H. M. BOGART.

TWIST DRILL GRINDER.

APPLICATION FILED MAY 10, 1913.

1,093,028.

Patented Apr. 14, 1914.

2 SHEETS—SHEET 1.

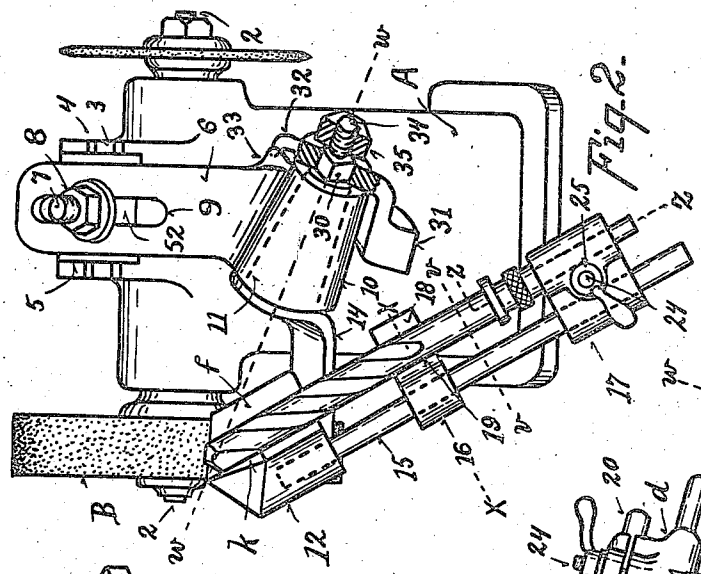


Fig. 2.

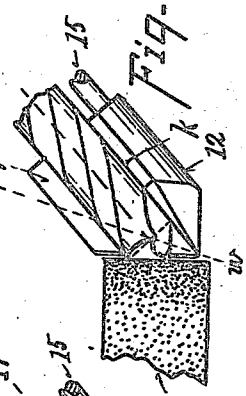


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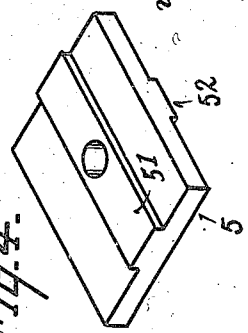


Fig. 4.

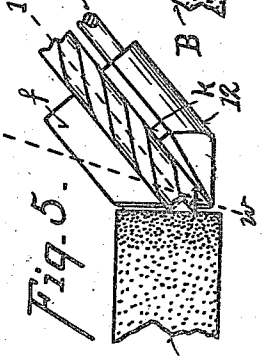


Fig. 5.

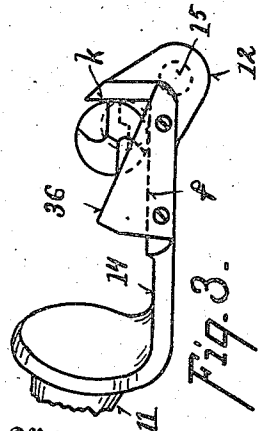


Fig. 3.

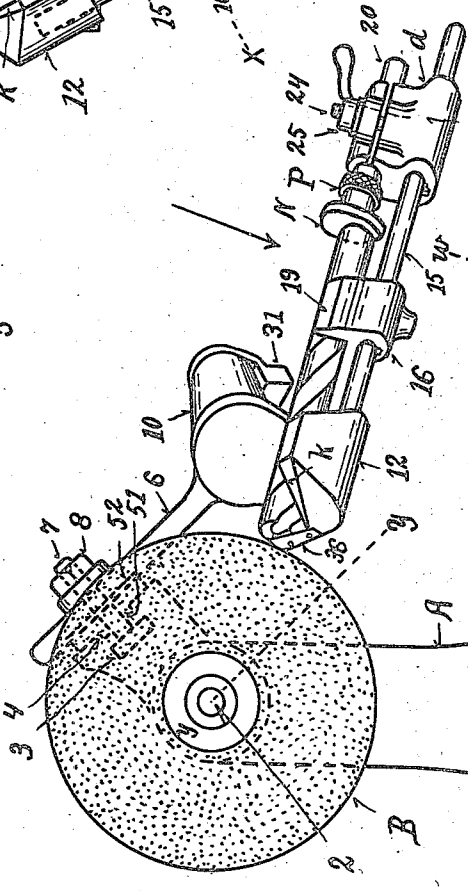


Fig. 1.

Witnesses

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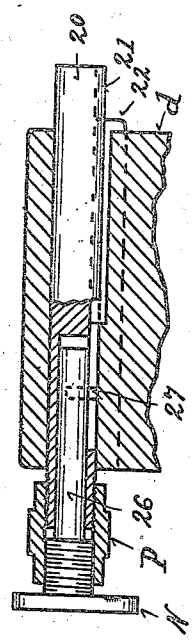


Fig. 8.

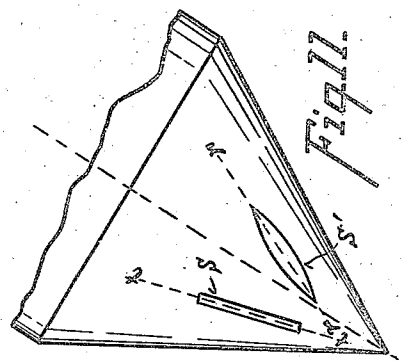


Fig. 11.

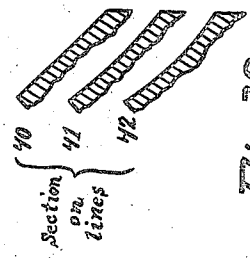


Fig. 12.

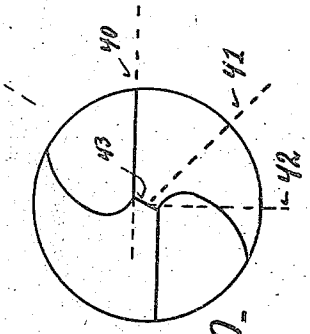


Fig. 10.

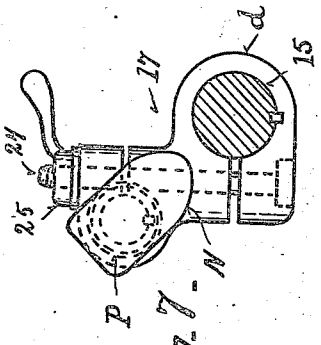


Fig. 7.

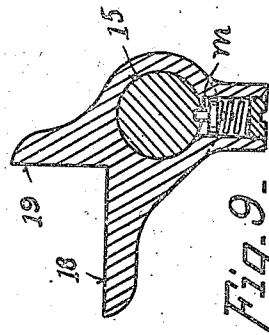


Fig. 9.

Witnesses

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UNITED STATES PATENT OFFICE.

HOWARD M. BOGART, OF CINCINNATI, OHIO.

TWIST-DRILL GRINDER.

1,093,028. Specification of Letters Patent. Patented Apr. 14, 1914.

Application filed May 10, 1913. Serial No. 766,810.

To all whom it may concern:

Be it known that I, HOWARD M. BOGART, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Twist-Drill Grinders, of which the following is a specification.

My invention relates to improvements in mechanism to grind twist drills.

One of its objects is to provide improved mechanism to hold drills of various diameter in position to be ground upon the periphery of the wheel.

Another object is to provide improved means to hold and adjust the drills to position.

Another object is to provide an improvement in the position and direction of oscillation of the drills.

Another object is to provide improved means to support and adjust the drill supporting members relative to the grinding wheel standard.

My invention also comprises certain details of form, combination and arrangement, all of which will be fully set forth in the description of the accompanying drawings, in which:

Figure 1 is a side elevation of my improved grinder. Fig. 2 is a plan view looking in the direction of the arrow in Fig. 1. Fig. 3 is a detail end view of the drill holder. Fig. 4 is a perspective view of the adjusting block detached. Figs. 5 and 6 are detail diagrams illustrating the relative positions of large and small drills. Fig. 7 is a sectional detail on line *v v* of Fig. 2. Fig. 8 is a sectional detail on line *z z* of Fig. 2. Fig. 9 is a sectional detail on line *x x* of Fig. 2. Fig. 10 is an enlarged diagram of the cutting end of a drill. Fig. 11 is a diagram illustrating the manner in which the grinding operation is effected. Fig. 12 represents a series of sections across the drill lip Fig. 10 on the lines 40, 41, and 42 respectively.

In the accompanying drawings, A represents a standard or frame in which the spindle 2 of the grinding wheel B is journaled. A boss or projection on the standard A is faced and provided with a T-slot 3 and ways 4 parallel to the axis of the wheel B. A block 5 is seated and adjustable by means of a rib 51 upon the ways 4 and a slotted bracket 6 is adjustably mounted upon the block 5, and guided relative thereto by a rib 52 seating in said slot, said block and bracket being held in any desired position of adjustment by means of a bolt 7 and nut 8. The head of the bolt is seated in the T-slot 3 and the shank of the bolt passed through a perforation in the block 5 and the slot 9 of bracket 6 and the nut tightened to lock the parts in position.

At the free end of the bracket 6 is a conical journal box 10 to receive the journal 11 of the drill holder 12. The drill holder comprises in addition to its journal 11 an arm 14 projecting out so as to nearly intersect the axis of oscillation of the journal 11, a plane drill supporting face *f* having a side guide *k* at substantially right angles to the drill supporting face, and a rearwardly projecting rod 15 carrying adjustable supporting members 16 and 17 to support the rear end of the drill laterally and endwise. The rod 15 is splined or grooved on its under side and the laterally supporting member 16 has a spring actuated key *m* engaging the key way of rod 15 to frictionally hold the lateral support in adjusted position thereon. Said lateral support has a plane drill supporting face 18 and a side guide 19 in line with the drill supporting faces *f* and *k*. The supporting member 17 comprises a base *d* splined to the rod 15.

A rod 20 is mounted parallel to rod 15 in a recess in member *d* and has a key seat 21 and a key 22 to hold it against rotation. The member *d* is split opposite rod 15 and also opposite rod 20, and a bolt 24 and nut 25 enable member *d* to be simultaneously locked to or released from rods 15 and 20. The forward end of rod 20 is counterbored and the shank 26 of the end thrust support N is seated therein and provided with a pin 27 seating in the key seat slot of rod 20. The end of rod 20 and the enlarged portion of shank 26 are threaded right and left handedly respectively, and a sleeve P engaging said threads provides a fine adjustment for the thrust support N.

At the right of the journal 11 is provided a rectangular seat 30 to which is fitted a counterweight 31 which serves to practically counterbalance the weight of the drill holder members in their various positions of oscillation. Said member 31 also carries a lug 32 which engages an ear 33 on the bracket 6 to limit the oscillating movement of the drill holder in a downward direction. The journal 11 is locked in the box 10 and the

member 31 held in position by means of a threaded shank 34 and nut 35.

A drill lip rest or gage 36 is secured to the forward end of the drill support. It will be noted that drills of different diameter when resting upon the face *f* and against the side guide *k* are brought to different positions automatically with reference to the axis of oscillation *w w* and hence that the greater the diameter of the drill the greater the distance between the face to be ground and the axis of oscillation and therefore a greater amount of radius is given to the drill lip while the position of the drill axis above the axis of oscillation determines the amount of clearance given to the drill lips, which is also made dependent upon the diameter and position of the drill.

In practice the drills are not locked to the drill holder during the grinding operation, but are laid upon the supporting faces and the end thrust adjustments made, and then the operator grasps the drill and rod 15 between the members 12 and 16 with one hand to hold the drill in place and oscillates the holder with the other hand. This permits the drills to be very quickly placed and shifted to present the opposite lip.

The bracket 6 is preferably mounted so as to bring its journal 10 to the right hand of the wheel B and so that the axis of oscillation will intersect or nearly intersect the periphery of the wheel at an acute angle and so that the limits of oscillatory movement with the drill in contact with the wheel will extend from a substantially horizontal position at one extreme through approximately 120 degrees to a position of downward inclination of the drill support. The relation of the drill holder and wheel are such that when the drill holder moving upwardly passes a horizontal position, the drill passes out of contact with the wheel, and thus avoids liability of injury to the forward edge of the opposite lip. This position of the drill holder is most convenient for the operator to hold and oscillate the holder and observe the effect produced. It also provides for a tendency of the drill to rest by gravity against the end thrust plate instead of working toward the wheel.

The oscillation of the drill holder with reference to the periphery of the wheel as herein illustrated provides for grinding the drill lips to a new outline. Fig. 11 indicates a cone rotatable on the axis *w w*, and its face would indicate the path traveled by the drill lips due to the oscillation of the drill holder. The periphery of the wheel being circular would only contact with the face of the cone along a line across the face of the wheel. Such a line of contact coincident with a radial line of the face of the cone is represented by *t t*, and *s* the surface ground by such a contact, while *r r* represents a line of contact which is diagonal to one of the radial lines of the face of the cone, and *s'* a face ground by such contact. In practice the line of contact shifts progressively from that indicated at *t t* to that indicated at *r r* as the grinding of the drill lip progresses, commencing at the cutting edge of the drill lip 40, which is a straight line and a fraction of a true cone to the line 41 where the drill lip face is ground slightly concave, and thence to the line 42 where the face of the drill lip is still more concave. The result of this is that the drill has greater clearance and the point or center line 43 where a scraping action occurs in drilling is sharper and better able to penetrate the work.

In practice the drill holder is adjusted so that with drills of small diameter the cutting edge of the drill will contact with the wheel at the commencement of the grinding operation substantially at the point where a line *y y* Fig. 1 intersects the periphery of the wheel, said line *y y* intersecting the axis of the wheel and being parallel with the adjusting faces of members 5 and 6. With drills of larger diameter contact occurs higher up on the wheel.

Where drills or reamers with three or more lips are to be ground the plate or block 5 and bracket 6 are adjusted toward the left until the major portion of the lips, all except the one to be ground are to the left of the periphery of the wheel, and not in position to contact with the wheel when the drill holder is oscillated. The adjustment of the members 5 and 6 also provides for securing the proper relation of the drill holder and its axis of oscillation with wheels of different diameter, or to compensate for wear of the wheel. By presenting the drills to the periphery of the wheel the line of contact is very narrow and hence there is very little tendency to injuriously heat the drills, and ample clearance for the escape of the cuttings.

The mechanism herein illustrated and described is capable of considerable modification without departing from the principle of my invention.

Having described my invention, what I claim is:

1. A twist drill grinder comprising a grinding wheel, a bracket supported relative to said wheel and adjustable parallel to and transversely to the axis of said wheel and provided with a journal to support the drill holder, a drill holder journaled to said bracket so as to oscillate from below to a horizontal position to present drills to the periphery of the wheel, and a counterweight to substantially counterbalance the weight of said drill holder.

2. In a twist drill grinder in combination with a grinding wheel and a supporting

bracket a drill holder comprising a member journaled to said bracket so as to oscillate relative thereto, said member being provided with a face to support the drills, a drill lip gage, a side guide for the drills, and a rearwardly projecting shank, a lateral guide for the rear end of the drills splined to and adjustable upon said shank, a thrust guard holder splined to and adjustable upon said shank, a thrust guard splined to said holder, and means to adjust said thrust guard relative to said holder.

3. A twist drill grinder comprising a standard, a grinding wheel rotatably supported upon said standard, a block adjustable upon said standard parallel to the axis of the grinding wheel, a bracket carried by said block and adjustable transversely to the axis of said wheel, a drill holder journaled to said bracket so as to be oscillated relative thereto upon an axis adjustable by means of said block and bracket to intersect at an acute angle the periphery of said grinding wheel, to present drills to the periphery of said wheel, said drill holder comprising a substantially horizontal drill supporting face, a substantially vertical side guide, a drill lip guide, and an adjustable thrust guard to automatically position drills of different diameter.

4. A twist drill grinder comprising a grinding wheel, a drill holder pivotally mounted so as to oscillate upon an axis obliquely intersecting the plane of rotation of the grinding wheel slightly outside of the periphery of the wheel, said drill holder comprising a substantially horizontal drill supporting face and a substantially vertical side guide, said drill holder being provided with a drill lip guide at one end and an adjustable end or thrust guard at the opposite end.

5. A twist drill grinder comprising a grinding wheel, a drill holder to present the drills to the periphery of said wheel pivotally mounted upon an adjustable axis so as to oscillate below the center of said wheel upon an axis obliquely intersecting the plane of rotation of said wheel outside the periphery of said wheel, said drill holder comprising a substantially horizontal drill supporting face and a substantially vertical side guide, said drill holder being provided with a drill lip guide at one end and an adjustable end or thrust guard at the opposite end.

6. A twist drill grinder comprising a grinding wheel, a grinding wheel standard, a bracket mounted upon said standard and adjustable longitudinally and transversely of the axis of said wheel, a drill holder to present the drills to the periphery of said wheel pivotally mounted upon said bracket so as to oscillate relative thereto, said drill holder comprising a substantially horizontal drill supporting face and a substantially vertical side guide, said drill holder being provided with a drill lip guide at one end and an adjustable end or thrust guard at the opposite end.

7. A twist drill grinder comprising a grinding wheel, a drill holder to present the drills to the periphery of said wheel pivotally mounted upon an adjustable axis so as to oscillate said drill holder, said drill holder comprising a support for the forward end of the drill having a lip rest and a rearwardly projecting shank, a lateral rest for the rear end of the drill slidably and non-rotatably mounted upon said shank and frictionally held to its adjusted position, and an adjustable end or thrust guard slidably and non-rotatably mounted upon the rear end of said shank.

8. In a twist drill grinder an oscillating drill holder having lateral drill supports and a lip rest, and an end or thrust guard comprising a slotted clamping member having a recess to slidably and non-rotatively engage a supporting shank a recess to slidably and non-rotatably support a thrust rod, a bolt seated in a recess in said clamping member and transversely to said slots to simultaneously clamp said clamping member to its supporting shank and to clamp said thrust rod to said clamping member.

9. In a twist drill grinder an oscillating drill holder having means to support a drill laterally and an end or thrust guard comprising a slotted clamping member having a recess to slidably and non-rotatably engage a supporting shank, a recess to slidably and non-rotatably support a thrust rod, a guard member adjustably mounted upon said thrust rod, and means to simultaneously clamp said clamping member to its support and said thrust rod to said clamping member.

10. In a twist drill grinder a grinding wheel, an oscillating drill holder to support a drill in contact with said wheel and comprising a substantially horizontal drill supporting face, a substantially vertical drill side guide and a drill lip rest, all forming a junction at a common point located upon the axis of oscillation of said drill holder, to automatically position drills of different diameter.

In testimony whereof I have affixed my signature in presence of two witnesses.

HOWARD M. BOGART.

Witnesses:

E. W. McCALLISTER,

C. W. MILES.