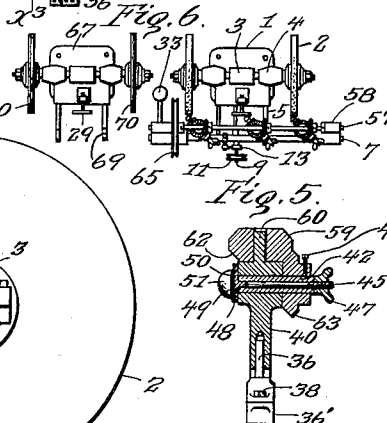
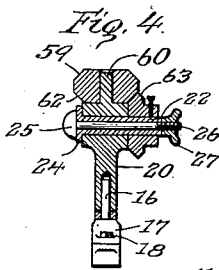
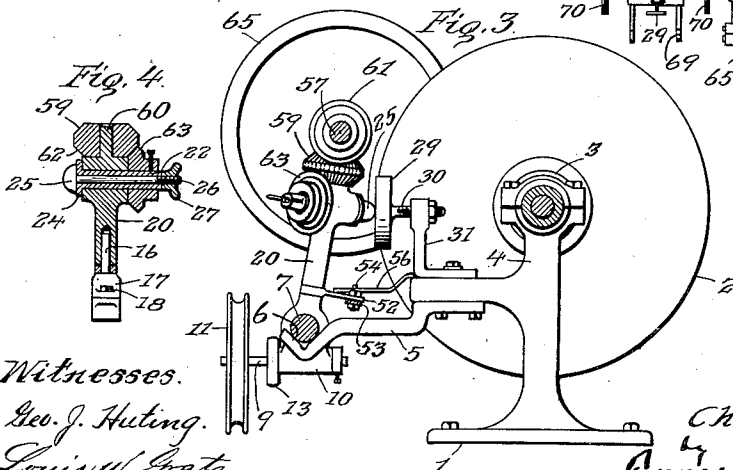
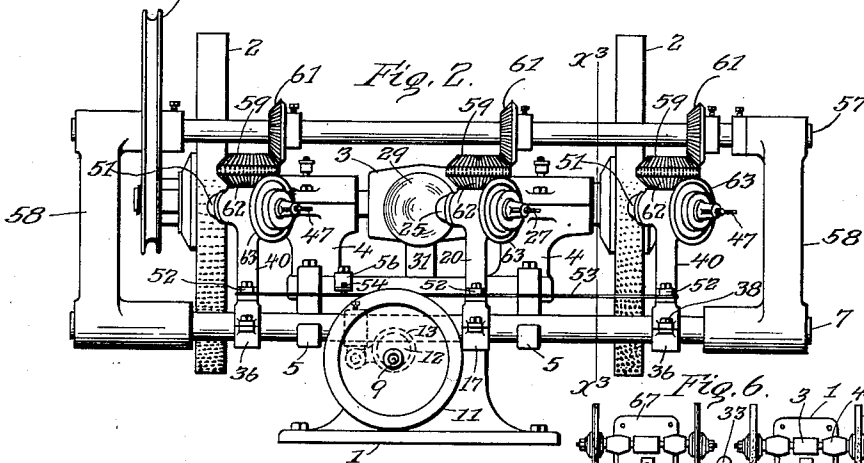
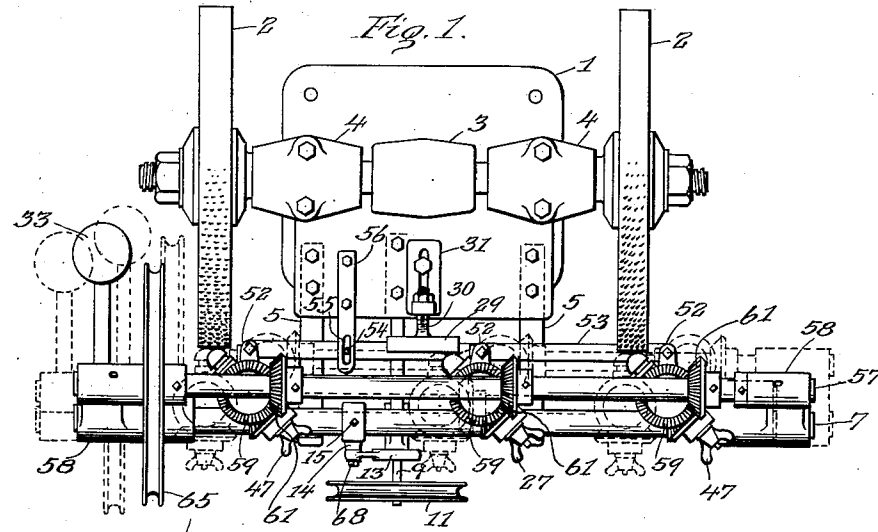


C. G. HULL.
GEM CUTTING MACHINE.
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UNITED STATES PATENT OFFICE.

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GEM-CUTTING MACHINE.

943,191.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES G. HULL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Gem-Cutting Machine, of which the following is a specification.

This invention relates to a machine for cutting gems of carbuncle, cabochon or other irregular forms, that is to say, having a rounded polished face without facets.

The main object of the present invention is to provide means for cutting any number of such gems according to a determined form automatically and in the most rapid and economical manner.

A further object of the invention is to provide means whereby the gem which is being cut can be removed from the machine when desired for inspection.

A further object of the invention is to provide for grinding and subsequently polishing the gem or gems by the use of the same holding apparatus, minimizing the labor involved in the setting up and operating the gem holding means.

The accompanying drawings illustrate the invention.

Figure 1 is a plan of the machine. Fig. 2 is a front elevation thereof. Fig. 3 is a section on line x^x-x^y in Fig. 2. Fig. 4 is a longitudinal section through one of the holders showing the dop-stick therefor. Fig. 5 is a similar view through the form. Fig. 6 is a diagrammatic plan showing the grinding and polishing heads with the holding and operating apparatus therefor interchangeably mounted with reference to said heads.

Figs. 1 to 3 show more particularly the application of the invention in connection with the grinding head. 1 designates the base or frame of the grinding head in which are journaled on standards 4 two grinding wheels 2 rotated by the usual driving means 3. From said standards extend a plurality of brackets 5 formed at their forward ends with seats or bearings 6 to receive and support the rock shaft 7 carrying the gem holders, etc. Rock shaft 7 forms part of a frame which carries one or more devices for holding the stones, and a device for holding a pattern or form whose shape is that of the finished gem, said form serving as a guide for the stone holding devices. Bearings 6 are preferably formed as angular

troughs allowing removal or detachment of the shaft 7 therefrom and bringing said shaft accurately to center when placed thereon. An operating shaft 9 journaled in the bearing on a bracket 10 extending from the standard 4 is provided with a driving pulley 11 and with an eccentric 12 whose strap 13 is connected to a collar 14 clamped by set screw 15 onto the rock shaft 7 to reciprocate said rock shaft longitudinally through a definite stroke. An arm or stud 16 extends upwardly from a collar 17 fastened on the shaft 7 by clamping screw 18. A carrier member 20 is mounted on the said stud 16 to turn around the same and is provided with a form holder or means for supporting the form. Said means consists of a sleeve 22 mounted to turn in a transverse bore in the carrier 20 and having a collar 24 at one end whereby it may be retained in place. The form 25 is provided with a shank or stem 26 extending through a fitting in said sleeve and screw-threaded at its rear end to receive a suitable fastening device such as a nut 27 whereby the form may be fastened on the sleeve. The form consists of a rounded head on said shank, the shape of said head conforming to the shape of the gem or stone to be cut and polished.

Means are provided for moving the form carrier throughout definite angles in vertical and horizontal planes and means are also provided for engaging with the form during such movement to control the position of the carrier frame and the rock shaft in accordance with the form. The means for engaging the form may consist of a rest plate formed as a disk 29 having a plane smooth surface against which the form 25 rests, said disk having a shank 30 screwing in a standard or support 31 whereby it may be horizontally adjusted forwardly or rearwardly of the machine, the adjustment being such that at all times during the operation of the machine the form 25 will rest against the face of said disk by gravity, the carrier frame supported by the rock shaft 7 tipping somewhat to the rear of the vertical as shown in Fig. 3, a weighted arm 33 being provided to increase the rearward pressure.

The machine is shown as adapted for simultaneous grinding of two gems and will be so described, but it will be understood that one or any number of gems may be provided for in the same machine. Extending upwardly from the rock shaft 7 are

two studs 36 similar to the studs 16 and fastened to the shaft 7 by split collars 36' secured by clamp screws 38 in such manner that the said studs 36 extend parallel to the stud 16, each stud 36 supports a rotatable gem carrier 40 mounted to turn thereon and provided with a transverse bore in which is journaled a sleeve or gem holder 42 having retaining screw 44 and supporting the dop-stick 45 which extends therethrough and fits therein and is held in position by clamp nut 47 screwing on its rear end. The forward end of the dop-stick is formed with a head 48 which is corrugated as at 49 to provide for closer grip of the cement 50 by which the stone indicated at 51 is secured to the dop-stick. Means are provided for moving the respective carriers 20 and 40 simultaneously and similarly in horizontal and vertical planes. The means for rotative operation in a horizontal plane is preferably controlled by the longitudinal reciprocation of the supporting rock shaft 7, said means consisting of arms 52 extending respectively from the members 20 and 40 and having their rear ends pivotally connected to a bar 53 provided with a pin 54 projecting through a slot 55 extending forwardly and rearwardly in a bracket 56 on the standard 4, so that as the members 20 and 40 move longitudinally with the rock shaft in the reciprocation thereof, this guiding action of the pin 54 on the bar 53 will cause partial rotation of the said members 20 and 40 through a definite angle in a horizontal plane. The means for rotation of the said members 20, 40 in vertical planes comprises a shaft 57 journaled in a carrier frame 58 fixed on the rock shaft 7, said shaft carrying a bevel gear 61 corresponding to each gem carrier and to the form carrier, each bevel gear 61 gearing with a bevel gear 59 mounted to turn on a stud 60 at the upper end of the gem carrier or form carrier and gearing by its lower gear portion 62 with a bevel gear 63 fast on the sleeve 22 or 42, as the case may be, of the form holder or dop-stick holder. Shaft 57 is provided with a driving pulley 65 adapted to receive a driving belt or cord for operation thereof.

The operation is as follows: The form 25 which determines the shape of the stone to be cut or ground is placed in the holder 22 and fastened by the means 27. The stone to be cut is cemented on the dop-stick and the dop-stick is secured in the sleeve 42 by the clamping means 47, any desired number of stones being so secured on the machine according to the capacity of the machine. By the connecting means above described the several gem holders and the dop-stick holders and form holder are held with their axes parallel in all positions of the machine and any movement of the form holder is accompanied by a similar move-

ment of each of the gem holders. In the rotation of the pulley 11, the rock shaft 7 is reciprocated longitudinally by the eccentric 12 and the carrier frame 58 and all of the gem carriers and the form carriers partake of this reciprocatory movement. By means of the connection 52, 53 and 54 this reciprocatory movement is caused to impart to each of the gem holders and to the form holder the corresponding partial rotation, so that all of said holders move in unison through a definite horizontal angle. At the same time the driving means 56, 57, 61 and 63 cause the form holder and all of the gem holders to be rotated on their longitudinal axes in unison, the grinding wheels 2 being simultaneously operated by the driving means 3. All parts of each of the gem stones are successively brought against the grinding wheels by the motions of the respective carriers in vertical and horizontal planes and the amount to which each gem stone is cut away is determined or limited by the form, which determines the amount to which the gem holder can move toward the grinding wheels in any particular angular position of the gem holder. Thus an indefinite number of gems can be cut to any determined form corresponding to the shape of the form 25. After the gem stones have been ground as above described to the required form they can be transferred to the polishing head indicated at 67 in Fig. 6, by unshipping the driving belt from the driving pulley 65 and uncoupling the strap connection from the eccentric 12 to the collar 14 by removing nut 68, then lifting the carrier frame bodily onto the journal supports 69 of the polishing head 67 and then coupling up the pulley 65 and rock shaft 7 with the driving belt and eccentric corresponding to the polishing head, it being understood that the polishing head 67 is provided with the same driving means as the grinding head, but in place of grinding wheels it is provided with the usual buffer or polishing wheels indicated at 70.

By unshipping the driving belt from pulley 65 the stone held by the gem holder can be ground in radiating facets, the angular position of the stone being changed to cut in different radii, by turning the shaft 57 to different positions, by hand.

It will be understood that the term "grinding wheels" as herein used includes the polishing wheels, the operation being identical in each case.

What I claim is:—

1. In a gem cutting machine, a rocking frame, two carrier members mounted on said rocking frame to rotate on an axis transverse to the rocking axis of the frame, a form holder and a gem holder carried respectively by the said carrier members, operating means connected to said two carrier

members to turn the same in unison with relation to the rocking frame, means operating on the form holder and gem holder to rotate the same in unison in their bearings in said members, grinding means movably mounted in proximity to the gem holder, and a guide member mounted in proximity to the form holder to control the position of the gem holder by engaging with a form on the form holder.

2. In a gem cutting machine, a grinding head provided with a grinding wheel and means for driving the same, a carrier frame mounted on the grinding head to rock toward and from the grinding wheel, a carrier member mounted on the carrier frame to turn to different angular positions, a sleeve rotatably mounted in said carrier member to turn on an axis transverse to the axis of movement of the carrier member, a gem holder carried by said sleeve, driving means connected to rotate said sleeve, and means for controlling the angular position of the carrier member.

3. In a gem cutting machine, a grinding head provided with a grinding wheel and means for driving the same, a carrier frame mounted on the grinding head to rock toward and from the grinding wheel, a carrier member mounted on the carrier frame to turn to different angular positions, a sleeve rotatably mounted in said carrier member to turn on an axis transverse to the axis of movement of the carrier member, a gem holder carried by said sleeve, driving means connected to rotate said sleeve, means for controlling the angular position of the carrier member, comprising a second carrier member mounted to move to different angular positions with respect to the carrier frame, a sleeve rotatably mounted in said second carrier member to rotate on an axis transverse to the axis of movement of said carrier member, a form holder secured to said sleeve, a guiding member engaging said form holder and supported in fixed relation to the grinding head, means for rotation of the form holder sleeve in unison with the gem holder sleeve, and means for moving said carrier members in unison to different angular positions.

4. In a gem cutting machine, a grinding head provided with a grinding wheel and means for driving the same, a carrier frame mounted on the grinding head to rock toward and from the grinding wheel, a carrier member mounted on the carrier frame to turn to different angular positions, a sleeve rotatably mounted in said carrier member to turn on an axis transverse to the axis of movement of the carrier member, a gem holder carried by said sleeve, driving means connected to rotate said sleeve, means for controlling the angular position of the carrier member, comprising a second carrier

member mounted to move to different angular positions with respect to the carrier frame, a sleeve rotatably mounted in said second carrier member to rotate on an axis transverse to the axis of movement of said carrier member, a form holder secured to said sleeve, a guiding member engaging said form holder and supported in fixed relation to the grinding head, means for rotation of the form holder sleeve in unison with the gem holder sleeve, and means for moving said carrier members in unison to different angular positions, comprising a bar pivotally connected to said carrier members, a guide engaging said bar to constrain its motion to a forward and rearward direction with respect to the grinding head, and means for reciprocation of the carrier frame.

5. In a gem cutting machine, the combination with a supporting means, two carrier members mounted to rotate on said means on parallel axes, means operating on said carrier members to move the same angularly in unison, a form holder and a gem holder mounted to rotate on parallel axes on said carrier members respectively, gearing connected to said form holder and gem holder to rotate the same in unison, grinding means in proximity to the gem holder, and guiding means mounted in proximity to the form holder to control the position of the gem holder in engagement with the form holder.

6. In a gem cutting machine, a grinding head provided with a grinding wheel and means for driving the same, a carrier frame mounted on the grinding head to rock toward and from the grinding wheel, a carrier member mounted on the carrier frame to turn to different angular positions, a sleeve rotatably mounted in said carrier member to turn on an axis transverse to the axis of movement of the carrier member, a gem holder, means for detachably clamping said gem holder in said sleeve, driving means connected to rotate said sleeve, and means for controlling the angular position of the carrier member.

7. In a gem cutting machine, a plurality of angularly movable carrier members, means for moving said carrier members in unison and a rotatable sleeve mounted to rotate in each carrier member transversely to the motion of the carrier member, means for rotating said sleeves in unison, a form holder, means for detachably clamping said form holder in one of said sleeves, fixed guiding means for engaging said form holder, a gem holder, and means for detachably clamping the gem holder in the other said sleeve.

8. In a gem cutting machine, two carrier members mounted to turn in horizontal planes, means for angularly moving said carrier members in unison, in horizontal planes, a gem holder and a form holder journaled respectively in said carrier to turn in verti-

cal planes, gearing connecting said holders to rotate the same in unison in their carrier members, and grinding means adjacent to the gem holder.

5 9. In a gem cutting machine, a movable grinding means, a guide means, two carrier members mounted to be movable toward and from said grinding and guiding means respectively, a gem holder and a form holder
10 journaled respectively in the said carrier members to rotate in vertical planes, means for rotating the said form holder and gem holder in vertical planes, and means connected to the two carrier members to turn the
15 same in unison in horizontal planes.

10. In a gem cutting machine, a movable grinding means, a guide means, two carrier members mounted to be movable toward and

from said grinding and guiding means respectively, a gem holder and a form holder 20 journaled respectively in the said carrier members to rotate in vertical planes, means for rotating the said form holder and gem holder in vertical planes, and means connected to the two carrier members to turn 25 the same in unison in horizontal planes, and for periodically reversing the direction of such horizontal turning.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 30 18th day of May 1909.

CHARLES G. HULL.

In presence of—

ARTHUR P. KNIGHT,
FRANK L. A. GRAHAM.