

July 1, 1952

A. M. LOHR
DRILL GRINDER

2,601,748

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2 SHEETS—SHEET 1

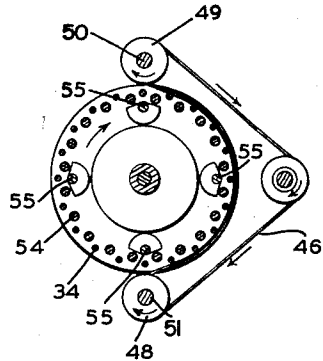


Fig. 2

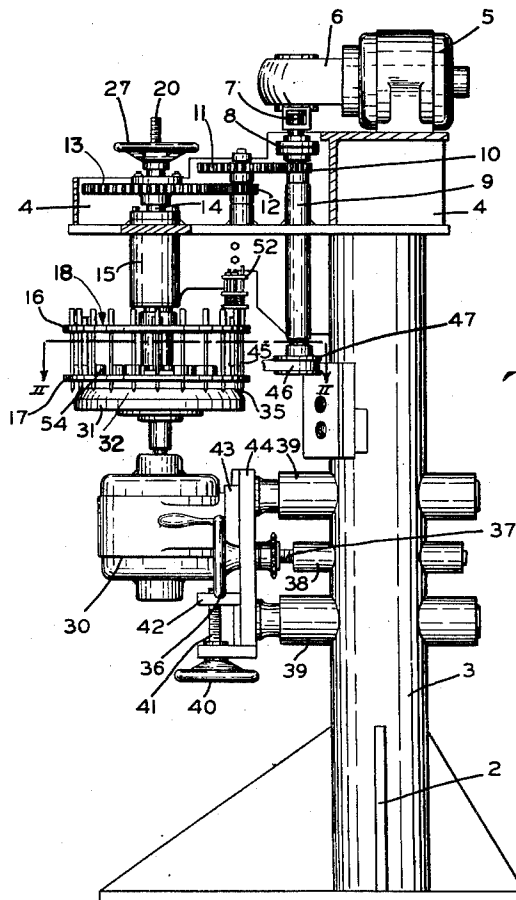


Fig. 1

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2 SHEETS—SHEET 2

Fig. 3

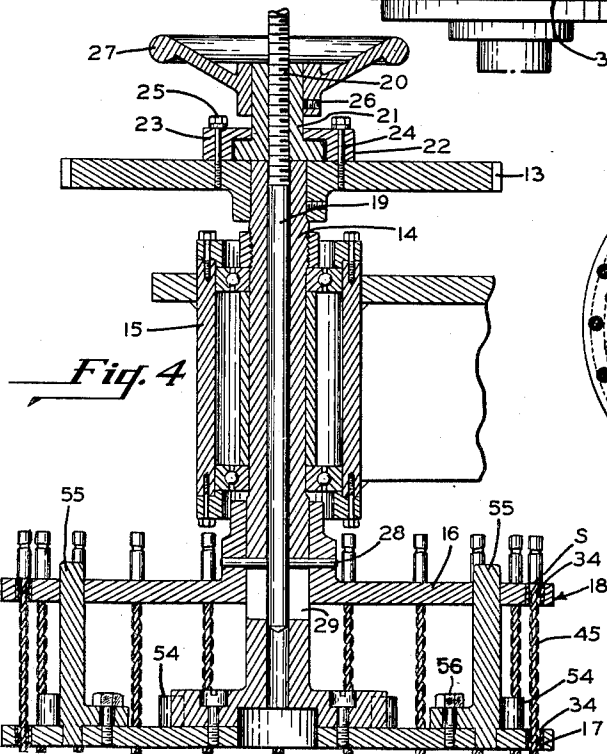
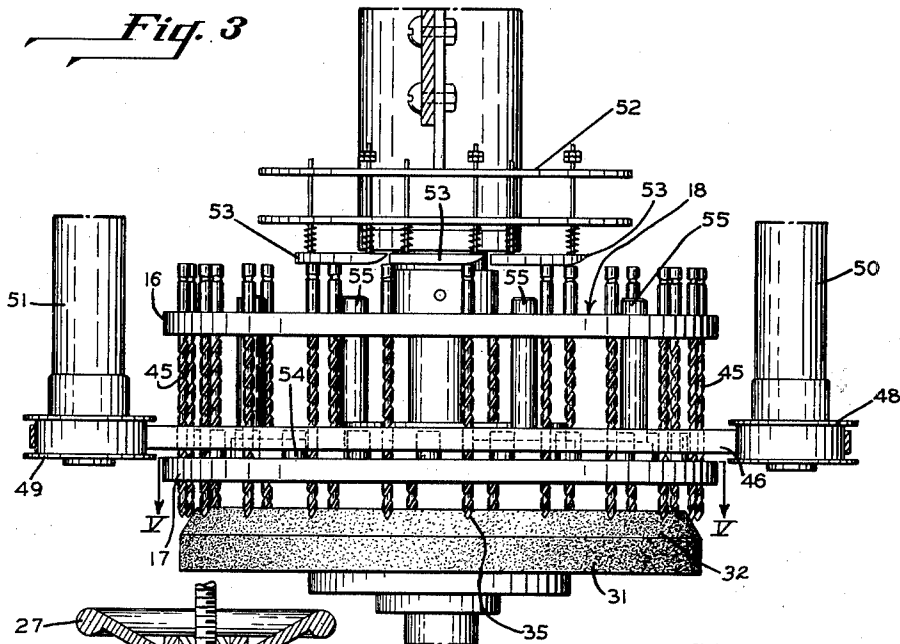
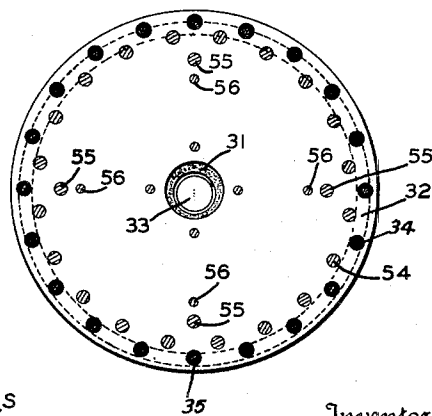


Fig. 5



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UNITED STATES PATENT OFFICE

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DRILL GRINDER

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4 Claims. (Cl. 51-108)

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This invention relates to a drill grinder and more particularly to a device for grinding a group of drills such as those used in gang drilling devices where it is essential or desirable that the drills all be of substantially the same length.

In gang drilling machines such as those used in the manufacture of perforated acoustical tile, it is desirable that the drills be of substantially uniform effective length so that the perforations which are drilled through a substantial extent of the thickness of the tile are of uniform depth. The term "effective length" used herein refers to the length of the drill between the tip and the shoulder which is provided at the bottom of the enlarged upper portion or shank of the drill. In drilling acoustical tile on a large-scale mass-production basis, it is necessary that the drills be resharpened periodically to produce clear-cut perforations. In resharpening the drills skill must be exercised so that all the drills are of uniform length. Prior to this invention, this was a hand operation and required a great deal of time.

An object of this invention is to provide a grinding device in which a series of drills may be rapidly and accurately sharpened in such a manner that all the drills are of substantially the same effective length.

In order that my invention may be more readily understood, it will be described in connection with the attached drawing in which:

Figure 1 is an elevational view of the drill grinder of my invention partially broken away;

Figure 2 is a cross-sectional view taken on the line II-II of Figure 1;

Figure 3 is an enlarged view of the work holder;

Figure 4 is a cross-sectional view showing the mechanism for rotating the work holder; and

Figure 5 is a cross-sectional view taken on the line V-V of Figure 3.

Referring to Figure 1, there is shown a base 2 and an upright support 3 on the top of which is mounted a gear housing 4. On top of the gear housing 4 is mounted a motor 5 provided with a gear-reduction drive 6 which is coupled to a shaft 7 by means of a coupling 8. Shaft 7 is a vertical shaft disposed within a housing 9. Keyed to shaft 7 immediately below the coupling 8 is a gear 10 which drives a reduction gear train made up of gears 11, 12, and 13 disposed in the gear housing 4.

Gear 13 is keyed to a vertical tubular shaft 14 (Figure 4) which is housed within housing 15. Keyed to shaft 14 below the housing 15 is a disc 16 which is adapted to rotate with the shaft 14.

Below the disc 16 is a second disc 17 which is also keyed to shaft 14. The two discs 16 and 17 constitute the work holding assembly designated generally at 18.

In order to accommodate drills of differing lengths, the top disc 16 is adjustable toward and away from the lower disc 17. The mechanism by which this is accomplished is shown in Figure 4. This cross-sectional view shows the tubular shaft 14 disposed within the housing 15. Positioned within the tubular shaft 14 is an elevating rod 19 which is free for limited movement up and down with respect to shaft 14. It is shown in its uppermost position in Figure 4. The top of the rod 19 is provided with a threaded portion 20 which is in engagement with a threaded member 21, received within a keeper 22 which is secured to gear 13 by means of studs 24 and 25. Secured to the threaded member 21 by means of a set screw 26 is a hand wheel 27. Rotation of the hand wheel 27 raises and lowers the rod 19 with respect to the tubular shaft 14.

The top adjustable disc 16 of the work holder 18 is attached to the elevating rod 19 and is driven by the hollow shaft 14 through a pin 28 which is received within an elongated vertical slot 29 in the shaft 14 and is fixed to the rod 19. The elongated vertical slot 29 allows the pin 28 to move in a vertical direction with respect to the shaft 14. It will be clear from this disclosure that raising and lowering of the elevating rod 19 will raise and lower the top disc 16 of the work holder 18, with respect to the lower holder 17, and the work holder assembly 18 will be rotated as a unit with shaft 14, through the gear reduction unit 10-13 powered by motor 5.

Positioned below the work holder assembly 18 is a second motor 30 (Figure 1) which is mounted on the upright support 3. Attached directly to the motor 30 is a grinding wheel 31 provided with a bevel 32 which is positioned immediately below work holder assembly 18 and slightly off center with respect thereto. The position of the grinding wheel is such that the drills positioned in openings 34 in the two discs 16 and 17 will contact a portion only of the bevel of the grinding wheel during a relatively short portion of their 360° path of travel. This is illustrated in Figure 5 in which the position of the grinding wheel is shown in dotted lines. The center of the grinding wheel is designated by the numeral 33. The point of contact between the drills and the grinding wheel is designated by the numeral 35. The motor 30 upon which the grinding wheel 31 is mounted may be adjusted horizontally by means

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of hand wheel 36 which operates a screw 37 which is in threaded engagement with a threaded housing 38 secured to the upright support 3. Rotation of the hand wheel 36 moves the motor mount in a horizontal direction in guides 39. The motor 30 and the grinding wheel 31 are also adjustable in a vertical direction by hand wheel 40 which is attached to a screw 41 which is in threaded engagement with a lug 42 attached to the vertical slide 43 and capable of movement in guideway 44. By these adjustments, the grinding wheel may be raised or lowered, retracted or extracted, by turning the hand wheels 36 and 40 to bring the operating surface of the wheel into proper position. It is possible to use grinding wheels of different diameter and thickness, if desired, by making appropriate adjustments.

In order that the individual drills 45 be rotated while in contact with the grinding wheel, a rubber belt 46 is provided which is driven by pulley 47 secured to the end of shaft 7 which, as explained before, is coupled directly to the reduced-speed drive 6 of motor 5. The belt 46 travels around the pulley 47 and idler pulleys 48 and 49 which rotate on columns 50 and 51, respectively, depending from the bottom of the gear housing 4. These have been omitted from Figure 1, but are shown in Figure 3. The path of travel of the belt 46 is such that it rotates the drills during that portion of the 360° path of travel of the drills with the work holder in which the drills are engaged by the grinding wheel and are being ground. While in the preferred embodiment a rubber belt is used to rotate the drills, it will be understood that other means such as gears and gear racks may be used. The drills are placed in openings 34 provided in discs 16 and 17, the discs being so arranged that the holes are in vertical alignment. The individual drills are provided with an enlarged upper portion embodying chuck engaging means. This enlarged upper portion is larger than the holes in the work holder assembly and, therefore, the shoulder s on the under side of the drill shank prevents the drill from falling through the openings 34 of the work holder. This shoulder also acts as the locating point which determines the length of the drill. In order to prevent the drills from being pushed upwardly by the grinding wheel 31 when they come in contact therewith, there is provided a hold-down mechanism shown generally at 52. This hold-down mechanism is comprised of a series of spring-urged shoes 53 which the drill shanks engage during their path of travel in engagement with the grinding wheel. These spring-urged hold-down shoes 53 prevent the drills from being jarred upwardly and keep them in engagement with the grinding wheel during their path of travel through the short arc in which they contact the same.

I have found that for best results the speed-reduction drive 6 should rotate the shaft 7 at approximately 16½ R. P. M. and the gear train comprised of gears 10, 11, 12, and 13 should be of such a ratio as to drive the discs 16 and 17 at a speed of 1 R. P. M. Since shaft 7 rotates at 16½ R. P. M., the pulley 47 rotates at the same speed and, therefore, the belt 46 travels at approximately the rate of 12 feet per minute. This rotates the drills at sufficient speed so that they make several revolutions during the short space of travel in which they contact the grinding wheel.

The disc 17 is provided with a series of pins 54 (Figures 4 and 5) which are positioned be-

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tween holes 34 and slightly to the rear thereof to engage the belt 46 in the event all of the holes 34 are not filled with drills. The disc 17 is also provided with four guide pins 55 which are rigidly attached thereto by means of studs 56 and pass through holes in disc 16. These guide pins keep the two discs in proper alignment so that the drills will be inserted in a true vertical position. The guide pins 55 pass freely through the disc 16 to enable disc 16 to be raised and lowered and still held in proper vertical alignment.

The device of my invention is not limited for use in grinding twist drills, but may be used for grinding tubular drills as well.

In the operation of my device, the drills to be ground are placed in the holes 34 provided in the work holding assembly 18. As shown in the drawing, the discs 16 and 17 are provided with twenty holes for accommodating drills. The drills are placed in the holes and the machine is started. As the work holder rotates, after the drills are no longer in engagement with the belt 46, they may be manually removed from the holder and inspected. If additional grinding is necessary, the drill is reinserted so that it travels past the grinding wheel a second time. If the drill is satisfactorily ground, another drill is inserted in the holder and the operation continued until the entire series of drills is ground uniformly.

While I have illustrated and described certain preferred embodiments of my invention, it will be understood that the same is not so limited, but may be otherwise practiced within the scope of the following claims.

I claim:

1. In a drill grinding device the combination of a support for rotatably receiving a plurality of drills aligned in a circumferential path with their axes parallel, said support comprising two disc-like members, one movable with respect to the other to accommodate drills of different lengths, a rotatable abrading element for dressing the tips of said drills, means for rotating said support to bring said drills sequentially into abrading relationship with said rotatable abrading element, and means for rotating said drills in said support while in abrading relationship with said rotatable abrading element.

2. In a drill grinding device the combination of a support for rotatably receiving a plurality of drills aligned in a circumferential path with their axes parallel, said support comprising two disc-like members, one movable with respect to the other to accommodate drills of different lengths, guide pins secured to one of the disc-like members and passing through the other disc-like element to keep them in alignment, a rotatable abrading element for dressing the tips of said drills, means for rotating said support to bring said drills sequentially into abrading relationship with said rotatable abrading element, and means for rotating said drills in said support while in abrading relationship with said rotatable abrading element.

3. In a drill grinding device the combination of a support for rotatably receiving a plurality of drills aligned in a circumferential path with their axes parallel, a driving belt for engaging said drills, said support being provided with pins to engage said belt, a rotatable abrading element for dressing the tips of said drills, means for rotating said support to bring said drills sequentially into abrading relationship with said rotatable abrading element, and means for

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rotating said drills in said support while in abrading relationship with said rotatable abrading element.

4. In a drill grinding device the combination of a support for rotatably receiving a plurality of drills aligned in a circumferential path with their axes parallel, a driving belt to rotate said drills positioned in said support, said support being provided with pins to engage said belt, a rotatable abrading element for dressing the tips of said drills, means for rotating said support to bring said drills sequentially into abrading relationship with said rotatable abrading element, and means for rotating said drills in said support while in abrading relationship with said rotatable abrading element.

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