(No Model.)

L. H. STERN & T. W. G. COOK.

MACHINE FOR GRINDING AND POLISHING DIAMONDS.

No. 605,193. Patented June 7, 1898.

Fig. 5.

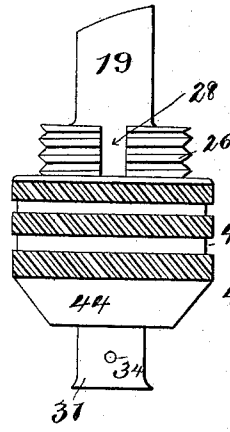
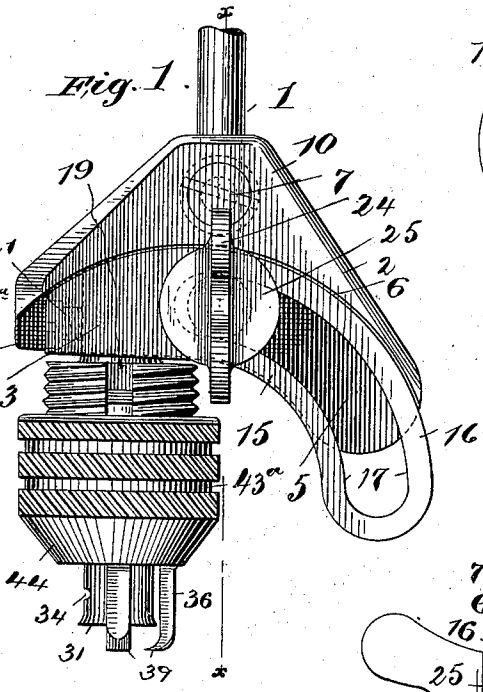


Fig. 1.



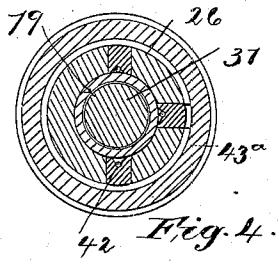


Fig. 4.

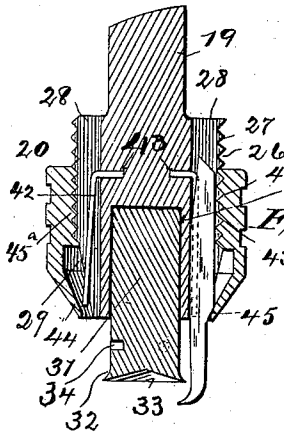


Fig. 6

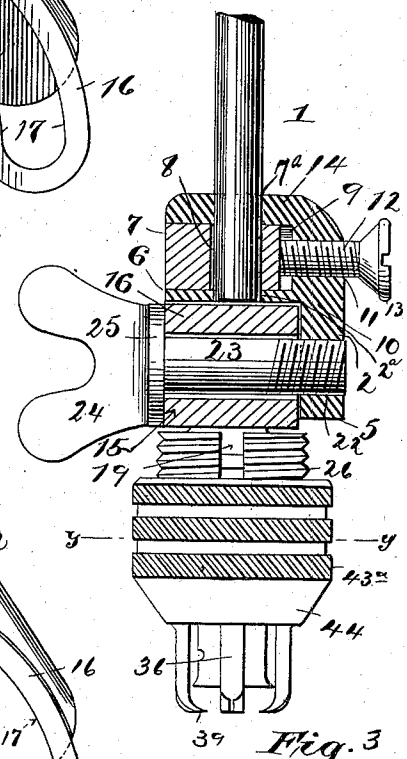


Fig. 3

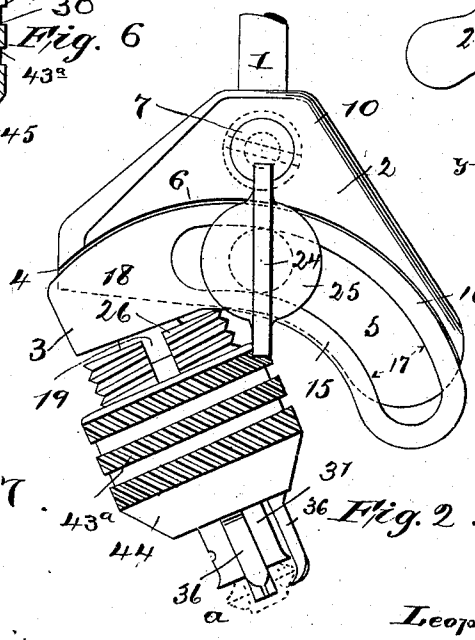


Fig. 2.

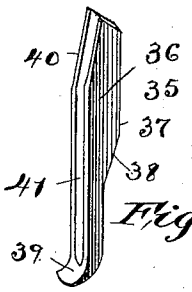


Fig. 7.

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UNITED STATES PATENT OFFICE.

LEOPOLD H. STERN AND THOMAS W. G. COOK, OF NEW YORK, N. Y.; SAID COOK ASSIGNOR TO SAID STERN.

MACHINE FOR GRINDING AND POLISHING DIAMONDS.

SPECIFICATION forming part of Letters Patent No. 605,193, dated June 7, 1898.

Application filed August 27, 1897. Serial No. 649,713. (No model.) Patented in Belgium November 30, 1897, No. 131,964.

To all whom it may concern:

Be it known that we, LEOPOLD H. STERN and THOMAS W. G. COOK, citizens of the United States, residing in the city, county, and State of New York, have made certain new and useful Improvements in Machines for Grinding and Polishing Diamonds and the Like, of which the following is a specification, for which Belgian Letters Patent No. 131,964, dated November 30, 1897, have been granted.

Our improvements have reference to devices designed for the purpose of holding a diamond in a stationary position relative to a grinding or polishing tool, such holding-tools being termed in the art a "dop." Our improvements in this regard have special reference to the chuck or means for confining the stone in its position and also means for varying the angle of presentation of the stone while secured in the dop. To this end we have devised a device which involves a supporting-rod adapted to be secured to a stand or frame usually employed in this art, the supporting-rod carrying a casting forming one section of the dop and which may be fixedly or preferably detachably secured thereto and a second dop-section provided with a segmentally-slotted arm movable in a recess formed in the first or stationary dop-section, the second dop-section carrying a chuck extending radially from the arc of the slot or line of movement of the second dop-section, which chuck carries means for confining a diamond therein, comprising a plurality of holding-fingers which as a group are capable of being bodily and simultaneously moved to or from the stone and which are also capable each of an independent movement to or from the stone or seat therefor.

Our invention further contemplates certain combinations of parts hereinafter described, and further pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of a dop with the chuck in position to present the table or collet of the stone to the grinding or polishing tool, the axis of the chuck being parallel to the perpendicular axis of the supporting-stem; Fig. 2, a like view showing the chuck adjusted to present the stone at an angle to the grinding or polishing tool for the purpose of grinding or polishing one of the facets thereof. Fig. 3 is a sectional elevation substantially on the line x x, Fig. 1. Fig. 4 is a transverse sectional view through the chuck, substantially on the line y y, Fig. 3. Fig. 5 is a front elevation of the chuck; Fig. 6, a sectional elevation through the center of the chuck, one of the gripping-fingers being removed to illustrate the spring; and Fig. 7 is an enlarged perspective view of one of the gripping-fingers detached.

Similar numerals of reference indicate corresponding parts throughout the several views.

Our device is intended to be employed in precisely the same manner as the original dop long in use, which latter consists of a supporting-stem adapted to be detachably secured to a frame to hold the dop in juxtaposition to a grinding or polishing tool and a casting having an aperture for the reception of soft metal to hold the stone, the supporting-stem being of malleable metal capable of being bent to present the stone in its various angles to the grinding or polishing tool. It is our aim to keep as closely to this old-fashioned tool as possible in order that the workmen's skill in the use of the old-fashioned dop can be employed in the use of our device without (to any material extent) altering their methods acquired by long practice. Our device therefore embodies the following essential elements: the supporting-stem 1, which may be made of malleable metal or otherwise and of any desired length or configuration and which is adapted to be secured to the support or frame employed in this art, a stationary dop-section 2, and a movable dop-section 3, the movable dop-section carrying a plurality of gripping-fingers movable in the direction of their length and having a plane of movement radial to the direction of movement of the adjustable dop-section.

With this brief statement of the essentials of our invention we will proceed to describe the details of construction of the device embodying the same.

The dop-section 2 is a casting of any desired shape, except that it is provided in its lower portion with a segmental recess 4, defined by the depending web 5 and segmental

crown-piece 6, the latter only being of necessity segmental.

To secure the supporting-stem 1 in the dop-section 2, we can employ any preferred construction which will allow of the ready detachment of the said section and rod. However, we consider the following construction especially valuable in this connection, the same consisting of the circular plug 7, having a vertical aperture 8 passing entirely therethrough, which aperture is of greater diameter than the rod 1, the plug being circular and movable in a circular aperture 9, extending transversely into the top or head 10 of the dop-section 2. The head 10 on the reverse side is provided with a threaded aperture 11, which aperture is in line with the aperture 9 and opens into the same, in which latter aperture 11 is movable the threaded stem 12 of the set-screw, having an enlarged head 13 exterior to the dop-section 2.

It is clear that by turning up the screw 12 the plug 7 will be moved outwardly, carrying with it the rod 1, which passes through alining apertures 1^a 2^a in the crown-piece 6 and the roof 14 of the dop-section and which also passes through the aperture 8 in the plug, pressing the parts of the rod 1 which lie in the said apertures in the head of the dop-section against the adjacent metal, tightly confining the rod in place, and by a reverse movement on the part of the same the plug may be loosened, allowing the rod to be readily withdrawn.

The second or adjustable dop-section (indicated generally by the numeral 3) comprises a plate 15, the upper edge 16 of which is disposed in an arc concentric with that of the crown-piece 6 of the section 1 and is provided at one end with a circular slot 17 of a coincident arc and at the other end with a solid projection 18. The plate 15 is adapted to lie snugly within the angular recess formed by the depending flange 5 and crown-piece 6 of the stationary dop-section, so that all the parts are snugly brought together, it being preferred that the inner end of the slot 17 should terminate approximately at the vertical axis of the supporting-rod 1, for a purpose hereinafter described.

The extension 18 of the plate 15 is provided with a transverse aperture, (shown in dotted lines, Fig. 1,) which receives the stem 19 of the chuck, (generally indicated in the drawings by the numeral 20,) a set-screw 21 (dotted lines, Fig. 1) passing through a threaded aperture in the end of the extension 18 to detachably secure the chuck-stem in position. These parts not being essential we have not shown them in full in the drawings. The depending web 5 of the section 2 is provided with a transverse aperture 22, adapted to receive the threaded stem 23 of a thumb-screw 24, the stem passing through the slot 17 in the plate 15, the thumb-screw having an enlarged head 25, adapted to bear against the outer face of the plate 15. By screwing up on the screw 23 the plate 15 is held against the depending web 5 of the section 2, holding the chuck-stem in the desired position, and by loosening the screw the plate can be moved in a circular path about the screw-stem 23, carrying the chuck-stem with it in these movements, and then secured in the foregoing manner, holding the chuck in the desired position of adjustment relative to the grinding-tool, which latter is generally horizontal in relation to the position of the supporting-stem 1.

The chuck is constructed as follows: At the lower end the stem 19 is widened out to form outwardly-extending segments 26, screw-threaded, as at 27, exteriorly, between which segments and formed by the same are longitudinal grooves or channels 28, the lower end of the segments being cone-shaped, as at 29, preferably, and free from any thread.

At 30 is a longitudinal aperture formed in the lower end of the stem 19 and opening out from the bottom, in which aperture is loosely secured a plug 31, so as to be capable of a rotative movement with slight frictional contact in the aperture, the extreme lower end of the plug being slightly flared outwardly, as at 32, and provided with a conical recess 33 to form a seat for the stone, in which seat may be secured soft metal to form a yielding abutment or backing for the stone, the periphery of the plug being provided with small apertures 34 to receive the end of the tool for the purpose of turning the plug in the aperture 30, which is accomplished after the gripping-fingers, hereinafter to be described, are released from their grip on the stone, allowing the stone to be turned or adjusted in the chuck without removing it, the end of the plug abutting against the head of the aperture.

At 35 are the gripping-fingers, comprising the stem 36, provided with an enlarged shank 37 on its outer surface, an inclined shoulder 38 on the same side intermediate between the ends of the finger, and inwardly-projecting gripping-point 39 at one extreme, and an inclined end or shoulder 40 on the same side as the gripping-point 39 at the other end, a channel 41 being formed in the edge of the finger opposite the shoulder 38 and extending from the points 39 to the other end of the finger.

At 42 are small wire springs located in the channels 28, affixed by their bent ends 43 in apertures in the stem 19 and extending outwardly in the channels at an angle to the stem from their point of securement thereto. These springs are adapted to lie in the groove or channel 41 formed in the fingers, as shown in Fig. 6, the fingers being movable up and down in the grooves or channels 28 and over the springs 42, each simultaneously, as hereinafter described, or independent of each other. At 43^a is a cap provided with a conical head 44, the extreme of which is rounded to form a circular shoulder 45, (shown more plainly in Fig. 6,) the upper end of the cap 43^a being enlarged at 45^a and provided with

a screw-thread 46, adapted to engage the thread 27 on the stem, so as to allow of the cap being moved up and down, the cap 43ª being enlarged interiorly to allow of a play of the spring and gripping-fingers, as hereinafter described. By moving the cap 43ª upwardly on the stem 19 the curved shoulder 45 of the head 44 is brought to bear against the inclined shoulder 38 of the gripping-fingers, moving their points 39 simultaneously toward the seat 33 of the plug 31. By this means the stone, after being adjusted in its desired position in the seat 33, can be firmly held therein, the springs 42 constantly tending to press the shoulder 38 of the gripping-fingers against the shoulder 45, maintaining them parallel with the stem. The fingers bear against the cap at two points—to wit, 38 and 45ª—and are thus prevented from inopportune vibration. When thus secured in the chuck, the stone can be given any desired angle of inclination to the grinding or polishing tool by moving the plate 15, as before described, the chuck, and therefore the stone, when the axis of the stem 19 is parallel with that of the supporting-stem 1, (in which position the table or collet of the stone is being ground or polished,) lying closely adjacent the center of the dop, the end of the slot 17 being close to the stem 23. In this way the extension of the tool is greatly limited and the parts conveniently compacted together. A further desirable result flowing from this arrangement is that the stone being located close to the axis of the supporting-rod 1 the leverage exerted on the rod through the friction between the stone and the grinding or polishing tool is reduced to a great extent, owing to the nearness of the stone to the axis of the rod.

We employ but three gripping-fingers, located about one-half the periphery of the plug, at suitable distances apart, so as to leave a space at one side of the gripping-fingers, as at *a*, Fig. 2, for the application of the stone (shown therein in dotted lines) to the grinding or polishing tool.

The independent adjustment of the gripping-fingers may be utilized at any stage of the grinding or polishing operation.

When the stones are in the rough—that is, when the stones are of irregular shape—it is very desirable when securing the stone to the seat to allow of various degrees of projection of the gripping-fingers, in order to take hold of the irregular surfaces of the stone. This may be done, preferably, when the cap of the chuck is not in contact with the shoulder 38 of the gripping-fingers, (although it may be done when such contact is present,) and by slightly forcing in the finger and moving the outer end outwardly from the plug 31, the round shoulder 45 of the head 44 providing for this, the inclined shoulder 40 will be brought in contact with the surface of the stem 19, allowing of the inward movement of either of the gripping-fingers to decrease its amount of projection independently of the others. The screw 12 being located on the side of the dop opposite the thumb-screw 24 enables both screws to be operated independently without conflict.

Having described our invention, we claim—

1. In a device of the kind described, the combination of the supporting-rod 1, the stationary dop-section secured thereto, and having a segmental recess in its lower edge, a movable dop-section, a segmental plate provided with a segmental slot forming part of the movable dop-section, means for securing the plate and stationary dop-section together, and a chuck having a plurality of independently-movable gripping-fingers movable in the direction of their length, extending radially from said plate, substantially as described.

2. In a device of the class described, the combination with the rod 1, the dop-section 2 secured to the rod, a segmental recess formed in the lower edge of said section, a plate having an upper edge coincident with said recess, a concentric slot, and a solid projection opposite the slot, a set-screw passing through the slot and into said section, and a chuck with movable holding-fingers extending from said projection, substantially as described.

3. The combination, in a clutch, of a threaded stem, longitudinal grooves formed in said stem, the cap movable on the stem, a plurality of movable gripping-fingers maintained in said grooves and moved by said cap, said fingers projecting outwardly from said cap, each being independently movable in the groove in the direction of their lengths, and a spring held by the stem and bearing against each of the fingers, substantially as described.

4. The combination, in a clutch, of a threaded stem, a plug having a seat rotatably secured in the end of the stem, a cap on the stem and longitudinally-movable gripping-fingers adapted to be moved toward said seat by said cap, substantially as described.

5. The combination, in a clutch, of a threaded stem, longitudinal grooves formed in said stem, a plug rotatably secured in a recess in the end of the stem, said plug having a seat formed in its outer end, a cap on the stem, and longitudinally-movable gripping-fingers in the grooves having ends extending beyond the end of the plug, and adapted to be bodily moved in said grooves in the direction of their length by said cap, substantially as described.

6. The combination, in a clutch, of a threaded stem, longitudinal grooves formed in said stem, a cap movable on the stem, a plurality of gripping-fingers, each being independently movable in said grooves in the direction of their lengths, and springs interposed between one side of the groove and the opposing side of the finger for pressing said fingers against the cap, substantially as described.

7. The combination in a clutch, of the grooved stem, a cap movable thereon, of a plurality of gripping-fingers held between the cap and stem and each capable of an independent sliding movement in the grooves in

the direction of their lengths, the stem being interposed between each of said fingers and separating them from each other, and a spring held by the stem and bearing against each of said fingers, substantially as described.

8. The combination, in a chuck, of a grooved stem, a cap movable thereon, the stem extending through the cap, of one or more gripping-fingers held in said groove between the stem and cap, said finger being movable in the direction of its length independent of the cap and bearing against the cap at two points, and a seat secured to the stem exterior of the cap, the point of the finger being adapted to bear against said seat, substantially as described.

9. The combination in a chuck, of a stem having solid center and a longitudinal groove formed between the exterior of the stem and said center, a cap movable on the stem over the groove, of a sliding gripping-finger maintained in said groove between the stem and cap, and a spring secured to the stem, loosely engaging the inner side of the finger, and adapted to press it against said cap, substantially as described.

10. The combination with the grooved and threaded stem, of the threaded cap movable on the exterior of said stem, a gripping-finger in said groove, a spring secured to the stem and interposed between the stem and inner side of the finger, a seat formed on the stem and projecting out beyond the cap, the finger extending beyond said seat, a contracted head on the cap, and a shoulder on the outer side of the finger between its ends engaging said head, substantially as described.

11. The combination with the grooved stem, of the cap movable on said stem, a gripping-finger in said stem-groove, said finger having a longitudinal groove facing the stem and an exterior shoulder engaging the cap, and a spring secured to the stem and resting in the groove in the finger between it and the stem, substantially as described.

12. In a clutch, the combination with the stem, of the cap movable on the stem, a groove formed in said stem, a gripping-finger having a groove adjacent said stem and a shoulder on the opposite edge, a rounded shoulder on the end of the cap engaging the shoulder on the finger, and a spring on the stem lying in the groove in the finger, substantially as described.

13. The combination with the grooved stem, of the cap movable on the stem over the groove, a spring secured to the stem at one end within the groove, its free end projecting outwardly therefrom, a grooved gripping-finger engaging the said spring and movable lengthwise thereon, a shoulder on the finger engaging a shoulder on the cap, and an inclined shoulder at the inner end of the finger adjacent the stem, substantially as described.

14. The combination with the dop-section 2 having the head 10, of a transverse aperture 9 formed in the head and extending partially therethrough, a threaded aperture 11 formed in the head alining with the aperture 9, a screw having a threaded stem 12 movable in the aperture 11 and adapted to enter the aperture 9, a plug movable in the aperture 9, said plug having a transverse aperture 8, said head 10 having a roof 14 and a crown-piece 6, alining apertures 1^a, 2^a in the crown-piece and roof, and a rod 1 passing through the apertures 1^a, 2^a and 8, the stem 12 abutting against the plug 7, substantially as described.

Signed in the city, county, and State of New York this 24th day of August, 1897.

LEOPOLD H. STERN.
THOMAS W. G. COOK.

Witnesses:
JOSEPH L. LEVY,
WM. JACOBSEN.