The present invention relates to a universally adjustable tool guide, such as may be placed upon the table of a grinding machine for supporting a tool undergoing shaping or sharpening. As will be understood, the mechanism in shaping or sharpening a tool, holds the shank of the tool either in his hand or in a suitable holder, using the tool guide as a rest or support as the grinding wheel operates upon the cutting portion of the tool. The grinding is performed at times on the periphery of the wheel, and at other times on the side of the wheel, as the technique may require.

One object of the present invention is to provide an improved protractor-type tool guide which is shiftable along the grinder table at any pre-determined distance from the grinding wheel, within the range of adjustment of the tool guide, and which may be accurately adjusted rotationally and transversely relative to the table surface, so that the working edge of the tool guide may be disposed at an infinite number of angular positions and spacings with respect to the grinding faces of the wheel, within any established plane of the grinder table.

Another object is to provide an improved tool guide universally adjustable as above explained, which is highly simplified in construction and assembly, to the end that cost and weight are effectively minimized, while at the same time preserving the necessary durability and serviceability of the device.

Another object is to incorporate in the tool guide structure, a wheel dresser which will have all the critical adjustment advantages possessed by the working edge of the tool guide, thereby ensuring a high degree of accuracy in the dressing of the grinding wheel, to promote tool grinding with precision.

A further object is to provide a device of the character stated, consisting of components designed and interrelated in such manner as to permit the use of light metals or materials in the construction, without sacrificing the ability of the device to withstand abuse and hard usage.

Another object is to provide in a device of the class described, a novel, convenient, and efficient protractor arrangement which is easily and quickly readable, and protected from injury and soil under all conditions of usage.

Other objects are attained by the means described herein and illustrated upon the accompanying drawings, in which:

Fig. 1 is a plan view of a grinding machine table and wheel, showing the device of the invention resting upon the table in one position of usage.

Fig. 2 is an enlarged cross-sectional view taken on line 2-2 of Fig. 1, the table and grinding wheel being omitted.

Fig. 3 is a cross-sectional view taken on line 3-3 of Fig. 1.

Fig. 4 is a rear elevational view of the universally adjustable tool guide, on a scale slightly larger than Fig. 1.

Fig. 5 is a perspective view of a part referred to as the slide member.

Although in the past, various types of tool rests or guides have been proposed and used incident to the shaping, and sharpening of cutting tools by means of grinding machinery, the prior devices have not kept pace with improvements and developments in tools, production machinery, and advanced production schedules. The advancements made in the design of grinders and other machines, and in the character and cost of cutting tool metals among other things, have magnified the fact of obsolescence of existing tool guides as heretofore employed in the shaping and reconditioning of tools. Among the requisites of a modern tool guide are the factors of light weight, quick and accurate adjustment universally without loss of time, increased durability with out excessive weight, bulk, or cost, and maximum convenience in handling and usage of the device. These principal qualities, as well as others of somewhat lesser importance, have been regarded and advanced in producing the improved tool guide herein disclosed.

Referring to the accompanying drawings, 1 indicates the table of a grinding machine which includes an abrasive wheel 8. The table may be slotted as at 9, to provide at least one keyway or groove serving to guide the device 10 in its movements traversing the peripheral face 12 of the wheel 8. The wheel 8 has two side faces 13 and 14 alternatively usable, along with the face 12, for tool grinding purposes and the like. The wheel may be of any approved type, common forms of which are the straight or plain disc type, and the cup type. As is customary, the grinding machine may include means to tilt the table relative to the wheel, and to vary the space between the wheel periphery 12 and the adjacent edge 15 of the table. The space referred to may be varied by bodily shifting either the grinding wheel or the table.

The universally adjustable protractor tool guide, indicated generally by the character 16, may comprise a base 16 preferably of generally circular formation, upon which is superposed a cover or platen 17. Means are provided whereby the cover or platen may be rotated upon the base
in directions indicated by arrow A, throughout 360 degrees, while at the same time the cover and base unitarily may be bodily shifted toward and from any given point on the grinding wheel, in all rotated positions of the cover. These movements provide for universal adjustment of the cover not only toward and from the peripheral face 12 of the wheel, but also to an infinite number of angular positions relative to said face 12 and the face 15-16 of the wheel, with further adjustments resulting from selectively sliding the device 10 along the length of table slot 9. Further explanation concerning these adjustments will appear as the description proceeds.

Referring to Figs. 2 and 4, it will be noted that base 10 and cover 17 are transversely bored substantially centrally thereof, at 10 and 17, respectively, to receive a pivot member 20 which may be in the form of a sleeve as shown. The sleeve may have at its inner end a head 21 received in a counterbore 22 of the base, wherein the head may be suitably anchored or held against rotation, as by means of a pin or the like 23. At its opposite end, the sleeve is provided with external threads 24 engaging the complementary internal threads of a clamp nut 25, so that by rotating said nut the operator may either clamp or release the cover with respect to rotation thereof relative to the base 15. In the preferred construction of the device, frictional contact between the cover and the base is provided along peripheral margins 25 and 27 of these parts, where ample resistance to rotation may be easily obtained with only a slight tightening of the clamp nut 25.

Inwardly of the frictional track 27, the base is recessed as at 28 to receive a plate or disc 29 which has its outer margin marked off in degrees, as indicated at 30 of Fig. 1, to cooperate with a stationary indicator 31 on the cover, thereby providing a complete protractor for indicating, in degrees, the angularity of the fence or rest 32 to the grinding wheel, at various rotated positions of the cover upon the base. The cover 17 may be released as at 33, if necessary, to provide clearance over the indexed face of the protractor plate or disc 29. It will be understood that disc 29 is fixed securely to the base 16 in any suitable manner, as by means of an adhesive, rivets, or mechanical fasteners of any known type. A frame 34, as shown in Figs. 3, may carry a suitable transparent plate or film 35 through which the protractor readings may be viewed, while at the same time affording protection against injurious and soil. The frame is fitted into an opening provided in the upper face of the cover, as shown.

The base 16, as indicated upon Fig. 3, has an annular edge 36 adapted to rest upon the table 7, and to facilitate sliding of the base along the table in the presence of chips or other foreign objects which may be resting thereon, this table contact edge 36 may be serrated or interrupted at intervals as shown at 37. While the base slides over the table top, it is guided along a straight line by the action of a key or guide bar 38 nicely fitted for sliding movement longitudinally within the slot or groove 9 of the table. The key or bar 38 is secured to or formed integrally with, a slide member indicated at 40 upon Figs. 2, 4 and 6. In the example shown, the slide member is provided with a pair of oppositely extending ears 41-41 upon which the key or bar 38 is secured by means of screws 42. The slide member 40, transversely of its length, may be of channel or U shape in cross-section, thereby to provide finished sides 43-43 and an intermediate web 44. The web is slotted as at 45, to receive slidably therein a slide clamp screw 46 which passes through the sleeve 20 and terminates in a knob or finger piece 47 exteriorly of the cover.

At its inner end, the screw 46 has its threads in engagement with the threads of the clamp nut 25 which bears upon the web 44 of the slide member to normally fix the slide member in place within a diametral way 48 milled or otherwise formed interiorly of the base 16. This way 48 is most clearly indicated upon Fig. 4, and will be seen to terminate at opposite ends, a diameter of the circular base 16.

From the foregoing, it is apparent that loosening the nut 49 by rotating the knob 47 in a proper direction, permits shifting of the slide member 40 longitudinally of the way or channel 48, thereby making it possible to dispose the guide bar or key 38 at various distances from the central pivot or screw 45 (see Fig. 4). Now, referring to Fig. 1, it will be appreciated that such shifting of key 38 toward or from the central screw 45, will relocate the fence or rest 32 with respect to its proximity to the grinding wheel 6. This adjustment does not necessarily affect the other adjustment obtained by rotating the cover relative to the base, since knob 47 may be rotated to release the slide member 40 without disturbing the adjusting nut 25. The stated independence of the two adjustments results from the fact that the back of knob 47 bears against the threaded end of sleeve 20, rather than against the recessed face 51 of adjusting nut 25. By the same token, the rotary adjustment between the parts 16 and 17 can be effected without disturbing the adjustment of slide member 40, since it is unnecessary to rotate the knob 47 and release the nut 49 in order to unscrew the adjusting nut 25. In connection, it should be noted that clearance preferably is provided between the sleeve head 21 and the web of the slide member 40, to facilitate shifting of the latter.

Referring to Fig. 4, it may be noted that the forward end 50 of slot 45 limits the extent to which the fence or rest 32 can be extended toward the grinding wheel, unless the base 16 is rotated a full half turn or 180 degrees relative to the cover 17, in which event the distance to which the fence or rest may be extended is substantially doubled. To avoid the occurrence of any dead spot or loss of adjustment between the two positions of the key or guide bar at opposite sides of the pivot screw 45, it is desirable to extend the slot 45 sufficiently beyond the center-line of the key or guide bar to ensure coincidence of the pivot screw axis with the center-line of the base 16. Thus, the end 50 of slot 45 should extend forwardly beyond the center-line of bar 38 a distance equal to half the diameter of pivot screw 46.

It may here be pointed out that the length of the guide bar or key 38 is inconsequential, so long as it suffices to smoothly guide the device along the length of the table slot 9. In practice, the length of the key need not exceed the diameter of base 16.

Attention is now directed to the provision of a wheel dressing tool or implement 53, conveniently and effectively located upon the tool guide cover or platen so as to operate in conjunction with the protractor for accurately dressing the grinding wheel. As shown, the wheel dresser may be in the form of a bar or rod having at its outer end a diamond point 54 or the equivalent, to be brought into contact with the wheel as the wheel rotates. The Shank or body of the implement 53...
is adapted to fit within one or the other of a pair of bores 55 provided in the sides of the cover or platen near the ends of the fence 32. The height of the rear edge of the platen may be fixed by the dress head screw 56, which may be provided to laterally enter the bore 55 and impinge upon the shank of the tool dresser.

To use the wheel dresser shown at 53 upon Fig. 1, for dressing the periphery of 12 of the wheel, for example, the operator would loosen the adjusting nut 25 and rotate the cover or platen 17 ninety degrees in clockwise direction upon its base 15, thereby to place the dressing implement in a position at which it points toward the face 12 of the grinding wheel. Then by turning the knob 47 to loosen the nut 49, the slide member 40 may be released to permit bodily shifting of the base and cover of the tool guide toward the table edge 15 until the diamond 54 projects beyond said edge 15, whereupon either the table or the grinding wheel may be shifted to place the diamond in proper dressing contact with the wheel periphery.

In performing the dressing operation, the mechanic need only reciprocate the tool guide bodily along the table slot 9 where it contacts the wheel face 12. It will be understood, of course, that during the dressing operation above described, the elements 17 and 25 will be tightened to rigidly the entire tool guide structure, while free reciprocation thereof as a unit progresses along the table slot 9. As may be required from time to time in the course of dressing, the grinding wheel or the table may be shifted to maintain the necessary force of contact between the wheel and the dresser.

To dress the side face 14 of the grinding wheel, the mechanic may set the protractor to the Fig. 1 position, at which the dresser extends parallel to the table slot 9. With the platen or cover 17 locked in this position, against rotation, the clamp means 47-49 may be loosened to permit reciprocation of the platen transversely of table slot 9, thereby causing the point of the dresser to traverse the side face 14 of the wheel for trueing same. In the performance of this dressing operation, it may be desirable to block movement of the tool guide toward the right, so that the dressing tool may deflect from the wheel face 14.

This readily may be accomplished by blocking the table slot at the right end of key 35, or by clamping a suitable plate or bar to the table top transversely thereof, for the tool guide to bear against while reciprocating upon the guide member 40 thereon. The same result may be obtained by wedging the key 35 within the table slot 9, in any suitable manner.

In substantially the manner above described, the side face 13 of the grinding wheel may be dressed by means of the dressing implement secured in the bore or holder 55 at the right side of the platen or cover. It may be pointed out that the protractor may be set to various angles, so that the grinding wheel sides may be shaped by the dresser, to meet the peripheral face 12 as angles greater or less than 90 degrees, if desired. Likewise, it is possible, with the use of the technique described in the paragraph next above, to dress the wheel face 12 to an angle acute to the table edge 15.

From the explanation previously given herein, it should be evident that the tool guide of the present invention embodies universal adjusting means whereby a mechanic skilled in the grinding of cutting tools and the like, may quickly and accurately establish an infinite number of desir able positions for the support of a tool to be ground. In Fig. 1, the character 7 indicates a tool undergoing grinding, with the tool guide held in a notch at the cutting end of the tool. The tool rests upon the table and may be manually held against the upright face 39 of the fence 32 during the grinding operation. If the angular edge 61 of the tool is to be ground, the operator simply adjusts the device to place the fence at an angle of 45° to the face 12 of the wheel, and holds the tool in the same way against the fence face 39, while reciprocating the tool, with the tool guide, longitudinally of the table slot 9, as the tool edge 81 contacts the grinding wheel. Due to the wide selection of working positions thereby made possible, the mechanic is enabled to utilize his skill to the best possible advantage, with a substantial saving of time and physical fatigue. When grinding tools having critical angle or relief characteristics, the easily readable and quickly adjustable protractor arrangement incorporated in the improved tool guide, is of inestimable value as a time saver and gauge promoting high accuracy and profitable employment of the mechanic's time. The grinding period can be shortened considerably, with a substantial reduction in wheel wear and tool steel waste, when the device of the invention is utilized in conjunction with tool grinding machines.

As was previously pointed out herein, the improved device has been so designed as to make possible the use of light metals or alloys in the manufacture of its component parts, without sacrificing durability and serviceability. Magnesium and aluminum, and alloys containing those light metals, have proven acceptable in the manufacture of the principal parts of the device. Porous metal castings herebefore used in the fabrication of tool guides, have always been objectionably heavy, and have interfered with efficiency of usage of such fixtures. The device herein disclosed eliminates the various known disadvantages common to devices herebefore proposed as perfected tool guides, and constitutes a meritorious advancement of the art to which the invention appertains.

It is to be understood that various modifications and changes in structural details and materials characterizing the device may be resorted to, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim is:

1. A tool guide structure comprising in combination, a disc-like base adapted for sliding upon a slotted work table, said base having a substantially central bore therein, a guide-way extending across the base and in which one end of the bore terminates, a longitudinally slotted slide member upon the guide-way and shiftable lengthwise thereon, an elongate key fixed to the slide member and adapted to slide snugly within the slot of the work table, said key extending transversely of the direction of sliding movement of the slide member, a calibrated disc-like protractor on the base concentric with the bore thereof, an annular track on the base encircling the protractor, an apertured cover engage rotationaly upon the base, said cover having a bore concentric to the bore of the base, with the aperture framing some of the calibrations of the protractor, an annular track on the cover in face contact with the corresponding track of the base, providing frictional resistance to rotation of the cover relative to the base and serving to enclose
the protractor, and means projecting through the concentric bores of the base and cover, for releasably clamping the slide member and the cover in various adjusted positions relative to the base.

2. A tool guide structure comprising in combination, a disc-like base adapted for sliding upon a slotted work table, said base having a substantially central bore therein, a guide-way extending across the base and in which one end of the bore terminates, a longitudinally slotted slide member upon the guide-way and shiftable lengthwise thereon, an elongate key fixed to the guide member and adapted to slide snugly within the slot of the work table, said key extending transversely of the direction of shifting movement of the slide member, a tool-supporting cover superposed rotationally upon the base, said cover having a bore concentric to the bore of the base, corresponding annular opposed tracks upon the cover and the base, said tracks being in face contact to provide frictional resistance to rotation of the cover relative to the base, means extending through the concentric bores of the base and cover for releasably clamping the slide member in various adjusted positions relative to the base, a clamping member passing through the bore of the base, and having opposite ends, one end anchored to the base and the remaining end extended through the bore of the cover, and means on said extended end for forcing the base into firm frictional contact against the cover.

3. A tool guide structure comprising in combination, a disc-like base adapted for sliding upon a slotted work table, said base having a substantially central bore therein, a guide-way extending across the base and in which one end of the bore terminates, a longitudinally slotted slide member shiftable lengthwise within the guide-way, an elongate key fixed to the guide member and adapted to slide snugly within the slot of the work table, said key extending transversely of the direction of shifting movement of the slide member, a tool-supporting cover superposed rotationally upon the base, said cover having a bore concentric to the bore of the base, corresponding annular opposed tracks upon the cover and the base, said tracks being in face contact to provide frictional resistance to rotation of the cover relative to the base, a clamping member passing through the bore of the base, and having opposite ends, one end anchored to the base and the remaining end extended through the bore of the cover, and means on said extended end for forcing the base into firm frictional contact against the cover.

4. A tool guide structure comprising in combination, a disc-like base adapted for sliding upon a slotted work table, said base having a substantially central bore therein, a guide-way extending across the base and in which one end of the bore terminates, a longitudinally slotted slide member upon the guide-way and reciprocable thereon, an elongate key fixed to the slide mem-

5. A tool guide structure comprising in combination, a disc-like base adapted for sliding upon a work table having a guide therein, said base having a substantially central bore therein, a guide-way extending across the base and in which one end of said bore, a longitudinally slotted slide member disposed upon and shiftable lengthwise along the guide-way an elongate key engageable with the work table guide for establishing linear travel of the base upon the work table, said key being fixed to the slide member transversely of the direction of sliding movement of the latter, a cover superposed upon the base for full circle rotation, said cover having a bore concentric with the bore of the base, including a shaft member passing through the bores of the cover and the base, for selectively clamping the slide member securely against shifting relative to the cover.

6. A tool guide structure comprising in combination, a base adapted for sliding upon a slotted work table, said base including an extending substantially central bored sleeve fixed thereon, a guide-way extending across the base and at which terminates one end of said sleeve bore, a longitudinally slotted slide member reciprocable upon the guide-way, an elongate key fixed to the slide member transversely of the direction of reciprocation of the latter, said key being outside the limits of the base and snugly sidable within the slot of the work table, a tool-supporting cover superposed rotationally upon the base, said cover having a transverse bore through which the sleeve extends, corresponding annular opposed tracks upon the cover and the base, said tracks being in face contact to provide frictional resistance to rotation of the cover relative to the base, releasable clamp means for forcing the tracks of the cover and the base into firm contact and
2,623,387 thereby precluding rotation of the cover relative to the base, and a slide clamp screw extending loosely through the bore of the sleeve and the an inner end, the inner end of the screw being threaded beyond the slide member, and a clamp 5 nut on the threaded end of the screw, abutting the slide member.

7. A tool guide structure in accordance with claim 6, wherein the area circumscribed by the annular track of the base carries a fixed protractor including a line of indicia, and the cover includes a window through which a section of the indicia is exposed.

8. A tool guide structure in accordance with claim 6, wherein the releasable clamp means for forcing the tracks of the cover and the base into firm contact, is concentric with the bored sleeve of the base.

9. A tool guide structure comprising in combination, a base adapted for sliding upon a work table having a guide thereon, said base including a substantially central bored sleeve in fixed relation thereto, the sleeve having an extended outer end, a guide-way extending across the base and at which terminates one end of said sleeve bore, a longitudinally slotted slide member reciprocable upon the guide-way, an elongate key fixed to the slide member transversely of the direction of reciprocation of the latter, said key being outside the limits of the base and slidable within the slot of the work table, a tool-supporting cover superposed rotationally upon the base, said cover having a transverse bore through which the sleeve extends, corresponding annular opposed tracks upon the cover and the base, said tracks being in face contact to provide frictional resistance to rotation of the cover relative to the base, releasable clamp means forcing the cover against the base at the track means, and thereby precluding rotation of the cover relative to the base, and a slide clamp screw extending loosely through the bore of the sleeve and the slot of the slide member, abutments at opposite ends of the screw, one of which abutments is a head, and the other a nut threaded onto the screw, said abutments being in contact one with the slide member and the other with the extending end of the sleeve.

10. A tool guide structure comprising in combination, a base adapted for sliding upon a slotted work table, said base including an extending substantially centrally bored sleeve in fixed relation thereto, a guide-way extending across the base and at which terminates one end of the sleeve bore, a longitudinally slotted slide member reciprocable upon the guide-way, an elongate key fixed to the slide member transversely of the direction of reciprocation of the latter, said key being outside the limits of the base and slidable within the slot of the work table, a tool-supporting cover superposed rotationally upon the base, said cover having a transverse bore through which the sleeve extends, corresponding annular opposed tracks upon the cover and the base, said tracks being in face contact to provide frictional resistance to rotation of the cover relative to the base, releasable clamp means forcing the cover against the base at the track means, and thereby precluding rotation of the cover relative to the base, and a slide clamp screw extending loosely through the bore of the sleeve and the slot of the slide member, abutments at opposite ends of the screw, one of which abutments is a head, and the other a nut threaded onto the screw, said abutments being in contact one with the slide member and the other with the extending end of the sleeve.

11. A tool guide structure in accordance with claim 10, wherein the area circumscribed by the annular track of the base carries a fixed protractor including a line of indicia, and the cover includes a window through which a section of the indicia is exposed.

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