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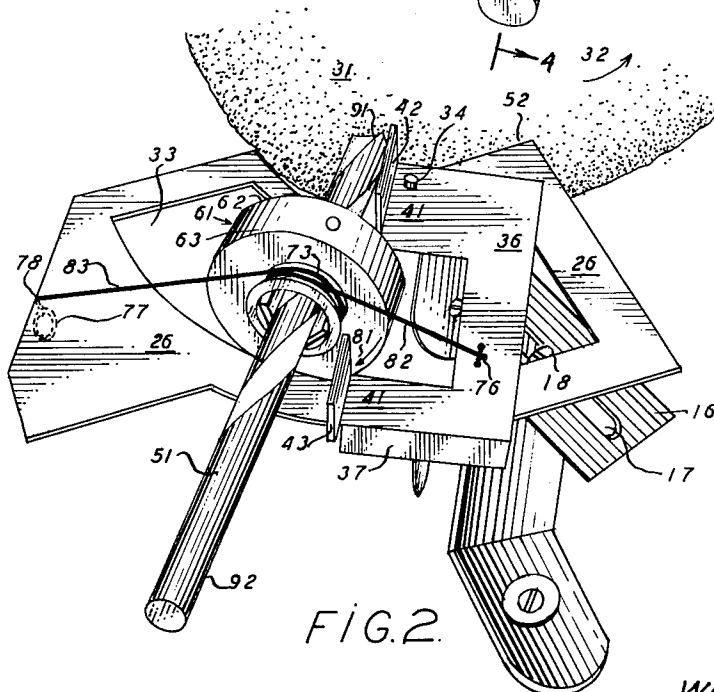
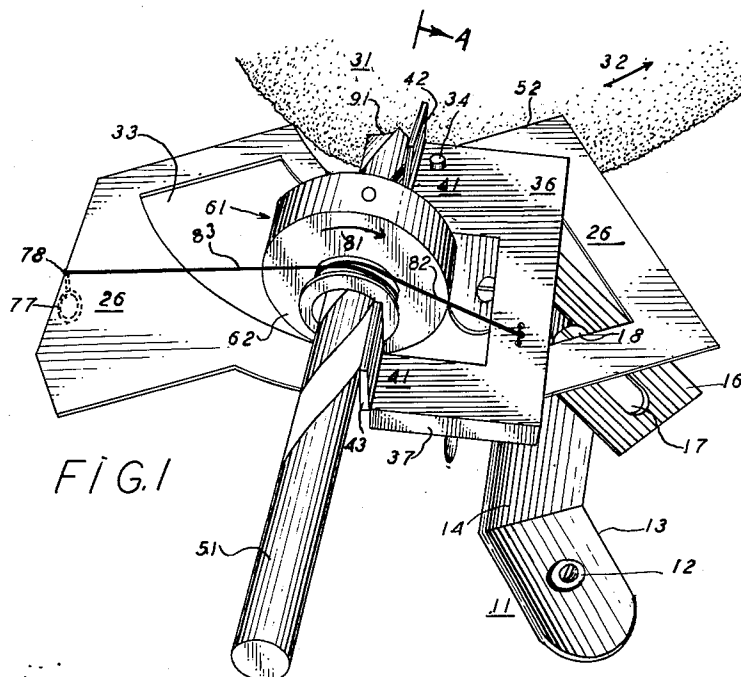
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3,060,645

DRILL GRINDING ATTACHMENT

Filed Nov. 20, 1961

2 Sheets-Sheet 1



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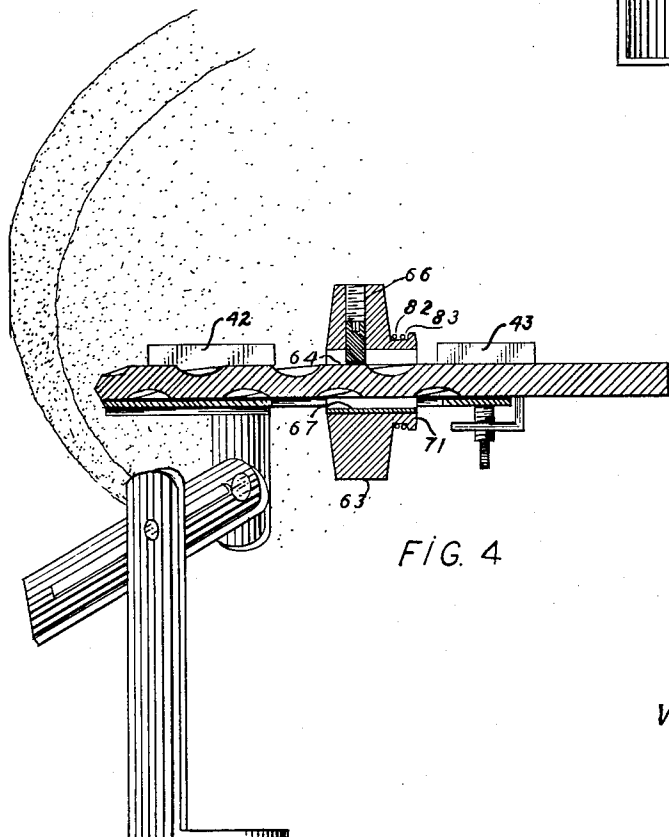
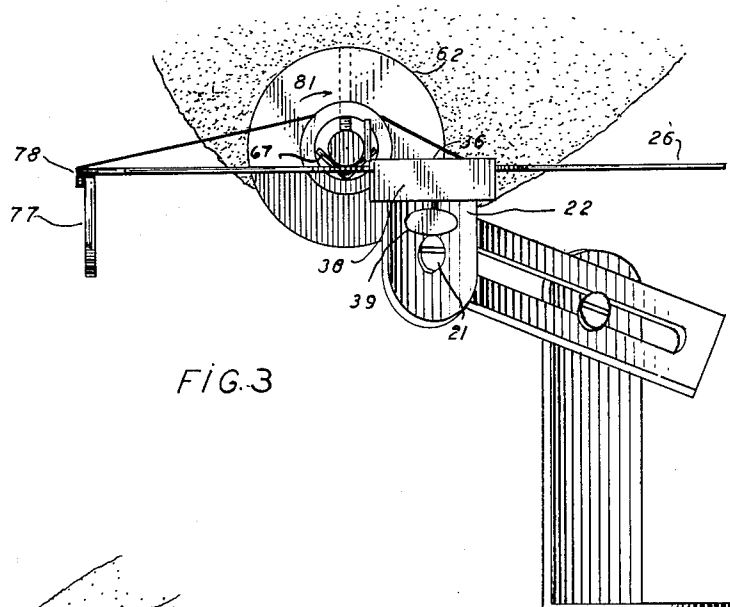
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2 Sheets-Sheet 2



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DRILL GRINDING ATTACHMENT
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The invention relates to accessories for grinding twist drills.

While long-experienced mechanics are capable of grinding drills to accurate point angles and lip clearances without the use of guides, the same can not be said of persons who only occasionally grind drills.

To accommodate the latter class, many different kinds of mechanical aids and guides have put in their appearance at the market place.

Unfortunately, however, these accessories have uniformly been so costly or so complex as to limit their desirability and widespread use.

At the other extreme, the available simple and cheap mechanical aids allow too great a margin of human error and, thus, are but little better than grinding by hand and eye.

It is therefore an object of the invention to provide a drill grinding attachment for use with a grinding wheel which is unusually accurate and which provides the proper point angle and lip angle with a minimum likelihood of an error.

It is another object of the invention to provide a drill grinding attachment which is capable of being used with grinding wheels both of the pedestal and the bench type, and with grinding wheels of the closed as well as the semi-closed type, without special brackets.

It is yet another object of the invention to provide a drill grinding attachment which is economical to acquire and in which upkeep is negligible.

It is still another object of the invention to provide a drill grinding attachment in which the drill point is at all times visible to the user.

It is a further object of the invention to provide a drill grinding attachment, the operation of which can quickly be learned, even by unskilled persons.

It is yet an additional object of the invention to provide a drill grinding accessory which is versatile in that it is capable of accurately grinding to many different selected point angles, and can handle drills of many different sizes.

It is another object of the invention to provide a generally improved drill grinding attachment.

Other objects, together with the foregoing, are attained in the embodiment described in the following description and shown in the accompanying drawings in which:

FIGURE 1 is a perspective view showing the device in a typical environment, adjacent one side of a grinding wheel, and illustrating a drill in its base or initial position, preparatory to grinding;

FIGURE 2 is a view comparable to that of FIGURE 1, but with a drill in its end or final position, and illustrating the use of a V-block in the drill chuck to handle a drill having a diameter smaller than the drill shown in FIGURE 1;

FIGURE 3 is a side elevation of the device looking directly along the axis of the drill; and

FIGURE 4 is a sectional view, the plane of the section being indicated by the line 4-4 in FIGURE 1, but with the addition of a V-block to illustrate its position in the chuck.

While the drill grinding attachment of the invention is susceptible of numerous physical embodiments, depending on the environment and requirements of use, substantial numbers of the herein shown and described embodiment have been made, tested and used, and all have performed in an eminently satisfactory manner.

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Mounted on a suitable support, such as a bench 11, as by fasteners 12, is a lower bracket 13 having an upstanding leg 14. Angularly and vertically adjustable with respect to the lower bracket 13 is an upper bracket 16 provided with a central slot 17 the upper bracket 16 being clamped at the desired location by a threaded fastening 18. A threaded fastening 21 secures the upper end of the upper bracket 16, at the desired inclination with respect to a flange 22 depending from and at right angles to a platform 26.

The bracket members and the flange are so disposed as to hold the platform 26 in a horizontal attitude and at a location adjacent the grinding wheel 31, preferably at a position on the side of the grinding wheel at approximately "7 o'clock," the grinding wheel rotating in the direction indicated by the arrow 32.

The platform 26 is generally arcuate in plan and has formed therein a correspondingly arcuate slot 33.

Pivotaly mounted on the edge of the platform 26 adjacent the grinding wheel 31, and at a location substantially at the center of curvature, as on a pin 34, is a generally reversed C-shaped drill positioning member 36, or plate. The outer edge (the edge most remote from the grinding wheel) of the plate is turned downwardly, as at 37 over the adjacent arcuate edge of the platform 26 and is recurved inwardly so as to form a flange 38 (see FIGURE 3) underlying the platform. A drilled and tapped opening has disposed therein a clamping screw 39 which permits the user to clamp the drill positioning plate 36 at any desired angular relation on the platform. The left hand ends (see FIGURES 1 and 2) of the legs 41 of the reversed C-shaped positioning plate are up-turned to form a vertical inner stop 42 and an outer stop 43. The stops 42 and 43 are aligned and serve as guides for positioning the drill 51, the drill being in abutment with both of the stops in initial or base position as appears most clearly in FIGURE 1.

The angular relation between the aligned stops 42 and 43 and the plane of the side of the grinding wheel is established by appropriately swinging the positioning plate 36 about the pivot 34 until the desired angle is obtained. A suitable angular template (not shown) is a convenient device for achieving the angular relation. The plate 36 is thereupon clamped to the platform by the screw 39 (see FIGURE 3).

As an alternative, scribe marks (not shown) indicating the angle formed by the aligned guide stops with respect to the linear innermost edge 52 of the platform 26 could be used. In this event, care would be taken to position the edge 52 so as to be in parallelism with the adjacent face of the grinding wheel.

The angle selected will depend on the nature of the drill which, in turn, will be determined by the kind of material to be drilled. For general purpose use, the angle will be fifty-nine degrees, measured from the plane of the grinder face to the plane of the aligned guide stops. It is this angle which determines what is known as the point angle of the drill.

As is well-known in the drill grinding art, the point angle, or lip angle, obtains only at the cutting lip. The heel or trailing edge of the point is at an angle approximately twelve degrees less than the fifty-nine degrees at the cutting lip. This angle is known as the clearance angle and provides a clearance behind the cutting lip so that the heel does not bind or rub against the cone formed by the cutting lips.

In order to provide a clearance angle which smoothly varies from zero at the cutting lip to twelve degrees at the heel, I provide a novel swinging chuck mechanism, generally designated by the reference numeral 61.

The mechanism includes a wheel 62, or pulley chuck, having a knurled edge 63 and a central or axial, cylindri-

cal throughbore 64 (see FIGURE 4), within which the drill is chucked. Clamping of the drill within the bore is effected by an Allen screw 66. The diameter of the bore 64 is selected so as to accommodate drills up to, for example, one half inch in diameter. For drills considerably smaller, a V-block 67, or spacer, is provided, the size of the block being chosen so as to locate the drill substantially coaxially with the axis of the through bore. For handling drills over one-half inch in diameter, for example, another wheel 62, with a larger through bore 64 would ordinarily be used. Here again, spacers would be used to center the drills and serve, in conjunction with the Allen screw, to chuck or clamp the drills securely in position within the wheel.

The outer, or outboard face of the wheel is provided with a flange 71, or flanged pulley, having one turn wound thereon of a member termed a tension cable 73. One end of the cable is anchored, as at 76, on the positioning plate 36 and the other end has secured thereto a ring 77. The user can either pull on the ring to exert continuous tension, or he can pull on the ring far enough to insert the cable into a V-notch 78 at the left-hand edge (see FIGURES 1-3) of the platform, in which case the cable is held under tension, with the ring 77 lodged tightly against the underside of the V-notch.

The cable is reaved about the pulley in a direction such that as the wheel is rotated in the clockwise direction indicated by the arrow 81, the right-hand leg 82 of the cable lengthens and the left-hand leg 83 of the cable shortens. The cable is also so wound on the pulley that the right-hand cable leg 82 is inboard of the left-hand cable leg (see FIGURE 4). Since there is this separation between the cable legs 82 and 83, there is created a moment arm, the extent of which is dependent upon the amount of separation. Acting through this moment arm is a right-hand tension (see FIGURES 1 and 2) on the cable leg 82 and a left-hand tension on the cable leg 83. The resultant effect is that a bias is impressed on the pulley and on the drill, the direction of the bias being such as to urge the point 91 of the drill against the inner stop 42 and to urge the shank 92 of the drill away from the outer stop 43.

The tension on the cable legs and the moment arm is such that the biasing effect is not, in and of itself, sufficient to dislodge the drill from the base or initial position of the drill shown in FIGURE 1. When, however, the user rotates the wheel in the clockwise direction 81, as by placing the thumb and middle finger on the upper and lower portions of the knurled edge of the wheel, and rolling the thumb and finger, the biasing effect occurs. Consequently, while the shank end 92 of the drill moves away from the outer stop 43, the point end 91 of the drill remains lodged against the inner stop 42.

It is this relative movement through an arc of approximately twelve degrees, measured between the original position (FIGURE 1) of the drill's axis and the final position (FIGURE 2) thereof, which provides the lip clearance angle.

In operation, after the drill is chucked, and the tension cable is wound around the flange, as described, and cable tension is applied, the drill is so located that one of the cutting lips of the drill is substantially parallel to the horizontal platform 26 and the drill point is in close juxtaposition to the grinding wheel. At this juncture, and starting with the drill in its initial position (FIGURE 1) against both stops 42 and 43, the user lightly urges the drill axially so that the cutting lip moves into light contact with the grinding wheel.

Then, maintaining tension on the cable, the wheel is

carefully rotated in the clockwise direction 81, causing the shank end 92 of the drill to swing away from the outer stop 43. Concurrently, the same light axially inward force on the drill is maintained, urging the drill point against the grinder. Upon reaching the approximately twelve degrees location shown in FIGURE 2, the drill is axially withdrawn from the grinder and, if desired, the ground portion of the point can be inspected, it merely being necessary to release the cable tension slightly to permit the drill point to be swung upwardly for a view of the entire point. If satisfied with the job on the first half of the point, the same cycle is repeated on the other half of the point.

Ordinarily, only a small amount of practice is necessary to enable a user quickly and effectively to sharpen a drill to factory-new condition.

It can therefore be seen that I have provided an especially versatile, economical and efficient drill grinding attachment.

What is claimed is:

1. A drill grinding attachment for use with a grinding wheel, said attachment comprising: a substantially arcuate drill supporting platform having formed therein a correspondingly arcuate slot; adjustable bracket means for supporting said platform in horizontal attitude and at a predetermined position relative to a grinding wheel; a drill positioning member including a horizontal plate overlying said platform and being pivotally mounted on said platform at a location substantially at the center of curvature of said arcuate slot, said plate having an aligned pair of vertical stops, one on each side of said slot; means for clamping said drill positioning member in a predetermined angular relation with respect to a grinding wheel; a pulley chuck having a flange and a central axial opening adapted to receive a drill, and including means for clamping a drill in said opening, said pulley chuck being disposed in said slot; a tensioned cable located substantially at right angles to the axis of said pulley chuck and secured at one end to said drill positioning member, said cable being wound over said pulley chuck flange in a manner such that the opposite end of said cable extends in a direction away from said one end thereof and the two portions of said cable extending away from said flange create a moment arm biasing said flange, said pulley chuck and a drill secured in said pulley chuck at an angle relative to said aligned stops as said pulley chuck is rotated from a base position wherein said drill is in engagement with both of said stops.

2. The device of claim 1 further characterized by means for detachably securing said opposite end of said cable to said platform.

3. A drill grinding attachment comprising a horizontal platform adjacent one side of a grinding wheel; a spaced pair of aligned vertical stops on said platform directed toward said side of said grinding wheel at a predetermined angle; a pulley rotatable about a central axis; chuck means on said pulley for clamping a twist drill coaxially with said pulley axis, said drill being in abutment with said stops in a base position whereby said drill is directed toward said side of said grinding wheel at said predetermined angle; and tension means in engagement with said pulley effective to bias the end of said drill removed from said grinding wheel away from the adjacent one of said pair of stops as said pulley is rotated in a direction away from said stops.

4. The device of claim 3 further characterized by means for selectively locating the alignment of said stops at a plurality of angles relative to said side of said grinding wheel.

No references cited.