March 5, 1957 E. F. CHANDLER 2,783,592

UNIVERSAL GRINDER

Filed Dec. 30, 1952 3 Sheets-Sheet 1

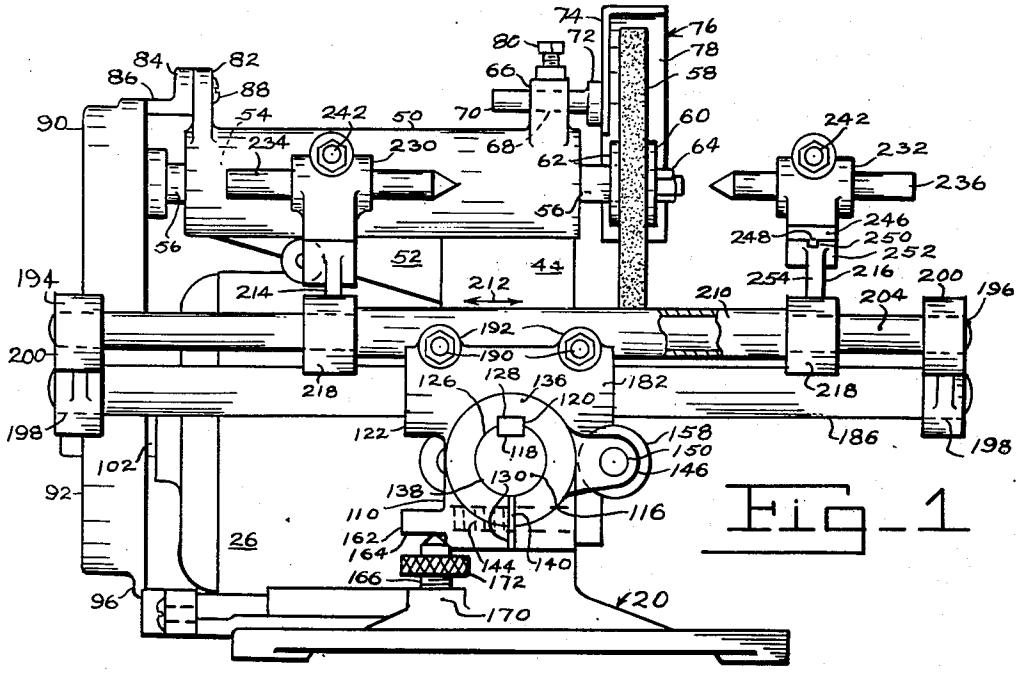


Fig. 1

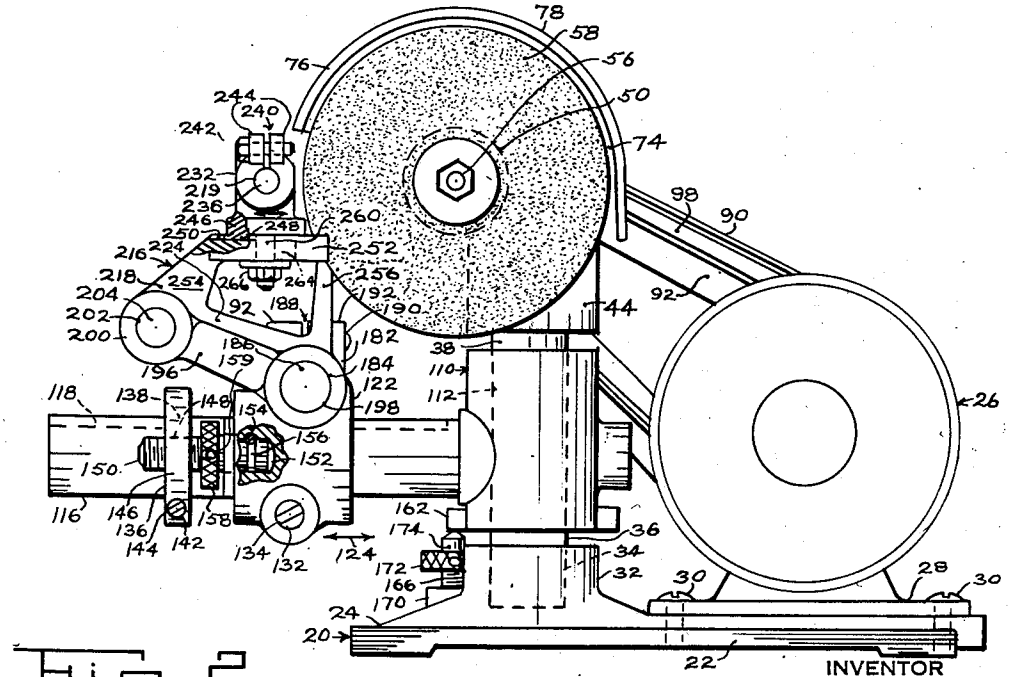


Fig. 2

INVENTOR
Edward F. Chandler
BY
Peter Fries, Jr.
ATTORNEY

March 5, 1957 E. F. CHANDLER 2,783,592

UNIVERSAL GRINDER

Filed Dec. 30, 1952 3 Sheets-Sheet 2

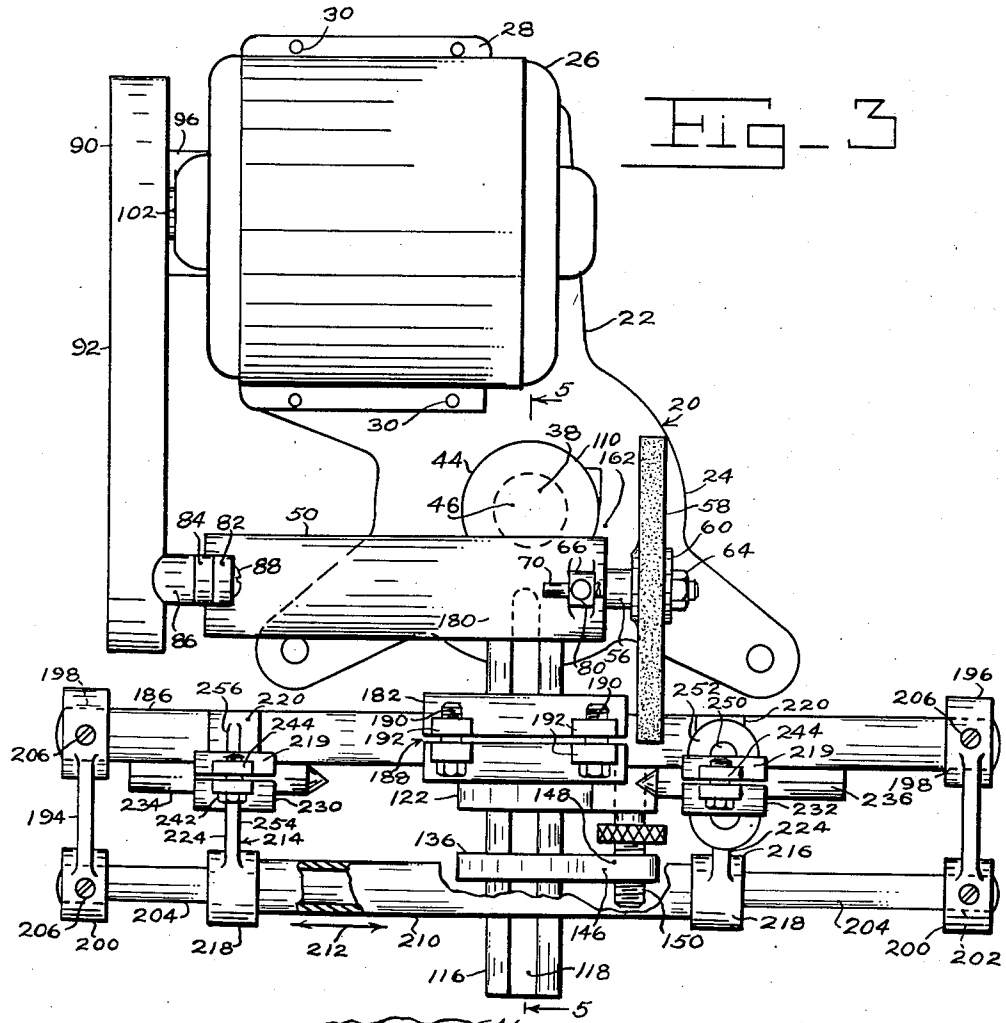


Fig. 3

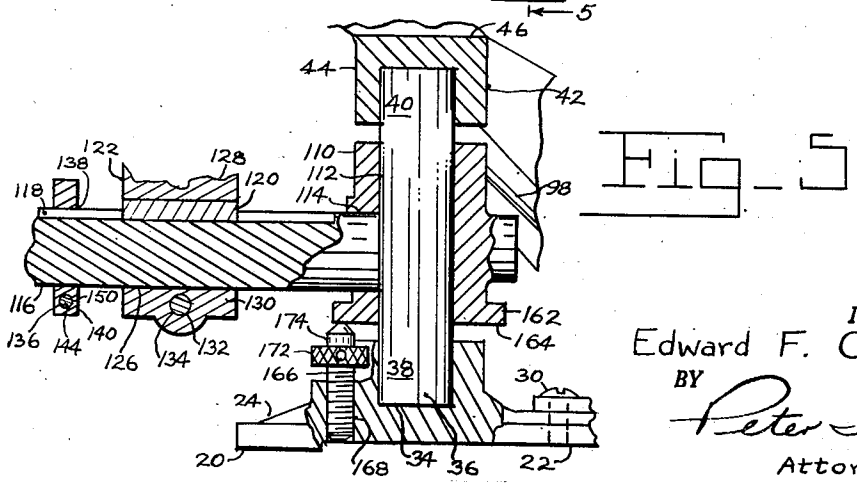


Fig. 5

INVENTOR.
Edward F. Chandler
BY
Peter Fries, Jr.
Attorney

March 5, 1957 E. F. CHANDLER 2,783,592

UNIVERSAL GRINDER

Filed Dec. 30, 1952 3 Sheets-Sheet 3

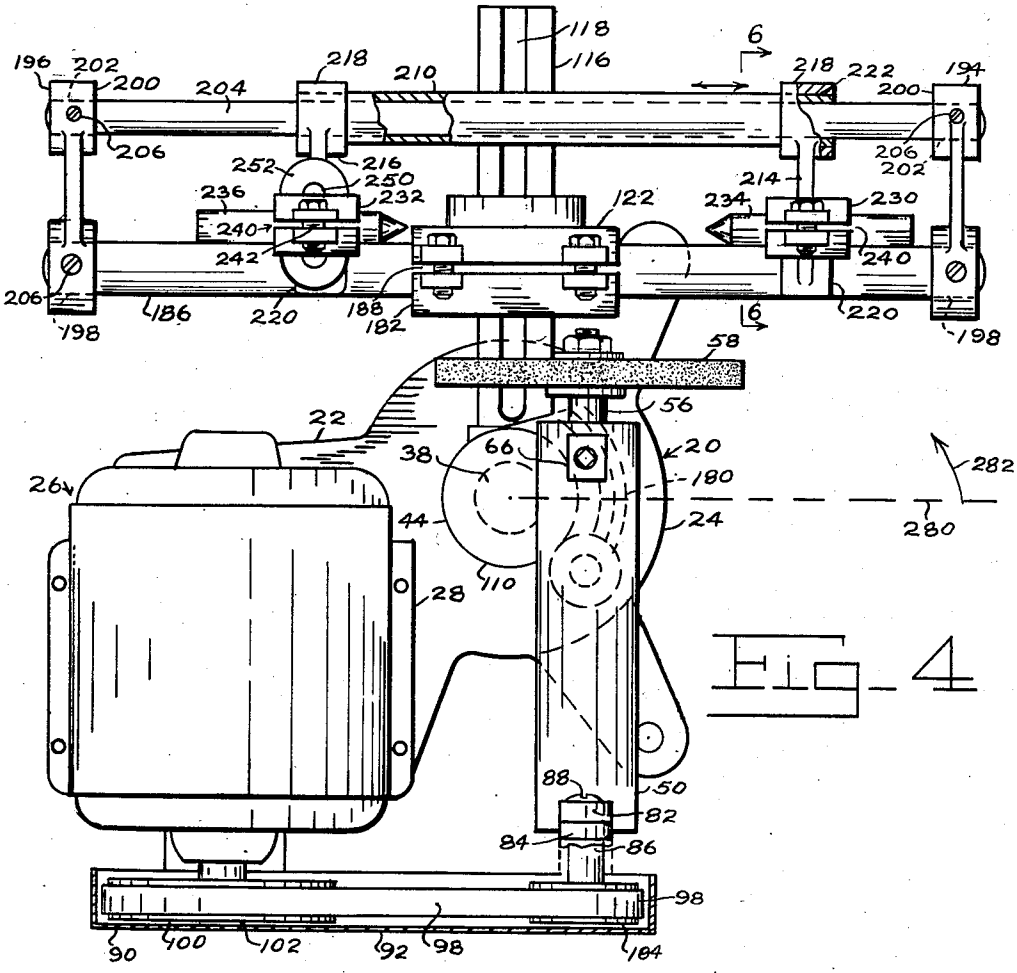


Fig. 4

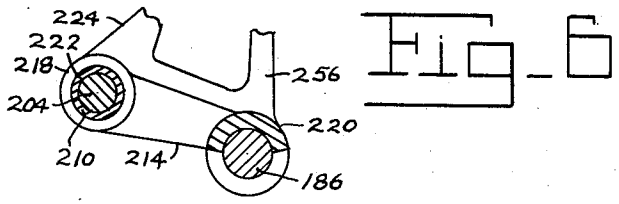


Fig. 6

INVENTOR
Edward F. Chandler
BY
Peter Fries, Jr.
ATTORNEY

United States Patent Office 2,783,592 Patented Mar. 5, 1957

2,783,592

UNIVERSAL GRINDER

Edward F. Chandler, New York, N. Y.

Application December 30, 1952, Serial No. 328,620

1 Claim. (Cl. 51—92)

This invention relates to improvements in bench grinders and the like.

An object of the invention is to provide a novel and improved bench grinding machine in which there is a grinding wheel mounted on a rotatable shaft, with novel means for supporting and presenting the work to be ground, to the surface of the grinding wheel.

Another object of the invention is to provide a novel bench grinding machine in which there is a main upright support and traverse post providing a pivotal support for the tool support means and thus angularly traversable about a vertical axis, whereby the tool or other part to be ground by the grinding wheel is vertically movable on the main upright post and angularly traversable about the vertical axis of the said main upright post.

A further object of the invention is to provide a novel bench grinding machine in which there is a main rotary shaft journaled in a main shaft housing to support a rotatable grinding wheel or the like, with a stable base disposed therebelow, and with a consequent low center of gravity and considerable stability, the construction being such that there is substantially little or no tipping or overturning torque evident even when considerable grinding forces are applied to the grinding wheel.

Still another object of the invention is to provide a novel and improved universal grinding machine of considerable versatility, in which the tool or other part to be ground is supported for linear motion in one or more different directions as needed, on a tool support, which in turn may be angularly oriented or turned relative to the grinding wheel, thus achieving universal motion under conditions of fine and accurate control, to grind any portion of a tool or other part with complete freedom of choice of mode of grinding to suit the purpose at hand.

Still a further object of the invention is to provide a novel and improved universal grinding machine in which the tool or other part to be ground, is movable toward or away from the grinding wheel by parallel motion, with fine adjustment means, such all parallel motions being characteristic features of the grinding machine.

Another object of the invention is to provide a novel and improved universal grinding machine of the character described, which is simple in design, inexpensive to manufacture, employs a minimum of movable parts, and is quite effective and efficient for its intended purposes, and especially useful in both large and small machine shops.

These and other objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof, as illustrated in the accompanying drawings, forming a part hereof, and in which,

Figure 1 is a front elevation of the complete machine, with the centers arranged in position parallel to the axis of the grinding wheel.

Figure 2 is a right end elevational view of the grinding machine shown in Figure 1, the view being partly broken out to show the construction of some of its parts.

Figure 3 is a top plan view of the grinding machine

shown in Figure 1, portions being broken out to illustrate the construction thereof.

Figure 4 is a top plan view similar to that of Figure 3, except that the entire center support assembly has been swung about the axis of the post 38 through an angle of ninety degrees on the base 20, and then the entire machine has been swung counterclockwise through an angle of ninety degrees. In Figure 4, the axis of the grinding wheel is perpendicular to the axis of the centers 234 and 236. Portions have been broken out to illustrate the construction, and the belt covering housing has also been sectioned to show the belt and pulleys in full lines.

Figure 5 is a fragmentary sectional elevational view taken on plane 5—5 of Figure 3 substantially.

Figure 6 is a fragmentary sectional elevational view taken substantially on plane 6—6 of Figure 4.

In the design and construction of grinding machines, especially the smaller types of such machines in the general class of bench grinders and the like, it is important that the grinder be not only small and compact, but also that it be quite stable, so that it may be mounted on a bench top or a stand, without danger of tipping due to unbalanced stresses encountered during the grinding operation. In addition, it is important that the part or article to be ground be presented to the grinding wheel surface at the best angle of incidence bearing in mind the grinding operation to be carried out. In this regard, there should be angular adjustment possible of the support of the article to be ground relative to the grinding wheel surface, and the adjustment possible should be as large as needed for the purpose at hand, and to avoid the necessity for taking down the set-up for large angles of adjustment. Further, the grinder should permit of parallel movement of the article to be ground in relation to any predetermined plane, for optimum performance. And finally, it should consist of as few parts as possible, so that its cost will be relatively small, and its versatility great.

The present invention provides such a grinding machine, which is of universal application. In order to understand clearly the nature of the invention, and the best means for carrying it out reference may now be had to the drawings, in which like numerals denote similar parts throughout the several views.

As shown, there is a stable base generally indicated at 20, and including a floor plate 22 integral with and extending outwardly from the base hub 24, which is somewhat circular when viewed in plan as in Figure 3, the floor plate 22 being intended for support of the electric drive motor 26, the base 28 of which is disposed thereon and secured thereto by any suitable means such as screws 30. The stable base 20 has a base projection 32 integral therewith, and this in turn has an upwardly open socket 34 formed therein to receive the lower end portion 36 of the main upright support post 38. The post 38 may be either seated in the post socket 34 and secured therein by means of a set screw or the like, or it may be pressed into the socket 34 and permanently seated therein, as desired.

The upper end portion 40 of the main upright support post 38 extends into the downwardly open bore or socket 42 in the main journal support hub 44, and from Figure 5, it is seen that in one form of the invention, the socket 42 may be closed at the top by wall 46, so that hub 44 rests upon the upper end of the main support post 38. If desired, the wall 46 may be omitted, leaving the bore 42 upwardly open, in which event, the hub 44 would be held in any desired elevation by means of a radial set screw extending through the wall of hub 44 and bearing against the underlying post 38, or other well known engaging means.

In any event, it is preferable that there be no relative

turning motion between the base 20, the post 38, and the hub 44 during normal operation of the machine. A main journal housing 50 may be mounted securely upon the hub 44, or formed integral therewith so as to be firmly supported thereby, and, as seen in Figure 1, in view of the fact that the housing 50 extends for the most part toward the left of the hub 44, a strengthening rib or wall 52 may be formed integral with both the hub 44 and the journal housing 50, to give good support and rigidity. The main journal housing 50 is provided with a longitudinal bearing bore 54 to receive the rotatable main shaft 56, which is longer than the housing 50, so that its opposite ends extend substantially outwardly beyond the ends of the journal housing 50. As seen best in Figure 1, a grinding wheel 58 is mounted on the right hand end of the main shaft 56, for rotation therewith, being secured between washers 60 and 62 by means of nut 64 threaded onto the end of shaft 56.

A projection 66 carried by or integral with the journal housing 50, as seen best in Figure 1, extends upwardly therefrom, and has a lateral bore 68 formed therein to receive the stub shaft 70 which has its outer end secured to or integral with the boss 72, so as to support the left wall 74 of the grinding wheel shield member or housing 76. As seen, the shield 76 has a curved shield wall 78 which extends partially around the grinding wheel, so as to catch any abrasive particles or cast off metallic particles of parts being ground, and guide them away from the machinist. A set screw 80 is threaded into an opening in the top of the projection 66, as seen in Figure 1, so as to permit adjustment of the position of the shield 76 as needed, by loosening the set screw and its lock nut shown.

At the left end portion of the journal housing 50, as seen in Figures 1 and 3, there is an upwardly extending mounting lug 82, which is provided with a bore in alignment with a corresponding bore formed in the lug 84 on the angle bracket 86, by means of which a screw 88 is threadedly engaged through these bores to secure the parts together as shown. A belt shield housing 90, having an end wall 92 and a skirt wall flange 94 extending thereabout and secured to wall 92 or integral therewith, is welded or otherwise secured to the angle bracket 86, for being supported thereby. The belt shield housing 90 may also be further secured in position by means of a flange extension 96, secured in any suitable manner to the base 22 to minimize vibration.

The belt shield housing 90 thus defines an enclosure within which the coupling belt 98 moves, so as to transmit power from the motor pulley 100 mounted on drive shaft 102 for movement therewith, to the driven pulley 104, which is mounted on the driven main shaft 56 for rotation therewith. It is thus seen that the driving motor 26 is mounted right down on the lower main base 20, so that its center of gravity is well below the axis of the journal housing 50 and of the grinding wheel 58, thus providing a high degree of stability, and freedom from any tendency to tip over under high grinding stresses. Figure 2 illustrates this stability arrangement wherein the motor is not only placed below the grinding wheel, but also well rearwardly thereof, so that the resultant of any pressure on the grinding wheel while a part is being ground, is directed substantially through the base and hence there is substantially no tendency to tip over at all.

From Figure 4, it is seen that the pulley 100 has a larger diameter than the driven pulley 104, and it is understood that the ratio of pulley diameters may be varied as needed, to impart any desired speed to the grinding wheel 58. In addition, it will also be understood that the pulleys 100 and 104 may be stepped, to give them a selection of diameters, so that shifting the belt 98 from one step to another will permit a change in speed of the grinding wheel. Also, it is within the purview of the invention to provide any well known means for changing the pulley effective diameter ratio continuously, or other continuous speed change means. It will also be understood that under high speed conditions, the grinding wheel 58 may be replaced by a thin disc-like high speed cut-off wheel, for cutting instead of grinding as desired, such cut-off wheels being well known in the art.

A main work support housing hub 110 has a vertical bore 112 formed therethrough as seen best in Figure 5, to receive slidably and turnably the upright cylindrical support post 38, and has a socket bore or recess 114 formed therein at right angles to and intersecting with the axis of the vertical bore 112, to provide a seat for the horizontal bed shaft 116 which is securely seated and secured therein in any suitable manner, as by being pressed therein, welded or brazed therein, or otherwise. As shown, the horizontal bed shaft 116 is substantially cylindrical, but I do not wish to be limited to this shape, and it will be understood that it may have other cross sections, such as rectangular, according to other forms of the invention. The bed shaft 116 is of substantial length, and is provided with a longitudinal keyway or slot 118 extending most of its length, and upwardly open, to receive a guide key or projection 120 which is secured to or carried by the traversing housing 122 which is movable longitudinally along the bed shaft 116 as indicated by the arrow 124 in Figure 2. It is seen that the traversing housing 122 has a bore 126 formed therethrough to receive the shaft 116, and the bore 126 has a recess 128 formed therein as seen in Figures 1 and 5, to receive the guide key 122, which may be secured therein by any suitable means, such as being pressed in, or brazed or welded in, or otherwise as desired.

The carriage housing 122 is thus movable along the bed shaft 116, and has a split 130 formed through its lower portion as seen, with a screw or bolt 132 threadedly inserted through aligned bores 134 in the two lips of the split, which can be tightened as desired, to clamp it securely on the shaft 116, or loosened to permit movement therealong when needed. To permit of fine control of the adjustment of the position of the movable parts relative to the cutting wheel 58, I also provide an auxiliary collar member 136 having an opening or bore 138 formed therethrough to receive the shaft 116, and the opening 138 may be enlarged to allow the key 128 also to extend therethrough as needed. The collar member 136 is split at 140 and provided with aligned bores 142 to allow a fastening screw 144 to threadedly engage the bores so that it may be tightened or loosened to clamp or unclamp the collar 136 to the shaft 116 as needed. An extension 146 of the collar 136 and integral therewith, has an opening 148 formed therethrough parallel to the axis of shaft 116, and threaded to receive the threaded portion of shaft or screw 150. As seen in Figure 2, the right hand end of the screw 150 is inserted into a cylindrical recess 152 in housing 122, and retained therein by means of a pin 154 inserted through a hole in member 122 and into an annular groove 156 in shaft 150, so that the shaft 150 is free to turn about its axis, but not to withdraw from recess 152. A knurled knob or nut 158 is mounted on shaft 150 for turning therewith, being keyed or otherwise secured thereto, so that turning the knob 158 turns shaft 150. As a result, it is seen that for fine adjustment, it is only necessary to tighten screw 144, fixing clamp 136 on shaft 116, and loosen screw 134, so that by turning knurled knob 158, a fine movement of housing 122 takes place, inwardly or outwardly in respect to post 38 and the grinding wheel.

To adjust the vertical level or elevation of the hub 110 relative to the base 20, I provide a collar extension 162 which is integral with the lower portion of hub 110 and extends radially therefrom, with a plane surface 164 formed on the underside thereof. An adjusting screw 166 has its lower portion threaded for engagement in a threaded vertical bore 168 in the boss 170 of base 20, having a knurled knob or nut 172 mounted on or integral with the screw 166 for turning therewith, so that turning

the knob 172 turns the screw 166 to elevate or lower its upper end 174, upon which the collar extension 162 of hub 110 rests and is supported, thus elevating or lowering the hub 110 and all parts carried thereby. The collar extension 162 may be a continuous annulus, or, where the amount of turning of hub 110 about its vertical axis is not great, extension 162 may be less than a complete annulus, say about 180 degrees or less, as needed. Suitable means may be provided for locking the hub 110 in any position, such as the positions shown in Figures 3 and 4, which differ from each other by ninety degrees, and this may be accomplished by forming a curved slot 180 in the collar 162 to receive a set screw or locking screw which can be releasably engaged from a fixed location on base 20, with the slot, and tightened when the desired angular position of the hub 110 is attained. By this means, it is seen that any desired grinding angle relative to the grinding wheel may be achieved.

The housing 122 has an upper extension or shaft clamp 182 integral therewith, which has a horizontal bore 184 formed longitudinally therethrough to receive the lower cradle shaft 186, the shaft clamp 182 being split longitudinally on its upper portion as at 188 in Figure 3, to allow adjustment of the degree of clamping engagement with the shaft 186. Screws 190 are threadedly inserted through the openings formed in opposite clamp lugs 192 which are integral with the upper lips or margins of the split 188, which can be loosened to permit sliding movement of the shaft 186 in a direction parallel to its axis, and also turning motion about its axis for traverse about its axis. The screws 190 are then tightened to lock the shaft 186 at any position as desired.

As seen in Figures 1, 2 and 3, a pair of end brackets 194 and 196 have lower bores 198 to receive the ends of the shaft 186, being secured thereto in any suitable manner, as by being pressed thereon, or by use of set screws, keys or the like. The other ends of the brackets 194 and 196, as seen at 200, are also provided with bores 202, to securely engage the outer ends of the secondary cradle support shaft 204, the axis of which is parallel to that of shaft 186. Set screws 206 may be employed to thread through radial openings in the walls of the bores 198 and 202, so as to bear upon the ends of shafts 186 and 204, to maintain the parts in secure engagement as desired.

A slide tube or cylinder 210 having an inside diameter slightly greater than the outside diameter of shaft 204, is mounted slidably thereon, for slidable motion axially in the directions indicated by arrow 212 in Figure 3 along shaft 204. Two center support brackets 214 and 216 each have riding hubs 218 and 220, the hubs 218 comprising cylindrical bores 222 as seen at the right end in Figure 4, of inside diameters only large enough to receive snugly fitted therein the ends of the slide tube 210, so that the brackets 214 and 216 move together as a unit with the slide tube 210 to which they are secured. The ribs 224 interconnect the hubs 218 and 220 of the brackets 214 and 216, and it is seen that the hubs 220 may be only hemicylindrical yokes, as seen in Figure 6, resting slidably on the other shaft 186 and movable therealong with the tube 210 and hubs 218 in the directions indicated by arrow 212. This construction permits the entire assembly of the tube 210, and brackets 214 and 216 to be swung, together with any part being machined or ground mounted thereon, about the axis of shaft 204, away from the cutting or grinding wheel 58 as needed. The hubs 220 may also be made full cylindrical if desired, to completely encircle shaft 186 if desired, according to another form of the invention.

A pair of center support clamps or housings 230 and 232 are carried by the brackets 214 and 216, for movement therewith, and have longitudinal bores 219 formed therethrough to receive the center members or rods 234 and 236. To permit clamping of the centers 234 and 236 and adjustment of their positions, the housings 230 and 232 are longitudinally split on top as at 240, and screws 242 are threadedly inserted through aligned bores formed in the clamp lugs 244 which are integral with both margins of the splits as seen best in Figures 2 and 3. Referring to Figure 2, it is seen that the housings such as 230 and 232 may be integral with a foot 246, which has a depending rib 248 slidable in a groove 250 formed in the guide plate 252 which in turn is integral with and supported by the ribs 254 and 256 which are integral with hubs 218 and 220. A screw 260 carried by foot 246, depends therefrom through slot 264 in plate 252, with a nut 266 threaded on the lower portion of the screw 260 to bear against a washer overlying the underside of the slot 264, so that by loosening the nut, the foot 246 and the parts carried thereby may be moved to the left or right as seen in Figure 2, that is toward or away from the grinding wheel, for adjustment in this regard as needed.

A part or tool to be ground may be mounted between the centers 234 and 236 in any well known manner, for being ground by the grinding wheel 58, and the part being ground may be moved in the directions of the arrows 212, from left to right as seen in Figure 3, for example, to traverse the part relative to the grinding wheel, or the motion may be oscillatory as needed, in these directions. It is seen that all the motions possible and the adjustments permit of parallel movement relative to the grinding wheel, so that any necessary alignment, once fixed, may be maintained, for the grinding operation. Similarly, by the turning of the entire assembly about the axis of the post 38, as seen in Figure 4, for example, the flat or side faces of the grinding wheel 58 may be employed for the grinding operation, the parts in Figure 4 being swung through ninety degrees about the post 38, compared to their positions as seen in Figure 3. That is to say, if the parts in Figure 4 were in the same positions as for Figure 3, the axis of the shaft 116 would be on line 280 of Figure 4, but it has actually been swung in the direction of arrow 282, through an angle of ninety degrees. It will also be understood that the shaft 116, and the parts carried thereby may be swung through a lesser angle than ninety degrees, as desired, to grind any tapered or otherwise oriented surface as needed.

Although a pair of centers like 234 and 236 have been illustrated in Figures 1, 2 and 3, it will be understood that this is only illustrative of one form of the invention, directed for use with centers, and that a tool, part or the like to be ground may be supported on one or both of the brackets 214 and 216 by means of any suitable fixture or support, for presentation to the grinding surface, in which event the other support would replace the center housings 230 and 232, by merely removing the screws 260, and replacing them with another support fixture or assembly.

Although I have described my invention in specific terms, according to a preferred embodiment, it will be understood that this is by way of example only, and that various changes may be made in size, shape, materials and arrangement without departing from the spirit and scope of the invention as claimed.

I claim:

A bench grinder comprising a main base constructed and arranged for mounting on a bench, a main upright support post carried on said main base, a housing carried by said main upright support post, a grinding wheel shaft journaled in said shaft housing for rotation therein, carried by said grinding wheel shaft for rotation about the axis thereof, a motor carried by said main base substantially below the axis of said grinding wheel shaft and above said base and coupled to said shaft for rotation thereof and of said grinding wheel, a hub carried by said main upright support post and constructed and arranged for angular traverse about the vertical axis of said post, relative to said grinding wheel, a shaft integral with and ex-

tending radially outwardly from said hub for movement therewith, means for adjusting the vertical elevation of said hub relative to said main base, work support housing means carried by and movable along said radial guide shaft in a direction radially of said hub, releasable split clamp means carried by said work support housing means for movement therewith, at least one lateral shaft means engaged with and carried by said clamp means releasably in encircled engagement so that said lateral shaft means is turnable about its axis on release of said clamp means, work support carrier means slidable along said lateral shaft means and constructed and arranged for carrying a workpiece to be ground by said grinding wheel, whereby said workpiece or the like is traversable relative to said grinding wheel angularly about a vertical axis, and

linearly in directions radially and laterally of said grinding wheel.

References Cited in the file of this patent

UNITED STATES PATENTS

439,154	Holz	Oct. 25, 1870
790,099	Bath	May 16, 1905
1,326,423	Rennie	Dec. 30, 1919
1,337,617	Perkins	Apr. 20, 1920
1,662,078	Severson	Mar. 13, 1928
1,667,064	Yerkey	Apr. 24, 1928
1,897,035	Anderson	Feb. 14, 1933

FOREIGN PATENTS

25,321	Denmark	Nov. 29, 1918
493,470	France	May 2, 1919