(No Model.) 2 Sheets—Sheet 1.

E. PASSMORE.

MACHINE FOR CUTTING AND POLISHING PRECIOUS STONES.

No. 479,452. Patented July 26, 1892.

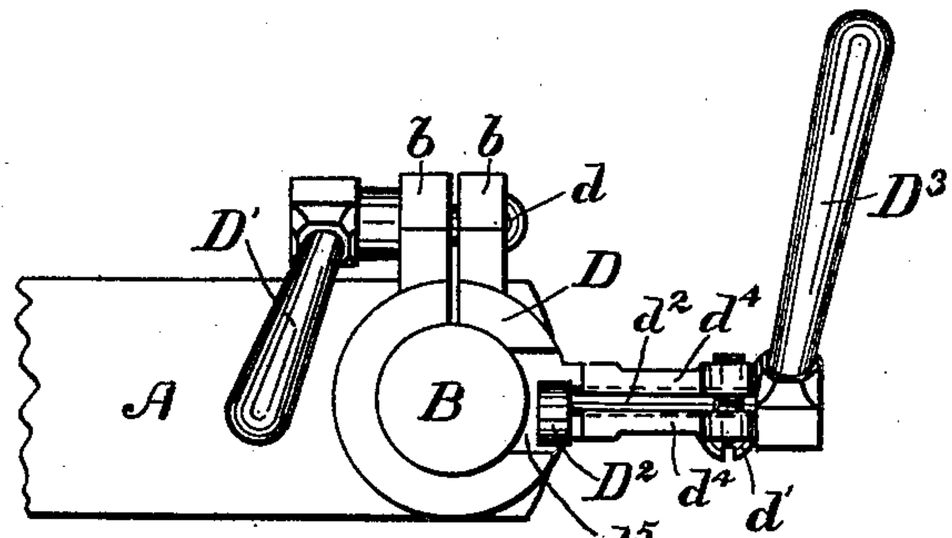

Fig. 2.

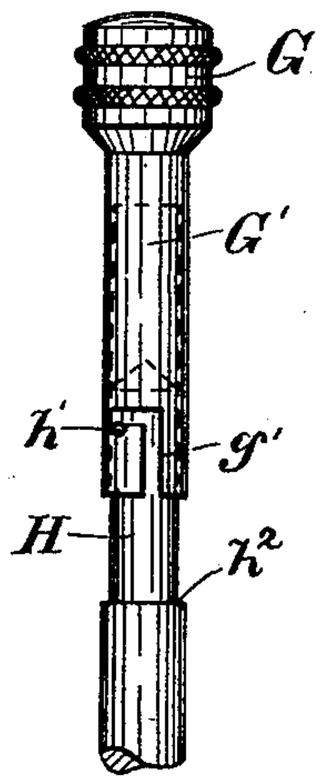

Fig. 4.

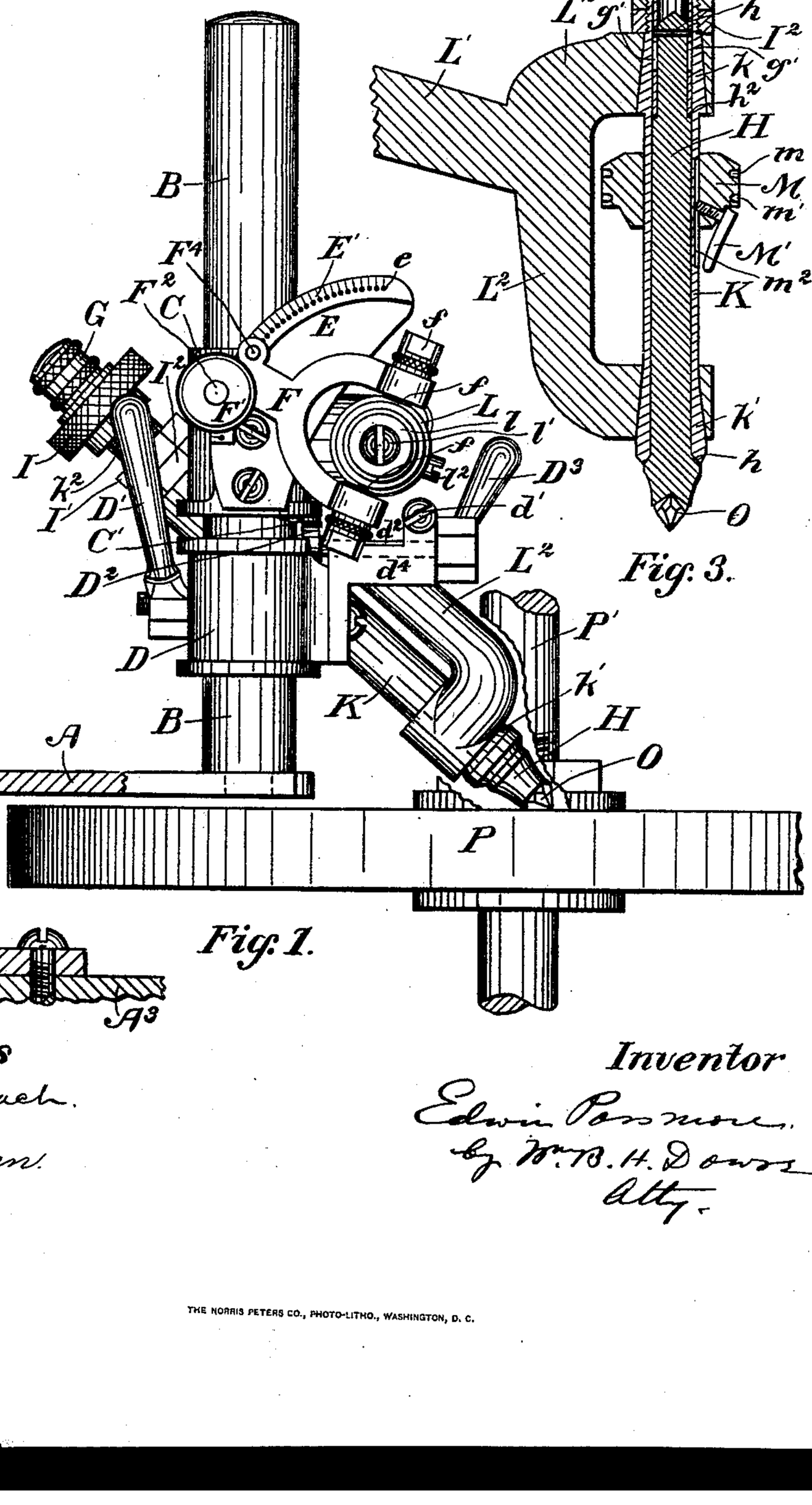

Fig. 1.

Fig. 3.

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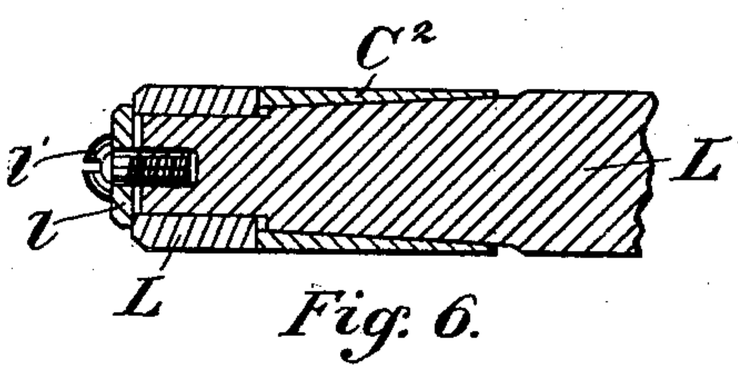

Fig. 6.

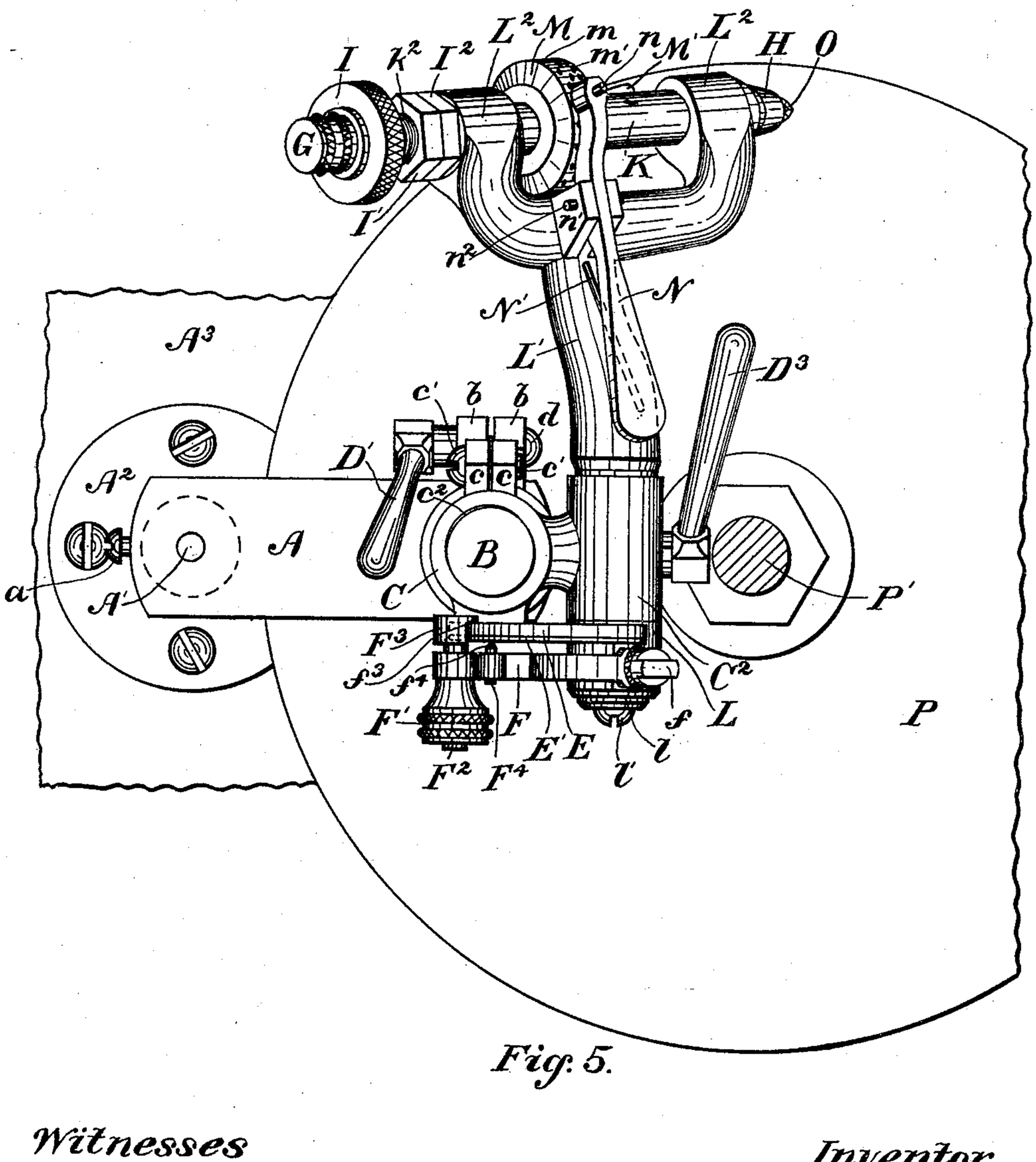

Fig. 5.

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UNITED STATES PATENT OFFICE.

EDWIN PASSMORE, OF SOMERVILLE, MASSACHUSETTS.

MACHINE FOR CUTTING AND POLISHING PRECIOUS STONES.

SPECIFICATION forming part of Letters Patent No. 479,452, dated July 26, 1892.

Application filed October 21, 1891. Serial No. 409,371. (No model.)

To all whom it may concern:

Be it known that I, EDWIN PASSMORE, a citizen of the United States, residing at Somerville, in the county of Essex and Commonwealth of Massachusetts, have invented a new and useful Machine for Cutting and Polishing Precious Stones, of which the following is a full specification.

My invention consists of an improved apparatus for presenting a gem to a lap-wheel and holding it steadily thereon at any desired angle of inclination, said angle of inclination being capable of the most minute adjustment. The machine has, furthermore, certain appliances whereby the gem may be readily and quickly turned step by step on its axis through a distance equal to any desired fractional portion of its circumference and set in each position while a facet is being cut in such a manner that any desired number of facets may be cut thereon with great precision and nicety at any given angle of inclination. By means of these two sets of graduated adjusting devices in two different planes, the one governing the angle of inclination at which the stone is presented to the wheel and the other the step-by-step motion of the stone around its axis, the stone may be cut with regularly-formed facets at any number of angles with mathematical accuracy and with comparatively little skill on the part of the operator, a result hitherto impossible with appliances in use for this work.

My improved machine not only enables the lapidary to cut an endless number of new and beautiful designs, but it also renders it an easy matter to reproduce with great accuracy any particular pattern or design and to cut any number of stones in the same pattern.

Referring to the accompanying drawings, Figure 1 shows in elevation my improved machine. Fig. 2 shows in plan view the clamping-sleeve, on which rest the working parts of the machine, said sleeve being shown in place on the upright post, the said working parts being removed. Fig. 3 is a sectional view through the center of the device which holds the stone upon the lap-wheel. Fig. 4 shows, on a larger scale, the method of fastening into the socket the stick which holds the stone. Fig. 5 is a plan view of the machine, and Fig. 6 is a sectional view through the center of the lateral arm and its bearings.

P is the lap-wheel mounted in the usual manner on the vertical spindle P′ and capable of a very high speed of revolution. The working parts of the apparatus for holding and presenting the stone to the wheel are supported directly by the upright post B, which is firmly set in the base A near one end thereof. Near the other end of the base A is firmly fixed the downwardly-extending supporting-rod A′, which has its bearing in a suitable box A^2, screwed or bolted to the bench A^3. The base A, and with it the entire apparatus, may be set at any height above the wheel and at any position over the same by means of the set-screw *a*.

The stone O to be cut or polished is cemented or otherwise affixed to the end of a stick H, preferably within a recess cut in the bottom thereof, in such a manner as to expose a portion of the stone beneath the stick to the surface of the lap-wheel when held thereon. The stick H is held within a suitable revoluble holder K, more fully hereinafter described, which has its bearings in the ends of the two branches L^2 of the lateral arm L′. This arm is in turn held within a horizontal sleeve C^2, which is rigidly connected with the vertical sleeve C, mounted loosely on the upright post B, the lateral arm L′ being capable of rotation within the sleeve C^2. The sleeves C C^2 together form what I term the "bearing-piece" for the arm. By the rotation of the lateral arm within the sleeve C^2 the angle of inclination of the frame formed by the two branches L^2 of the arm and with it the angle of inclination of the stick H, held in said frame, is varied at will with reference to the surface of the lap-wheel, and by the rotation of the holder K within its bearings any number of facets may be cut on the stone at each angle of inclination, both movements being capable of minute regulation in the manner hereinafter detailed.

D is a sleeve or collar on the upright post B, adapted to be clamped thereon at any height. For this reason the sleeve is cut through vertically on one side, as shown in Fig. 2, having the two branches or lugs *b b*, through which passes the screw *d*. By means

of the clamping-handle D′, which engages with the end of the screw *d*, the sleeve D may be clamped readily at any height on the upright post B in a manner obvious without further description. The flanged top of the sleeve D is cut away, as at d^5, and in this recess is held a cam D^2, secured to a spindle d^2, mounted in suitable bearings d^4, secured to the side of the sleeve and tightened or loosened by the screw *d′*, as shown in Figs. 1 and 2.

D^3 is a handle fixed to the end of the cam-spindle, by means of which the cam is operated.

The vertical sleeve C on the post B either rests directly upon the cam D^2 or has a thin intervening strip C′, Fig. 1, on the flanged bottom of said sleeve. By turning the handle D^3 the cam D^2 raises and lowers the sleeve C. The cam-spindle d^2 works quite tight in its bearings in such a manner that the cam when set in a given position will not change except by turning the handle D^3.

The horizontal sleeve C^2, which is preferably integral with the vertical sleeve C, is conical on the inside to form a bearing for the lateral arm L′, (see Fig. 6,) which it accurately fits.

L is a collar which fits over the outer end of the arm L′ against the end of the sleeve C^2, *l* being a cap which covers the end of the collar L, all parts being held in place by means of the screw *l′*. The collar L is made to turn with the arm L′ by means of the set-screw l^2, Fig. 1, which passes through said collar and enters a longitudinal groove in the arm L′.

E is a plate screwed or otherwise secured to a faced-off shoulder on the sleeve C, said plate having thereon the graduated scale E′, the top of which is curved in the arc of a circle struck from the center of the collar L. The scale E′ has a series of indentations *e*, arranged in a circular arc at regular intervals apart.

F is a clamping-piece having two arms passing one on each side of the collar L, being pivotally secured to the collar by means of screws *f*. The piece F has set therein the pin or pointer F^4 in such a position as to traverse the scale E′ directly in front of the indentations *e*.

F^3 is a block having the lip f^3, which fits behind the plate E. F^2 is a screw secured to said block F^3 and passing through the clamping-piece F.

F′ is a thumb-nut engaging with the screw, the arrangement and construction being such that when the thumb-nut F′ is loosened the arm L′ may be easily turned in its bearings and at the same time the pin F^4 traverses the circular arc of indentations *e*. The arm L′ may thus be set in any position with the stick H, which holds the stone at any desired angle of inclination by screwing up the thumb-nut F′, with the point f^4 of the pin F^4 in engagement with one of the indentations *e* on the scale E′.

The ends of the two branches L^2 of the forked frame at the end of the arm L′ are provided with conical bearings for the enlarged conical portions *k k′* of the stick-holder K. The portion of the stick-holder above the upper bearing projects upward for some distance and is screw-threaded, as at k^2. The nuts I′ I^2 serve to keep the holder K firm in its bearings, but at the same time allow easy rotation of the same. The stem of the stick H is of a size to fit easily within the holder K, but is enlarged at the bottom, as at *h*, to fit against the beveled under side of the holder, as shown in Fig. 3. The upper portion of the stick H is reduced in diameter above a shoulder h^2, the stick being provided near its top with a pin *h′*, which passes through the same and projects out on either side.

G′ is a hollow socket, which is of such a size as to fit easily over the diminished top of the stick H and within the top of the holder K, the socket being provided with bayonet-slots *g′* on opposite sides to fit over the projecting ends of the pin *h′*. The socket G′ has the enlarged top G.

I is a thumb-nut on the screw portion k^2 of the holder K above the nuts I′ I^2. The stem of the stick H is passed up from beneath through the holder K and the socket G′ passed down from above into said holder and over the top of the stem, with the projecting ends of the pin *h′* in the top of the bayonet-slots *g′*, the thumb-nut I being first screwed down upon the nut I′. The socket G′ is then given a turn by means of the milled head G, so as to bring the ends of the pin *h′* in the clamping portion of the bayonet-slot *g′*, as shown in Fig. 4, and the thumb-nut I is then screwed up against the under side of the enlarged head G of the socket G′, which by tension holds the stick firmly in place within the holder K, so that it will turn therewith.

M is a regulating-drum on the holder K. This is centrally bored out to fit the holder, and in circles around the surface of the drum are several series of indentations *m m′*, the indentations in each series being evenly spaced off, the distance between them being preferably equal to some regular fractional portion of its circumference, as one-sixteenth, one-eighth, one thirty-second, &c. Any number of series of variously-spaced indentations may be provided on the drum.

N is a handle-lever pivoted at n^2 between lugs *n′* on the piece L′ L^2, the outer end of said lever having fixed therein the pin *n* of a size to engage with the indentations on the drum M one at a time. The holder K is provided with the longitudinal groove m^2, into which projects the end of the set-screw M′, (see Fig. 3,) mounted in the under portion of the drum M. The drum may thus be slid up and down on the holder K and clamped at any desired height thereon to turn therewith,

the object of this adjustability being to bring any desired series of indentations *m m'* on the drum opposite the pin *n* on the lever N.

N' is a spring fixed to the under side of the handle of the lever and bearing against the arm L' in such a manner as to press and hold the pin *n* in one of the indentations *m m'* when opposite the same.

The operator by pressing down on the handle of the lever N and turning the holder K by means of the milled nut I may thus move the stick, with the stone O therein, step by step through an angle equal to that between any two indentations *m*, letting the pin *n* engage successively with each indentation of the series. The angle of inclination of the stick, and with it the angle at which the facets are to be cut on the stone O, is thus determined by the indentation *e* on the scale E', with which the pin F^4 is in engagement.

When once the stick is set at the required angle, the drum M is adjusted in position on the holder K to bring the required series of indentations *m m'* opposite the pin *n*, according to the number of facets which it is desired to cut on the stone O at the given angle of inclination.

By loosening the set-screw *a* the stick H, set at a given angle of inclination, may be moved so as to bring the stone O above any portion of the lap-wheel P, the base A moving about the rod A' as a pivot. When placed in its desired position, the base A is clamped by tightening the screw *a*. The size of the facet cut on the stone, or, in other words, the pressure of the stone upon the lap, depends on the height of the sleeve C on the post B. This is, therefore, roughly adjusted by the clamping-sleeve D, all fine adjustments being done by means of the cam D^2, moved by the handle D^3. The facet is cut by pressing down the sleeve C as far as it will go on the post till it rests upon the cam D^2, thus bringing the stone O into contact with the wheel, the clamping-sleeve D and the cam D^2 having previously been set in proper position to act as a stop. When the facet is cut, the operator lifts up the sleeve C, turns the drum M through the required angle by means of the regulating device already described, and presses down the sleeve C, bringing a fresh portion of the stone into contact with the wheel, and so on. The sleeve C has free motion about the post B, being loose thereon, so that the gem may readily be applied to the lap-wheel at any point between the rim and the center.

The polishing of a cut stone is equally simple, it being necessary only to set the stone at the proper angle of inclination and to make the proper adjustments of the regulating-drum M, the sleeve D, and the cam D^2 at the beginning.

It is frequently useful in polishing gems to employ a lap-wheel the upper surface of which has two grades of diamond-dust arranged with the coarser near the rim of the wheel and the finer near the center, the dotted circle *y y* in Fig. 5 representing, for instance, the limits of each, the surface outside the dotted circle being supposed to be covered with the coarser and that within the circle with the finer diamond-dust. In polishing a stone on such a wheel the stone is first applied to the coarser or outer portion of the wheel-surface and then to the finer or inner part. After the gem leaves the coarser part it has certain minute scratches left on its facets, which are removed in the final polishing on the finer portion of the wheel. It is obvious, therefore, that when the stone is applied to the inner or finer portion of the wheel-surface it must be lowered slightly in order to efface the scratches. I provide as a simple means for accomplishing this the before-mentioned strip C' on the bottom of the sleeve C, which intervenes between the sleeve C and the top of the cam D^2. This strip is in itself virtually a wedge, being so arranged that when the stone is applied to the lap-wheel near the rim of said wheel, or on the part outside the circle *y y*, in undergoing the coarser polishing the thickest part of the wedge-strip C' intervenes between the sleeve C and the cam D^2; but when the sleeve C turns on its post B to bring the stone onto the finer portion of the wheel within the circle *y y* to undergo the final polishing the tapering wedge-strip C' lowers the sleeve C, and thus the stone O, slightly, but sufficiently to efface the scratches left by the rough polishing.

The hole through the sleeve C does not perfectly conform to the post B, as shown in Fig. 5 at c^2, being slightly irregular. This is to give a very slight play to the sleeve in one direction, so that the stick, with the gem therein, is not held perfectly rigid up and down for the reason that when slight inaccuracies on the surface of the lap-wheel are encountered in polishing the gem would be marred thereby if rigidly held.

I claim—

1. In a machine for cutting and polishing precious stones, an upright post, in combination with a bearing-piece mounted on said post to slide and turn thereon, said bearing-piece being provided with a graduated scale, an angularly-adjustable frame mounted in said bearing-piece, a pointer and clamping device engaging with said scale and mounted on a connection of said frame to turn therewith, and a revoluble stone-holding stick suitably mounted in said frame, substantially as described.

2. In a machine for cutting and polishing precious stones, a suitably-mounted angularly-adjustable frame, in combination with a revoluble stick-holder having bearings in said frame and provided with a graduated regulating-drum mounted thereon, a stone-holding stick fixed in said holder to turn therewith, and a spring-lever pivoted to a connection of

the frame, said lever having a pin engaging with said graduated drum, substantially as and for the purposes described.

3. In a machine for cutting and polishing precious stones, a suitably-supported bearing-piece provided with a graduated scale, in combination with an angularly-adjustable frame mounted in said bearing-piece, a clamping device and pointer engaging with said scale and mounted on a connection of said frame, whereby the frame may be set at any desired angle of inclination, a revoluble stick-holder having bearings in said frame and provided with a graduated regulating-drum, a stone-holding stick fixed in said holder to turn therewith, and a spring-lever pivoted to a connection of the frame, said lever having a pin engaging with said drum, all constructed and arranged substantially as and for the purposes described.

4. In a machine for cutting and polishing precious stones, an upright post B, in combination with a bearing-piece C C^2, mounted on said post to slide and turn thereon, a lateral arm L′, mounted in said bearing-piece to turn therein, a frame L^2 L^2, carried at the end of said arm, and a revoluble stone-holding stick H, suitably held in said frame, substantially as described.

5. In a machine for cutting and polishing precious stones, a frame L^2 L^2, in combination with a revoluble stick-holder K, having bearings in said frame and having the screw-threaded portion k^2, a stone-holding stick H, having the enlarged end *h* and provided with the pin *h*′, a socket G′, engaging with the stem of said stick, having bayonet-slots *g*′, engaging with said pin and provided with an enlarged head G, and a thumb-nut I, mounted on said screw-threaded portion k^2 of the holder, all constructed and arranged and operating substantially as described.

6. In a machine for cutting and polishing precious stones, the combination, with an upright post B, of a bearing-piece C C^2, supporting a suitably-mounted angularly-adjustable revoluble stone-holding stick, a clamping-sleeve D, having a fastening device whereby the said sleeve may be clamped at any desired height on said post, a cam D^2, fixed to a spindle mounted in a connection of the sleeve D, and a cam-operating handle D^3, the said cam being arranged to support the bearing-piece and to adjust the working position of the bearing-piece on the post, substantially as described.

7. In a machine for cutting and polishing precious stones, the combination, with an upright post B, of a bearing-piece C C^2, supporting a suitably-mounted angularly-adjustable stone-holding stick, and a wedge-shaped piece C′ on the bottom of said bearing-piece, and a clamping-sleeve D, provided with a handle-operated cam D^2, engaging with said piece, substantially as and for the purposes described.

8. In a machine for cutting and polishing precious stones, the combination, with an upright post B, of a bearing-piece C C^2, supporting a suitably-mounted angularly-adjustable stone-holding stick, said piece C C^2 being loosely mounted on said post to slide and turn thereon and having, also, a lateral play on said post, substantially as and for the purposes described.

In witness whereof I have hereunto set my hand.

EDWIN PASSMORE.

Witnesses:

WM. B. H. DOWSE,

ALBERT E. LEACH.