-sized gems a record of the scales W and X will promote the work with much saving of time. The gem-stick holder is provided with a longitudinal register *m* of the number of teeth or division of each opposite ratchet-wheel to select quickly the division-wheel to use, as shown in Fig. 5. Instead of providing a spring-pawl for each ratchet one pawl, secured to a sliding stud, as shown in Fig. 6, may be employed. By connecting the quadrant-rail S with the table and bracket D both the table and bracket are strongly braced for a more steady motion. Said socket *e* has a key passing through each ratchet-wheel to prevent the ratchet from turning on the socket. To hold the arm *f* with the slide U in the groove T of the rail S is provided a projecting rim *j* on the inner periphery of the rail S, and the arm *f* has projecting lugs *p* to overlap the rim *j*, as shown in Fig. 2.

By reason that less grinding material, such as diamond-powder, is wasted with the employment of a horizontal lapidary-wheel than with the vertical lapidary-wheel, we prefer to use the horizontal wheel. To avoid undue vibrations in the bearings and the wheel, we construct the rail S, as shown in Fig. 7, with an arm T' on the top end of said rail and bolt it solidly with the top bearing of the spindle and also provide a flange T<sup>2</sup> on the bottom end of said rail and bolt it solidly with the table E of the machine, and between the table and the bottom bearing of the spindle we secure the brace T<sup>3</sup>. Thus the rail S serves as a strong brace between said bearings, and thereby avoiding largely contrary vibrations to effect accurate work.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a gem cutting or polishing machine the combination with a lapidary-wheel having a horizontal grinding or polishing surface, in one or more vertical parallel planes with the axis of the spindle of the wheel, a stationary graduated quadrant arc-rail secured above said surface to the machine and having a slide guided and adjustable to all degrees of the said quadrant and connected to a radial jointed working arm and by it to a radial arm of a gem-stick socket and a holder to which is attached a radial gem-stick, placing the gem concentric with said arc-rail and its periphery in contact with said grinding-surface, and its axis longitudinal and central with the axis of said gem-stick which is revoluble in said socket to all degrees of a circle in a vertical plane across the gem's axis, and is adjustable for closely placing and grinding tangential facets upon the surface of the gem, substantially as and for the purpose set forth.

2. In a gem cutting or polishing machine the combination with a lapidary-wheel having a horizontal grinding or polishing surface in one or more vertical parallel planes with the axis of the spindle of the wheel, a stationary graduated quadrant arc-rail above the said surface and having a slide guided and adjustable to all degrees of said quadrant and connected to a working arm with a radial joint and vertical pivot on one end and with a vertical joint and horizontal pivots to connect with a radial gem-stick socket and holder and said socket and holder being provided with a gem-stick attached carrying a gem in the center of said arc-rail and said holder with the gem-stick and being held centrally and longitudinally with the axis of the gem and revoluble in said socket and adjustable to all degrees of a circle in a vertical plane and concentric to said axis of the gem for closely placing and grinding or polishing minute tangential facets over the surface of the gem and said socket and holder and gem-stick and gem being provided as aforesaid, are movable in a vertical plane for inspection of the gem and in a horizontal plane for grinding, substantially as herein shown and set forth.

3. In a gem cutting or polishing machine the combination with a lapidary-wheel having a horizontal grinding or polishing surface in one or more parallel planes with the axis of the spindle of the wheel, a stationary graduated quadrant arc-rail, above said surface and having an adjustable slide to all degrees of said quadrant and said slide connected and pivoted to a two-arm working lever in a radial plane and the loose arm of said lever attached by a horizontal pivot to a radial gem-stick socket in which is held and guided in line with it a tooth or notch and pawl graduated and numbered gem-stick holder with a longitudinal central gem-stick carrying a gem which is concentric with the said arc-rail and its periphery resting upon said grinding-surface and its axis in the same plane with the axis of said socket-holder and gem-stick, substantially as herein set forth.

4. In a machine for cutting gems the combination comprising a horizontal revolving lapidary-wheel, a quadrant guide-rail secured with one end to the bracket of the top bearing of the spindle of said wheel and the other end of said rail to the table of the machine to brace the machine rigidly, a slide in the groove of said rail with a radius center in the gem's center and a radial connection consisting of a gem-stick and gem-stick holder connected with a cross-head and the cross-head connected with a working arm and then pivoted to a radial arm carrying a pinion-arbor, a pinion engaging a toothed periphery on the said quadrant-rail, substantially as and for the purpose to move the said slide over the scale on said rail.

5. In a machine for cutting gems the combination comprising a radial revoluble gem-stick holder in the axis of the gem guided in a socket of a cross-head pivoted to a working arm and said gem-stick holder carrying a revolving spring-pawl around a stationary ratchet-wheel secured upon said cross-head socket, substantially as and for the purpose herein set forth.

6. In a machine for cutting gems the combination comprising a gem-stick holder with a socket-opening to receive a cylindrical shank of the gem-stick and said socket-opening having a longitudinal key-opening in which a loosely-pivoted key is held and filling in the removed portion of said opening, but slightly increasing the diameter on the outside pe-

riphery at this key, the outside periphery of the socket being threaded and a proper screw-nut placed over the socket by these means the gem-stick shank is clamped very rigidly in said socket.

7. In a machine for cutting gems a combination comprising a horizontal revolving lapidary-wheel, a quadrant guide-rail over it in a vertical plane and concentric with the gem upon the cutting-surface of the wheel and said gem held with a gem-stick held radial with a revoluble gem-stick holder guided in a socket, of a cross-head with a fixed ratchet-wheel and the gem-stick holder carrying a spring-pawl over the periphery of said ratchet, and said cross-head being pivoted to swing vertically on a working arm pivoted to a radial arm to swing laterally and said radial arm being connected to a slide guided in the groove of the quadrant guide-rail and said radial arm carrying a lateral pinion-arbor and pinion of which said pinion engaging in the peripheral gear-rim on the quadrant guide-rail, and of which the said pinion-arbor is furnished with a hand-crank to adjust said lever-arm with the said slide to any angle indicated on the scale upon said quadrant-rail, or indicated by the more reduced scale at the arbor of the pinion-gear, substantially as and for the purpose herein set forth.

8. In a gem-cutting machine, which consists of a radial gem-stick and gem-stick holder and a fixed stationary quadrant guide-rail both in vertical planes and with the center of the radius in the gem, and a working arm pivoted in the radius, turning in a lateral plane and the gem-stick holder pivoted to a working arm movable in a vertical plane and revoluble on its axis and provided for all turns and parts thereof controllable with pawl and teeth or notch graduations, substantially as and for the purpose herein set forth.

In testimony whereof we, the said G. PURPER, J. MOSER, and R. BOEKLEN, have signed our names to this specification, in the presence of two subscribing witnesses, this 29th day of October, 1901.

GUSTAV PURPER. [L. S.]  
JAKOB MOSER. [L. S.]  
REINHOLD BOEKLEN. [L. S.]

Witnesses:

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P. J. RIELLY.