June 5, 1951 F. DIXON 2,556,073

MACHINE FOR GRINDING DRILLS

Filed July 2, 1948 4 Sheets-Sheet 1

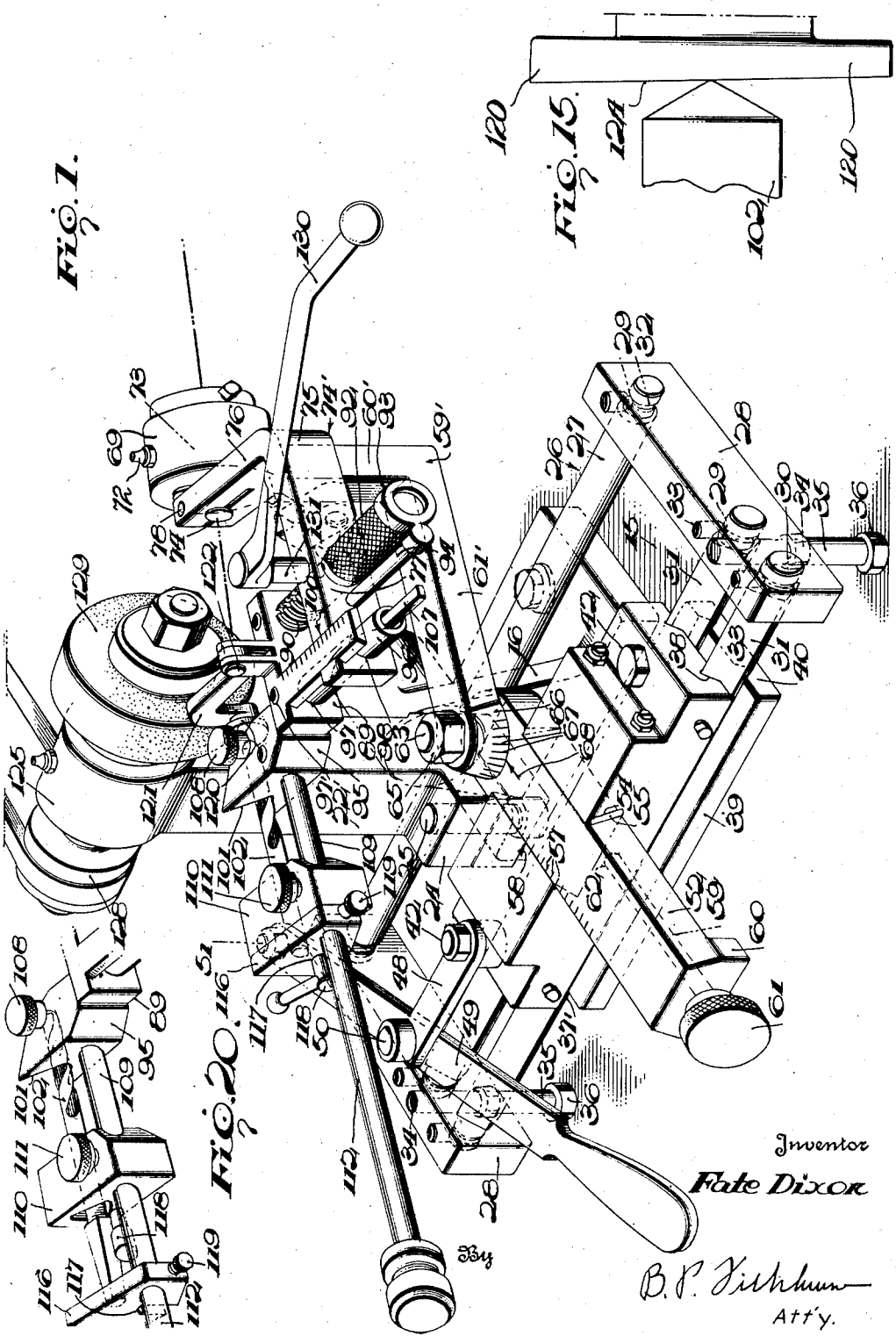

Fig. 1.

Fig. 15.

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MACHINE FOR GRINDING DRILLS

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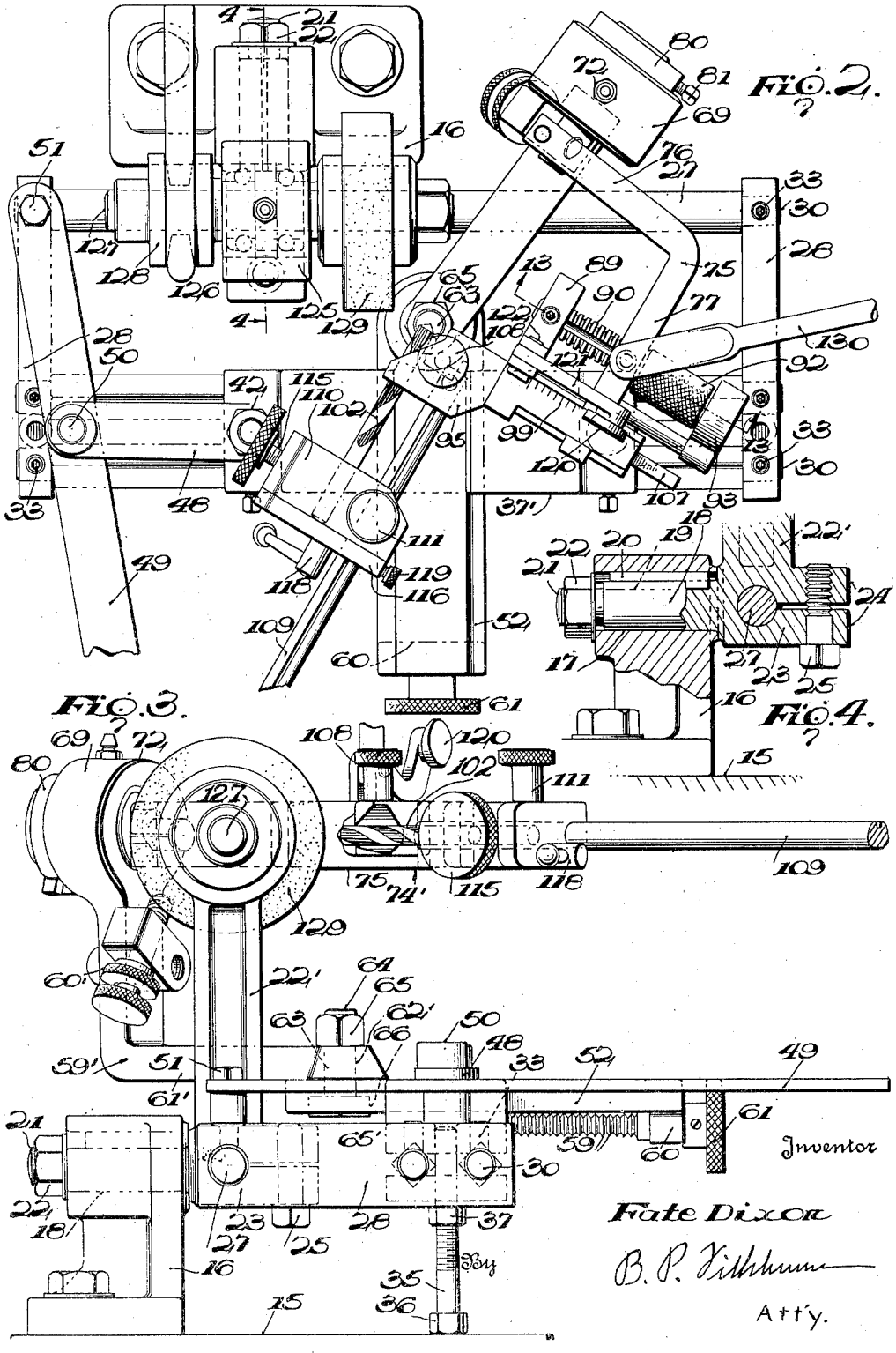

FIG. 2.

FIG. 3.

FIG. 4.

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MACHINE FOR GRINDING DRILLS

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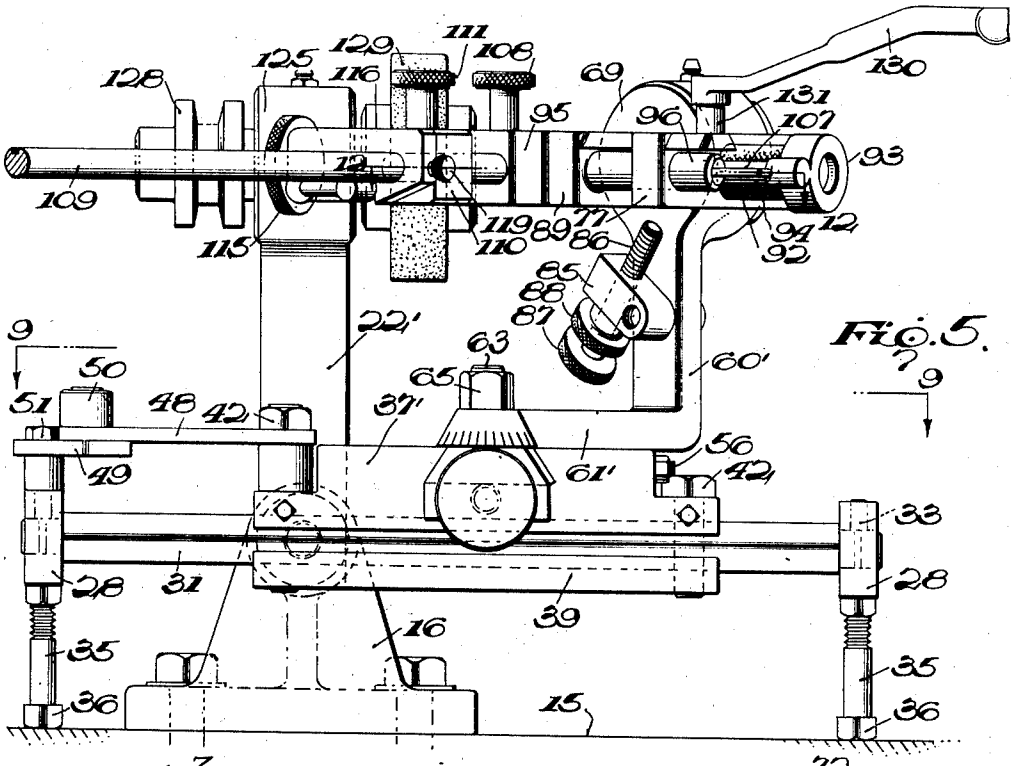

Fig. 5.

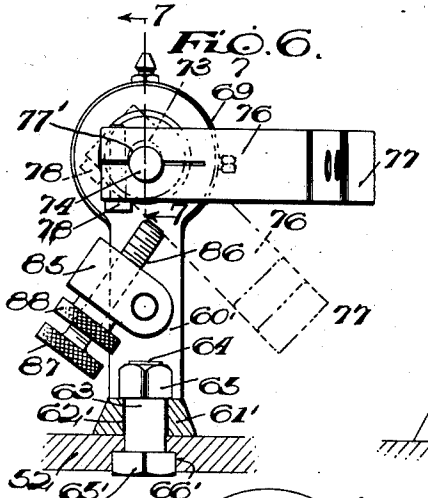

Fig. 6.

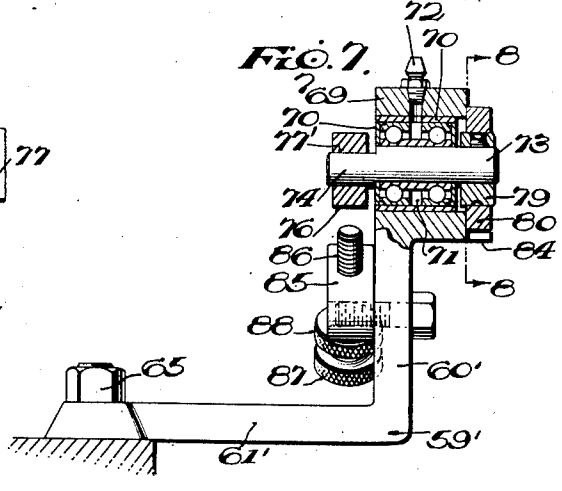

Fig. 7.

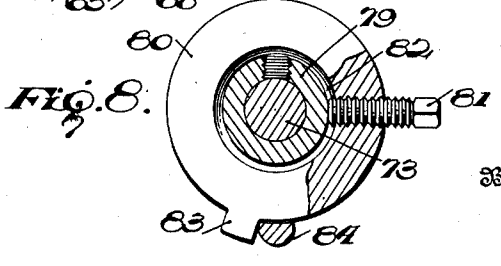

Fig. 8.

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MACHINE FOR GRINDING DRILLS

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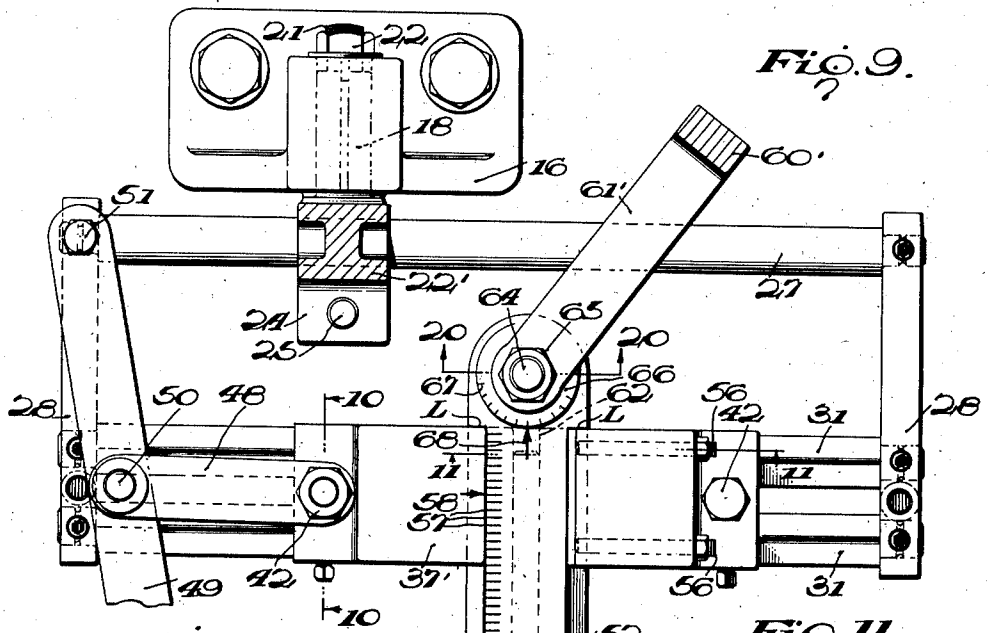

Fig. 9.

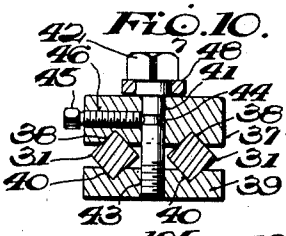

Fig. 10.

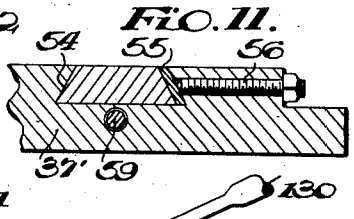

Fig. 11.

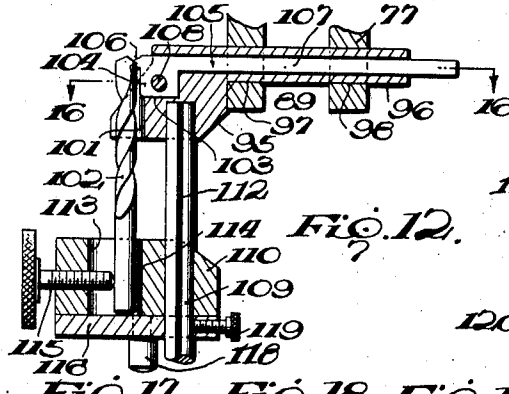

Fig. 12.

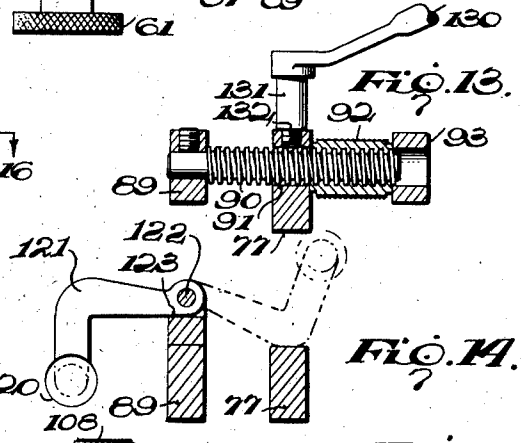

Fig. 13.

Fig. 14.

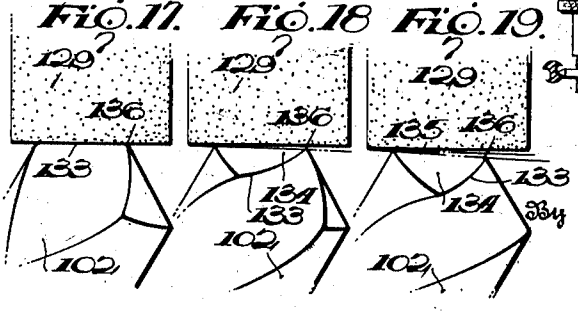

Fig. 17. Fig. 18. Fig. 19.

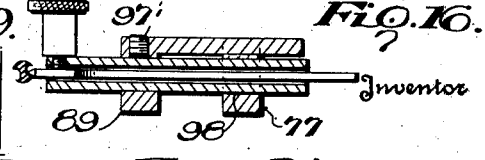

Fig. 16.

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Patented June 5, 1951

2,556,073

UNITED STATES PATENT OFFICE

2,556,073

MACHINE FOR GRINDING DRILLS

Fate Dixon, Durham, N. C., assignor of one-fourth to William H. Rowe and one-fourth to William E. Jones, Jr., Durham, N. C.

Application July 2, 1948, Serial No. 36,767

13 Claims. (Cl. 51—219)

1

My invention relates to a machine for grinding drills.

An important object of the invention is to provide a machine of the above-mentioned character which will grind the lips of the drill uniformly, and in a manner to provide proper lip clearance.

A further object of the invention is to provide a drill-grinding machine which swings the drill through a compound angle, in feeding the same against the face of the grinding wheel, so that the trailing edges or heels of the drill lips are ground deeper than the forward or cutting edges of the lips, while the point of the drill is simultaneously swung away from the grinding wheel, so that the wheel will not nick the cutting edge of the next approaching lip.

A further object is to provide a drill-grinding machine wherein the geometrical relation of various parts of the machine is such that a theoretically accurate or ideal point may be ground upon drills of standard sizes, and wherein the proper adjustments are provided for the accurate grinding of the different sizes of drills.

A further object is to provide means for accurately indexing the drill while grinding the same, so that the different lips of the drill may be brought into proper engagement with the grinding wheel.

A further object is to provide a machine of the above-mentioned character which is simplified and which may be readily used by an unskilled operator.

A further object is to provide gauge means for determining the proper longitudinal adjustment of the drill, with respect to the grinding wheel, to prevent the grinding of too much material from the drill, or burning or destroying its temper.

A further object is to provide gauge means for maintaining the point of the drill concentric with the pivotal axis of the angularly adjustable holder, so that the drill point will remain in contact with the grinding wheel as the angle of the drill point is varied, regardless of the size of the drill.

A further object is to provide means for holding the drill point at the vertical center of the grinding wheel at the start of the grinding operation.

A still further object of the invention is to provide means for shifting the drill laterally across the face of the grinding wheel, to prevent scoring the wheel or forming a groove in the same.

Other objects and advantages of the invention will be apparent during the course of the following description.

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In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a perspective view of the machine, with the swingable drill-feeding assembly in the horizontal position,

Figure 2 is a plan view of the machine as shown in Figure 1,

Figure 3 is an end elevation of the machine,

Figure 4 is a fragmentary vertical section taken on line 4—4 of Figure 2,

Figure 5 is a front elevation of the machine,

Figure 6 is an end elevation of a bracket and associated elements, parts omitted,

Figure 7 is a vertical section taken on line 7—7 of Figure 6, part in elevation,

Figure 8 is a vertical section taken on line 8—8 of Figure 7,

Figure 9 is a horizontal section taken on line 9—9 of Figure 5,

Figure 10 is a vertical section taken on line 10—10 of Figure 9, parts omitted,

Figure 11 is a fragmentary vetrical section taken on line 11—11 of Figure 9,

Figure 12 is a fragmentary horizontal section taken on line 12—12 of Figure 5,

Figure 13 is a fragmentary vertical section taken on line 13—13 of Figure 2,

Figure 14 is a vertical sectional detail showing a gauge and associated elements,

Figure 15 is an enlarged fragmentary diagrammatic view showing the relation between the point of a drill and the inclined face of the gauge in Figure 14,

Figure 16 is a vertical section taken on line 16—16 of Figure 12, parts omitted,

Figure 17 is an enlarged fragmentary diagrammatic plan view of a drill and grinding wheel, wherein the leading or cutting edge of one of the drill lips is being dressed or ground,

Figure 18 is a similar view illustrating the relation of the drill to the grinding wheel when the swingable drill-feeding assembly is in an intermediate position,

Figure 19 is a similar view showing the relation between the drill and grinding wheel when the swingable assembly is at the bottom of its travel and the heel or trailing edges of the drill lip is being ground,

Figure 20 is a fragmentary perspective view illustrating the holding of a drill having a tapered shank.

In the drawings, where for the purpose of illustration is shown a preferred embodiment of my

invention, the numeral 15 designates a table, upon which is rigidly mounted a vertical bracket 16, having a horizontal bore 17 for receiving a cylindrical shank 18, having a longitudinal groove 19, to receive a key 20. The shank 18 has a reduced screw-threaded extension 21, receiving a nut 22. Formed integral with the shank 18 is a vertical post 22', provided at its lower end with the split head 23, forming jaws 24, drawn together by a bolt 25.

The machine comprises a bed 26, including a cylindrical rod 27 which is horizontally disposed and clamped between the jaws 24. Rigidly mounted upon the rod 27 are bars or ends 28, having cylindrical openings 29, for receiving the reduced cylindrical ends 30 of guide rods 31 which are square in cross section, forming upper and lower V-shaped portions, Figure 10. The ends 30 have annular grooves 32, for receiving the ends of set screws 33, whereby the guide rods 31 are locked to the ends 28. The ends 28 are provided between the guide rods 31 with vertical screw-threaded openings 34, for receiving the screw-threaded ends of vertically adjustable legs 35, having feet 36, to engage upon the table 15. The legs 35 carry lock nuts 37. It is thus seen that the legs 35 may be adjusted to level the bed 26, and engage upon the table, whereby the bed will be securely supported in the adjusted position by the legs and by the bracket 16.

Longitudinally adjustably mounted upon the guide rods 31 is a carriage 37', the lower face of which has V-shaped grooves 38, Figures 1 and 10, to receive the upper corners of the guide rods 31, and a lower plate 39 is provided having V-shaped grooves 40 to receive the lower corners of the guide rods 31 therein. The carriage 37' is provided near its ends with vertical openings 41, which receive adjusting bolts 42, the lower screw-threaded ends of which engage in screw-threaded openings 43 in the lower plate 39. These bolts 42 serve to draw the carriage 37' and plate 39 together until the carriage has an accurate sliding engagement with the guide rods 31. The bolts 42 have annular grooves 44, to receive the inner ends of set screws 45, engaging in screw-threaded openings 46. The carriage 37' is shifted longitudinally by means of a link 48, pivoted to the carriage by one of the bolts 42, and this link 48 is pivotally connected with a lever 49, at 50. The lever 49 is pivotally connected with the adjacent end or bar 28 by a bolt 51.

Extending transversely of the carriage 37' is a slide 52, operating in a dovetailed groove 54 formed in the carriage, Figure 11. A shim 55 is mounted in the groove 54 and is engaged by adjustable set screws 56 to compensate for wear. The slide 52 is provided upon its top surface, and at one longitudinal edge with a micrometer scale 57, for coaction with a scribe line 58, formed upon the carriage 37', Figure 9. An adjusting screw 59 is arranged beneath the slide 52 and has a swiveled connection with a depending portion 60, and is provided at its outer end with a knurled knob 61, disposed outwardly of the slide 52 to turn the feed screw 59. The feed screw engages in a transverse screw-threaded opening 62 in the carriage 37'.

Arranged above the slide 52 at its inner end is an L-shaped bracket 59' which is horizontally angularly adjustable, and includes vertical and horizontal arms 60' and 61'. The horizontal arm 61' has an opening 62', Figure 6, for pivotally receiving a vertical pin 63 rigidly mounted upon the inner end of the slide 52. This pin 63 has an upper screw-threaded portion 64, receiving a nut 65, and a square head 65' disposed in a square recess 66' formed in the bottom of the slide 52. By manipulation of the nut 65 the bracket 59' can be angularly adjusted and locked in the selected adjusted position. The arm 61' is provided with a circularly curved head 66, integral therewith, and this head is provided with a scale 67, graduated in minutes, for coaction with a scribe line 68 formed upon the top surface of the slide 52 for indicating the angular adjustment of the bracket 59'. The innermost end of the slide 52 is enlarged, forming lateral shoulders L, which limit the outward longitudinal travel of the slide 52, Figure 9.

Formed integral with the upper end of the vertical arm 60' is a tubular bearing head 69, Figure 7, receiving ball bearings 70, having a press-fit therein. These ball bearings 70 are sealed at their outer ends, and their inner ends are spaced apart, providing a passage 71 to receive lubrication from an "Alemite" fitting 72. Held within the inner races of the ball bearings 70 is a horizontal cylindrical shaft 73, provided at its inner ends with a cylindrical eccentric or crank 74, integral therewith. The crank 74 is in the lowermost position when the vertically swingable drill-feeding assembly 74', to be described, is in its top horizontal position.

The numeral 75 designates a bracket included within the vertically swingable assembly 74'. This bracket 75 includes arms 76 and 77, arranged at an obtuse angle. The arm 76 has an opening 77', to receive the eccentric 74, Figure 6. The arm 76 is split and clamped to the eccentric 74 by a bolt 78. When the bracket 75 is at the top horizontal position, the eccentric is at the bottom of its travel, or depending from the shaft 73. Adjustable stop means are provided to limit the upward movement of the assembly 74', including an inner ring 79 permanently clamped to the shaft 73, and an outer ring 80 mounted to turn upon the inner ring. The outer ring carries a set screw 81, the point of which engages within an annular groove 82 formed in the inner ring 79. The outer ring may therefore be turned with respect to the shaft 73 and locked thereto in the selected adjusted position. The outer ring 80 is provided with a radial stop lug 83 to engage a stop lug 84 rigidly secured to the bearing head 69. The vertical arm 60' has a block 85 rigidly secured thereto, carrying an adjustable-screw-stop 86, to limit the downward swinging movement of the bracket 75 by contacting the underside of the arm 76, Figure 6. The screw-stop 86 has a knurled head 87 and carries a knurled lock nut 88.

The numeral 89 designates a bar or carriage, parallel to the arm 77, and spaced laterally therefrom and having a feed screw 90 rigidly secured thereto. This feed screw preferably has square threads. The feed screw 90 is slidably mounted in an opening 91 formed in the arm 77, and carries a knurled adjusting nut 92, arranged between the head 93 and the arm 77, and the head 93 is rigidly secured to the arm 77 by means of a rod 94. The numeral 95 designates a head formed integral with a tube 96, extending through an opening 97 in the carriage 89 and clamped therein by a set screw 97'. The tube 96 extends slidably through an opening 98 formed in the arm 77, and this arrangement prevents rotation of the carriage 89 about the feed screw 90. Rigidly secured to the carriage 89, and held within a dovetailed groove formed in the arm 77 is a scale 99 graduated in 32nds of an inch, and co-

acting with a scribe line 109 formed upon the arm 77. The scale 99 is provided, so that the head 95 can be adjusted radially of the eccentric 74 in connection with drills of different standard diameters.

The head 95 is part of the drill support and is provided with a V-shaped groove 101 to receive the drill 102. The head 95 also has a slot 103 for receiving a flat rectangular plate 104 of an indexing dog 105, having a point 106 to engage within the spiral grooves or flutes of the drill. The plate has a tail 107 extending through the tube 96, and projecting outwardly beyond the same, so that the indexing dog may be longitudinally adjusted; and the indexing dog 105 is clamped in the selected adjusted position by a set screw 108, engaging in the head 95 and having a knurled head. When the drill 102 is positioned within the V-shaped groove 101 of the head, and is held against turning movement by the point 106 engaging within a flute of the drill, the drill may be lifted and turned 180 degrees, and the point 106 of the dog will again enter the spiral flute of the drill and hold it against further turning movement. This action presents the faces or lips of the drill in succession for grinding action. A rod 109 is rigidly secured to the head 95, and is parallel to the arm 77. This rod has a second head 110 longitudinally adjustably mounted thereon, carrying a set screw 111, the point of which engages within a longitudinal groove 112 formed in the rod 109. The head 110 has an opening 113 formed therein, having a V-shaped bottom 114. The apex of this V-shaped bottom 114 is spaced the same lateral distance from the rod 109 that the apex of the groove 101 is spaced therefrom, Figure 12. The head 110 is provided at its top with an adjusting screw 115 to clamp the drill 102 in the opening 113, and this adjusting screw has a knurled head, as shown. The outer end of the opening 113 may be covered by a plate or end 116, having an opening to slidably receive the rod 109. This plate 116 has a notch 117 to receive a set screw 118, tapped into the head 110. This set screw is employed to clamp the plate 116 to the head 110. The plate 116 is further equipped with a set screw 119, having a knurled head, for clamping engagement with the rod 109. When the drill 102 has a cylindrical shank, the plate 116 is locked to the head 110, and the head is moved toward the free end of the rod 109 for a suitable distance, and the cylindrical shank of the drill is inserted in the opening 113 and the set crew 115 is turned to clamp the drill in the head 110. The head 110 is now moved toward the head 95, and in order that the correct longitudinal adjustment of the drill may be effected, a swingable gauge 120 is moved into a position in alignment with the longitudinal axis of the drill. This gauge 120 is carried by an arm 121, pivotally mounted upon the carriage 89, at 122. The arm 121 has a shoulder 123 which limits the downward swinging movement of the arm. The generally vertical face 124 of the gauge 120 is inclined slightly when the gauge is in the lowered position, Figures 14 and 15, and when the point of the drill 102 contacts with the inclined face 124, and when the gauge is swung upwardly from such point, the point will clear the inclined face during this swinging action so that the face will not be scratched nor the drill point injured. When the drill has a tapered shank the plate 116 is separated from the head 110, Figure 20, so that the end of the tapered shank contacts the plate and the cylindrical portion of the drill engages in the bottom 114. The plate 116 is clamped to the rod 109 after the head has been moved forwardly so that the point of the drill will contact the gauge 120.

The post 22' is provided at its top with a bearing head 125, receiving ball bearings 126, identical to the ball bearings 70 and having the same lubrication arrangement, as shown. These ball bearings receive a horizontal shaft 127, driven by a grooved pulley 128, receiving rotation from any suitable source. A rotary grinder 129 formed of Carborundum, or any other suitable material, is mounted upon the free end of the shaft 127 in the usual manner.

A generally forwardly extending handle 130 is provided to facilitate swinging the drill-feeding assembly 74'. At its inner end, the handle 130 carries a depending shank 131, having a lower reduced screw-threaded extenion 132, engaging in a screw-threaded opening in the top of the arm 77. The extension 132 serves the dual purpose of securing the handle 130 to the assembly 74' and serving as a set screw to engage upon the screw 99 for locking the carriage 89 in the selected adjusted position, Figure 13.

The shaft 127 is horizontal and parallel to the longitudinal axis of the carriage 37'. The central longitudinal axis of the shaft 127 and the central longitudinal axes of the eccentric 74 and drill 102 are all horizontal and in the same horizontal plane, when the drill-feeding assembly 74' is in the raised position. Since the drill 102 and rod 109 are parallel to the arm 77, and the arm 76 is at right angles to the longitudinal axis of the shaft 73, the drill 102 and carriage 89 are at a slight angle to the longitudinal axis of the shaft 73, such as approximately 10 degrees but this angle may be varied slightly.

It is to be noted that the geometry of this machine is such that when the assembly 74' is in its upper horizontal position and the drill 102 is properly adjusted, as previously described, the center of the drill point will be disposed directly over the vertical axis of the pin 63, and the point of the drill will be at the same elevation above the bed 26 as the longitudinal axis of the grinding wheel 129. The drill will engage the grinding wheel at the vertical center of the same. The projected longitudinal axes of the drill and eccentric 74 will intersect directly over the axis of the pin 63, at this time.

The operation of the machine is as follows:

The bracket 59' is angularly adjusted for setting the desired angle to be ground upon the point of the drill, and the carriage 89 is adjusted laterally corresponding to the diameter of the drill being ground. The drill is longitudinally adjusted by the use of the gauge 120 and by moving the head 110 longitudinally, as stated. When this has been done the tip of the drill point will be directly over the axis of the pin 63. When the drill-feeding assembly 74' is swung to the top of its travel, and is disposed horizontally, the slide 52 is then adjusted for bringing the point of the drill into contact with the periphery of the grinder 129, which contact is indicated by sparks. The extent of grinding may be varied by the use of the knob 61 in conjunction with the scale 57 on the slide 52. However, the normal feeding of the drill point into the grinding wheel is accomplished by swinging the assembly 74' vertically. With the assembly 74' arranged horizontally, or in its uppermost position, with the lugs 83 and 84 arranged as shown in Figure 8, the grinder 129 first

grinds the leading or cutting edge 133 of a drill lip 134, and when the assembly 74' is swung downwardly, the eccentric 74 causes the drill point to swing laterally toward the periphery of the grinder 129. The lip 134 being ground, as it moves downwardly, is thus shifted slightly toward the periphery of the grinder and this continuous slight feeding action results in the lip of the drill being ground slightly inclined or deeper toward its trailing edge or heel 135, and the leading cutting edge 133 of the drill lip 134 is disposed above or in advance of the trailing edge or heel 135 when the grinding action is completed by the full downward swing of the assembly 74'. This above-described grinding action is very important for the proper use of a drill. While the assembly 74' is swinging downwardly, due to the slight angular relation of the longitudinal axis of the drill to the longitudinal axis of the shaft 73, the point 136 of the drill is swung slightly away from the periphery of the rotary grinder 129. This feature is very important because it prevents the cutting edge of the next approaching lip of the drill from being nicked by the grinding wheel adjacent to the point 136. There is therefore a compound movement imparted to the drill 102 while the assembly 74' swings downwardly, one component of which causes the grinder 129 to progressively cut the lip 134 deeper toward the trailing edge or heel 135, and the other component moves the drill point 136 away from the grinder 129, as stated, see Figures 17, 18 and 19.

After one lip 134 has been ground, the drill is lifted and turned 180 degrees upon its longitudinal axis in the head 110 and the next lip 134 will be ground to the identical extent and in the identical manner as the preceding lip 134, by again swinging the assembly 74' from its upper horizontal position downwardly until the arm 76 contacts the screw-stop 86. None of the previously described adjustments are changed when the drill is turned over or rotated 180 degrees for grinding a new lip.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A machine for grinding drills comprising a support, a rotatable shaft mounted upon the support for carrying a rotary grinder, an angularly adjustable supporting member mounted upon the support and having a turning point, a second member arranged near the rotary grinder, means to pivotally mount the second member upon the angularly adjustable supporting member including a pivot element provided with an eccentric extension having a central longitudinal axis, a drill holding device mounted upon the second member and having holding means for receiving the drill, the holding means having a longitudinal axis extending generally longitudinally of the central longitudinal axis of the eccentric extension and arranged at a slight angle from the parallel with relation to such axis, the arrangement being such that the projected longitudinal axis of the drill and the projected central longitudinal axis of the eccentric extension will intersect at a point in alignment with the turning point of the angularly adjustable member when the second member is shifted to a position for starting the grinding operation.

2. A machine for grinding drills comprising a support, means mounted upon the support for carrying a rotary grinder, a swinging supporting device mounted upon the support, a carriage mounted upon the supporting device, an adjusting screw secured to the carriage and engaging the supporting device, a feed nut engaging the screw, a tube secured to the carriage and slidably engaging the supporting device, a head carried by the tube and having a recess to receive a drill, an index element arranged within the tube to engage with the drill, adjustable means carried by the head to clamp the index element in the selected position, a rod secured to the head and extending axially of the drill, and a drill holding device adjustably mounted upon the rod.

3. A machine for grinding drills comprising a support, means mounted upon the support for carrying a rotary grinder, a swinging supporting device mounted upon the support, a carriage mounted upon the swinging supporting device, a head mounted upon the carriage and having a recess to receive the drill, a rod mounted upon the head and extending axially of the drill held within the recess, a head longitudinally adjustably mounted upon the rod and having an opening to receive the drill, a plate separate from the second head and arranged upon that side of the second head remote from the first head, a set screw for clamping the plate to the second head, and a separate set screw for clamping the plate to the rod, and a screw engaging the second head for clamping the drill in place therein.

4. A machine for grinding drills comprising a support, means mounted upon the support for carrying a rotary grinder, a swinging supporting device mounted upon the support near the rotary grinder, a carriage mounted upon the swinging supporting device, a head mounted upon the carriage and having a recess to receive the drill, screw means to adjust the carriage with respect to the supporting device, a scale to indicate the adjustment of the carriage in accordance with different diameter size drills, a set screw carried by the supporting device for clamping engagement with the screw means, a handle to swing the supporting device and carried by the set screw and rigidly connected with the set screw to turn it, a second handle secured to the head, and a drill holding device mounted upon the second handle.

5. A machine for grinding drills, comprising a support, a substantially horizontal shaft mounted upon the support for carrying a rotary grinder, a carriage mounted upon the support at an elevation beneath the substantially horizontal shaft to move longitudinally of and parallel with such shaft, a slide mounted upon the carriage to move transversely thereof at substantially a right angle to the shaft, an L-shaped bracket including a horizontal arm and a vertical arm, means to pivotally mount the horizontal arm upon the slide, the vertical arm being arranged near one end of the substantially horizontal shaft and upon one side of its longitudinal axis, a pivot element carried by the upper end of the vertical arm and horizontally disposed and having an eccentric extension, an L-shaped bracket which is substantially horizontal when in the raised position and including first and second arms, the first arm being clamped upon the eccentric extension, the end of the first arm and the eccentric extension being disposed upon the same side of the axis of the substantially horizontal shaft with the vertical arm of the first named L-shaped

bracket, the second arm being disposed at an obtuse angle with relation to the first arm and extending upon the opposite side of the substantially horizontal shaft with relation to the eccentric extension, a drill holding device mounted upon the free end portion of the second arm for holding a drill parallel with the second arm, the drill and eccentric extension being arranged in spaced end-to-end relation and disposed upon opposite sides of the substantially horizontal shaft and disposed at a slight angle from the parallel with respect to the eccentric extension, and a gauge mounted upon the drill holding device to contact with the free end of the drill and adjustable so that its contact face is in alignment with the pivot means for the horizontal arm of the first named L-shaped bracket.

6. A machine for grinding drills, a support, a substantially horizontal rotatable shaft mounted upon the support for carrying a rotary grinder, a substantially horizontally angularly adjustable supporting member mounted upon the support and having a turning point, a substantially vertically swinging member arranged near the rotary grinder, a pivot element mounted upon the angularly adjustable supporting member and arranged substantially horizontal and having an axial eccentric extension which is secured to the substantially vertical swinging member, a drill holding device mounted upon the swinging member and having drill engaging parts arranged in end-to-end relation to the eccentric extension and slightly inclined with respect to the longitudinal axis of such eccentric extension, the drill holding device being arranged to bring the lip of the drill into engagement with the periphery of the grinder, the shaft, the eccentric extension and the drill engaging parts of the drill holding device being disposed in the same substantially horizontal plane when the swinging member is in the raised starting position, and the central longitudinal axis of the eccentric extension being in alignment with the turning point of the angularly adjustable supporting member when the swinging member is in the raised starting position.

7. In a machine for grinding drills, a support, a shaft mounted upon the support for carrying a rotary grinder, an angularly adjustable supporting member mounted upon the support and movable in a plane parallel with the longitudinal axis of the shaft, a swinging member arranged near the grinder and movable in a plane at right angles to the longitudinal axis of the shaft, a pivot element mounted upon the angularly adjustable supporting member and arranged in a plane parallel with the longitudinal axis of the shaft and having an axial eccentric extension which is secured to the swinging member to turn therewith, a drill holding device mounted upon the swinging member and having drill engaging parts arranged in end-to-end relation to the eccentric extension and slightly inclined with respect to the longitudinal axis of such eccentric extension, the shaft, eccentric extension and drill engaging parts of the drill holding device being disposed in the same plane when the swinging member is in the starting position, the central longitudinal axis of the eccentric extension being in alignment with the turning point of the angularly adjustable member when the swinging member is in the starting position, and means connected with the drill holding device and swinging member to shift the drill holding device radially with respect to the turning point of the angularly adjustable member without disturbing the inclination of the drill engaging parts with respect to the longitudinal axis of the eccentric extension.

8. In a machine for grinding drills, a support, a shaft mounted upon the support for carrying a rotary grinder, an angularly adjustable supporting member mounted upon the support and movable in a plane parallel with the longitudinal axis of the shaft, a swinging member arranged near the grinder and movable in a plane at right angles to the longitudinal axis of the shaft, a pivot element mounted upon the angularly adjustable supporting member and arranged in a plane parallel with the longitudinal axis of the shaft and having an axial eccentric extension which is secured to the swinging member to turn therewith, a drill holding device mounted upon the swinging member and having drill engaging parts arranged in end-to-end relation to the eccentric extension and slightly inclined with respect to the longitudinal axis of such eccentric extension, the shaft, eccentric extension and drill engaging parts of the drill holding device being disposed in the same plane when the swinging member is in the starting position, the central longitudinal axis of the eccentric extension being in alignment with the turning point of the angularly adjustable member when the swinging member is in the starting position, and a gauge mounted upon the swinging member and having a face to contact with the point of the drill, the gauge being adjustable so that said face may be brought into the path of travel of the point of the drill and in alignment with the turning point of the angularly adjustable supporting member.

9. A machine for grinding drills, comprising a support, a rotatable shaft mounted upon the support for carrying a rotary grinder, a bracket mounted upon the support, a member arranged near the rotary grinder, means to pivotally mount the member upon the bracket including a pivoted element having a turning axis which is inclined with respect to the rotatable shaft and provided with an axial eccentric extension, a drill holding device mounted upon the member in end-to-end relation with the eccentric extension and axially spaced from the eccentric extension and having holding means for receiving the drill, the holding means having drill engaging parts extending longitudinally of said turning axis and arranged at a slight angle with relation to the turning axis, said drill engaging parts holding the drill so that its longitudinal axis is at a slight angle with respect to said turning axis.

10. A machine for grinding drills, comprising a support, a rotatable shaft mounted upon the support for carrying a rotary grinder, an angularly adjustable supporting member mounted upon the support near the rotary grinder and having a turning point, a second member arranged near the rotary grinder, means to pivotally mount the second member upon the angularly adjustable supporting member including a pivot element having a turning axis and provided with an eccentric extension, turning axis being inclined with respect to the rotatable shaft, a drill holding device mounted upon the second member and including drill engaging parts arranged in end-to-end relation with the eccentric extension and axially spaced from the eccentric extension, the drill engaging parts being arranged at a slight angle with relation to the turning axis, the drill engaging parts holding a drill so that

the longitudinal axis of the drill is arranged at a slight angle with respect to the turning axis, and a gauge connected with the drill holding device for contacting with the end of the drill so that such end is brought in alignment with the turning point of the angularly adjustable supporting member at the starting of the grinding action.

11. A machine for grinding drills, comprising a support, a rotary grinder mounted upon the support and having an axis of rotation and a periphery, a supporting member mounted upon the support near the rotary grinder, a pivot element mounted upon the supporting member and having a turning axis inclined with relation to the axis of rotation of the grinder and provided with an axial eccentric extension, a drill holding device to bring the lip of the drill into contact with the periphery of the grinder, mounting means secured to the eccentric extension so that they move together and carrying the drill holding device so that the drill holding device will hold the drill with the longitudinal axis of the drill at a slight angle to the turning axis, the drill holding device and drill being arranged in end-to-end relation with relation to the turning axis and axially spaced from the turning axis.

12. A machine for grinding drills, comprising a support, a substantially horizontal rotatable shaft mounted upon the support, a substantially vertically rotating grinder mounted upon the shaft and having a periphery and end, a substantially horizontally angularly adjustable bracket mounted upon the support and having a turning point, a substantially vertically swinging member arranged near the rotary grinder, a substantially horizontal pivot element mounted upon the angularly adjustable bracket and having a turning axis extending radially of the turning point of the angularly adjustable bracket and inclined with respect to the shaft and provided with an axial eccentric extension upon which the substantially vertically swinging member is mounted, the eccentric extension having a central longitudinal axis, a drill holding device mounted upon the swinging member and having drill engaging parts arranged in end-to-end relation to the eccentric extension and axially spaced from the eccentric extension and inclined slightly with respect to the central longitudinal axis of the eccentric extension, the drill holding device being adjustable to hold the drill so that its point will be in alignment with the turning point of the angularly adjustable bracket.

13. A machine for grinding drills, comprising a support, a substantially horizontal rotatable shaft mounted upon the support, a substantially vertically rotating grinder mounted upon the shaft and having a periphery and end, an upstanding bracket disposed near the end of the grinder and including an elongated horizontal portion, a pivot element connecting the horizontal elongated portion with the support so that bracket may be angularly adjusted with respect to the axis of rotation of the grinder, a substantially vertically swinging member having ends, a substantially horizontal pivot element mounted upon the bracket and having a turning axis extending longitudinally of the elongated horizontal portion and inclined with respect to the axis of rotation of the grinder and provided with an axial eccentric extension upon which one end of the substantially vertically swinging member is mounted, the eccentric extension having a central longitudinal axis, a drill holding device mounted upon the opposite end of the swinging member to be arranged adjacent to the periphery of the rotary grinder and having drill engaging parts spaced axially from the eccentric extension and inclined slightly with respect to the central longitudinal axis of the eccentric extension.

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