Aug. 26, 1952 E. V. STATIA, SR 2,608,189

GRINDING WHEEL DRESSER

Filed May 18, 1950 2 SHEETS—SHEET 1

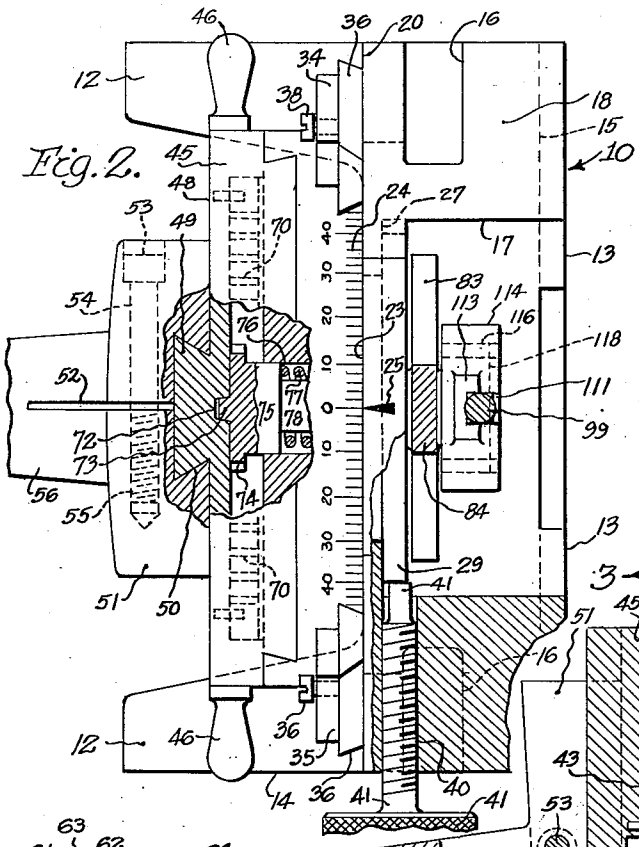


Fig. 2.

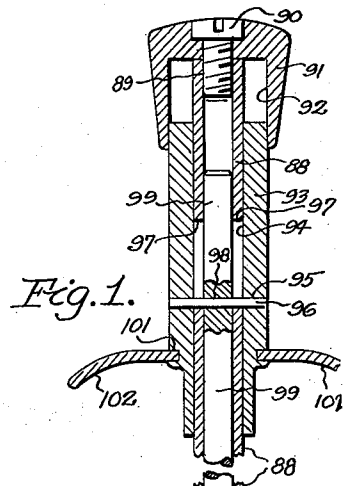


Fig. 1.

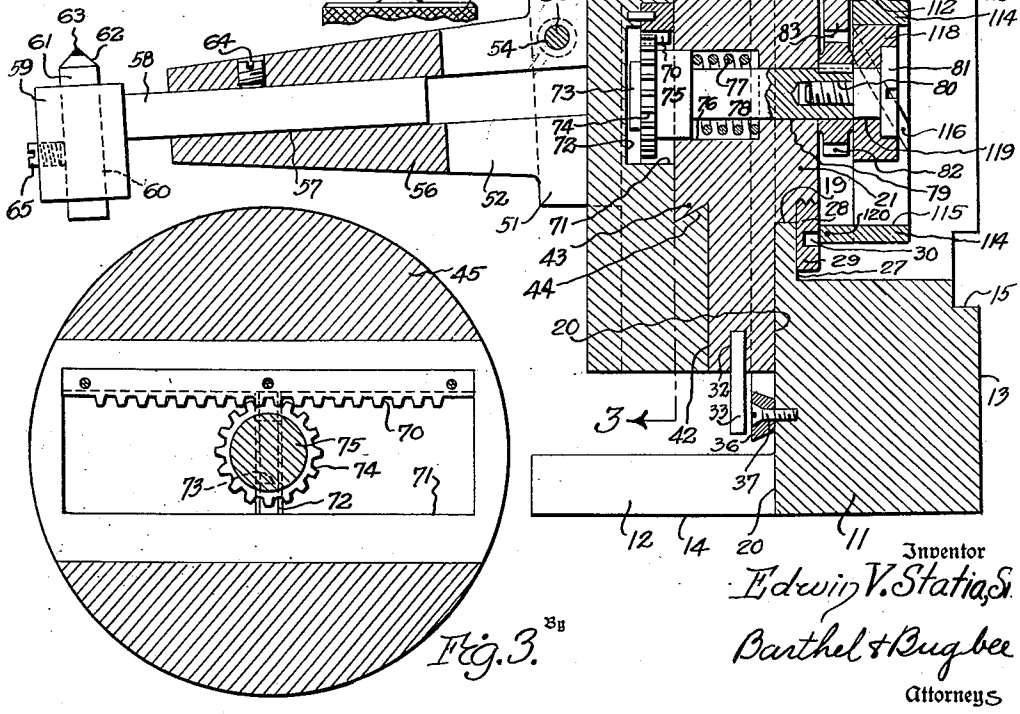


Fig. 3.

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Fig. 4.

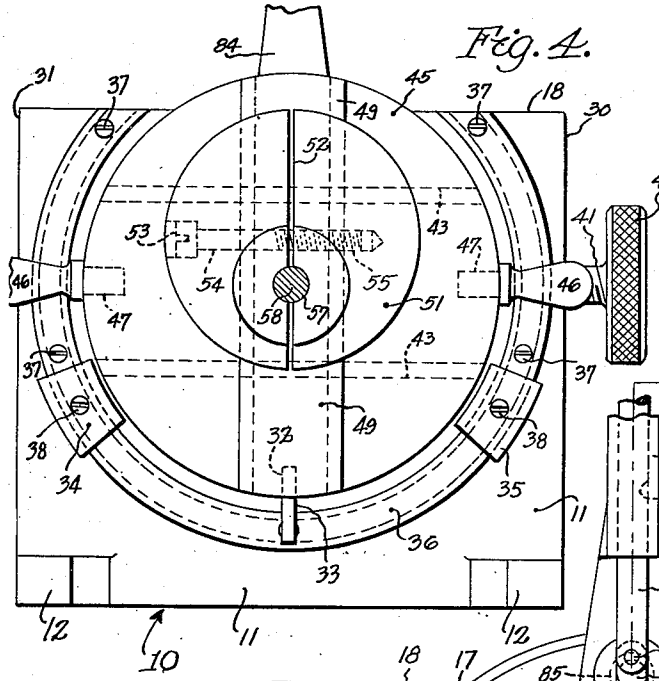


Fig. 6.

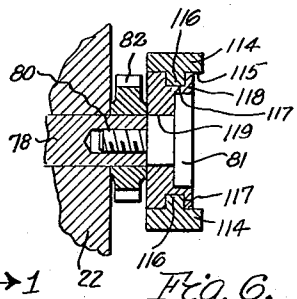
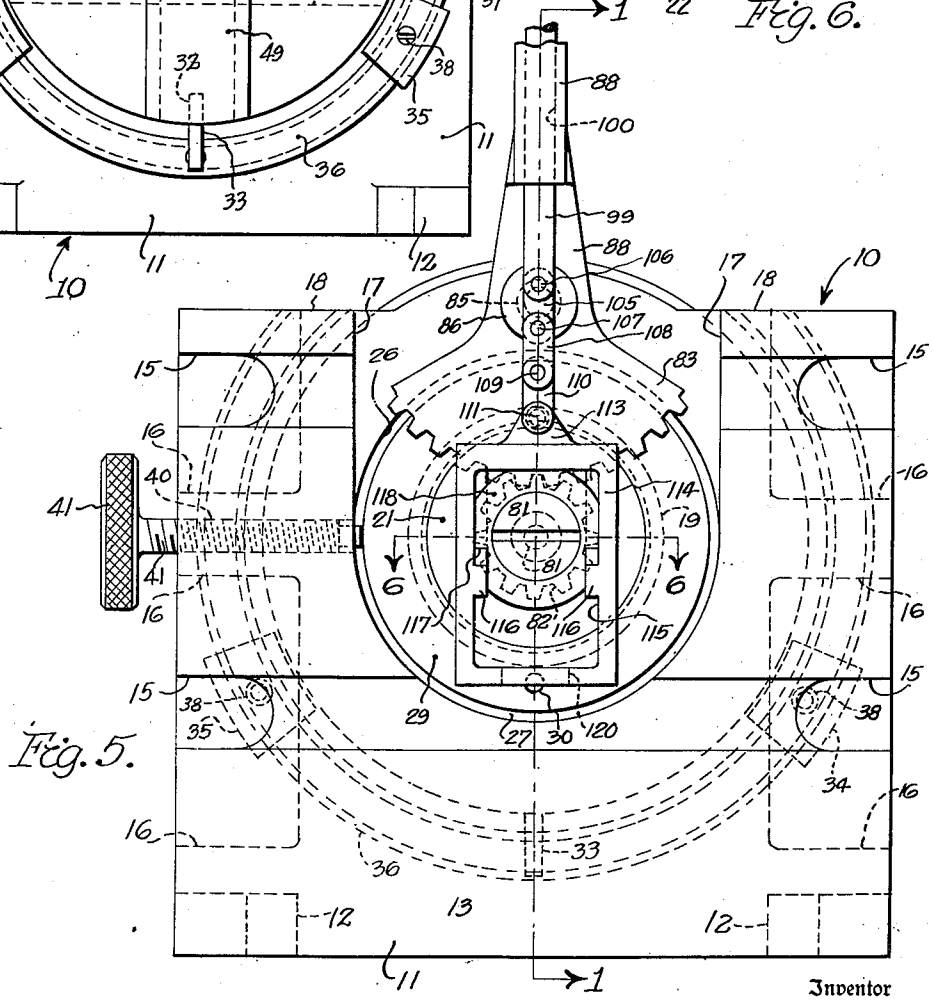


Fig. 5.



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2,608,189

GRINDING WHEEL DRESSER

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Application May 18, 1950, Serial No. 162,731

7 Claims. (Cl. 125—11)

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This invention relates to grinding wheel dressers and, in particular, to dressers for dressing the peripheries of grinding wheels to curves of arcuate cross-section.

One object of this invention is to provide a grinding wheel dresser which will impart a grinding surface of arcuate or rectilinear cross-section to the periphery of a grinding wheel, the device being so constructed that it can be mounted in either of two positions at right angles to each other so as to enable the device to be used on different types of grinding machines, where its use in one position would be unfeasible.

Another object is to provide a grinding wheel dresser of the foregoing character wherein the dressing tool point may be tilted and swung in an arcuate or rectilinear path, or a combination of arcuate and rectilinear paths, by operating mechanism which is located remote from the dressing tool, thereby enabling the dressing tool to be inserted and to engage the grinding wheel in an otherwise inaccessible location.

Another object is to provide a grinding wheel dresser of the foregoing character wherein the grinding wheel dressing tool point may be locked in position or unlocked by release mechanism which is likewise remote from the dressing tool point, this mechanism, as well as the mechanism for swinging the point in an arcuate or rectilinear path in either of two positions at right angles to one another, lying wholly inside the level of the supporting surface of the base so as to be free from conflict with portions of the grinding machine when it is mounted in the grinding machine and ready for use.

In the drawings:

Figure 1 is a central vertical section through a grinding wheel dresser, according to one form of the invention, taken along the line 1—1 in Figure 5, with the finger grip on the hand lever swung into the plane of the paper;

Figure 2 is a top plan view of the grinding wheel dresser shown in Figure 1, partly in horizontal section to disclose certain locking devices;

Figure 3 is a vertical cross-section taken along the line 3—3 in Figure 1, showing a portion of the mechanism for reciprocating the inner slide;

Figure 4 is a fragmentary front elevation of the grinding wheel dresser of Figure 1, looking from the left-hand side thereof, with the dressing point and control handle omitted;

Figure 5 is a fragmentary rear elevation of the grinding wheel dresser shown in Figure 1, with the control handle likewise omitted; and

Figure 6 is a horizontal section taken along the

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line 6—6 in Figure 5, showing a portion of the slide lock operating mechanism.

Hitherto, the provision of a grinding wheel dresser capable of cutting arcuate or rectilinear portions on a grinding wheel and adapted to fit different makes of grinding machine and to operate in different positions necessitated by the differing construction of these machines, has been a difficult problem. In the prior Statia Patent Nos. 2,336,758 of December 14, 1943, and 2,404,465 of July 23, 1946, two very efficient grinding wheel dressers of differing constructions have been disclosed, and these operate very satisfactorily when the grinding wheel is accessible from a certain position. Where, however, the grinding wheel is inaccessible from that position, such as when the wheel must be dressed or trued from a location beneath the wheel, these prior dressing tools are inconvenient to use, since the control mechanism is either inaccessible or is interfered with by portions of the machine. The present invention provides a grinding wheel dresser which solves this problem since the tool can be used in either of two positions at right angles to one another without interfering with the operation of its operating mechanism.

Referring to the drawings in detail, Figures 1 to 6 inclusive show a grinding wheel dresser, generally designated 10, according to one form of the invention as mounted upon a base 11 with feet 12 projecting perpendicularly therefrom. The outer surfaces 13 and 14 of the base 11 and feet 12 are machined to accurately flat surfaces and also to be accurately at right angles to one another. Either of these surfaces 13 or 14 serves as a surface of reference which may be clamped against the bed or other portion of a grinding machine in such a manner that the dressing point or crystal is presented to the grinding wheel in an accurate predetermined direction.

The feet 12 may be clamped to the machine bed by the use of suitable clamps, such as T-bolts, and the base 11 is provided with spaced edge notches 15 opening into bolt head pockets 16 (Figure 5) for the same purpose. The operating mechanism of the dressing tool of the present invention is so arranged that no portion of it projects outwardly beyond the plane of the base surface 13 or leg surfaces 14 so as to be interfered with by portions of the machine to which it is clamped. (One portion of the tool operating handle seen immediately below the figure caption of Figure 1 appears to project beyond the base surface 13, but is a finger grip

which swings into a position entirely to the left of the plane of the surface 13, as described below.)

The base 11 is provided with a recess or cavity 17 of U-shaped cross-section (Figure 5) extending downwardly from the edge 18 of the base 11, and from this recess a bore 19 extends outwardly to the surface 20 (Figure 1) which is parallel to the base surface 13. The axis of the bore 19 is accurately perpendicular to the planes of the surfaces 13 and 20. Rotatably mounted in the bore 19 is the hub 21 of a disc-like head or drum 22, the rearward surface 23 of which abuttingly engages the base surface 20. The head 22 is provided with graduations 24 (Figure 2) such as in degrees, and the base edge 18 is provided with an index mark 25 registering with these graduations 24 and indicating the amount of tilt to which the head 22 is rotated. Arching above the upper half of the recess 17 is an arcuate boss 26 (Figure 1) which projects above the level of the bottom surface 27 of the cavity 17 and half surrounds the bore 19. The hub 21 of the head 22 is threaded as at 28 (Figure 1) to receive a correspondingly threaded retaining ring or annular nut 29 by which the rearward surface 23 of the head 22 is held in abutment with the forward surface 20 of the base 11, while permitting free rotation of the head 22. The retaining ring 29 is rotated into position by means of an ordinary spanner, the pins of which engage corresponding recesses 30 in the ring 29 (Figure 1).

Seated in the socket 32 in the rim of the drum 22 is a radial contact pin 33 (Figures 1 and 4). The pin 33 is engageable with adjustable stops 34 and 35 which are arcuately slotted to engage an arcuate rib 36 of dovetail cross-section partially encircling the head 22 and secured as by the screws 37 to the forward surface 20 of the base 11. The dovetail rib 36 is in the form of an arc of a circle having its center located on the axis of rotation of the drum or head 22. The stops 34 and 35 are provided with clamping screws 38 whereby they may be secured at any portion of the rib 36 so as to limit the rotation of the head 22 to any desired extent and thereby to correspondingly limit the swing of the dressing point or crystal. The opposite sides of the rib 36 approach closely to the opposite edge faces 30, 31 of the base 11.

In order to clamp the head 22 in any desired position of rotational adjustment, the base 11 is provided with a threaded bore 40 which is radial to the bore 19 and extends into the cavity 17 (Figure 2). Threaded into the threaded bore 40 is the threaded shank of a thumb screw 41, the inner end of which engages the periphery of the retaining ring 29.

Projecting from the forward side or face 42 of the head 22 is a dovetail rib 43 which enters and engages a corresponding dovetail groove 44 in an inner or rearward slide 45, both the rib and the groove 44 extending diametrically across the head 22. The slide 45 and consequently the head 22 are rotated by diametrically opposite knobs 46 seated in sockets 47 in the rim of the slide 45. The slide 45 is preferably circular or cylindrical like the drum or head 22, and on its forward face 48 is provided with a dovetail rib 49 which engages a corresponding dovetail groove 50 in an outer or forward slide or cross-slide 51. The rib 49 is arranged at right angles to the rib 43 (Figures 1, 2 and 4) so that the forward slide 45 is reciprocated in a path perpendicular to the rearward slide 45. The forward slide 51 is radially slotted as at 52 (Figure 2) and the opposite halves of the slide 51 divided by the slot 52 are clamped together by a clamping screw 53, the shank of which extends through the bore 54 and is threaded into the bore 55 on the other side of the slot 52. The clamping screw 53 clamps the forward slide 51 at any desired position along the dovetail rib 49 on the rearward slide 45.

Extending forwardly from the forward or outer slide 51 is an integral post 56 (Figures 1 and 2) which is bored as at 57 in a direction slightly inclined relatively to the axis of rotation of the head 22 and receiving the rod-like shank 58 of a dressing crystal or point holder 59 which is bored transversely as at 60 to receive the dressing point mount 61. The latter is in the form of a rod having a tapered end 62 in which a dressing point or crystal 63, such as a diamond, is seated. Set screws 64 and 65 mounted in the post 56 and holder 59 serve to clamp the shank 58 and mount 61 in their positions of adjustment. The rearward slide 45 is moved to and fro along the dovetail rib 43 by a rack 70 (Figures 1 and 3) pinned to the upper edge of an elongated rectangular cavity 71 in the rearward slide 45 and provided with a locking notch or recess 72 of wedge-shaped cross-section (Figure 2) extending forwardly toward the rib 49.

Engageable with the locking notch or recess 72 is a correspondingly shaped locking rib or projection 73 also of wedge-shaped cross-section and formed on the forward face of an axially slidable pinion 74 meshing with the rack 70. The rack 70 is considerably thicker than the pinion 74 so as to permit sliding motion of the teeth of the pinion along the teeth of the rack within the cavity 71. The hub 75 of the pinion 74 is slidable to and fro in abore 76 (Figures 1 and 2) and is urged forward by a helical spring 77 surrounding the rod or shaft 78 on which the hub 75 of the pinion 74 is mounted, the spring 77 being housed in the bore 76. The pinion shaft 78 passes through an axial bore 79 in the center of the hub 21 of the head 22 (Figure 1) and its outer end is provided with a threaded socket 80 into which is threaded the shank of a pivot screw 81. Keyed to the rearward end of the shaft 78 is a pinion 82 by which the shaft 78 and pinion 74 are rotated in order to reciprocate the rack 70 and rearward slide 45. Meshing with the pinion 82 for this purpose is a quadrant gear portion 83 on the lower end of a lever 84 which is bored as at 85 (Figure 1) to receive the head of a pivot screw 86, the shank of which is threaded into a threaded bore 87 in the arcuate boss 26 projecting rearwardly from the upper portion of the base 11.

The lever 84 is provided with a tubular portion 88 (Figures 1 and 5) which is threaded at its upper end as at 89 to receive a retaining screw 90 by which a cup-shaped handle cap 91 is held upon the end of the tubular portion 88 of the lever 84. The handle cap 91 is provided with a socket 92 in which the upper end of a sleeve 93 reciprocates. The sleeve 93 is bored as at 94 to receive the tubular portion 88 of the lever 84, and is provided with radial bores 95 in which the opposite ends of a diametral pin 96 are seated. The pin 96 passes through aligned slots 97 in the tubular portion 88 of the lever 84 (Figure 1) and also passes through a diametral hole 98 in a reciprocable rod 99 slidably mounted within the bore 100 of the tubular portion 88 of the lever 84. In order to reciprocate the sleeve 93, the latter is provided with an annular groove 101 which

loosely and rotatably receives an elongated approximately rectangular finger grip 102 which is disposed diametrically of the sleeve 93. Thus, with the palm of the hand resting against the handle cap 91 and the fingers of the operator grasping the finger grip 102, the sleeve 103 and the rod 99 may be raised and lowered to operate the locking mechanism of the rearward slide 45.

The lower or inner end of the rod 99 is slotted as at 104 (Figure 1) to receive a link 105 connected thereto by a pivot pin 106. Pivoted as by the pin 107 to the link 105 is a pair of links 108 which in turn are pivoted as at 109 to a link 110, the lower end of which is bored to receive a pivot screw 111, the shank of which is threaded into a hole 112 in an ear 113 (Figure 5) projecting upward from the upper end of an open rectangular reciprocating cam 114 having a central approximately rectangular opening 115 therethrough. Extending inwardly from the opposite long sides of the opening 115 are two inclined cam ribs 116. These slidably engage a pair of correspondingly inclined grooves 117 in a block 118 which is bored and counterbored as at 119 (Figure 6) to receive the head of the pivot screw 81. A tongue 120 extends forwardly from the inner edge of the cam 114 and serves as a stop to engage the outer surface 27 of the retaining ring 29 and prevent the cam 114 from tilting into an inclined position and jamming against the quadrant or sector gear portion 83.

Operation

In the operation of the invention, let it first be assumed that the periphery of the grinding wheel is to be dressed with the simplest form of surface, namely a cylindrical surface, the elements of which are perpendicular to the side faces of the wheel. To so dress the wheel, the forward slide 51 is moved upward or downward on the forward dovetail rib 49 by loosening the clamping screw 53 so that the dressing crystal or point 63 lies adjacent the periphery of the grinding wheel in a position adapted to take the desired depth of cut from the periphery of the wheel. It is assumed, of course, that the base 11 has been firmly secured to the bed of the machine, as by clamping the legs 12 firmly thereto. It is also assumed that the head 22 has been clamped, by means of the thumb screw 41, shown in the position of Figure 2, with its zero graduation 24 coinciding with the index mark 25. In this position, the rearward dovetail rib 43 is horizontal, so that the rearward slide 45 will move to and fro horizontally. Let it also be assumed that these parts are in the position shown in Figures 1 and 2, with the locking rib 73 urged forwardly into the locking notch 72 by the helical spring 77.

To unlock the rib 73 from the notch 72, the operator grasps the cap 91 in the palm of one hand and pulls upward with his fingers upon the finger grip 102. This action reciprocates the rod 99 and the open rectangular cam 114 upwardly, causing its inclined ribs 116, by their engagement with the inclined groove 117 in the block 118 to move the block 118 outward (Figure 1). This action shifts the shaft 78, pinion 74 and rib 73 outward to the right, withdrawing the locking rib 73 from the locking notch 72. The operator then swings the handle cap 91 in an arcuate path, thereby rotating the pinion 82 through its coaction with the sector gear portion 83 of the lever 84, consequently rotating the shaft 78 and pinion 74. The coaction of the pinion 74 with the rack 70 reciprocates the inner or rearward slide 45 horizontally along the inner dovetail rib 43, causing the dressing crystal or point 63 to move in a rectilinear path across the edge of the wheel, dressing or truing it to a cylindrical or straight grinding periphery.

To cut or dress a beveled periphery on the grinding wheel, the operator follows the foregoing procedure except that he loosens the thumb screw 41, rotates the head 22 by the knobs 46 until the proper graduation 24 expressing the amount of bevel desired for the grinding edge of the grinding wheel is placed opposite the index mark 25, after which he tightens the thumb screw 41. When he now lifts the hand grip 102 and again swings the handle cap 91 in an arcuate path, the locking rib 73 is again withdrawn from the locking notch 72 and the inner or rearward slide 45 reciprocated along the rearward dovetail rib 43, this time not in a horizontal path but in an inclined rectilinear path. The dressing point or crystal 63 is thus caused to travel across the periphery of the wheel in a path inclined to the axis of rotation thereof, thereby beveling the periphery of the wheel with a conical grinding surface.

To dress the periphery of the wheel with a concave or convex surface, the operator first locks the rearward slide 45 in its central position (Figure 2) by letting the rib 73 enter the notch 72. He then loosens the clamping screw 53 and moves the forward or outer slide 51 upward or downward the desired distance so that the tip of the the dressing point or crystal 63 is placed at the distance of the desired radius of cut above or below the axis of rotation of the head 22, depending on whether a concave or convex periphery is to be cut on the wheel. The clamping screw 53 is then retightened, but the thumbscrew 41 remains loosened. Grasping one of the handles or knobs 46, the operator swings or rotates the head 22 through an arc centered on the axis of rotation of the bore 19, causing the dressing point or crystal 63 to swing in an arcuate path and thereby cutting a surface of arcuate cross-section on the edge of the grinding wheel. Instead of using the knobs 46, he may also swing the handle cap 91 and lever 84 to rotate the head 22 through the gearing 82, 83 and driving connection 72, 73 (now locked in engagement). In order to govern the length of swing of the dressing point 63 in its arcuate path, the operator sets the stops 34 and 35 (Figure 4) so that the pin 33 will encounter these stops at the desired opposite limits of swing or rotation of the head 22.

What I claim is:

1. A grinding wheel dresser comprising a base having substantially flat bottom and rear dresser-supporting surfaces arranged at right angles to one another, either of said supporting surfaces being selectively adapted to rest upon a flat portion of a grinding machine adjacent said grinding wheel, said base having a cavity therein, a rotary head rotatably mounted on said base with its axis of rotation disposed parallel to one of said surfaces and perpendicular to the other surface, a slide reciprocably mounted on said head for motion transversely to said axis of rotation of said head, a dressing tool holder mounted on said slide and having a dressing tool receptacle therein, and mechanism operatively connected to said slide and extending through said base into said cavity for reciprocating said slide, said mechanism being disposed partly within said cavity and lying wholly inside the plane of each of said supporting surfaces, said mechanism

including an axially shiftable rotary shaft extending through said base, gearing on said shaft connected to said slide for reciprocating said slide in response to the rotation of said shaft, and a locking arrangement responsive to the axial shifting of said shaft for locking and unlocking said slide relatively to said head.

2. A grinding wheel dresser comprising a base having substantially flat bottom and rear dresser-supporting surfaces arranged at right angles to one another, either of said supporting surfaces being selectively adapted to rest upon a flat portion of a grinding machine adjacent said grinding wheel, said base having a cavity therein, a rotary head rotatably mounted in said base with its axis of rotation disposed parallel to one of said surfaces and perpendicular to the other surface, a slide reciprocably mounted on said head for motion transversely to said axis of rotation of said head, a dressing tool holder mounted on said slide and having a dressing tool receptacle therein, and mechanism operatively connected to said slide and extending through said base into said cavity for reciprocating said slide, sadi mechanism being disposed partly within said cavity and lying wholly inside the plane of each of said supporting surfaces, said mechanism including an axially shiftable rotary shaft extending through said base, gearing on said shaft connected to said slide for reciprocating said slide in response to the rotation of said shaft, a locking arrangement responsive to the axial shifting of said shaft for locking and unlocking said slide relatively to said head, and a manually-operated member operatively connected to said shaft to rotate the same.

3. A grinding wheel dresser comprising a base having substantially flat bottom and rear dresser-supporting surfaces arranged at right angles to one another, either of said supporting surfaces being selectively adapted to rest upon a flat portion of a grinding machine adjacent said grinding wheel, said base having a cavity therein, a rotary head rotatably mounted in said base with its axis of rotation disposed parallel to one of said surfaces and perpendicular to the other surface, a slide reciprocably mounted on said head for motion transversely to said axis of rotation of said head, a dressing tool holder mounted on said slide and having a dressing tool receptacle therein, and mechanism operatively connected to said slide and extending through said base into said cavity for reciprocating said slide, said mechanism being disposed partly within said cavity and lying wholly inside the plane of each of said supporting surfaces, said mechanism including an axially shiftable rotary shaft extending through said base, gearing on said shaft connected to said slide for reciprocating said slide in response to the rotation of said shaft, a locking arrangement responsive to the axial shifting of said shaft for locking and unlocking said slide relatively to said head, a manually-operated member operatively connected to said shaft to rotate the same, and a shaft-shifting device associated with said manually-operated member and operatively connected to said shaft to shift said shaft in an axial direction to operate said locking arrangement.

4. A grinding wheel dresser comprising a base having substantially flat bottom and rear dresser-supporting surfaces arranged at right angles to one another, either of said supporting surfaces being selectively adapted to rest upon a flat portion of a grinding machine adjacent said grinding wheel, said base having a cavity therein, a rotary head rotatably mounted in said base with its axis of rotation disposed parallel to one of said surfaces and perpendicular to the other surface, a slide reciprocably mounted on said head for motion transversely to said axis of rotation of said head, a dressing tool holder mounted on said slide and having a dressing tool receptacle therein, and mechanism operatively connected to said slide and extending through said base into said cavity for reciprocating said slide, said mechanism being disposed partly within said cavity and lying wholly inside the plane of each of said supporting surfaces, said mechanism including an axially shiftable rotary shaft extending through said base, gearing on said shaft connected to said slide for reciprocating said slide in response to the rotation of said shaft, a locking arrangement responsive to the axial shifting of said shaft for locking and unlocking said slide relatively to said head, a manually-operated member operatively connected to said shaft to rotate the same, and a cam device associated with said manually-operated member and operatively connected to said shaft to shift said shaft in an axial direction to operate said locking arrangement.

5. A grinding wheel dresser comprising a base having substantially flat bottom and rear dresser-supporting surfaces arranged at right angles to one another, either of said supporting surfaces being selectively adapted to rest upon a flat portion of a grinding machine adjacent said grinding wheel, said base having a cavity therein, a rotary head rotatably mounted in said base with its axis of rotation disposed parallel to one of said surfaces and perpendicular to the other surface, a slide reciprocably mounted on said head for motion transversely to said axis of rotation of said head, a dressing tool holder mounted on said slide and having a dressing tool, and mechanism operatively connected to said slide and extending through said base into said cavity for reciprocating said slide, said mechanism being disposed partly within said cavity and lying wholly inside the plane of each of said supporting surfaces, said mechanism including an axially shiftable rotary shaft extending through said base, gearing on said shaft connected to said slide for reciprocating said slide in response to the rotation of said shaft, a locking arrangement responsive to the axial shifting of said shaft for locking and unlocking said slide relatively to said head, a manually-operated member operatively connected to said shaft to rotate the same, and a cam device having an operating element mounted on said manually-operated member and operatively connected to said shaft to shift said shaft in an axial direction to operate said locking arrangement.

6. A grinding wheel dresser comprising a base having a supporting portion adapted to rest upon a part of a grinding machine, a rotary head rotatably mounted in said base, a slide reciprocably mounted on said head for motion transversely to the axis of rotation thereof, a dressing tool holder mounted on said slide and adapted to receive a dressing tool, and mechanism operatively connected to said slide and extending through said base for reciprocating said slide, said mechanism lying wholly inside the level of said supporting portion, said mechanism including an axially shiftable rotary shaft extending through said base, gearing on said shaft connected to said slide for reciprocating said slide

in response to the rotation of said shaft, a locking arrangement responsive to the axial shifting of said shaft for locking and unlocking said slide relatively to said head, a manually-operated member operatively connected to said shaft to rotate the same, a shaft-shifting element mounted on said shaft, a movable cam operatively engaging said shaft-shifting element, and a cam-moving member mounted on said manually-operated member.

7. A grinding wheel dresser comprising a base having a supporting portion adapted to rest upon a part of a grinding machine, a rotary head rotatably mounted in said base, a slide reciprocably mounted on said head for motion transversely to the axis of rotation thereof, a dressing tool holder mounted on said slide and adapted to receive a dressing tool, and mechanism operatively connected to said slide and extending through said base for reciprocating said slide, said mechanism lying wholly inside the level of said supporting portion, said mechanism including an axially shiftable rotary shaft extending through said base, gearing on said shaft connected to said slide for reciprocating said slide in response to the rotation of said shaft, a locking arrangement responsive to the axial shifting of said shaft for locking and unlocking said slide relatively to said head, a manually-operated member operatively connected to said shaft to rotate the same, a cam follower mounted on said shaft, a cam engageable with said cam follower and movable transversely to the axis of rotation of said shaft, said cam and cam follower having interengaging portions inclined relatively to the axis of said shaft, and a cam moving member mounted on said manually-operated member.

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