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GRINDING WHEEL DRESSING MECHANISM

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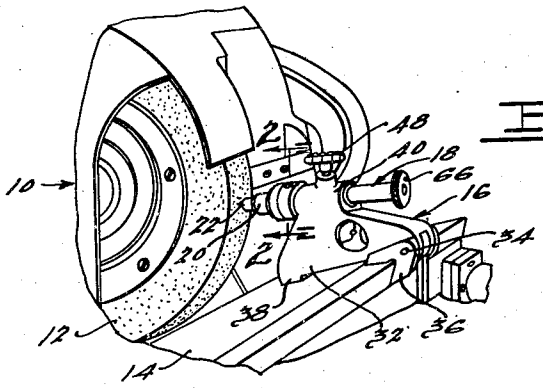


FIG. 1.

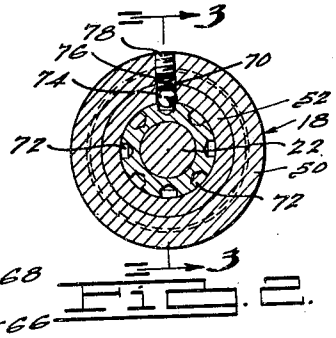


FIG. 2.

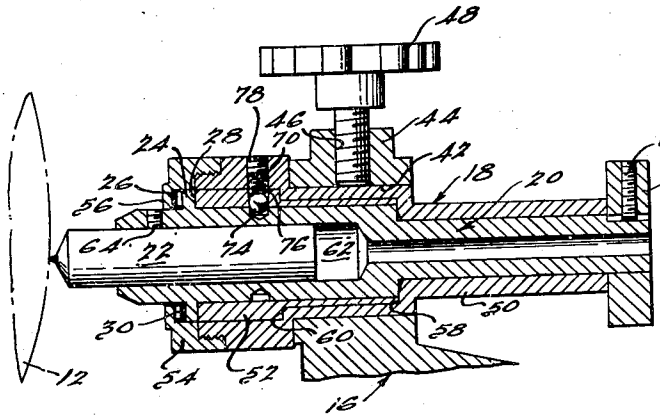


FIG. 3.

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GRINDING WHEEL DRESSING MECHANISM

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5 Claims. (Cl. 125—11)

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This invention relates broadly to new and useful improvement in tool holders and more particularly to a holder for diamond tools of the type conventionally used for dressing grinding wheels and the like.

In order to maintain the working face of a grinding wheel true and smooth, it is necessary to dress it from time to time. One way of doing this is to move a diamond point across the working face while the wheel is being rotated about its axis. Since the diamond is much harder than the grinding wheel, it cuts away a small portion of the wheel and leaves a fresh, smooth and true working surface.

In practice, the diamond tool is mounted in a suitable carriage designed to hold it steady and at a proper angle to the wheel during the dressing operation. Heretofore, however, difficulty has been encountered in preventing chattering of the tool in the holder. Vibration or chattering results from play between the tool and the holder or between parts of the holder and leaves the surface of the grinding wheel rough and unfit for accurate work.

The problem of vibration is further complicated by the fact that it usually is considered necessary or desirable to rotate the diamond tool periodically to present a fresh cutting edge to the grinding wheel and to prevent the diamond from being worn excessively on one side by the wheel. Consequently, the diamond tool or some part of the holder associated therewith must be rotatable and heretofore the parts have been associated in such manner that the working clearances necessary for rotation also permit vibration or chattering of the parts in use.

An important object of the present invention is to provide a holder for a diamond tool which permits rotary adjustment of the tool without causing objectionable vibration or chattering of the parts in use.

Another object of the invention is to provide a holder of the above-mentioned character which can be readily adapted to practically any type of grinding machine.

Still another object of the invention is to provide a holder of the above-mentioned character which is simple in construction, efficient in operation, and relatively inexpensive to manufacture.

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

In the drawings forming a part of this specification and wherein like numerals are employed to designate like parts throughout the same,

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Fig. 1 is a fragmentary, perspective view of a conventional grinding machine showing apparatus embodying the invention associated therewith and in operative relation to the working face of the wheel,

Fig. 2 is an enlarged, vertical, transverse sectional view taken on the line 2—2 of Fig. 1, and

Fig. 3 is a vertical, longitudinal, sectional view taken on the line 3—3 of Fig. 2.

In the drawing, the device embodying the present invention is shown associated, by way of illustration, with a conventional grinding machine 10 having a rotatably driven grinding wheel 12 and a reciprocable table 14. Table 14 is movable back and forth in front of the grinding wheel 12 and in a direction parallel to the axis about which the wheel rotates in the usual manner.

According to the present invention, the grinding machine 10 is provided with a wheel dressing mechanism, which considered in certain of its broader aspects comprises a support 16 fastened to and movable with the table 14, a stationary mounting 18 in the support, and a rotatable holder 20 for the conventional diamond tool 22 in the mounting. At the forward end thereof, the tool holder 20 is formed with a radial flange 24, and the mounting 18 is provided with opposed radial seats 26 and 28 disposed in confronting relation to the front and rear surfaces, respectively, of the flange 24. As best shown in Fig. 3, the spacing between seats 26 and 28 is greater than the thickness of flange 24 and an annular spring element 30 confined between seat 26 and the front radial face of flange 24 urges the flange axially rearwardly against seat 28. Spring 30 is yieldable to permit rotation of the holder 20 in mounting 18 but exerts sufficient axial thrust against the holder to prevent chattering of the same during operation of the device. Suitable means hereinafter described in detail are provided for rotating holder 20 and for indexing the same during such rotation.

More specifically, the support 16 here shown by way of illustration comprises a casting having a base portion 32 arranged transversely of the table 14 and pivoted, as at 34, to hinge brackets 36 on the forward edge of the table. At the forward edge of base portion 32 is an integral foot 38 which seats solidly on the table 14 and supports the wheel dressing mechanism for proper engagement with the grinding wheel 12. The wheel dressing mechanism is moved back and

forth across the face of the grinding wheel by reciprocating the table 14 in the usual manner, and when not in use the mechanism can be swung backwardly about pivot 36 to an unobstructive position off the table.

The upper portion of support 16 is in the form of an integral generally horizontal barrel 40 having an internal bore 42 which snugly receives the mounting 18. Surmounting the barrel portion 40 is an integral boss 44 and extending downwardly through the boss to the bore 42 is an internally threaded opening 46 which receives the hand screw 48. As best shown in Fig. 3, hand screw 48 can be tightened against the mounting 18 to hold the latter fixedly but removably associated with the support 16.

The mounting 18 comprises an outer generally tubular casing 50, an Oilite bearing 52 in the forward portion of the casing, and a nut 54 threaded on the forward end of the casing. The nut 54 is removable to permit holder 20 to be assembled in mounting 18, and it has an inwardly extending radial flange 56 which defines the forward seat 26 and retains the spring 30 in the manner hereinabove described. As best shown in Fig. 2, bearing 52 is retained against axial movement rearwardly in the casing 50 by radial shoulders 58 and 60 in the latter. The forward end of the bearing 52 defines the rear seat 28 hereinabove referred to and, by reason of the nature of the material from which the bearing is made, the seat 28 presents an antifriction surface to flange 24.

As suggested, the holder 20 is rotatably received in mounting 18 and is formed with an axial socket or bore 62 which opens through the forward end thereof and snugly receives the diamond tool 22. A set screw 64 normally holds tool 22 fixedly in a selected axially adjusted position in the socket 62. At its rearward end, the holder 20 extends axially from the mounting casing 50 and the projecting portion thereof carries a hand wheel 66 which is normally secured by a set screw 68 and provides for manual rotation of the holder.

The indexing mechanism which controls rotation of holder 20 comprises a radial bore 70 at the forward end of mounting 18, which bore extends through the casing 50 and bearing 52 and registers with an annular series of circumferentially spaced sockets or serrations 72 in the outer surface of holder 20. A ball detent 74 at the inner end of bore 70 projects into any one of the sockets 72 disposed in register with the bore and is yieldably urged against the holder 20 by a compression spring 76. A threaded plug 78 in the outer end of bore 80 is adjustably axially against spring 76 to regulate the pressure which the latter exerts against ball detent 74. When the holder 20 is rotated, ball detent 74 rides along the surface thereof and drops successively into one socket 72 after the other. Manifestly, when ball detent 74 is seated in one of the sockets 72 it maintains the holder 20 normally stationary until such time as the latter again is rotated.

In operation, the diamond tool 22 is presented to the working face of grinding wheel 12 in the conventional manner and, from time to time, the holder 20 is turned angularly a sufficient distance so that the ball detent 74 is pushed from one socket 72 and drops into the next adjacent socket. Preferably, the holder 20 is rotated in the same direction each time so that wear on the diamond point is substantially uniform. Each time the holder 20 is adjusted angularly in mounting 18 the diamond tool presents a new cutting edge to the grinding wheel and the wear occurs on a fresh portion of the diamond. As a result, the diamond assumes the shape of a polysided pyramid, as shown in Fig. 3, its effective life is substantially increased, and the cutting or dressing action materially enhanced.

A particular feature of the invention resides in the manner in which holder 20 is associated with the mounting 18. Specifically, by providing the holder 20 with a radial flange 24 and pressing the flange rearwardly against a fixed shoulder by a relatively stiff spring 30, I am able to adjust the holder angularly or rotatably from time to time without undue binding and at the same time to eliminate destructive chattering of the parts when the device is in use. In this connection, any suitable spring or series of springs 30 may be used, but I have found that a single annular undulating strip of spring metal so constructed and arranged as to be confined and compressed between flange 24 and seat 26, when nut 54 is tightened, is best suited for this purpose.

Also, it is desirable to reduce the axial distance between the diamond point and the shoulder 28 which supports the holder 20 as much as possible in order to reduce the effect of any slight vibrating movement which may occur at the surface of the wheel during the dressing operation. I achieve this result by locating the flange 24 at the forward end of holder 20, and experience teaches that this arrangement is pre-eminently satisfactory.

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

Having thus described the invention, I claim:

1. In a device of the character described, a mounting, a tool holder rotatable in said mounting, said tool holder having forwardly and rearwardly directed annular shoulders, said mounting having annular radial seats disposed in confronting relation to said shoulders and provided behind said seats with an elongated bearing rotatably supporting said tool holder, and spring means confined between the forwardly directed shoulder and its seat for urging the rearwardly directed shoulder solidly against its seat, whereby to prevent chatter of the parts during operation of the device.

2. In a device of the character described, a mounting, a tool holder rotatable in said mounting, said tool holder provided adjacent the forward end thereof with a radial flange, said mounting provided with opposed annular seats disposed in confronting relation to the opposite radial surfaces of said flange and the seat confronting the rear radial surface of the flange having an antifriction surface, and spring means in the mounting acting against said flange to hold the rearward radial surface thereof in pressed engagement with the antifriction surface of the radial seat which confronts therewith.

3. The combination as set forth in claim 2 including means for manually rotating said tool holder in said mounting, an indexing mechanism acting on said tool holder to yieldably stop rotation thereof after a predetermined angular movement about its axis.

4. In a grinding wheel dressing mechanism, a mounting having a forwardly directed radial

seat, a tool holder rotatable in said mounting, said tool holder having a radial flange thereon, and resilient means acting between said mounting and said flange to hold the rear surface of said flange against said radial seat.

5. In a grinding wheel dressing mechanism, a mounting, a tool holder rotatable in said mounting, said tool holder having a radial flange and said mounting having radial shoulders disposed in confronting relation to the front and rear surfaces of said flange, and resilient means acting between the forward surface of said flange and the radial shoulder confronting said surface to hold the rear surface of said flange against its confronting radial shoulder.

STANFORD P. BRUCE.

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