Sept. 7, 1943. R. T. McQUILLAN 2,328,826

CLEARANCE ANGLE RADIUS DRESSING ATTACHMENT FOR SURFACE GRINDING MACHINES

Filed Dec. 13, 1941 2 Sheets-Sheet 1

Fig. 1.

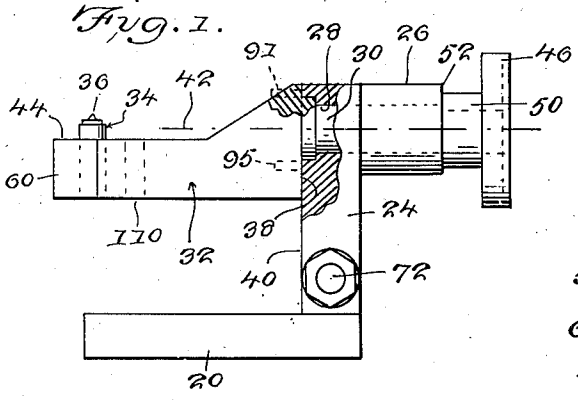


Fig. 2.

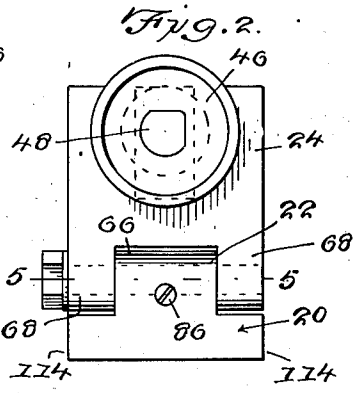


Fig. 3.

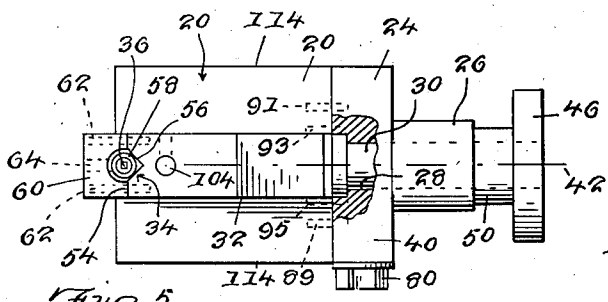


Fig. 4.

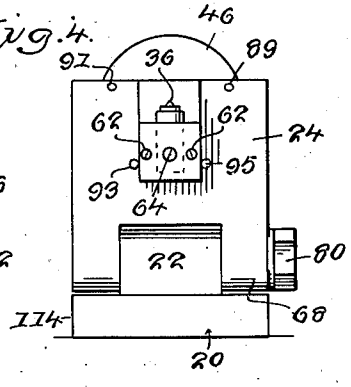


Fig. 5.

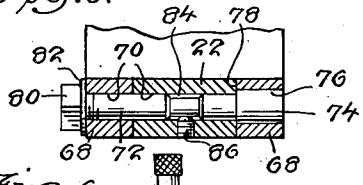


Fig. 8.

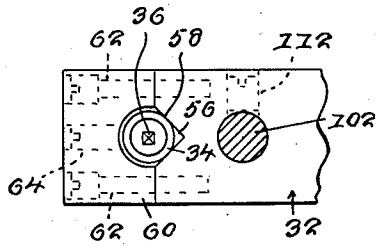


Fig. 6.

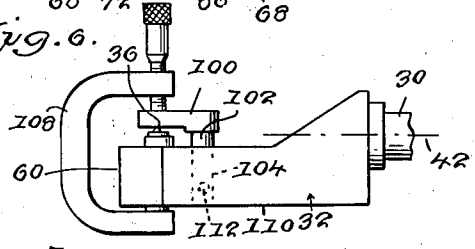
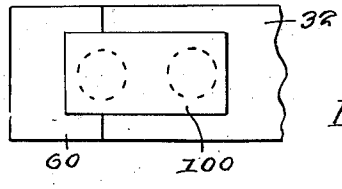


Fig. 7.



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CLEARANCE ANGLE RADIUS DRESSING ATTACHMENT FOR SURFACE GRINDING MACHINES

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Fig. 9.

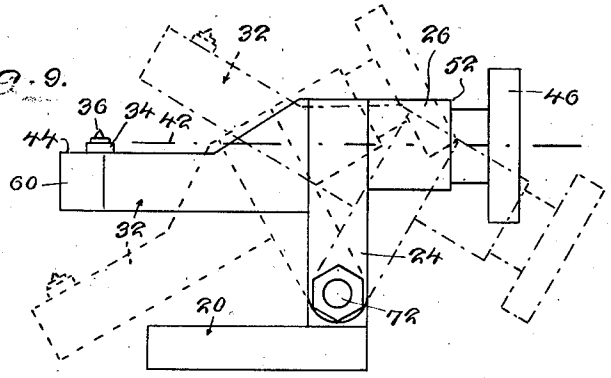


Fig. 10.

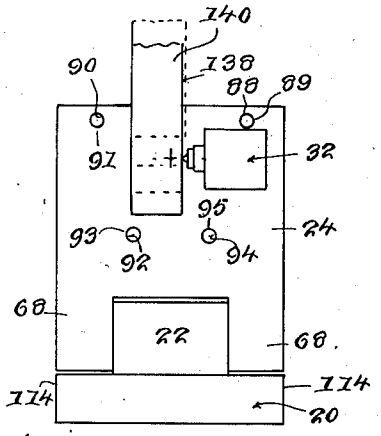


Fig. 11.

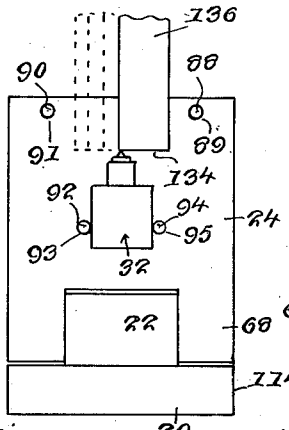


Fig. 12.

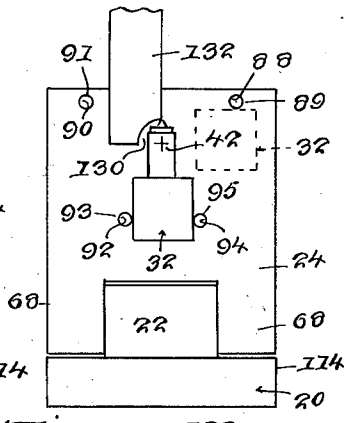


Fig. 13.

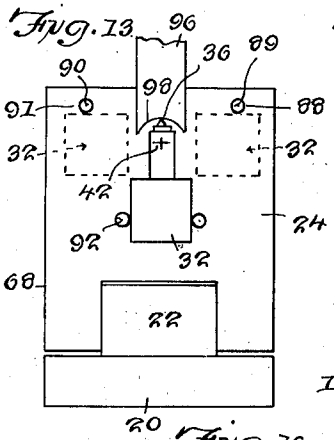


Fig. 14.

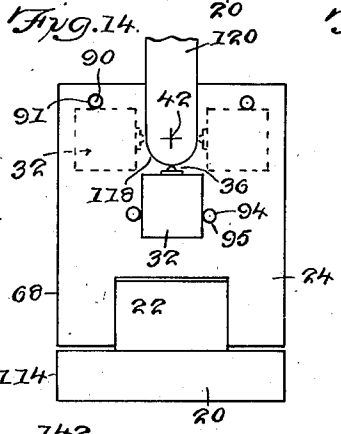


Fig. 15.

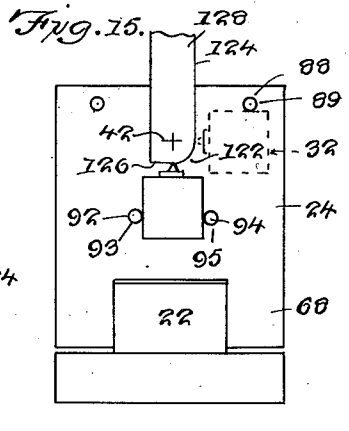
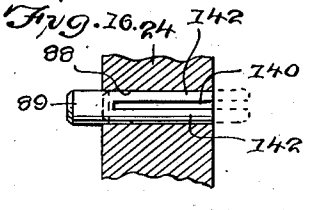


Fig. 16.



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UNITED STATES PATENT OFFICE

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CLEARANCE ANGLE RADIUS DRESSING ATTACHMENT FOR SURFACE GRINDING MACHINES

Robert T. McQuillan, East Orange, N. J.

Application December 13, 1941, Serial No. 422,923

4 Claims. (Cl. 125—11)

My invention relates to grinding wheel profiles, and has among its objects and advantages the provision of an improved profile dressing tool.

In the accompanying drawings:

Figure 1 is a side elevational view of a profile dressing tool in accordance with my invention, with a portion thereof illustrated in section;

Figure 2 is an end view;

Figure 3 is a top plan view with a portion illustrated in section;

Figure 4 is a view similar to Figure 2 but illustrating the other end of the tool;

Figure 5 is a sectional view taken along the line 5—5 of Figure 2;

Figure 6 is a view illustrating the manner in which the cutting element of the tool is set to a predetermined position through the aid of a micrometer;

Figure 7 is a top plan view of the structure of Figure 6 with the micrometer removed;

Figure 8 is a view illustrating the cutting element mount;

Figure 9 is a view similar to Figure 1 but illustrating the manner in which the cutting element may be shifted to different positions to provide a clearance angle for a radius turning tool which is to take the radius;

Figure 10 is a view illustrating the cutting element positioned for dressing the side of a grinding wheel;

Figure 11 is a view illustrating the cutting element adjusted for dressing the peripheral face of the grinding wheel;

Figure 12 is a view illustrating the manner in which the cutting element is manipulated to provide a concaved peripheral surface in the grinding wheel, which concaved surface intersects one side face of the grinding wheel and the peripheral surface thereof;

Figure 13 is a view illustrating the manipulation of the cutting element when dressing the peripheral face of the grinding wheel to provide a concaved profile;

Figure 14 is a view illustrating the manipulation of the cutting element when dressing the grinding wheel to provide a convexed peripheral profile;

Figure 15 is a view illustrating manipulation of the cutting element when dressing the grinding wheel to provide a convexed corner profile in the wheel area corresponding to that illustrated in Figure 12; and

Figure 16 illustrates a stop pin.

In the embodiment selected to illustrate my invention, I make use of a cast iron base 20 having an upstanding body 22 to which is connected a cast iron hinge plate 24. At the upper end of the hinge plate 24 is provided a boss 26, and the hinge plate and the boss are provided with a common bore 28 for supporting a rotary shaft 30 formed as an extension of an arm 32 which carries a cutting unit 34 provided with a diamond cutting element 36. Arm 32 is preferably formed of steel, which is also true of the shaft 30.

One end of the arm 32 has an end or shoulder 38 engaging the face 40 of the hinge plate 24. Face 38 lies at right angles to the axis 42 of the the shaft 30. The greater length of the arm 32 is narrowed vertically when viewed according to Figure 1 to bring its face 44 beneath the axis 42, the cutting element 36 projecting above the face 44.

Shaft 30 and its arm 32 is rotated through the medium of a hand wheel 46 attached to the end 48 of the shaft. The hub 50 of the hand wheel 46 lies in engagement with the end 52 of the boss 26 so that the shaft 30 is restrained from relative axial movement.

In the end 54 of the arm 32 is provided a vertical V-shaped groove 56 into which is pressed the cylindrical body 58 of the cutting unit 34. A cap 60 is secured to the end 54 by screws 62, and the cylindrical body 58 is pressed firmly into engagement with the walls of the groove 56 by a set screw 64 threaded into the cap 60 and engageable with the cylindrical body 58.

Figure 5 illustrates the pivotal connection between the body 22 and the hinge plate 24. A recess 66 is formed in the lower end of the hinge plate 24 to provide ears 68 between which the body 22 is positioned. One end 68 and the body 22 are provided with coaxial bores 70 for the reception of a pin 72. One end of the pin 72 is provided with a larger diameter length 74 fitting in a bore 76 in the other ear 68. The length 74 provides a shoulder 78 which engages the body 22, and the end of the pin 72 opposite the length 74 is threaded for the reception of a lock nut 80 between which and one end 68 is positioned a washer 82. Intermediate the ends of the pin 72 is provided a circumferential groove 84, and a set screw 86 is threaded into the body 22 to engage the bottom wall of the recess 84 for securing the pin 72 against rotation.

The hinge plate 24 may be pivoted about the axis of the pin 72 and firmly secured in different positions through tightening of the nut 80 which clamps one end 68 firmly against the body 22. Such screw 86 restrains the pin 72 from rotation when the nut 80 is tightened.

Figure 4 illustrates the hinge plate 24 as being provided with four bores 88, 90, 92 and 94. Rotation of the arm 32 may be limited through the medium of stop pins 89, 91, 93 and 95 respectively slidably disposed in the bores 90 through 94.

To dress a concaved radius, as in Figure 13, the cutting unit 34 is adjusted to bring the cutting element 36 above the axis 42. If the grinding wheel 96 is to be provided with a concaved profile 98 in its peripheral face having a radius of .25 inch, the point of the cutting element 36 is located .25 inch above the axis 42.

Figure 7 illustrates the manner in which the cutting unit is adjusted to the foregoing requirements. A hood 100 having a pin 102 receivable in a bore 104 in the arm 32 is extended over the cutting unit 34. The hood is elevated to a position which brings its bottom face engageable with the cutting unit .250 inch above the axis 42. This position is determined by a micrometer 108 engaging the bottom face of the arm 32 and the top face of the hood 100, the thickness of the hood being predetermined so that its bottom face may be accurately determined through the medium of the micrometer. The bottom face 110 of the arm 32 is also constant with respect to its positional relation to the axis 42.

After the setting of the hood 100, the pin 102 is made secure by a set screw 112 threaded into the arm 32. The cutting unit 34 is then adjusted to bring its cutting element 36 into contact with the face 106 of the hood 100. When so positioned, the cutting unit 34 is firmly secured in position through tightening of the set screw 64.

After removal of the hood 100, the grinding wheel 96 of Figure 13 may be dressed to a .250 inch concaved radius by placing the dressing tool under the grinding wheel of the surface grinder and rotating the knob 46 back and forth, which imparts oscillatory motion to the cutting element 36 across the face of the grinding wheel 96.

The cutting element 36, when viewed according to Figure 3, is located vertically of the axis 42, which axis is in parallelism with the side edges 114 of the base 20, which base is located against the rail of the magnetic chuck (not shown).

In oscillating the cutting element 36 across the peripheral face of the grinding wheel 96, the pins 89 and 91 are projected into the path of the arm 32 to limit its oscillatory motion. The arm may be rotated 90° in both directions from a vertical plane intersecting the axis 42.

Figure 14 illustrates the manipulation of the tool for grinding a convexed profile 118 on the grinding wheel 120 throughout an arc of 180°. When grinding such a profile, the cutting element is located .250 inch beneath the axis 42, assuming that the profile 118 is to have a radius of .250 inch. The stop pins 89 and 91 may be employed when dressing the profile 118.

In dressing a profile 122 merging with a side face 124 and a peripheral face 126 of the grinding wheel 128, the pins 89 and 93 are employed, which limits oscillatory motion of the arm 32 to an arc of 90°.

In Figure 15, the cutting element 36 is located beneath the axis 42 a distance corresponding to the radius of curvature desired in the profile 122.

Figure 12 illustrates a concaved profiled 130 in one side and the peripheral face margins of a grinding wheel 132. In grinding such a profile, the pins 89 and 93 are employed, but the cutting element 36 is located above the axis 42 a distance determined by the desired radius of the profile.

In Figure 11, the tool is set for dressing the peripheral face 134 of the grinding wheel 136, in which case the arm 32 is latched against oscillatory movement by the pins 93 and 95 in the bores 92 and 94.

Figure 10 illustrates the cutting element adjusted for dressing the side face 138 of the grinding wheel 140. In this case, the arm 32 is held in engagement with the pin 89.

In providing a clearance angle for a radius turning tool which is to take the radius, the hinge plate 24 may be set to the desired clearance angle by means of a protractor and then locked in position through tightening of the pin 72.

All the stop pins 89, 91, 93 and 95 are slidable in their respective bores. Figure 16 illustrates the stop pin 89 as having a longitudinal slot 140 inwardly of one end thereof to provide opposed fingers 142 resiliently urged against the wall of the bore. In the operative position of Figure 16, the unslotted end of the pin is projected for engagement with the arm 32. To render the pin 89 inoperative, the pin is shifted to the dotted line position of Figure 16. In either position, the fingers 142 are tensioned against the wall of the bore so as to prevent accidental shifting and loss of the pin. All the pins are of the same construction.

Without further elaboration, the foregoing will so fully illustrate my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. A device of the type described comprising a base, an upright member pivotally connected at its lower end with the base and having a bore, an arm having a shaft rotatably mounted in said bore and a shoulder engaging one face of said member, said arm having a tool carrying end located laterally of the axis of rotation of the arm, said member being provided with a plurality of bores intersecting said one face and spaced one from the other in the path of said shoulder when said arm is rotated about its axis, and pin means respectively slidable in said plurality of bores to lie inwardly of said one face or to be selectively projected beyond said face into the path of said shoulder to restrain the arm from rotation beyond predetermined limits.

2. A device of the type described comprising a base, an upright member pivotally connected at its lower end with the base and having a bore, an arm having a shaft rotatably mounted in said bore and a shoulder engaging one face of said member, said arm having a tool carrying end located laterally of the axis of rotation of the arm, said member being provided with a plurality of bores intersecting said one face and spaced one from the other in the path of said shoulder when said arm is rotated about its axis, and pins having resilient fingers frictionally engaging the faces of said plurality of bores, said pins being movable to positions clear of said one face or to positions projecting beyond said one face into the path of said shoulder to restrain the arm from rotation beyond predetermined limits.

3. The invention described in claim 2 wherein said arm is provided with an end groove having side walls converging toward a plane passing through the axis of rotation of the arm, a tool

having a cylindrical body engageable with said side faces, a cap engageable with said cylindrical body to press the latter against said side faces, and means threadedly related to said arm for clamping the cap against said cylindrical body.

4. The invention described in claim 2 wherein said arm is provided with an end groove having side walls converging toward a plane passing through the axis of rotation of the arm, a tool having a cylindrical body engageable with said side faces, a cap engageable with said cylindrical body to press the latter against said side faces, means threadedly related to said arm for clamping the cap against said cylindrical body, said groove extending transversely of the axis of rotation of said arm, said arm being provided with an opening having its axis paralleling the longitudinal axis of said groove, and a tool locating hood having a pin guidably receivable in said opening.

ROBERT T. McQUILLAN.