2 Sheets—Sheet 1.

A. HESSELS.

Machine for Cutting Diamonds.

No. 216,855. Patented July 1, 1879.

Fig: 1.

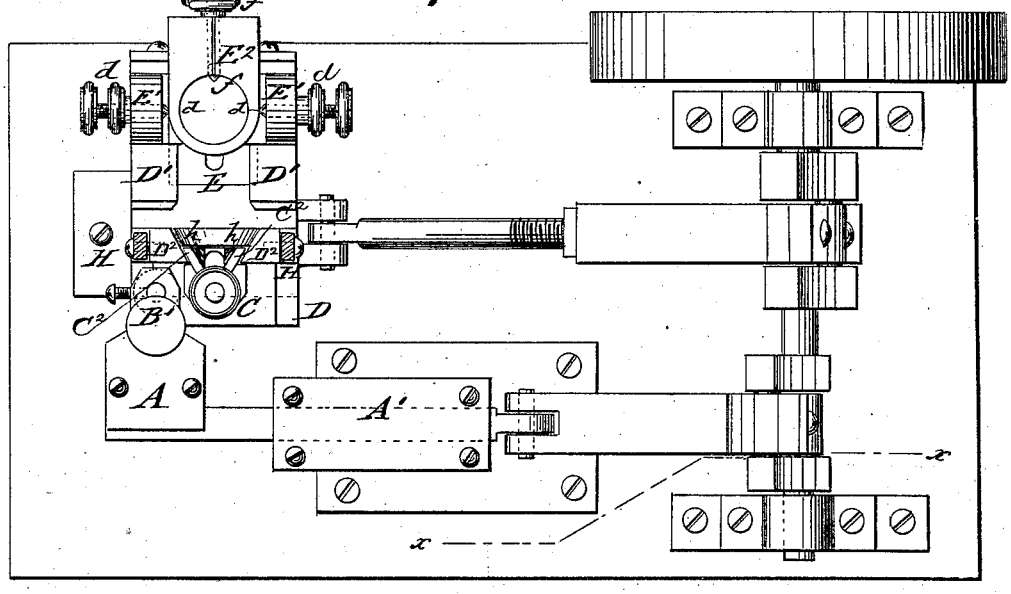
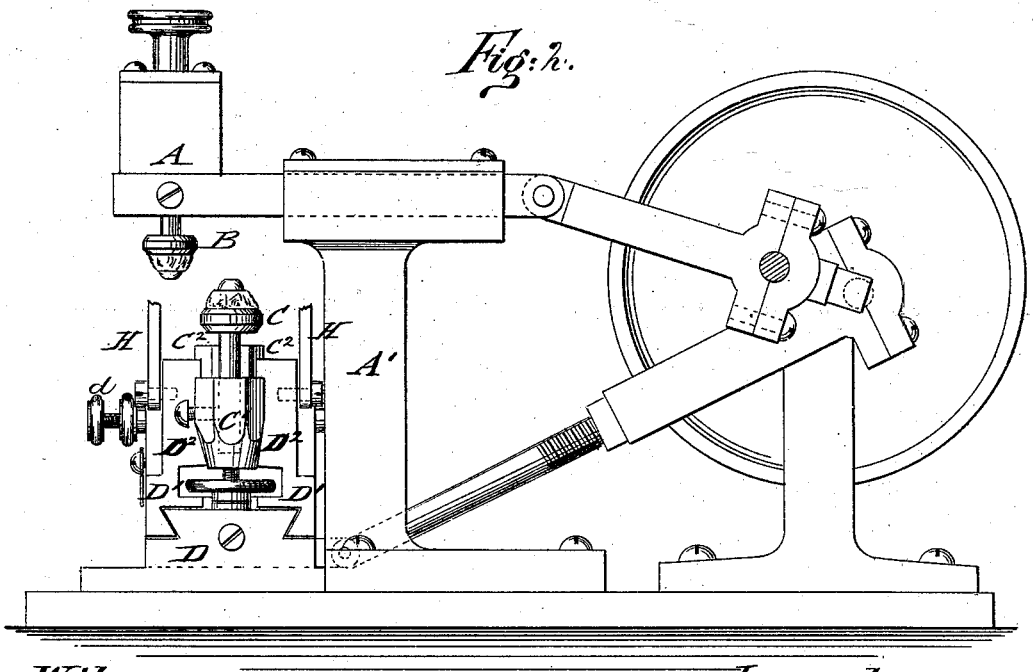


Fig: 2.



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Inventor:
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A. HESSELS.

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Fig: 3.

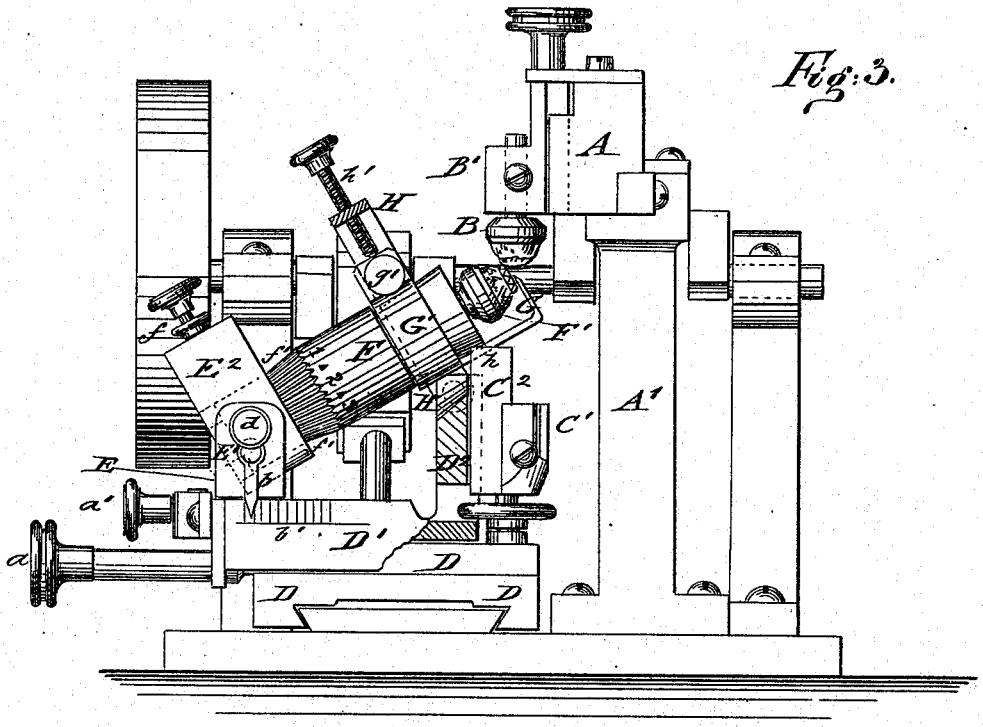


Fig: 4.

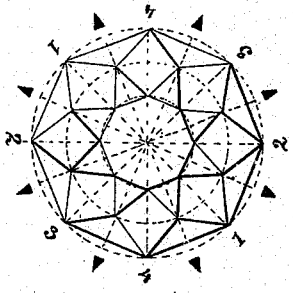


Fig: 5.

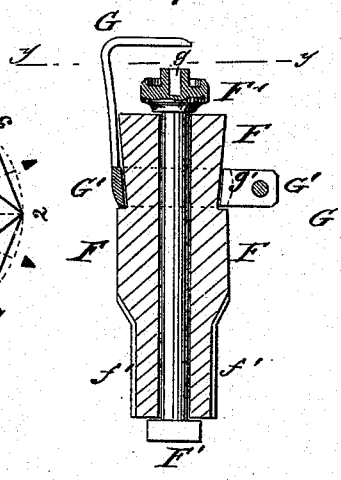
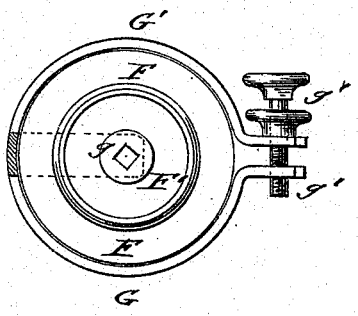


Fig: 6.



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UNITED STATES PATENT OFFICE.

ANTHONY HESSELS, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR CUTTING DIAMONDS.

Specification forming part of Letters Patent No. **216,955**, dated July 1, 1879; application filed April 5, 1879.

To all whom it may concern:

Be it known that I, ANTHONY HESSELS, of the city, county, and State of New York, have invented certain new and useful Improvements in Machines for Cutting Diamonds, of which the following is a specification.

In the accompanying drawings, Figure 1 represents a top view of my improved machine for cutting diamonds with the inclined dop-cylinder and its stirrup removed. Fig. 2 is a side elevation, partly in section, on line *x x*, Fig. 1, and Fig. 3 is a sectional end elevation of the same. Fig. 4 is a diagram illustrating the facets of a diamond and the graduation of the dop-carrying cylinder. Fig. 5 is a detail vertical central section of the dop-cylinder, and Fig. 6 a top view of the same on an enlarged scale and partly in section on line *y y*, Fig. 5.

Similar letters of reference indicate corresponding parts.

This invention is intended to furnish an improved machine for cutting diamonds, so that the present slow and tedious process of cutting them by hand may be dispensed with and a more accurate cutting of the facets than by hand obtained at a considerable saving of time and labor.

The invention consists of a horizontally-reciprocating socket-frame and dop, to which the cutting-diamond is cemented, in connection with an alternately-reciprocating carriage, which carries a laterally-adjustable frame that supports an inclined cylinder and dop containing the diamond to be cut. The adjustable supporting-frame also carries a vertically-adjustable standard for inserting a dop for cutting the table and cullets of the diamond. The lower part of the dop-cylinder is secured, by parallel longitudinal grooves, into a pivoted clamp-socket of an auxiliary slide-frame, so as to be adjusted axially therein for setting the diamond for cutting the facets. An adjustable spring-holder is attached, by a clamping-roller, to the conical neck of the dop-cylinder for retaining the dop securely in position therein for cutting the facets. A swinging stirrup and set-screw serve to retain the dop-cylinder rigidly in position on the concave seats of the vertically-adjustable standard at the end of the laterally-adjustable frame. The auxiliary frame, to which the clamp-socket of the cylinder is pivoted, is also laterally adjustable by means of a set-screw, and serves, in connection with the end standard, to set the cylinder to the proper angle of inclination in the supporting-frame for cutting the facets of different inclinations. The auxiliary frame is adjusted by an index on the graduated side of the lateral slide-frame, and the vertical standard by an adjusting screw-nut along its guide-posts, for accurately setting the cylinder to the proper degree of inclination.

Referring to the drawings, A represents the horizontally-reciprocating frame of the upper cement stick or dop, B, which frame is guided in bearings of a vertical standard, A′, and set in motion by a crank-rod connection with the driving crank-shaft. The top frame, A, carries a vertically-adjustable socket, B′, into which the dop B, that carries the cutting-diamond, is secured by a set-screw, the socket being also arranged with an approved feed mechanism (not shown in the drawings) for feeding the cutting-diamond in downward direction, so that it gradually abrades the facets on the diamond to be cut. The rough-cutting diamond is cemented to the vertical dop or stick in the usual manner, and employed for cutting the facets, &c., of a second diamond, that is reciprocated below the same.

The diamond to be cut is first cemented into a second dop or stick, C, which is set into a socket, C^1, of a vertically-adjustable standard, C^2, below the socket of the cutting-diamond. The standard C^2 is guided along fixed vertical posts D^2 of a laterally-adjustable slide-frame, D^1, that is guided on a carriage, D, to which reciprocating motion is imparted on the bed-frame from the driving crank-shaft in the same direction as the top frame, but alternately therewith, so that the diamonds are always simultaneously carried toward and past each other. The vertical standard and dop serve for cutting the table or horizontal top facet of the diamond, and then, after reversing the diamond, for cutting the cullet or small horizontal bottom facet of the diamond. For the cutting operation the axis of the lower diamond is brought exactly in line with the

axis of the upper or cutting diamond by means of the slide-frame D^1, which is adjusted by a screw, *a*.

The screw *a* is continuously turned by the fingers or by suitable mechanism, so that the slide-frame is laterally reciprocated below the cutting-diamond, and thereby a perfectly smooth plane for the facets obtained. On the slide-frame D^1 is guided a second auxiliary frame, E, which is adjustable in the same direction as frame D^1 by a screw, *a'*, by which it may be set to any desired position in connection with a fixed index, *b*, along the graduated scale *b'* at the side of frame D^1.

The auxiliary frame E carries in side posts E^1 two conically-pointed pivots, *d*, on which frame E swings the clamp-socket E^2 of the inclined dop-carrying cylinder F. The inclined cylinder F is clamped into the socket E^2 by a set-screw, *f*, which enters into one of a series of parallel longitudinal and equidistant grooves, *f'*, at the lower part of the cylinder, the number of which is in exact proportion to the number of facets that are usually cut at the upper part of the diamond. The grooves are extended to some distance above the clamp-socket E^2, and numbered in the manner indicated in Fig. 4, the figures indicating the diametrically-opposite main facets, while the triangular marks indicate the intermediate upper and lower star facets.

By this mechanism the dop-cylinder F may be axially adjusted in a mathematically correct manner, so as to cut a corresponding facet on the diamond cemented to the dop F' of the cylinder. The stem or handle of the dop F' is inserted into a center hole of the cylinder and secured at the lower end by a nut. The top part of the dop F' has a square central socket-hole, into which the lower part of the diamond is inserted after the four lower main facets have been cut.

The diamond-carrying dop F' is further retained in the cylinder by means of a spring-holder, G, which bears on the table of the diamond and is secured to a collar, G', that is clamped tightly by a set-screw and jam-nut, *g'*, to the upper part of the cylinder, to which a slight inward convexity is given, so that the spring-holder in clamping the collar to the cylinder is tightly drawn down on the table of the diamond. The spring-holder is readily adjusted on the cylinder to the different positions required in cutting the different facets, and has the important function of holding the diamond rigidly in position, even if the cement should drop out.

The cylinder is supported in its inclined position on concaved seats *h* of the vertically-adjustable standard C^2, and clamped thereto by means of a stirrup, H, that is pivoted to the guide-posts D^2, and secured tightly to the collar of the spring holder G by a clamp-screw, *h'*. The degree or angle of inclination to which the cylinder has to be set, so as to admit the cutting of the different facets, is obtained by the horizontal adjustment of the auxiliary slide-frame E and by the vertical adjustment of the standard C^2. The graduation of the slide frame D^1, in connection with a graduated nut of the adjusting-screw of the standard C^2, facilitates the quick and accurate setting of the cylinder to the angle required for cutting the main and star facets.

The machine is operated as follows: The rough-cutting diamond is first cemented into the upper reciprocating dop and adjusted to its proper height. The diamond to be cut is then cemented into the socket of the vertical standard below the cutting-diamond. The machine is then set into motion, and the table of the lower diamond cut by the reciprocating movements of the two carriages, in connection with the laterally-reciprocating motion of the main slide-frame, as produced by the screw *a*. The diamond is then removed from the dop and cemented thereto with the table downward, being inserted again into the vertical socket for cutting the small lower plane or cullet. The dop is then set into the inclined cylinder and secured for cutting the four lower main facets. After these are cut the diamond is taken from the dop and set with the lower part into the square socket-hole of the dop of the cylinder and cemented thereto. The upper main and star facets are then successively cut by the simultaneous longitudinal and lateral motions of the parts, the facets at one side being first cut and then that at the diametrically-opposite side, as indicated by the figures and marks on the cylinder. The inclinations of the cylinder at the exact angles required for the facets are obtained by the adjusting devices described. After the upper part of the diamond is entirely cut the additional facets of the lower part are cut in analogous manner, the upper portion of the diamond being then set into a corresponding socket-hole of another dop. When all the facets are cut the diamond is polished in the usual manner.

By my machine the facets are cut in mathematically accurate manner, without the irregularities incidental to hand-cutting, and thus diamonds of increased brilliancy and refractory power are attained, while the employment of machinery accelerates the cutting and accomplishes it at a considerable saving in time and labor. Thus every diamond receives the so-called "gem-cut," which is the most perfect and regular of cuts.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a horizontal reciprocating top frame having a vertically-adjustable dop-socket with a reciprocating carriage having a vertical standard and dop-socket capable of lateral and vertical adjustment thereon, substantially as set forth.

2. The combination of a horizontally-reciprocating top frame having a vertically-adjustable socket for the dop of the cutting-diamond with a longitudinally and laterally reciprocating

dop-cylinder that is capable of being axially adjusted and set to different angles of inclination, substantially as and for the purpose specified.

3. The combination of a reciprocating top frame and cutting-dop with a reciprocating carriage, a laterally adjustable and reciprocating slide-frame, and with an inclined dop-carrying cylinder that is adapted to be set to different angles of inclination, substantially as and for the purpose described.

4. The combination of reciprocating carriage D, having vertically-adjustable standard C^2, laterally-adjustable slide-frame D^1, auxiliary slide-frame E, pivoted clamp-socket E^2, and inclined dop-carrying cylinder F, substantially as specified.

5. The combination of the auxiliary slide-frame E, and of pivoted clamp-socket E^2, having set-screw *f*, with the dop-carrying cylinder F, having parallel longitudinal grooves *f'* at its lower circumference for axially adjusting the cylinder, substantially as specified.

6. The combination of the dop-carrying cylinder F, having a conical upper part, with a spring-holder, G, collar G', and clamp-screw *g'*, for securing the diamond to the dop, substantially as set forth.

7. The combination of the pivoted dop-cylinder F with a vertically-adjustable supporting-standard, C^2, and with a retaining stirrup, H, pivoted to posts of slide-frame D^1, substantially as described.

8. In a diamond-cutting machine, the combination of the pivoted dop-cylinder F with the vertically-adjustable standard C^2, having concave seats *h* for the cylinder, substantially as and for the purpose described.

9. The combination of the adjustable cylinder F, having a central hole, with a diamond-carrying dop, F', whose stem is passed through the cylinder and secured at the lower end of the same, substantially as set forth.

10. In diamond-cutting machines, a dop having a raised center position, with a central socket-hole for inserting the diamond, substantially as specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 2d day of April, 1879.

ANTHONY HESSELS.

Witnesses:
PAUL GOEPEL,
CARL KARP.