

No. 690,398.

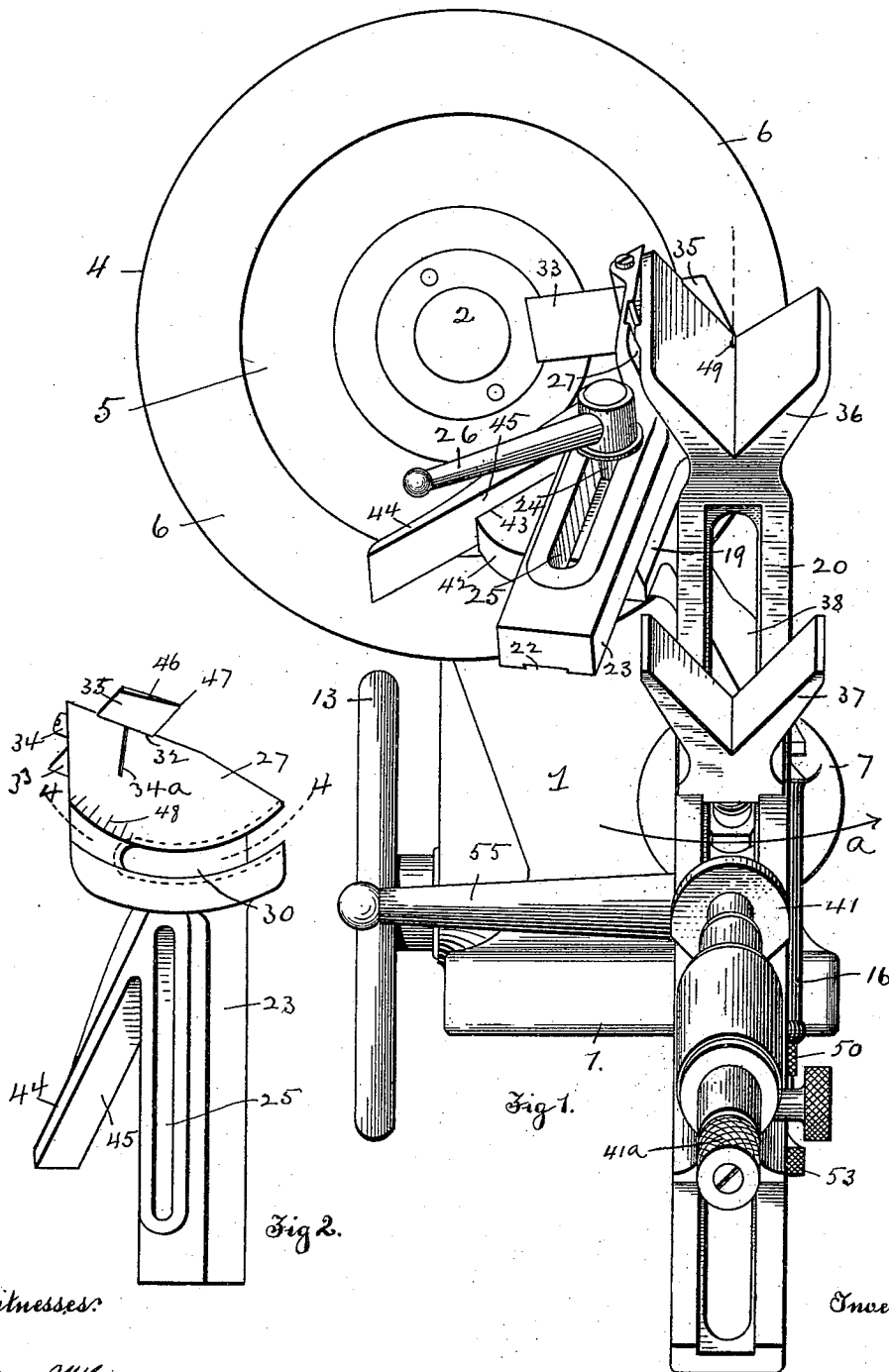
Patented Jan. 7, 1902.

C. A. CHANDLER.
MACHINE FOR GRINDING DRILLS.

(Application filed May 9, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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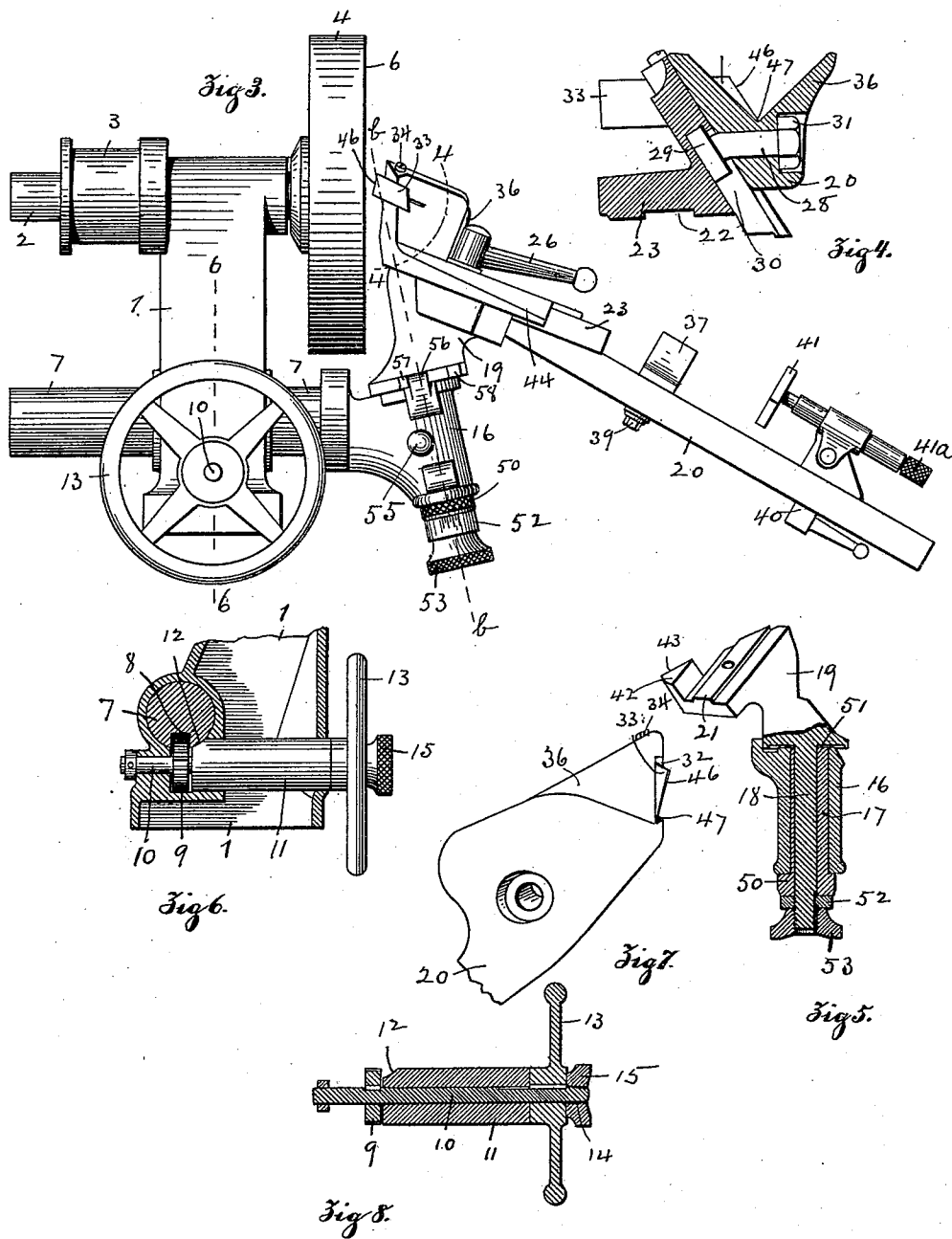
By Rufus B. Towles atty.

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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

CLARENCE AUSTIN CHANDLER, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR GRINDING DRILLS.

SPECIFICATION forming part of Letters Patent No. 690,398, dated January 7, 1902.

Application filed May 9, 1900. Serial No. 16,008. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE AUSTIN CHANDLER, a citizen of the United States, and a resident of Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Machines for Grinding Drills, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same, in which—

Figure 1 represents a front view of a drill-grinding machine embodying my invention. Fig. 2 is a perspective view of the intermediate piece which connects the drill-holder and its supporting-bracket. Fig. 3 is a side view of my improved drill-grinding machine. Fig. 4 is a sectional view, the section being shown on a plane corresponding to the curved line 4 4, Fig. 3. Fig. 5 is a perspective view of the bracket upon which the drill-holder is supported, and the sleeve in which the bracket is journaled being shown in central sectional view. Fig. 6 is a vertical sectional view of a portion of the supporting-stand, the section being shown on the broken line 6 6, Fig. 3. Fig. 7 is a view of the end of the drill-holder next the grinding-wheel; and Fig. 8 is a vertical central sectional view of the rotating shaft, with the pinion and hand-wheel carried thereby, which is represented in full in Fig. 6.

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

My invention relates to a machine for grinding drills, especially that class of drills known as "twist-drills;" and it consists in the construction and arrangement of parts, as hereinafter described.

Referring to the drawings, 1 denotes a stand upon which the operating mechanism is supported, said stand being adapted to be supported upon a shelf or bracket or upon a post resting upon the floor. In the upper portion of the stand is journaled a shaft 2, carrying a wheel 3, by which the shaft is driven, and an emery-wheel 4, preferably having one side recessed at 5, so as to present an annular grinding-surface 6, to which the ends of the drills to be ground are presented. In the lower portion of the stand 1 and capable of sliding therein is a cylindrical bar 7, provided on its under side with a rack 8, which is engaged by a pinion 9, carried on a shaft 10,

journaled on the stand 1 and carrying a sleeve 11, having one end cut away at 12 to fit the periphery of the cylindrical bar 7. The shaft 10 also carries a hand-wheel 13, by which it is rotated, having a spline connection with the shaft 10 and capable of sliding thereon. The end of the shaft 10 is provided with a screw-thread 14 and carries a milled nut 15 for the purpose of crowding the sleeve 11 against the bar 7 and holding it from sliding in the stand 1. One end of the cylindrical bar 7 carries a sleeve 16, in which is journaled a sleeve 17, having an eccentric hole to receive a spindle 18 on a bracket 19, by which the drill-holder 20 is supported. The bracket 19 is provided on its upper surface with a rib 21, fitting a groove 22, Fig. 4, in a piece 23, intermediate between the bracket 19 and the drill-holder 20, said rib and groove forming ways on which the intermediate piece 23 is capable of sliding toward and away from the side of the grinding-wheel. The piece 23 is clamped in position by means of a bolt 24, passing through a slot 25, having a lever-handle 26. The end of the intermediate piece 23 next the grinding-wheel is enlarged and presents an oblique surface 27, parallel with the beveled edge of a lip-rest, and the drill-holder 20 is clamped against the oblique surface 27 by means of a bolt 28, having a T-shaped head 29, held in a T-shaped slot 30 in the piece 23 and carrying a nut 31. The end of the piece 23 is provided with a dovetailed slot 32, holding a plate forming a lip-rest 33, which is clamped in the slot by means of a clamping-screw 34, a slit 34^a being formed in the piece 23 to allow the clamping-screw to press the sides of the dovetailed slot against the edges of the lip-rest. The drill-holder 20 is provided with a stationary V-shaped drill-support 36 and a movable V-shaped drill-support 37, adjustable in the drill-holder along a longitudinal slot 38 and held in position by a tightening-bolt 39. Adjustably held on the drill-holder by means of a bolt 40 is an end support 41, which holds the drill from sliding longitudinally in the drill-holder and away from the grinding-wheel.

The bracket 19 is provided on one side with a triangular lug 42, having its side 43 placed obliquely to the line of motion of the intermediate piece as it slides upon the bracket 19. The intermediate piece 23 carries a projecting arm 44, having its side 45 parallel

with the side 43 of the lug 42 and forming a similar oblique angle to the line of motion of the sliding piece 23 on the ways of the bracket 19, the lug 42 and arm 44 forming a pair of caliper-jaws between which the drill to be ground is placed in order to determine the position of the intermediate piece 23 on the bracket 19 by the separation of the jaws, as hereinafter described. The lip-rest 33 is held stationary in the intermediate sliding piece 23, with its end 35 projecting into the angle formed by the sides of the stationary V-shaped drill-rest 36 in position to receive the contact of the lip of a twist-drill supported by the drill-holder. The corner 47 of the lip-rest coincides with the apex of the V-shaped drill-rest 36, and the edge 46 is slightly beveled or made to recede from a plane bisecting the angle formed by the sides of the drill-rest 36 in order to adapt the lip-rest to receive drills of different diameters without requiring an adjustment of the lip-rest, as described and claimed in United States Patent No. 411,845, issued to O. S. Walker on the 1st day of October, 1889.

The T-shaped slot 30 in the end of the intermediate sliding piece 23 is curved concentrically with the corner 47 of the lip-rest, so that by loosening the nut 31 and sliding the head 29 of the bolt 28 in the curved slot 30 the drill-holder 20 is rocked about a center coinciding with the corner 47 of the lip-rest and in a plane parallel with the beveled edge 46 of the lip-rest, thereby changing the inclination of the drill-holder to the side of the grinding-wheel in order to change the bevel of the cutting-lip of the drill. The surface 27 is graduated at 48 to indicate the proper inclination of the drill-holder 20 to give the desired angle to the cutting edge of the drill, and as the drill-holder is rocked in a plane parallel with the edge 46 of the lip-rest the drill is held in proper relation to the lip-rest whatever the angle of the drill-holder. When the drill has been placed in position in the drill-holder and in proper relation to the side of the grinding-wheel, the drill-holder is rocked in the sleeve 11 in order to swing the end of the drill in contact with the cutting-wheel, thus grinding a curved surface on the end of the drill. When a twist-drill is held in the V-shaped rests of the drill-holder, the axis of the drill will lie immediately over the apex of the V-shaped rests, and if the axis of oscillation be made to pass slightly to one side of the apex of the V-shaped rests, as indicated by the point 49, Fig. 1, the drill-holder, as it is oscillated in the direction of the arrow *a*, Fig. 1, will carry the drill slightly toward the grinding-wheel, thereby producing what is known as a "clearance" on the ground surface of the drill, and this clearance will be increased or diminished by varying the axis of oscillation, which is accomplished by means of the eccentric sleeve 17, which is provided with a milled flange 50 and is clamped between the shoulder 51 on the

bracket 19, and a washer 52, resting against a milled nut 53, carried on the screw-threaded end of the spindle 18. By loosening the nut 53 the eccentric sleeve 17 is released and may be turned by its milled flange 50 so as to vary the axis of oscillation of the drill-holder and again clamped in position by tightening the nut 53 against the washer 52 and causing the sleeve 17 and spindle 18 to rotate as one piece in the sleeve 11. The washer 52 has a spline connection with the spindle 19 and is provided with a graduated surface 54, Fig. 3, placed against an index-mark on the milled flange 50 to denote the proper position of the eccentric sleeve 17.

The employment of an eccentric sleeve for the purpose of varying the clearance of the drill is not herein claimed, as it is described and claimed in my application for Letters Patent of the United States, Serial No. 741,270, filed on or about December 22, 1899. The drill-holder, when rocked in order to vary the angle of its cutting-lips, moves in an oblique plane parallel with the beveled end 46 of the lip-rest, and as the drill-holder is depressed in order to make the angle of its cutting-lips more acute the clearance is also increased as the apex of the V-shaped supports is moved farther away from the plane of the axis of oscillation, and as the more acute the point of the drill the greater should be its clearance the machine automatically adjusts the clearance to the variation in the angle of its cutting-lips. The sleeve 11 is provided with a projecting handle 55 for convenience in oscillating the drill-holder.

The operation of my improved drill-grinder is as follows: The clamping-bolt 24 is loosened to allow the sliding intermediate piece 23 to be moved on the bracket 19. The piece 23 is then moved on the bracket 19 toward the side of the grinding-wheel far enough to just allow the drill to be ground to be inserted between the lug 42 and the projecting arm 44, which will carry the end of the drill-holder toward the side of the grinding-wheel just far enough beyond the axis of oscillation to give the proper curvature to the ground end of the drill. The eccentric sleeve 17 is adjusted to carry the axis of oscillation far enough to one side of the apex of the V-shaped drill-rest 36 to give the proper clearance to the drill. The drill-holder 20 is then rocked on the intermediate piece 23 to incline the drill-holder and give the desired bevel to the cutting-lips of the drill. The drill-holder is then clamped in position by tightening the nut 31 on the bolt 28. The drill to be ground is laid in the V-shaped rests 36 and 37, with the lip of the drill bearing against the edge 46 of the lip-rest and projecting slightly beyond it and with the opposite end of the drill bearing against the plate 41. The rack-bar 7 is then released by unscrewing the nut 15, and the drill-holder is carried toward the grinding-wheel to bring the end of the drill into light contact with the side of the wheel

by means of the hand-wheel 13, pinion 9, and rack-teeth 8. The cylindrical rack-bar 7 is then clamped in position and the drill-holder rotated about an axis of oscillation *b b*, Fig. 3, concentric with the sleeve 17, journaled in the sleeve 16. When one lip of the drill has been ground, the drill is turned half-way around in the V-shaped drill-rests to bring its opposite lip in contact with the lip-rest, and the operation of grinding is repeated. As the drill is being ground it can be fed along the drill-holder toward the grinding-wheel by advancing the plate 41 by means of a screw-feeding mechanism common in machines of this class and actuated by turning the milled knob 41^a. As the drill-holder 20 is oscillated its movement is limited by means of the arm 56, attached to the sleeve 11 and extending upwardly into a space between and into the path of two projecting lugs 57 58.

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

1. In a drill-grinding machine, the combination with a supporting-stand and a grinding-wheel journaled in said stand, of a bar capable of sliding longitudinally in said stand and provided with a rack, a shaft journaled in said supporting-stand and transversely to said bar, a pinion carried by said shaft and engaging said rack, a hand-wheel by which said shaft is turned and means for clamping said sliding bar in a fixed position and a drill-holder carried by said sliding bar, substantially as described.

2. The combination with a supporting-stand and a grinding-wheel journaled in said stand, of a bar capable of a longitudinal movement in said stand, a drill-holder carried by said bar, mechanism for sliding said bar comprising a screw-threaded transverse shaft, a hand-wheel and a rack and pinion, a sleeve held on said screw-threaded shaft and arranged to clamp said sliding bar and a nut on said screw-threaded bar by which said sleeve is crowded against said bar, substantially as described.

3. The combination with a supporting-stand and a grinding-wheel journaled in said stand, of a bar capable of a longitudinal sliding movement in said stand and having a rack, a transverse shaft journaled in said stand and having a screw-threaded end, a pinion attached to said shaft and engaging said rack, a sleeve held loosely on said shaft, and adapted to engage the periphery of said sliding bar, a hand-wheel held on said shaft and having a spline connection therewith and a nut held on the end of said shaft, whereby said hand-wheel and sleeve are clamped between said nut and said sliding bar, substantially as described.

4. The combination with a supporting-stand and a grinding-wheel journaled therein, of a bar capable of sliding longitudinally in said stand, means for holding said bar in a fixed position, a sleeve carried by the end of said bar, a bracket journaled in said sleeve and provided with ways, an intermediate piece adjustably attached to said bracket and a drill-

holder pivotally attached to said intermediate piece, whereby its angle of inclination is varied relatively to said grinding-wheel, substantially as described.

5. The combination with a grinding-wheel, of a bracket for supporting a drill-holder, a drill-holder supported by said bracket at an oblique angle to the side of said grinding-wheel, an intermediate piece between said bracket and said drill-holder, a lip-rest held by said intermediate piece, means for adjustably attaching said drill-holder to said intermediate piece, whereby it is capable of being rocked thereon, in order to change its angle of inclination to said grinding-wheel, substantially as described.

6. The combination of a bracket for supporting a drill-holder, a drill-holder supported by said bracket, an intermediate piece between said drill-holder and said bracket, a lip-rest held by said intermediate piece, means for rocking said drill-holder concentrically with a point on the edge of said lip-rest as a center and means for adjustably attaching said drill-holder to said intermediate piece, substantially as described.

7. The combination with an adjustable drill-holder, of a lip-rest held independently of said drill-holder and means for rocking said drill-holder concentrically with a point in the edge of said lip-rest and means for holding said drill-holder at a fixed angle of inclination, substantially as described.

8. The combination with a bracket and a drill-holder supported thereby, of an intermediate piece between said bracket and said drill-holder, a lip-rest held by said intermediate piece, a T-shaped groove in said intermediate piece concentric with a point in the edge of said lip-rest, a bolt passing through said drill-holder having a T-shaped head held in said slot and a nut carried by said bolt by which said drill-holder is clamped in position, substantially as described.

9. The combination with a bracket for supporting the drill-holder and capable of an oscillating motion, of a drill-holder held on said bracket and adjustable thereon in an oblique plane to the axis of oscillation, whereby the variation of its angle of inclination moves it toward or away from the plane of its axis of oscillation and thereby automatically changes the clearance of the drill, substantially as described.

10. The combination with a lip-rest having a beveled end to receive the contact of the drill-lip and a drill-holder adjustable in a plane parallel with the beveled end of the lip-rest, substantially as described.

In testimony whereof I have signed my name to this specification, in presence of two subscribing witnesses, this the 7th day of May, 1900.

CLARENCE AUSTIN CHANDLER.

Witnesses:

AVA T. MURPHY,
RUFUS B. FOWLER.