

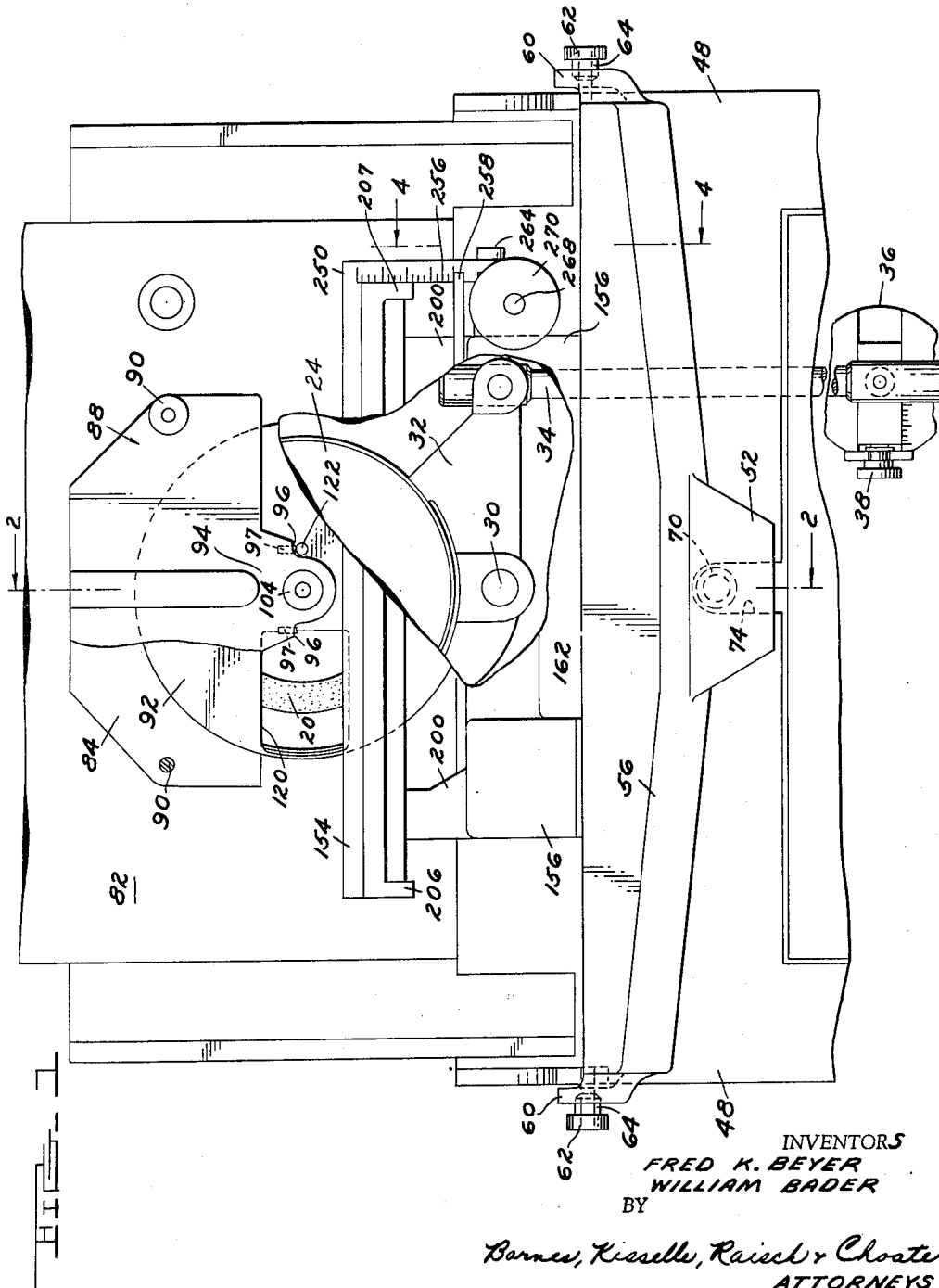
Nov. 1, 1960

F. K. BEYER ET AL
GRINDING MACHINE

2,958,164

Filed Oct. 9, 1957

4 Sheets-Sheet 1



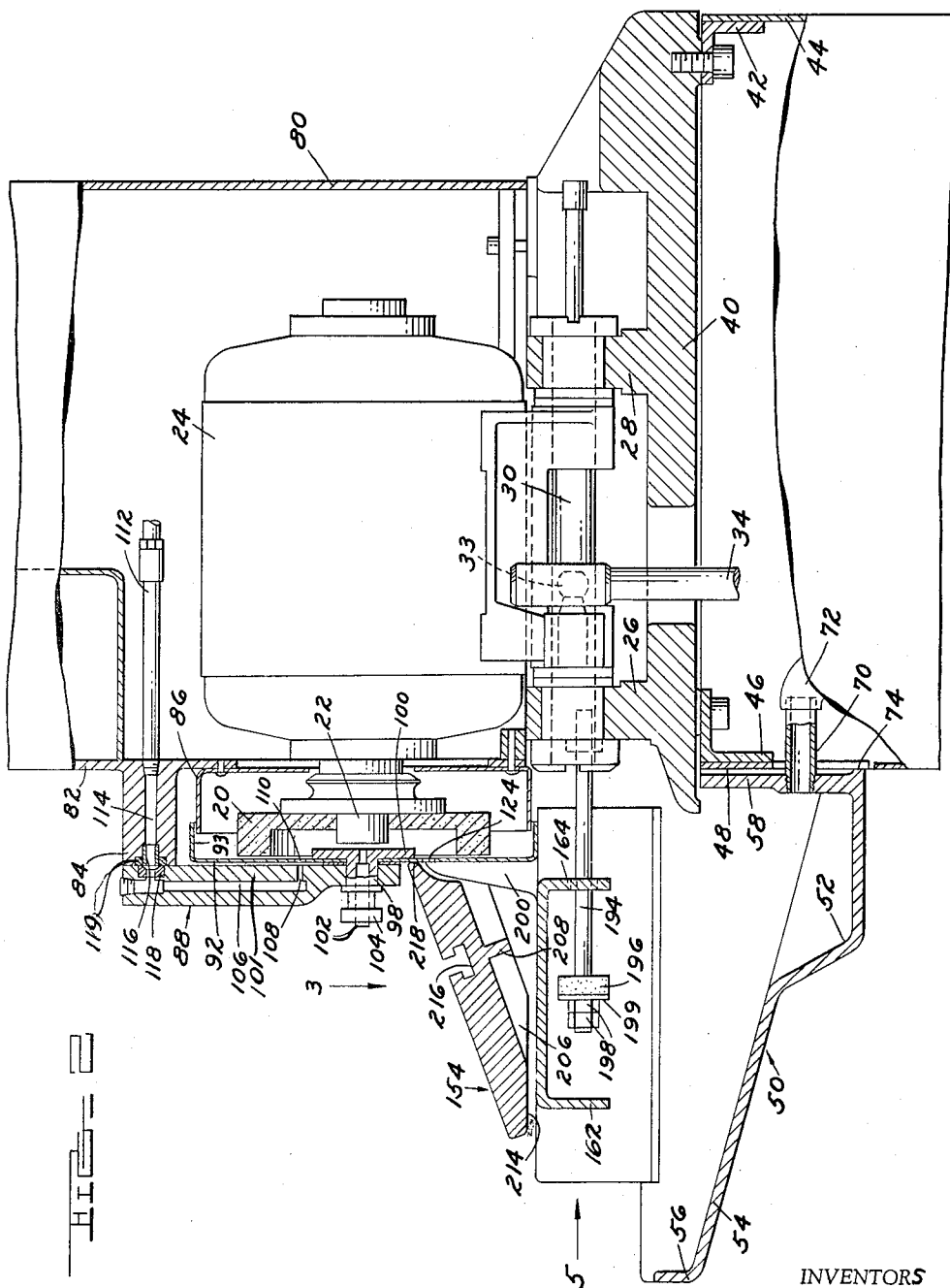
Nov. 1, 1960

F. K. BEYER ET AL
GRINDING MACHINE

2,958,164

Filed Oct. 9, 1957

4 Sheets-Sheet 2



INVENTORS
FRED K. BEYER
WILLIAM BADER
BY

Barnes, Kisselle, Raich & Choate
ATTORNEYS

Nov. 1, 1960

F. K. BEYER ET AL
GRINDING MACHINE

2,958,164

Filed Oct. 9, 1957

4 Sheets-Sheet 3

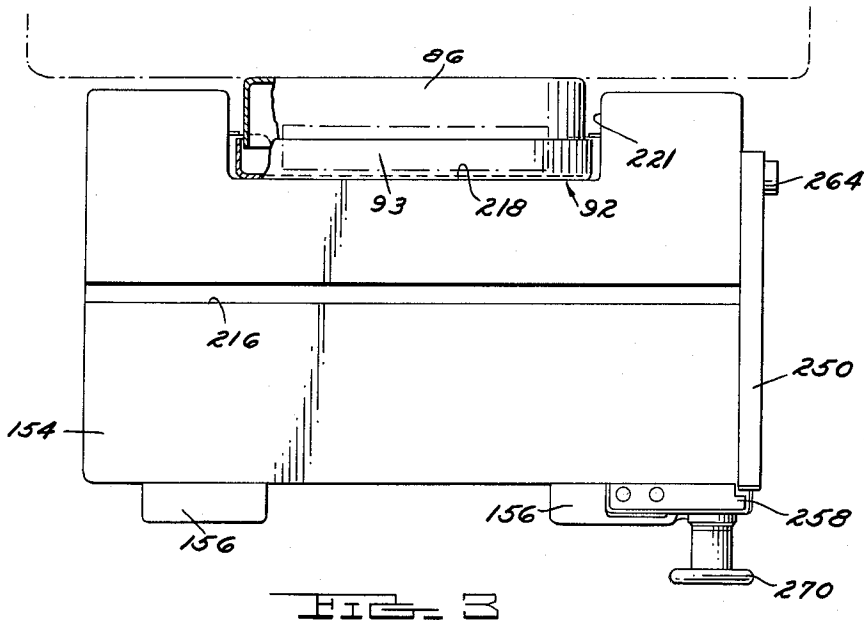


FIG. 3

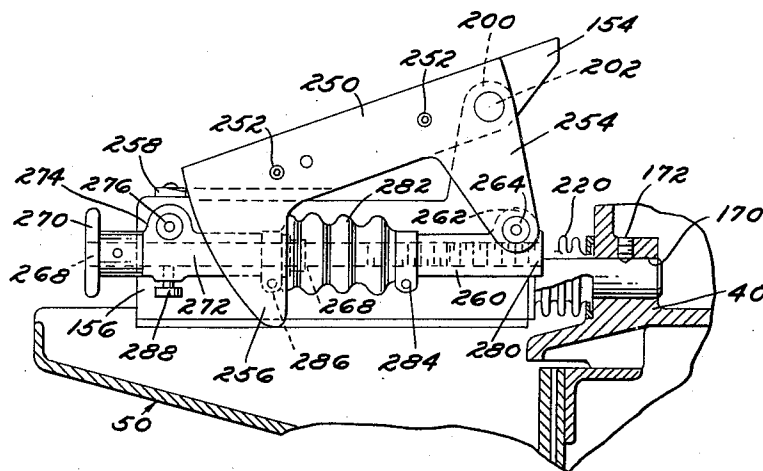


FIG. 4

INVENTORS
FRED K. BEYER
WILLIAM BADER
BY

Barney, Kisselle, Raich & Choate
ATTORNEYS

1

2,958,164

GRINDING MACHINE

Fred Karl Beyer and William Bader, Ferndale, Mich., assignors to Wesson Company, Ferndale, Mich., a corporation of Michigan

Filed Oct. 9, 1957, Ser. No. 689,200

18 Claims. (Cl. 51—55)

This invention relates to a grinding machine.

The improvement to be described and claimed relates to a grinding machine having an abrasive wheel which not only rotates but has an oscillatory movement in the plane of rotation. A part to be ground may be brought up to the rotating surface and the oscillation of the wheel will take the place of a motion of the part.

This general type of machine is described in the United States patent to Lumsden, No. 1,032,758, dated July 16, 1912. Despite this early disclosure of an oscillatory grinding wheel, these machines have not come into common use, and today it is still usual to grind tools and small parts by moving them up to the wheel and imparting a reciprocatory motion either to the part itself or a table on which it rests which results in the necessary finish and prevents uneven wear on the wheel.

With the advent of women into the labor groups of grinding rooms, and the general trend of machine design which emphasizes less effort on the part of the employee and more work to be done by the machine, there has been a search for improved grinding machines which has brought about the adoption of the oscillatory type of wheel. This makes for an easier operation for the worker and actually results in superior workmanship with less training and skill requirement.

It is one object of the invention to provide a table which is adjustable from horizontal without changing the working relation to the wheel. Also to provide such a mount that a workpiece may be moved into the wheel with a sensitive "feel" just as previously it was moved along a stationary table to the wheel.

The present invention is a result of a need for an improved part table having a requisite slide and adjustment facility. It is also an answer to a need for a machine which is reversible and yet which has a coolant guard which is readily adaptable to such a change in operation. It is further directed to a grinding machine which provides a suitable coolant control with a combination coolant guard and table stop as well as protective design for table bearings which prevents introduction of the destructive abrasive dust.

Another need is supplied by the present invention in a coolant guard which not only can be reversed readily and which serves as a table stop but also can be readily removed for full access to a wheel without laborious disconnection of coolant supply lines.

Other objects and features of the invention, which responds to the need for an improved grinding machine, will be evident in the following description and claims.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

Figure 1, a frontal view of the grinding machine.

Figure 2, a sectional view on line 2—2 of Figure 1.

Figure 3, a plan of the table as viewed on line 3 of Figure 2.

Figure 4, a side view of the table on line 4—4 of Figure 1.

2

Figure 5, a frontal view partly sectioned on line 5 of Figure 2.

Figure 6, a side sectional view on line 6—6 of Figure 5.

Figure 7, a sectional view of the table support on line 7—7 of Figure 5.

In Figures 1 and 2, the grinding wheel 20 is mounted centrally on mandrel 22 driven by motor 24 which in turn is mounted for oscillation on journals 26 and 28 by shaft 30. The motor frame has an arm 32 connected by a ball joint 33 to a tie rod 34 leading to a similar ball joint connection on an adjustable eccentric drive wheel 36. The throw of the wheel 36 can be adjusted by screw 38, which alters the relation of the tie rod 34 to the center of wheel 36.

Journals 26 and 28 are formed on a frame member 40 suitably supported in a machine assembly. The tie rod 34 and wheel 36 are driven by a power assembly, not shown, in a machine frame below the portion 40. Parts of this machine frame are shown in an angled member 42, a back plate 44, a front angle 46, and a front plate 48. Extending outwardly from the plate 48 is a reciprocal catch basin 50 which has a small central sump portion 52 at the extreme bottom and angling bottom walls 54 which terminate at a front wall 56. A back wall 58 lies against the front plate 48.

The catch basin is formed with supporting ears 60 at the upper rear corners, these ears being supported on the machine by a double shank screw nut 62 having one portion threaded into the frame of the machine and a second portion 64 fitting into a recess in the ear portion 60. A loosening of the screws without removal thereof permits the removal of the catch basin by reason of a small slot, not shown, at the back of the ear 60.

As illustrated in Figure 2, the sump is connected to a return conduit 70 which is threaded into the back wall 50 at a point spaced above the bottom wall of the sump 52, thus the coolant can return to the pump while sediment will be deposited in the sump. A hose 72 connects the pipe 70 to the inlet side of the coolant pump, not shown. A slot 74 in the front wall 48 permits removal and dumping of the sediment pan without disconnecting the hose 72, thus making it possible to readily remove and replace the pan in a short period of time whenever the machine is not operating.

The upper portion of the machine, including the motor 24 is contained in a housing having a back wall 80, a front wall 82 and suitable side walls. The front wall 82 has an extension 84 having the shape shown in Figure 1. This extension is a portion of a housing having a fairly thick wall and a circular opening within the housing.

This circular opening is intended to house the wheel 20 and also a supplemental coolant housing comprising a dished shell member 86 apertured centrally to permit the passage of the mandrel 20 and fastened to the wall 82 concentric with the axis of the motor 24.

This housing 84 has a fairly thick front plate 88 bolted thereto by bolts 90 which are readily removable and on the rear face of the front plate 88 is a second dished shell 92 having a side flange 93 which is of slightly greater diameter than the dish 86 and which extends inwardly to overlap the periphery of the edges of the dish member 86.

It will be seen that the front plate 88 has a central downward projection 94 provided with shoulders 96 (see Figure 1) each of which has an adjustable contact screw 97. The plate 92 is rotatably mounted inside the cover plate 88 on a flanged stud 98 wherein the flange 100 lies behind the plate to stabilize it. A spacer washer 101 serves to prevent scraping of the plate on the rear surface of the plate 88.

A threaded shaft 102 is anchored in the stud 98 and a knurled nut 104 serves to lock the parts together. The

central portion of the plate 88 is provided with a vertical passage 106 which connects at its bottom and with a short passage 108 leading to the back surface of plate 88. This registers with a hole 110 in plate 92 so that coolant may pass through the plate into the wheel 20.

Coolant reaches the aperture 110 by a hose fitting 112, a passage 114 in housing 84, a nipple 116 pressed into said housing and a recessed insert 118 mounted in plate 88. A sealing ring 119 around nipple 116 is recessed into housing 84. The sealing ring 119 is formed of a compressible material such as neoprene wherein a seal is established between the insert 118 and the ring, leading coolant into the passage 106.

As shown in Figure 1, the plate 92 has a rectangular opening 120 extending from a peripheral edge almost to the center. This opening is positioned as shown in Figure 1 by a pin 122 which co-operates with an adjustable pin 97 on shoulder 96. When the knurled nut 104 is released, the plate 92 can be rotated in a clockwise direction so that the opening 120 will lie to the right of the axis rather than to the left, and the pin 122 will lie up against the left-hand shoulder 96. In this position a hole 124 diametrically opposed to hole 110 will register with the passage 108.

Thus the guard 92 may be used for either directional rotation of the wheel for right and left grinding. It is also extremely easy to remove the entire guard for inspection and replacement of the wheel without disturbing the coolant lines. The guard assembly has an additional function as a stop for a work table, which will now be described.

Above the coolant tray or earth basin 50 is a work table assembly 150, which consists of a main slide frame or sub-table 152 on which is tiltably mounted an adjustable work table 154. The body 150 has two-spaced parallel rectangular box-like side elements 156, closed by bottom plates 158. A central reinforced webbing 160, having drop side 162—164, connects the side housings 156.

On the frame member 40 projecting outwardly in parallel relation over the tray 50 are cantilever bars 166 and 168, solidly mounted at the proximal end in the frame in a bore 170 and held by a set screw 172 (Figure 4). The bars are circular in cross-section, and they project into the housings 156, which carries top rollers 174 on stub axles 176 and side rollers 178 on stub axles 180. Roller axles 176 are mounted in eccentric bushings 182 locked by set screws 184. This permits a level adjustment as desired. Roller axles 180 are mounted in eccentric bushings 186 to permit compensation for misalignment.

Thus, the main slide frame or sub-table 152 rests on the bars 166 and 168 by rollers 174 and is stabilized horizontally by rollers 178. A stop rib 190 is fastened to the base plate 158 to prevent the table from jumping upward accidentally. A locking screw 192 in the sidewall of box element 156 permits fixing the table for certain types of grinding.

Rearward motion of the table assembly 150 is controlled by the rod 194 anchored in frame 40. A rubber cushion washer 196 acts against plate 164 through which rod 194 passes. Nuts 198 and washer 199 position cushion 190 on the rod. As shown in Figure 6, the table is at the rear limit of travel.

Extending upwardly from the sub-table 152 are spaced uprights 200, each drilled to provide a pivot point for a pin 202 mounted in work table on rest plate 154 by a bushing 204, adjustable axially, and locked by screw 205. These bushings 204 permit lateral adjustment of the table for accurate positioning thereof during assembly to align all mounting and actuating parts.

Table 154 is formed as a casting, having side bars 206 and 207 on the left and right, respectively, as viewed in Figure 5. A center rib 208 (Figure 6) reinforces the structure. Adjacent the leading edge of the table, i.e.,

the edge facing the wheel, recesses 210 are formed to receive the rounded tops of uprights 200. The side bars of the table 154 are angled at 212 at the forward edge and at 214 on the rear on trailing edge. A center re-entrant groove 216 is provided across the table for a rest plate side.

Thus the entire table assembly is free to slide fore and aft on the cantilever bars 166—168, and is mounted for accurate positioning in these bars. A syphon or bellows type seal 220 is provided around these bars between the main body 40 and the rear wall of housings 156 to keep the slideways clean of abrasive dust and coolant.

The forward motion of the table is controlled by the leading edge or nose 218 on a recessed section 221 (Fig. 3) in table 154. In Figure 2 this nose portion 218 is shown against the shell 92, which is mounted on the frontal plate 88 and reinforced by the stud-flange 98—100.

The pivot centers 202 are only about one inch from the working edge of nose 218. Ideally these should be coaxial with the working edge but this is impossible to achieve because clearance is needed across the table top. However, by mounting pivot 202 very close to edge 218 and then utilizing the edge as a stop directly at the wheel level (Figure 2), the relationship of the working edge changes only a fraction of an inch relative to the wheel. It will be seen that if the stop were on the bars 166 or 168, then each time the angle of the table was changed, it would be necessary to change the stop in order to get the working edge in proper relation to the wheel. With the present construction the slidable base will have a different position relative to the slides but the table will not.

The angle-position of work table 154 on pivots 202 is controlled by a mechanism mounted to the right of the table on the right hand slide box 156 (Figures 1, 3, 4, 5). The table has a side plate 250 on the right hand side as viewed facing the machine. This side plate is bolted (Figure 4) to the table by bolts 252 and has a depending leg 254 at the rear end and a depending leg 256 at the front end. The front edge of the front leg 256 is curved accurately and provided with protractor graduations to mark the position of the table relative to a finger 258 fastened to the top of slide-box 156.

The rear leg 254 is the actuator for the table position. Anchored to the toe of the leg 254 is an elongate housing 260, having a knuckle 262 through which passes bolt 264, which anchors in the rear end of slide box 156. Housing 260 is centrally bored and threaded to receive the threaded end of an actuator bolt 268, having a knob 270 at its outer end. The bolt passes through an unthreaded bore in second housing 272, having a forward mounting knuckle 274, through which passes a bolt 276 into slide-box 156.

Knob 270 is pinned to bolt 268 so that a turning of the knob to the right screws bolt 268 into housing 260 and draws the housing 260 and the leg 254 to the fore, thus raising the front edge of table 154. Turning of knob 270 to the left allows the table to lower, the back end of threaded bore of housing 260 is provided with a plug 280 to keep out dust and dirt. The housings 260 and 272 are connected by a Sylphon type boot 282 clamped at 284 and 287 to prevent the entry of dirt and abrasive particles. Suitable breather holes may be provided. A locking screw 288 is provided in the bottom of housing 272 for shaft 268.

Thus the table can be readily adjusted to any angle by rotation of knob 270.

In the use of the machine, a suitable work holder can be mounted on table 154 in the slide groove 216 and adjusted to the proper angle. Once the table is tilted to the proper angle, the wheel 20 may be started. The oscillations may be adjusted in its degree by screw 38 (Figure 1) and the table moved up to position toward

the wheel. The grinding operation may thus be readily

5

performed on each piece and the operator need only watch the degree of grinding and replace the parts.

As has been described it is a simple matter to reverse the grinding wheel and move the guard to the right position as contrasted with the position of Figure 1. With the table mounting described, the leading edge of the table on which the work will rest is always about the same distance, preferably about one inch, below the center of the wheel and no stop adjustments are necessary and no vertical adjustment is required to accomplish this positioning. The roller mounted table enables an operator to load and unload the work pieces with ease simply by pulling back the table. It permits also accurate and sensitive feeding of the work to the wheel.

What is claimed is as follows:

1. In a grinding machine having a frame and an abrasive wheel mounted for rotation and oscillation in a defined area, a shield for said wheel comprising telescoping, dished plates, the first plate being mounted on the frame behind the wheel having side edges facing toward the wheel, the second plate being adapted to mount in telescoping relation to the first in front of the wheel, means for mounting said second plate comprising a forward projection on said frame overlying said wheel axially, a downward projection on said first projection overlying a portion of the face of said wheel, means on said last projection rotatably mounting said second plate over said wheel in telescoping relation to said first plate, said second plate having a window movable from one side of the wheel to another by rotation of the plate.

2. A device as defined in claim 1 in which said projections are provided with connecting passageways for coolant leading to point within the periphery of the wheel, said downward projection being removable from said forward projection, and means on said projections to provide a seal between said passageways.

3. A device as defined in claim 2 in which the second plate is perforated to permit passage of coolant there-through from said passageways to said wheel.

4. A device as defined in claim 3 in which means on said second plate and means on said downward projections are operatively associated to limit the motion of said second plate to two extreme positions wherein said window is positioned at said positions in an operating location on either side of said wheel and said perforations are positioned in either position to register with a coolant outlet in said downward projection.

5. A device as defined in claim 1 in which a work table is slidably mounted on said frame in front of said wheel, and means is provided on said table to contact said downward projection to serve as a forward stop for said table in motion toward said wheel.

6. A device as defined in claim 5 in which the table mount comprises cantilever bars projecting forward from said frame in parallel relation, rollers on said table positioned to contact each of said bars at spaced points of contact, means on said table boxing in said bars and rollers to keep them free of dust, and an expansible shield between said frame and said means to close an aperture of entrance of said bars.

7. A device as defined in claim 6 in which a plurality of rollers contact the top of each bars to bear the load of said table, and a plurality of rollers contact the sides of said bars to stabilize the table against sideward thrust.

8. A device as defined in claim 7 in which each of said rollers are mounted on stub shafts in said table, and means for mounting one or more of said rollers comprising a bushing with an eccentric bore for said shafts to permit radial adjustment of the axis of rotation of said shafts.

9. A device as defined in claim 5 in which said table comprises a sub-table slidably mounted horizontally relative to said frame and a work bearing plate mounted for angular adjustment relative to said sub-table, means for mounting said parts together comprising opposed uprights

6

on the front of said sub-table, means pivotally associating said sub-table and said plate wherein said plate can move to different positions of angular adjustment relative to said wheel, and means to hold said parts in adjusted position.

10. A device as defined in claim 9 in which the two last named means comprise spaced legs depending from one side of said plate, one leg at the rear of the plate having a pivoted connection, a pivotally suspended housing at the fore part of said table, and adjustment means passing through said housing to said rear leg and pivotal connection, said last named means being adjustable in length to cause shifting of said plate relative to horizontal, said other leg at the fore part of the plate being curved with an arc of radius of the plate, and being calibrated to serve as a protractor locator for said plate.

11. A device as defined in claim 10 in which the pivotal connection on the rear leg comprises a housing with a threaded bore pivoted to the leg, and the adjustment means comprises a threaded shaft with one end threaded in said threaded housing and the other end suspended in said suspended housing.

12. A device as defined in claim 11 in which the suspended housing and the housing with a threaded bore are joined by a collapsible-extensible casing to seal out foreign matter.

13. In a grinding machine of the type having a rotating wheel mounted on a base on a horizontal axis, a guard means for said wheel including a support depending in front of said wheel to a position near and below the center of said wheel, a work support combination comprising parallel cantilever bars below said wheel projecting from said base to underlie the work area in front of said wheel, riser means extending upwardly at the wheel side of said base to a point approaching the center of said wheel, a table base mounted for free, unrestrained motion on said bars limited only at the extremities of the motion toward and away from the wheel, a tool support table on said base table pivotally mounted on said riser means for motion with said base table and movable about a horizontal axis at said risers transverse to but closely adjacent the wheel axis, to varying angles relative to said base table, means on said base to limit the outward motion of said tables, and means adjacent the plane of the wheel to limit the inward motion of said tables, whereby an operator may place a tool on said tool support table and move it to contact with said wheel by moving the entire table assembly directly on the cantilever bars.

14. A machine as defined in claim 13 in which the table has a leading edge for supporting work, and means supported on said base and positioned in front of said wheel to serve as a forward stop for said table regardless of its angular adjustment.

15. A device as defined in claim 13 in which a coolant guard is mounted on said depending support, said guard comprising a disc having a window-like opening on one side of the center to permit work to reach the wheel, said disc being rotatable to a position wherein said opening is on the other side of the center for reverse operation of said wheel.

16. A machine as defined in claim 15 in which said depending support is provided with openings to carry coolant liquid to an opening in said disc leading to said wheel.

17. A device as defined in claim 13 in which the guard means support has a coolant passage leading from said body downwardly to open inwardly toward the center of said wheel, said support being engaged with said body in a fluid tight seal.

18. A device as defined in claim 13 in which a plurality of rollers contact the top of each of said bars to bear the load of said table, and a plurality of rollers contact the sides of said bars to stabilize the table against sideward thrust, each of said rollers being mounted on stub shafts in said table, and means for mounting one or more of said rollers comprising a bushing with an eccentric bore

for said shafts to permit radial adjustment of the axis of rotation of said shafts.

References Cited in the file of this patent

UNITED STATES PATENTS

1,337,352	Gardner	Apr. 20, 1920
1,872,718	Flanigan	Aug. 23, 1932
2,361,550	Krueger	Oct. 31, 1944

2,497,504
2,526,518
2,554,299
2,661,037
5 2,700,992

690,666

Kronouer	Feb. 14, 1950
Turretini	Oct. 17, 1950
Hammond	May 22, 1951
McGihon	Dec. 1, 1953
Grzybowski	Feb. 1, 1955

FOREIGN PATENTS

Germany	May 3, 1940
---------	-------------