No. 768,032. PATENTED AUG. 23, 1904.

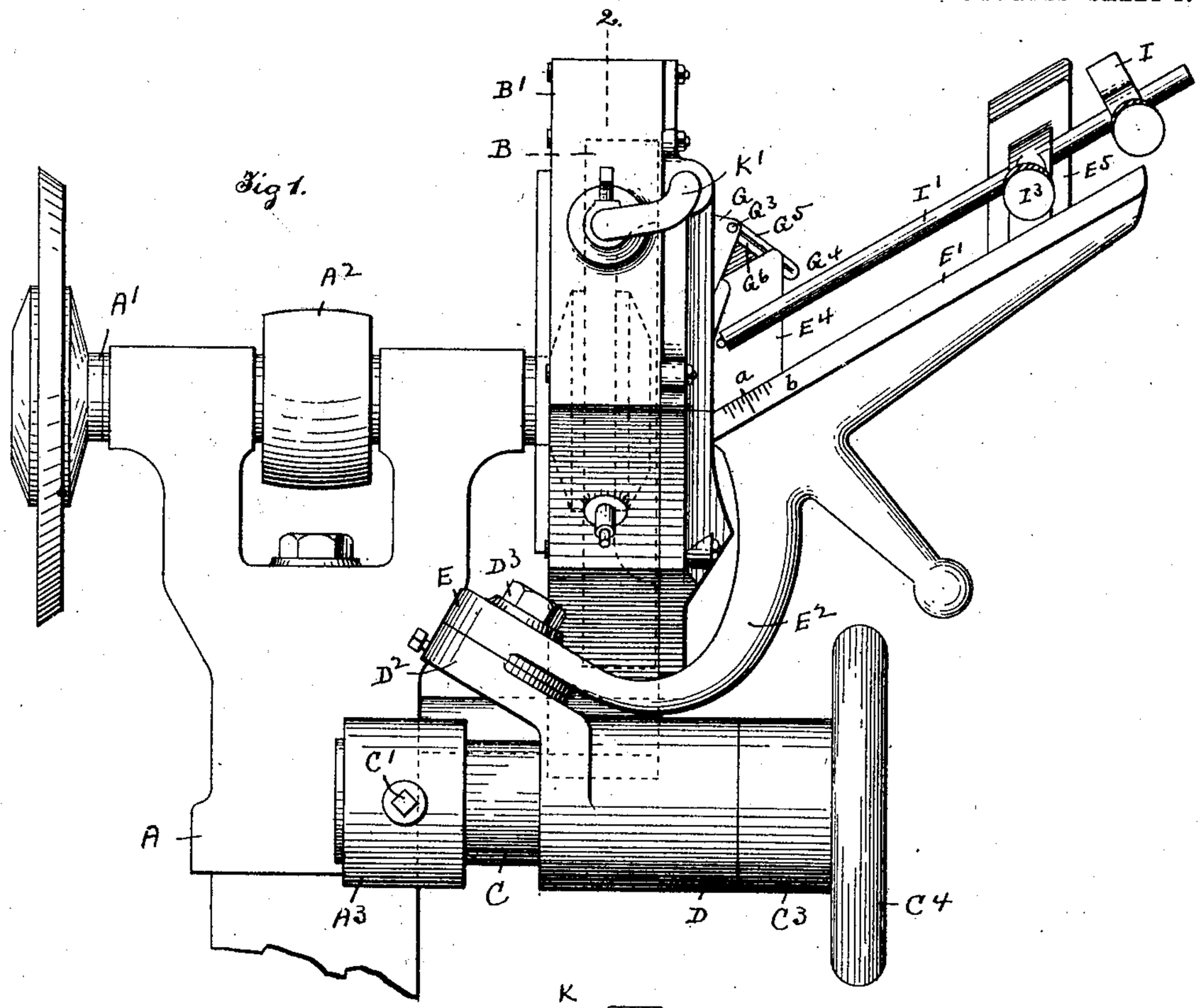
C. A. CHANDLER.

MACHINE FOR GRINDING TWIST DRILLS.

APPLICATION FILED JUNE 3, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

Fig 1.



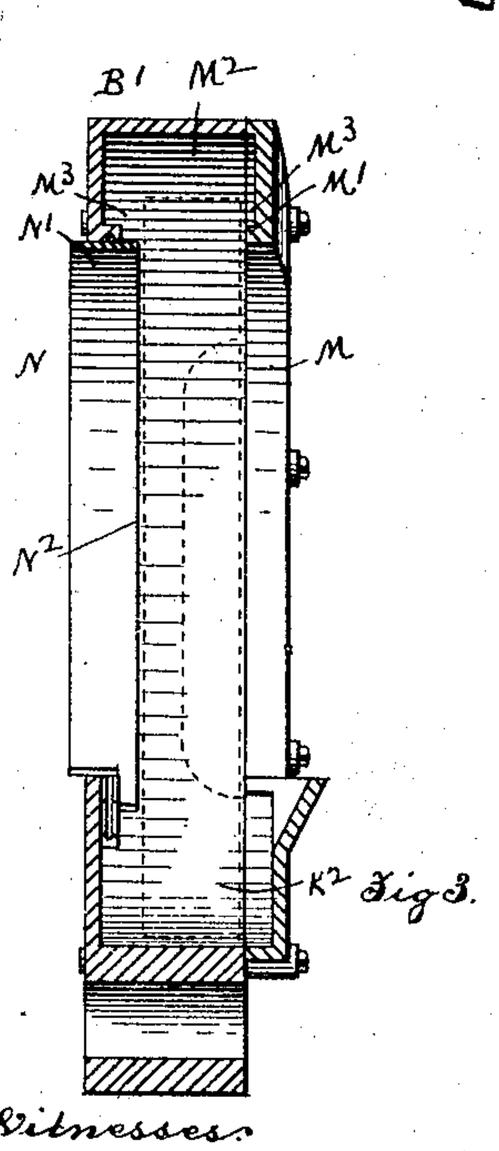


Fig 3.

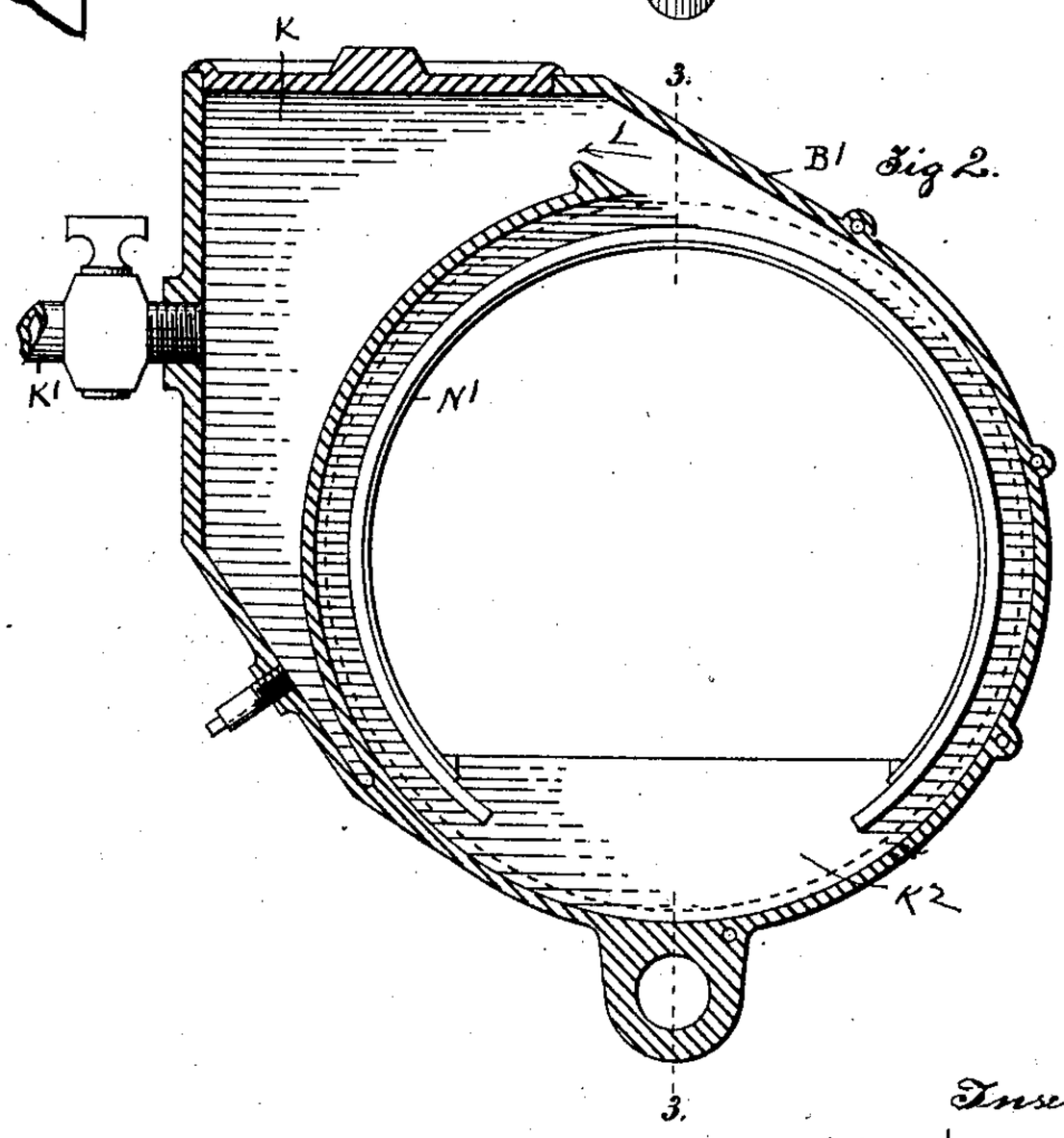


Fig 2.

Witnesses:

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NO MODEL. 3 SHEETS—SHEET 2.

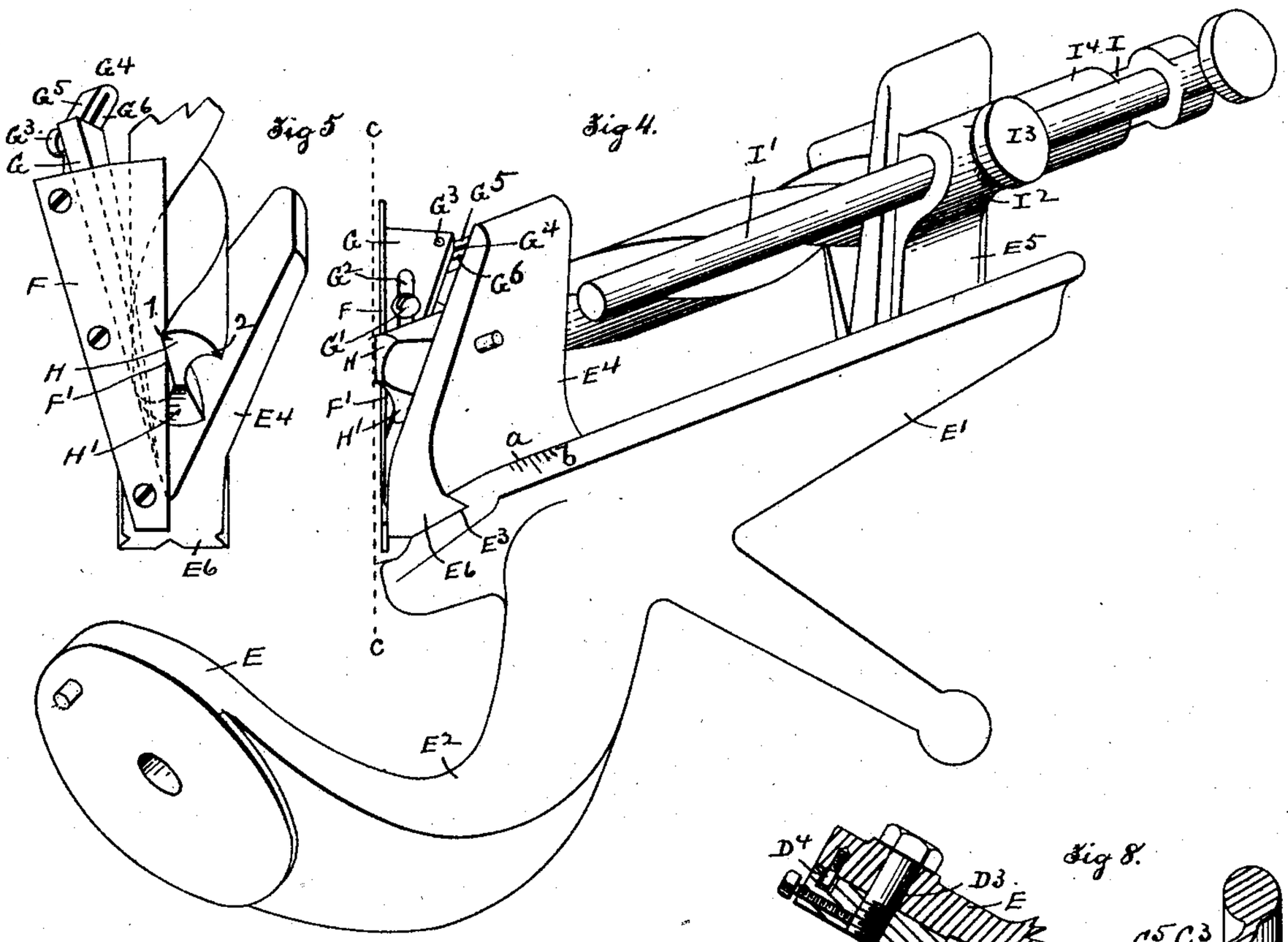

Fig 5

Fig 4.

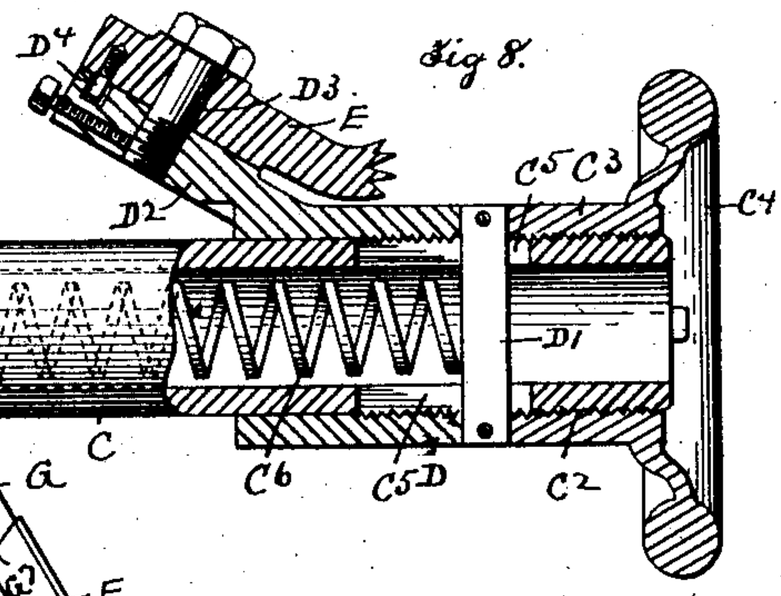

Fig 8.

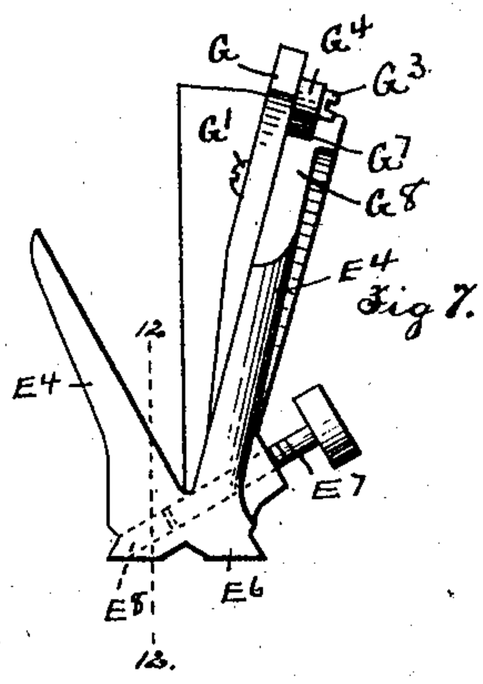

Fig 7.

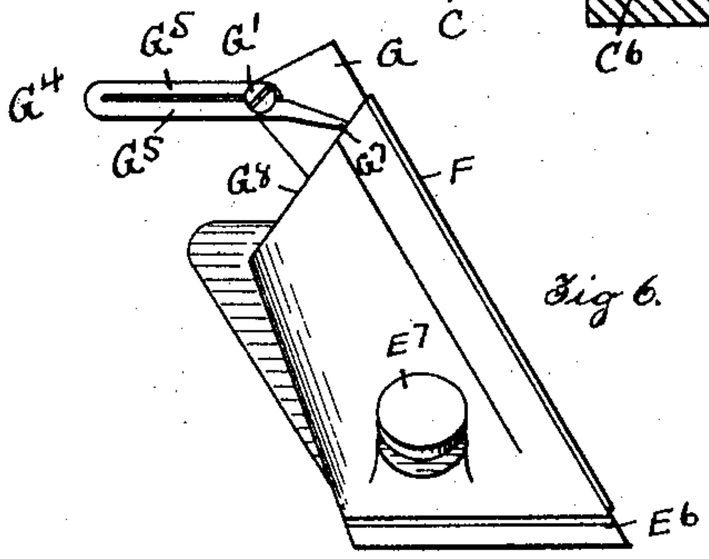

Fig 6.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig 10

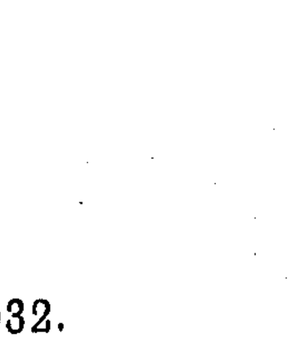


Fig 9

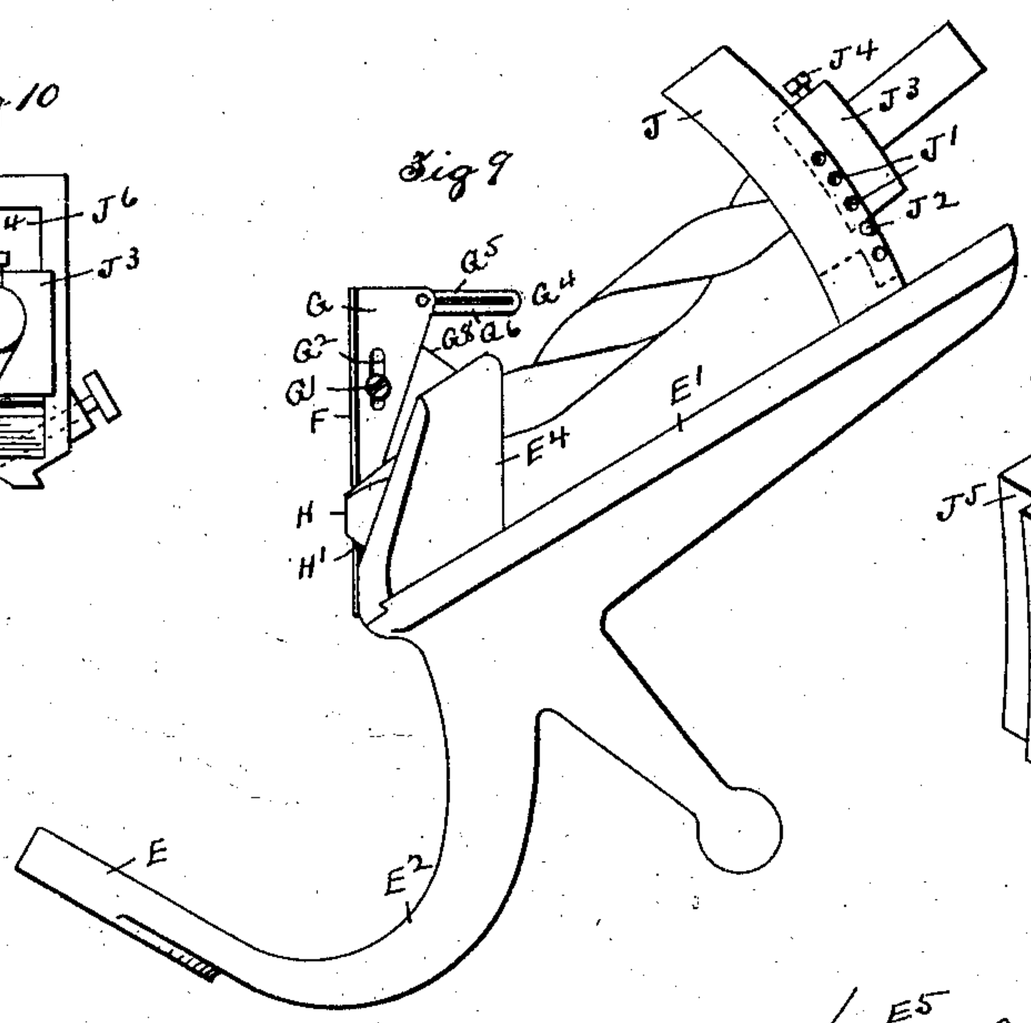


Fig 11

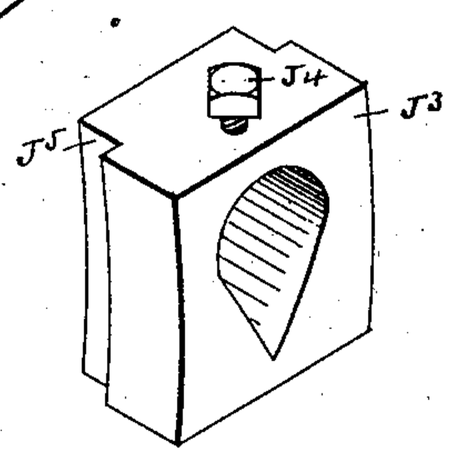


Fig 14.

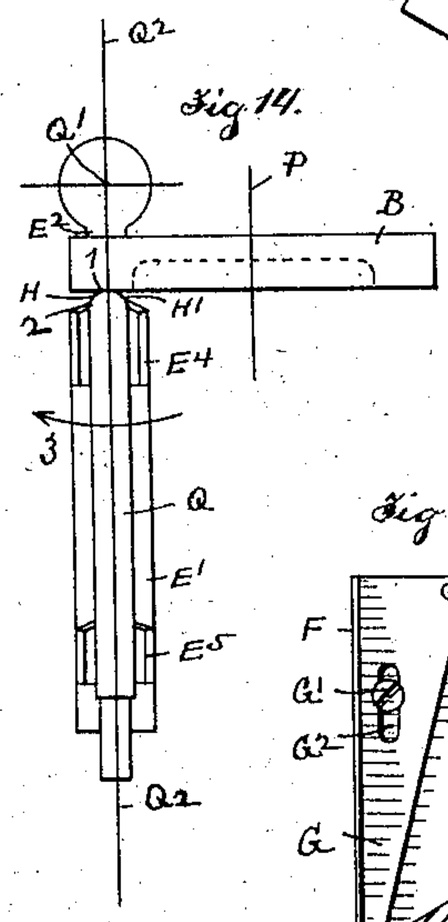


Fig 15.

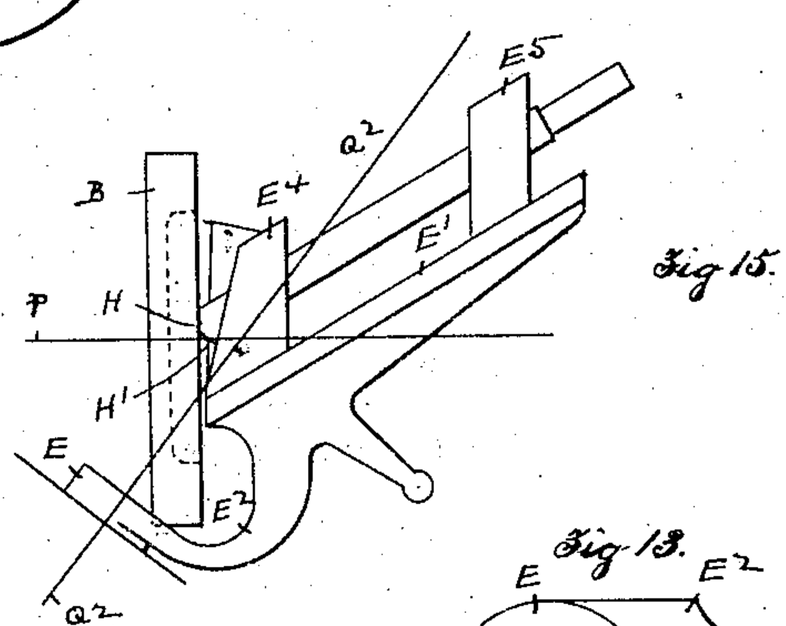


Fig 12.

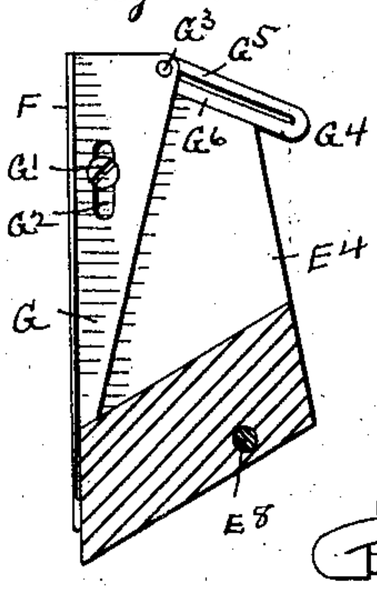


Fig 13.

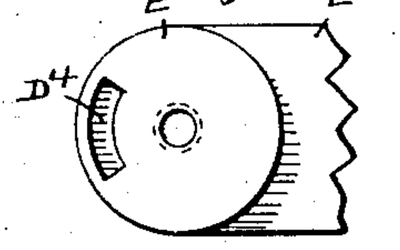
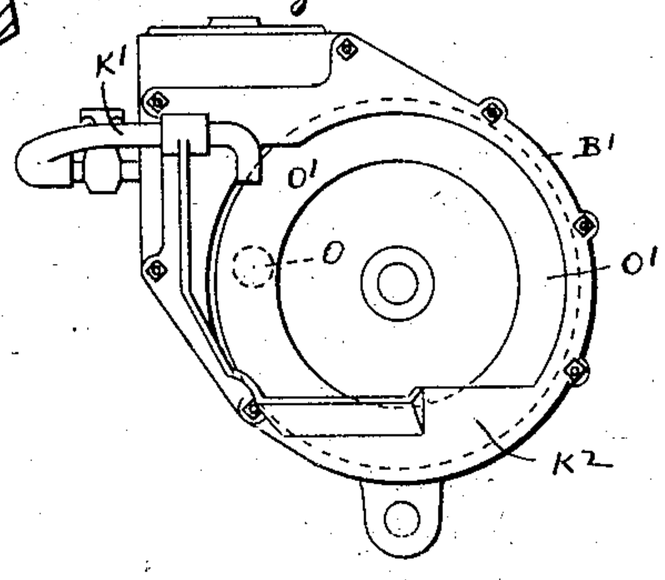


Fig 16.



Witnesses.

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Florence C. Cook

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No. 768,032. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

CLARENCE A. CHANDLER, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR GRINDING TWIST-DRILLS.

SPECIFICATION forming part of Letters Patent No. 768,032, dated August 23, 1904.

Application filed June 3, 1901. Serial No. 62,868. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE A. CHANDLER, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Machines for Grinding Twist-Drills, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

Figure 1 represents a front elevation of a twist-drill-grinding machine embodying my invention, a portion of the supporting-post having been removed. Fig. 2 is a sectional view of the hood inclosing the grinding-wheel and containing the water-reservoir, the section being taken on line 2, Fig. 1. Fig. 3 is a sectional view of the hood on line 3 3, Fig. 2. Fig. 4 is a perspective view of the drill-holder detached from the machine, with a drill held therein. Fig. 5 is an end view of one of the V-shaped supports of the drill-holder and representing the end of a drill resting therein. Fig. 6 is a side view of the V-shaped drill-support nearest the grinding-wheel. Fig. 7 is a rear view of the same. Fig. 8 is a central sectional view of the horizontally-adjustable bracket upon which the oscillating drill-holder is supported. Fig. 9 is a top view of the bracket upon which the oscillating drill-holder is supported. Fig. 10 represents the inner side of the V-shaped drill-support nearest the grinding-wheel, showing the adjustable wedge-shaped stop against which one of the drill-lips rests during the operation of grinding to limit the longitudinal movement of the drill toward the grinding-wheel. Fig. 11 is a side view of a drill-holder provided with means for raising and lowering the shank of the drill in order to vary the angle between the cutting-lip and the axis of the drill. Fig. 12 is a rear view of the curved bracket for elevating the shank of the drill, and Fig. 13 is a perspective view of the collar which is attached to the shank of the drill. Figs. 14 and 15 are diagrammatic views representing the position of the drill-lip which is being ground relatively to its axis of oscillation and to the axis of the revolving grinding-wheel; and Fig. 16 is a diagrammatic view showing the relative position of the grinding-wheel, end of the drill being ground, and water-pipe by which water is supplied to the drill.

Similar reference letters and figures refer to similar parts in the different views.

My present invention relates to a machine for grinding twist-drills in which the drill to be ground is held in the V-shaped supports of an oscillating drill-grinder, with the ground end of the drill the lowest.

The object of my invention is to provide means for determining the proper position of the drill-lips while they are being ground, to provide means for varying the clearance of the drill, to simplify the construction of the drill-holding device, and to provide means for the necesssary adjustment of the drill relatively to the grinding-wheel; and my invention consists in the construction and arrangement of parts by which these objects are accomplished and in other novel details of construction, as hereinafter described, and pointed out in the annexed claims.

In the accompanying drawings I have represented a twist-drill grinder in which the grinding-wheel is inclosed in a hood provided on one side with a water-reservoir for the application of water to the grinding-wheel, whereby water is automatically applied to the wheel and returned to the reservoir by the rotation of the wheel. My present invention, however, does not relate to the devices for applying water to the grinding-wheel or returning it to the reservoir, those features of my twist-drill grinder having been made the subject of a separate application.

Referring to the accompanying drawings, A denotes the upper part of the supporting-post, upon which the operating parts of the machine are mounted.

A′ is a spindle journaled in the post A and carrying a belt-pulley A^2, by which the spindle is rotated. One end of the spindle A′ carries a grinding-wheel B, (indicated by broken lines in Fig. 1,) to the side of which the point of the drill to be ground is applied. The

grinding-wheel B is inclosed within a hood B′, forming a trough in which the grinding-wheel runs and containing a water-reservoir into which the water is raised from the trough by the rotation of the wheel, as hereinafter described. The post A is provided with a projecting lug A^3, in which is held a cylindrical bar C by means of a set-screw C′. The bar C is provided on its outer end with a screw-thread C^2, Fig. 8, carrying a cylindrical nut C^3, provided with a hand-wheel C^4, by which the nut is turned. Capable of sliding on the bar C is a sleeve D, connected on diametrically opposite sides by a cross-bar D′, which passes through and is capable of sliding in the slots C^5 C^5. The hollow cylindrical bar C contains a spiral spring C^6, having one end bearing against the end wall C^7 of the hollow cylindrical bar and its opposite end bearing against the cross-bar D′, with the tension of the spring applied to force the cross-bar and connected sleeve D toward the free end of the cylindrical bar C and hold the end of the sleeve D against the end of the cylindrical nut C^3. The sleeve D is provided with a projecting bracket D^2, which holds a stud D^3 and is provided with a curved concentric slot D^4.

Pivoted upon the stud D^3 is the foot E of the drill-holder, which consists of a bar E′, connected with the foot E by a curved neck E^2 and provided with ways E^3 on its upper surface for the adjustable V-shaped supports E^4 and E^5. The drill-holder, comprising the V-shaped supports, bar E′, and foot E, is capable of being oscillated about the pivotal stud D^3 about an axis coincident with the axis of the pivotal stud D^3, as is usual in drill-grinders of this class, by which the tip of the drill held in the V-shaped supports E^4 E^5 is given a rocking motion past the grinding-surface of the wheel. The twist-drill when in position to be ground is held in the V-shaped supports E^4 E^5. The lower V-shaped support E^4 is provided with a dovetailed base E^6, which is adjustably held in dovetailed ways E^3 of the bar E′ by means of a tightening-screw E^7, arranged to press against a wedge-shaped pin E^8.

The V-shaped support E^4 is provided with an index-mark *a*, and the surface of the bar E′ is graduated at *b* to indicate the position of the V-shaped support E^4, which is moved on the bar E′ to change the position of the point of the drill relatively to its axis of oscillation, which is coincident with the axis of the stud D^3, and thereby vary the clearance of the drill. Attached to the end of the V-shaped support E^4 is a plate with its edge F′ arranged to contact with one of the lips of the drill and form a lip-rest F, by which the drill is held from rotating about its axis. Upon the inside of the V-shaped support E^4 is a wedge-shaped drill-stop G capable of sliding vertically on a stud G′, which passes through a slot G^2 in the drill-stop and is held in one side of the V-shaped support E^4.

The wedge-shaped drill-stop G is provided at its upper end with a stud G^3, which carries a lever G^4, comprising two elastic members G^5 and G^6, which are arranged to pinch the stud G^3 and prevent the lever from turning too freely upon the stud. The tip or toe G^7 of the lever bears against the upper end G^8 of one side of the V-shaped support E^4, which serves as a fulcrum to lift the wedge-shaped support G. In placing the drill in the V-shaped supports E^4 and E^5 the upper lip H of the drill is placed against the lip-rest F and slightly in advance thereof. The wedge-shaped support G is then released and allowed to fall by gravity until its rear edge strikes against the lower lip H′ and serves to hold the drill from longitudinal movement toward the grinding-wheel. The drill-holder is then moved toward the side of the grinding-wheel by rotating the hand-wheel C^4 and cylindrical nut C^3 to slide the sleeve D and bracket D^2 toward the grinding-wheel until the upper lip H of the drill is brought into contact with the side of the grinding-wheel, when the holder is oscillated around the axis of the pivotal pin D^3, thereby imparting a rocking motion to the drill-lip in contact with the grinding-surface of the wheel.

The wedge-shaped support G is then maintained in its position by resting the toe G^7 of the lever G^4 against the V-shaped support, and the drill is then turned one-half a revolution, causing the upper and lower lips to change position when the grinding operation is repeated. By this means both lips of the drill are ground alike by maintaining the wedge-shaped support G in the same position as each lip is ground, provided the drill is symmetrical or the two lips are of the same size in cross-section. In case the drill is unsymmetrical or the lips vary in cross-section the drill is placed in proper position to grind one of the lips and the longitudinal position of the drill in the V-shaped supports is determined by means of a gage I, attached to a rod I′, adjustably held in a lug I^2 on the side of the V-shaped support E^5 by means of a clamping-screw I^3. The gage I is brought against the end I^4 of the drill, as represented in Fig. 4, and the gage is clamped in position to determine the proper position of the drill when it is turned to grind the second lip, the wedge-shaped support G serving to hold the drill from longitudinal movement toward the wheel during the operation of grinding. The V-shaped supports E^4 and E^5 are arranged at the proper angle to hold the drill in proper position to grind the lips at an angle to the axis of the drill usual in twist grind-drills; but in case it is desired to grind the drill at a different angle, forming a sharper point to the drill, I remove the upper V-shaped support E^5 and substitute therefor a curved bracket J, which is adjust-

ably attached to the bar E′ in the same manner already described in reference to the V-shaped support E^4.

The curved bracket J is provided with a series of holes J′ to receive a pin J^2, Fig. 10, which supports a collar J^3, secured to the shank of the drill by means of a set-screw J^4. The collar J^3 is reduced in thickness at J^5 to fit a slot J^6 in the curved bracket, and thereby hold the shank of the drill from lateral movement.

Having described those parts of the twist-drill grinder illustrated in the accompanying drawings to which my present invention relates, I will now briefly describe the method by which water is automatically applied to the surface of the grinding-wheel and automatically returned to the water-reservoir.

The hood B′, inclosing the grinding-wheel, comprises a chamber K, forming a water-reservoir, from which water is conducted by a pipe K′ to a point directly over the lips of the drill, as shown in Fig. 16. The water as it strikes the lips of the drill flows off the end of the drill against the rapidly-revolving wheel and is carried down into the trough K_z at the bottom of the hood, so that the lower edge of the grinding-wheel B runs immersed in water which collects in the trough K^2. The rapid revolution of the wheel B throws the water by centrifugal force in the direction of the arrow L, Fig. 2, into the reservoir K, from which it flows through the pipe K′ upon the drill, thereby causing a constant circulation of the water from the trough K^2 to the reservoir K and from the reservoir K through the pipe K′ back to the trough. The hood B′ is provided with a circular opening M on the front side to allow the drill to be presented to the grinding-wheel and with a similar circular opening N on its rear side in which is fitted an elastic metal band N′, with its inner edge N^2 bearing against the rear side of the grinding-wheel. As the grinding-wheel is reduced in thickness by wear it is moved forward relatively to the hood and the metal band N′ is pushed into contact with the rear side of the wheel in order to close the space between the revolving wheel and its inclosing hood and prevent water being thrown outside the hood by the revolution of the wheel. The front side of the hood B′ is provided with a flange or lip M′, between which and the edge of the metal band N′ the edge of the grinding-wheel revolves, forming an annular chamber M^2 around the periphery of the grinding-wheel slightly wider than the thickness of the wheel and inclosing a space M^3 upon each side of the periphery of the wheel, as shown in Fig. 3, in which the water thrown laterally from the periphery of the wheel is collected and flows over the metal band N′ and the lip M′ back into the trough K^2.

In the diagram Fig. 16 the circle O represents the position of the end of the drill which is being ground relatively to the grinding-wheel, and O′ denotes the mouth of the water-pipe K′, from which water is supplied to the end of the drill, and as the ground end of the drill is the lowest the water will flow over the lips of the drill in contact with the revolving grinding-wheel, thereby preventing the spattering of the water, which is liable to occur when the water is supplied directly to the wheel.

Referring to the diagram Fig. 14, B denotes the grinding-wheel, and the line P denotes its axis of rotation. Q represents the position of the drill in plan view; Q′, the pivotal point of the drill-holder; Q^2, the axis of oscillation of the drill, and E^2 the curved neck of the drill-holder. H denotes the upper lip of the drill or the lip which is being ground, and H′ the lower lip of the drill.

The diagram Fig. 15 represents the tip of the drill against the grinding-wheel or in the position occupied by the drill prior to its oscillation about the pivotal point Q′ by the movement of the shank of the drill in the direction of the arrow 3, Fig. 14, which carries the curved neck E^2 of the holder away from the grinding-wheel as the drill is oscillated in order to bring the entire surface of the drill-lip from the tip 1 to the heel 2 of the lip against the wheel, thereby enabling the curved neck E^2 to be placed in its normal position in close proximity to the hood surrounding the grinding-wheel, permitting a short curved neck to be used, which adds to the rigidity of the holder. This result is accomplished by providing a drill-holder capable of being rocked about an axis of oscillation and holding the drill in proper position to present that lip to the grinding-surface of the wheel which lies outside the axis of oscillation of the drill, so that when the drill is oscillated in the direction of the arrow 3, Fig. 14, in the operation of grinding the shank of the drill will be carried away from the axis of the revolving wheel. If the drill when held upon the left side of the axis P of the grinding-wheel were to be supported in a holder by which the point of the drill would be held the highest, then the lower lip H′ would be presented to the grinding-surface of the wheel, and as this lip would lie between the axis of oscillation Q^2 and the axis P of the grinding-wheel the operation of grinding would require the shank of the drill to be moved toward the axis of the wheel, and this position would require the curved neck E^2 of the drill-holder to be materially increased in length in order to provide the required clearance between the curved neck and hood inclosing the grinding-wheel.

In the above-described drill-grinder I preferably hold the point of the drill the lowest in order to allow the water supplied to the drill to flow off the point of the drill in contact with the grinding-wheel, thereby bringing the upper lip H into contact with the

grinding-wheel, and I therefore locate the drill-holder upon the left side of the axis of the grinding-wheel as the operator faces that side of the wheel. If, however, the drill is supported in the holder with the point of the drill the highest, thereby bringing the lower lip H′ in contact with the grinding-wheel, the drill-holder is placed on the right-hand side of the axis P of the wheel, so as to cause the lip of the drill which is being ground to lie outside its axis of oscillation or upon that side of the axis of oscillation opposite the axis of the grinding-wheel.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for grinding twist-drills, the combination with a grinding-wheel and a drill-holder adapted for supporting a twist-drill and presenting one of its lips to said grinding-wheel, and means for holding the drill from rotation in said holder about its axis, of an adjustable wedge-shaped plate adapted to bear against the other of the drill-lips and hold the drill from longitudinal movement toward the grinding-wheel, substantially as described.

2. In a twist-drill grinder, the combination with a grinding-wheel and a drill-holder for supporting a twist-drill and presenting one of its lips to said grinding-wheel, and means for holding the drill from rotating in said holder about its axis, of a wedge-shaped plate adapted to bear against the other drill-lip and hold the drill from longitudinal movement toward the grinding-wheel, and means for adjusting said plate to determine the longitudinal position of the drill relatively to the grinding-wheel, substantially as described.

3. In a twist-drill grinder, the combination of a V-shaped support for a twist-drill, a lip-rest bearing against one of the drill-lips to hold the drill from rotating in said holder about its axis and a wedge-shaped plate bearing against the other drill-lip to hold the drill from longitudinal movement toward the grinding-wheel, substantially as described.

4. In a twist-drill grinder, the combination of a grinding-wheel. a holder for supporting the drill, a gage for determining the longitudinal position of the drill in the holder, and a movable wedge-shaped plate arranged to contact with one of the drill-lips and hold the drill from endwise movement toward the grinding-wheel, substantially as described.

5. In a twist-drill grinder, the combination of a grinding-wheel and a drill-holder by which the drill is presented to the side of the grinding-wheel, a supporting-bracket for said drill-holder, a pivotal connection between said bracket and said drill-holder, whereby said holder is capable of oscillating about an axis passing obliquely through the side of the grinding-wheel, said holder being inclined to bring that drill-lip lying on the side of the axis of oscillation opposite to the axis of the grinding-wheel into contact with the grinding-wheel, whereby the drill will be swung away from the axis of the grinding-wheel in the operation of grinding the drill, substantially as described.

6. In a twist-drill grinder the combination of a grinding-wheel, a bar parallel with the axis of the grinding-wheel, a sleeve capable of sliding on said bar, a spring applied to crowd said sleeve away from the grinding-wheel, means for moving said sleeve toward the grinding-wheel and against the tension of the spring, and a drill-holder carried by said sleeve, substantially as described.

7. In a twist-drill grinder, the combination with a supporting post or framework and a grinding-wheel journaled therein, of a bracket mounted on said post, a drill-holder pivotally connected to said bracket, a spring with its tension applied to move said bracket and its pivoted drill-holder away from the grinding-wheel, and means for moving the bracket toward the grinding-wheel against the tension of said spring, substantially as described.

8. In a twist-drill grinder, the combination of a grinding-wheel, a bar parallel with the axis of the grinding-wheel, a bracket movable longitudinally on said bar, a drill-holder carried by said bracket, a spring applied to move said drill-holder away from the grinding-wheel, and means for moving said holder toward the grinding-wheel and against the tension of the spring, substantially as described.

9. In a twist-drill grinder, the combination with a supporting-post and a grinding-wheel journaled therein, of a cylindrical hollow screw-threaded bar parallel with the axis of the grinding-wheel and provided with longitudinal slots on diametrically opposite sides, a sleeve capable of sliding on said bar and provided with a projecting bracket, a drill-holder pivotally connected with said bracket, a cross-bar attached to opposite sides of said sleeve and extending diametrically through said slotted hollow bar, a spiral spring inclosed in said bar and bearing against said cross-bar to move the drill-holder away from the grinding-wheel, and a nut on said screw-threaded hollow bar bearing against said sleeve, whereby the drill-holder is carried toward the grinding-wheel, substantially as described.

10. In a drill-grinder, the combination with a grinding-wheel and a drill-holder adapted to hold a drill and present its lips to the grinding-wheel, of a spring applied to move the drill-holder away from the grinding-wheel, and means acting against the tension of said spring to positively move the drill-holder toward the grinding-wheel, substantially as described.

Dated this 28th day of May, 1901.

CLARENCE A. CHANDLER.

Witnesses:

RUFUS B. FOWLER,

FLORENCE C. COOK.