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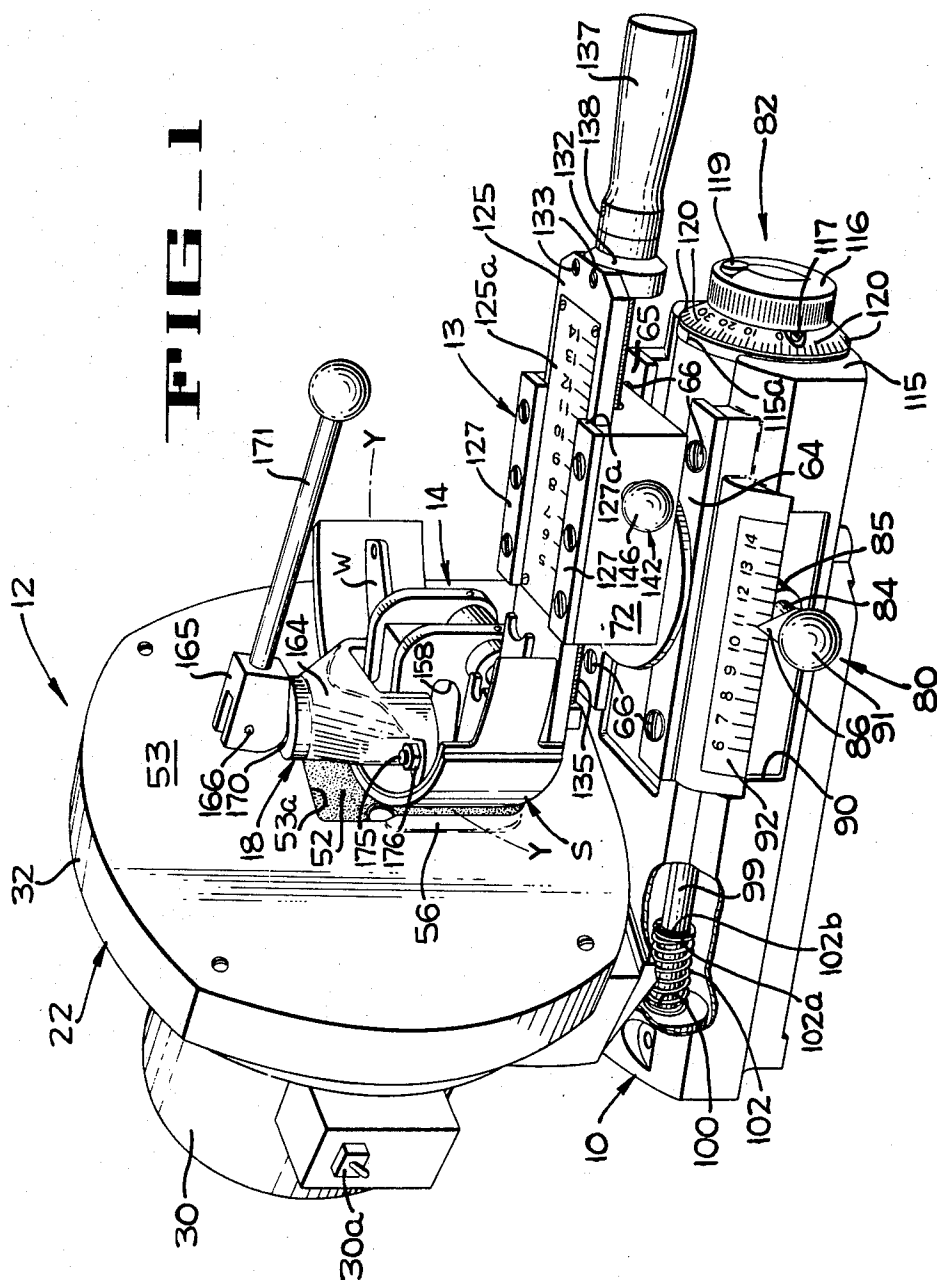
M. H. LILL ET AL

3,394,500

GRINDER

Filed May 13, 1965

4 Sheets-Sheet 1



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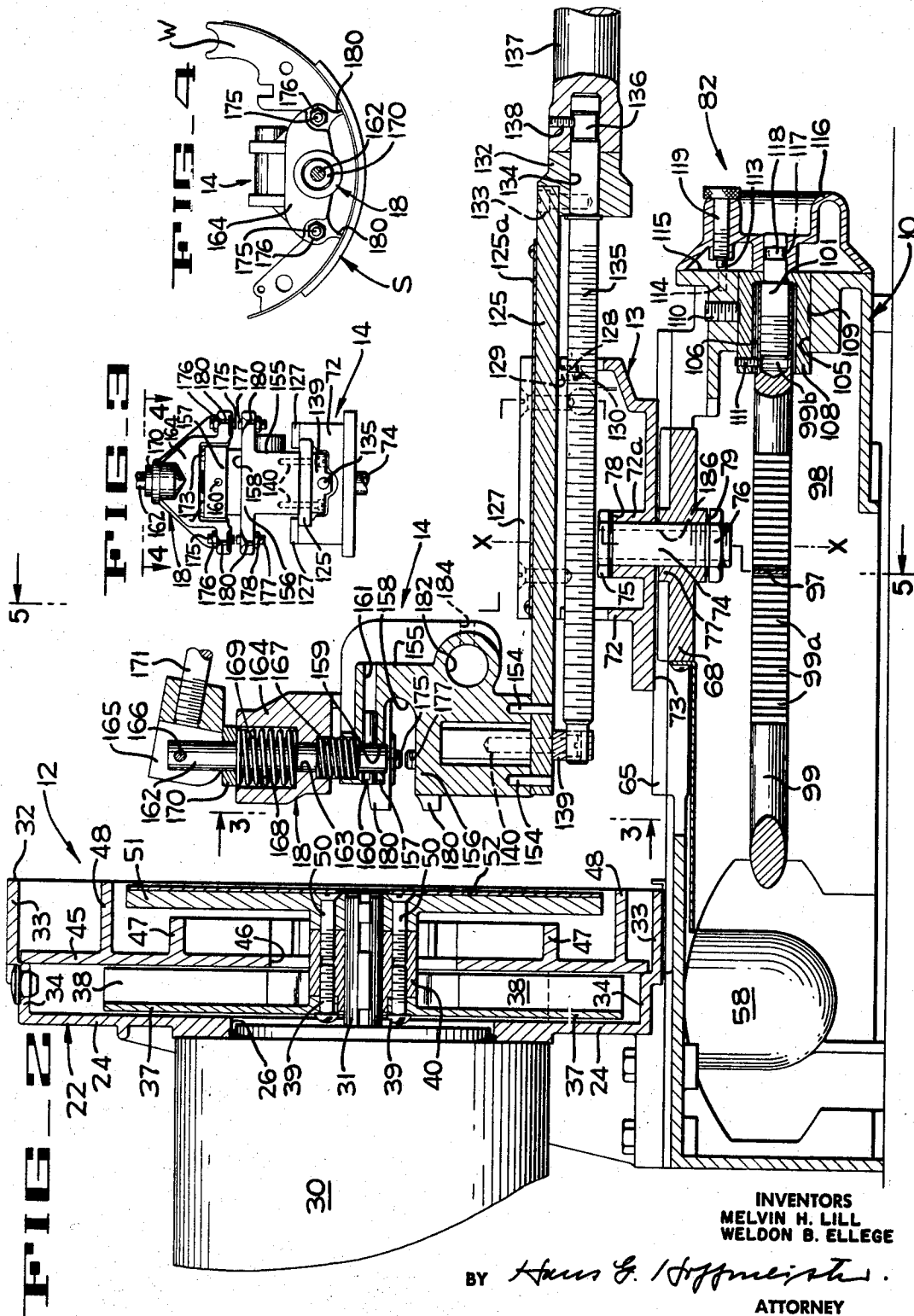
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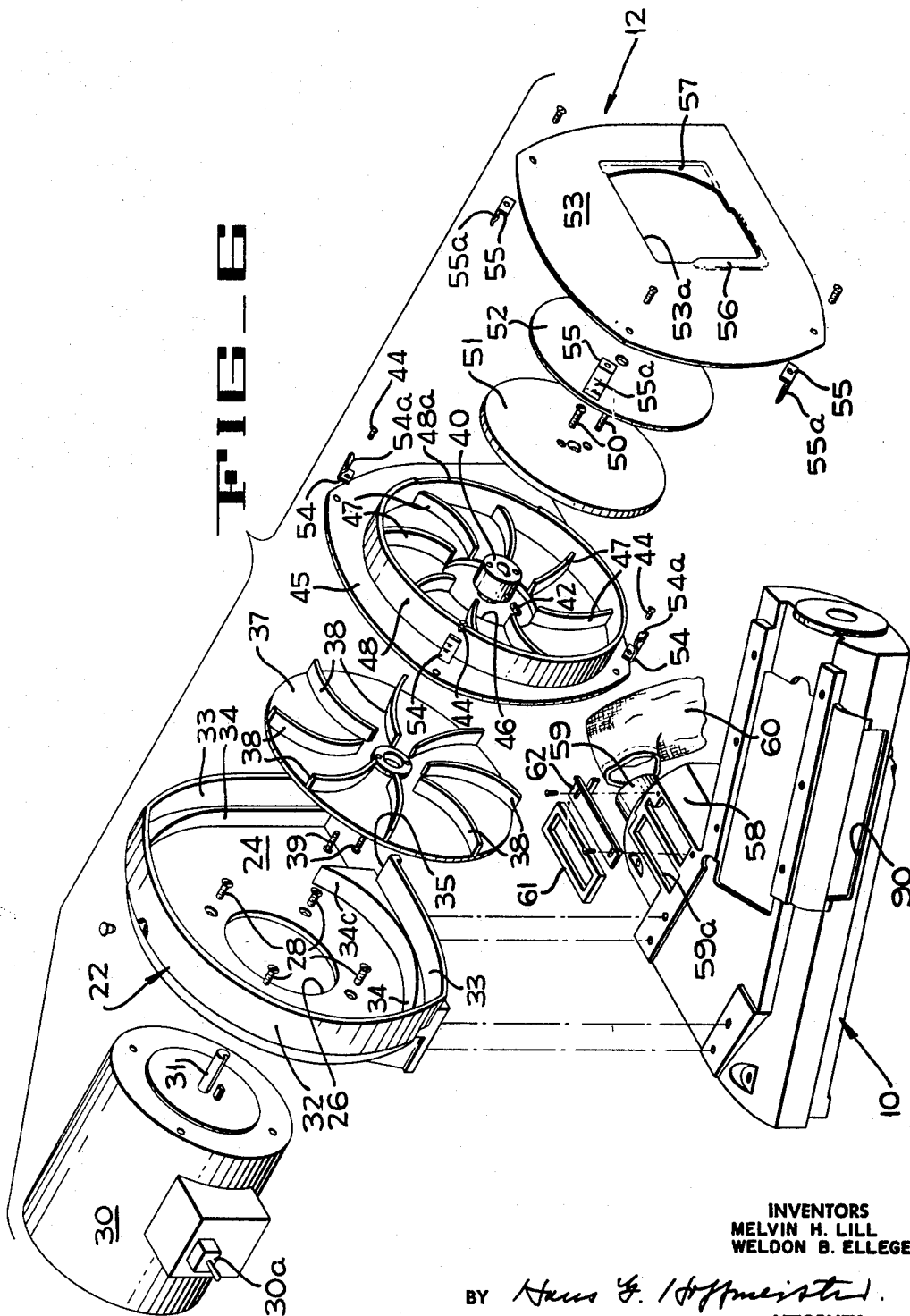
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3,394,500 GRINDER

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ABSTRACT OF THE DISCLOSURE

A device for grinding lined automotive brake shoes has a base with a grinding disc mounted thereon. The base has a carriage comprising a lower slide and a pivot member mounted on the lower slide. The lower slide of the carriage is movable along a line making an acute angle with the flat planar side of the grinding disc which defines the grinding surface. The pivot member carries a work holder which has a clamp to grip a brake shoe. The pivot member is movable on the lower slide by a coarse adjustment or a fine adjustment. Similarly, the work holder is movable on the pivot member by a coarse adjustment or a fine adjustment. The pivot member pivots on the lower slide to swing the brake shoe lining in an arc in abrading contact with a point on the flat planar side of the grinding disc.

The present invention relates to grinding devices and more particularly, to devices for grinding arcuate surfaces such as the convex surfaces of brake shoes.

In processing lined automotive brake shoes it is usually necessary to dress down a new lining so that the radius of curvature is substantially the same as that of the brake drum with which the brake shoe is to be used in order that the entire braking surface of the lining will engage the brake drum when the brakes are applied. As is often the case, several brake shoes of varying sizes must be processed in rapid succession in the same machine. Heretofore, devices for grinding brake shoe liners have required numerous adjustments before they could accommodate a large variety of different sized linings. In previous devices these adjustments required numerous hand motions and consequent inefficient waste of the operator's time. Also, in previous devices the brake shoes normally contacted the grinding disc repetitively at the same general location, causing the disc to become worn at this location and in need of replacement.

It is thus an object of the present invention to provide a grinding device which is easy to operate and which provides for rapid adjustment with a minimum of operator hand movements.

Another object is to provide an improved adjusting mechanism for the operating components of a tool such as a grinder.

Another object is to provide a grinding device in which a variety of brake shoes may be successively and rapidly accommodated within the usual range of sizes.

Another object is to provide a grinding device wherein adjustments may be made to compensate for wear and to provide a calibration point from which to make measurements during manufacture of the device.

Another object is to provide a grinding device having a holder for the brake shoe to be ground which will hold any brake shoe within the usual range of sizes, and will hold the lining parallel to the surface of the grinder to assure accurate dressing down of the surface of the lining.

Another object of the present invention is to provide a grinding device wherein there is an angular relationship between the grinding disc and the movable support for the brake shoe holder for distributing wear at a different point on the disc for each sized brake shoe.

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Another object is to provide a brake shoe grinder having an improved blower assembly for removing the dust particles caused by grinding the brake shoe liner.

Another object of the present invention is to provide a grinding device wherein the improved adjusting elements are precisely interrelated to assure accurate positioning of the brake shoe liner.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings, in which:

FIGURE 1 is a perspective of the grinding device embodying the present invention, with a brake shoe lining mounted in the position in which it is held when its surface is to be ground.

FIGURE 2 is a vertical longitudinal section through the device of FIGURE 1.

FIGURE 3 is a fragmentary front elevation of a portion of the clamping mechanism, the view being taken looking in the direction indicated by lines 3—3 of FIGURE 2.

FIGURE 4 is a section taken along lines 4—4 of FIGURE 3.

FIGURE 5 is a transverse section taken along lines 5—5 of FIGURE 2.

FIGURE 6 is an exploded perspective of a portion of the grinding device.

In FIGURE 1 there is shown an embodiment of the improved grinding device of the present invention which comprises a base 10 having mounted thereon a grinding disc and blower assembly 12, a work carriage 13 that is slidable on base 10 toward and away from the grinding disc and is pivotable about vertical axis X—X, and a work holder 14 that is slidably adjustable on the carriage 13 and has a clamp assembly 18 on its outer end.

The grinding disc and blower assembly 12 comprise an upright dust housing 22 mounted at an angle with respect to the longitudinal axis of the base 10. The dust housing 22 is made of a heavy gauge metal and includes a back wall or plate 24, having an opening 26 provided therein, and a side wall 32. Mounted on the back wall 24 by screws 28 is a conventional electric motor 30 controlled by a switch 30a with its rotatable shaft 31 protruding through the opening 26 in the back plate 24. The side wall 32 is cast integral with the back wall and is made up of a forward portion 33 and a rear portion 34 that forms a blower housing and has an inner wall 34c that has a spiral or volute configuration. Neither the forward nor the rear side wall portions 33 and 34 are completely closed members and accordingly a downwardly opening passage 35 is formed in the side wall of the housing.

Mounted on the shaft 31 within the blower housing is an impeller 37 having a plurality of blades 38 fixed thereon. The impeller is secured by capscrews 39 (FIG. 2) to a hub 40 which is fastened or keyed to the shaft by a set screw 42. Mounted in the dust housing 22 by screws 44 is a baffle plate 45 which provides the front wall of the blower compartment and has a central circular opening 46 therein. Formed on the plate 45 are a plurality of guide vanes 47 and surrounding the guide vanes 47 is a forwardly projecting annular wall 48. As can best be seen in FIGURES 2 and 6, the back plate 24, the baffle plate 45, and the side wall portion 34 when assembled form a substantially closed chamber in the shape of a scroll opening downwardly into the base 10 through the passage 35 and has rotatably fastened therein the impeller 37. When the impeller 37 is rotated by the shaft 31 of the motor 30, air currents are created by the motion of the fan blades 38 causing air currents to be drawn rearwardly through the opening 46 and into the eye of the impeller.

Also keyed to shaft 31 and fixed to the hub 40 is a

backing disc 51. As can readily be seen in FIGURE 2, screws 50 pass through the backing disc 51 and are threaded into the hub 40. Thus screws 39 and 50 fasten the impeller, hub, and disc together in a unitary assembly. The screws 50 are flat-headed and rest in counter-sunk bores in the backing disc 51 so that their heads are flush with the surface of the disc. A disposable abrasive disc 52 is fixed to the surface of the backing disc 51 as by gluing. The backing disc 51 carrying the abrasive disc 52 is positioned on the shaft 31 closely adjacent the guide vanes 47 and within the annular wall 48. Adjacent the disc 52 is mounted a flat cover 53 which is removably attached to the baffle plate 45 by means of interengaging clips 54 and 55 which are fastened to the baffle plate 45 and the front cover 53, respectively, each clip 54 having a deflectable resilient leg with a curved projection 54a that fits into a groove 55a in the clip 55. Thus, the baffle plate 45, the annular wall 48, and the front cover 53 provide a second substantially closed chamber which enclose the guide vanes 47 and the rotatable discs 51 and 52 and functions as a dust-collecting compartment. The front cover 53 is provided with an opening 53a to permit a work piece to be brought into contact with the abrasive disc 52. Adjacent the opening 53a are an outwardly deflected flange 56 and an inwardly deflected flange 57. The flange 56 provides a cupping surface (FIG. 1) for intercepting dust particles that are hurled downwardly by the grinding disc and directing them into the area behind the backing disc 51 for subsequent removal by the air currents induced by the impeller 37. The inwardly deflected flange 57 fits into a recessed portion 48a of the annular wall 48 and lies in substantially the same plane as the abrasive disc 52, so that this portion of the front cover does not interfere with the swinging movement of the work piece into contact with the disc but still closes the front of the dust collecting compartment.

The base 10 is provided with an exhaust duct 58 which communicates with an exhaust spout 59 through a port 59a. A permeable dust bag 60 is removably fitted over the spout 59. A gasket 61 surrounds the outer surface of the port 59a and a bracket 62 is screwed to the base adjacent the gasket 61 and assists the clips 54 and 55 in firmly holding the front cover 53 against the wall 48 of the baffle plate 45.

In the operation of the blower assembly, the downwardly moving dust particles caused by a brake shoe S engaging the rotating abrasive disc 52 are guided inwardly by flange 56 and are caught up in the rapidly moving air currents induced by the rotating impeller 37. The dust particles entrained in the air currents are drawn behind the backing disc 51, through the opening 46 in the baffle 45, and expelled through the scroll shaped chamber into the exhaust duct 58, and out the exhaust spout 59 into the dust bag 60. The permeable material of the dust bag 60 restrains passage of the dust particles but permits the air to pass therethrough. When the disc and blower assembly is mounted on the base 10 the dust housing 22, adjacent the passage 35 snugly engages the gasket 61 and provides an air tight communication between the scroll shaped chamber and the discharge duct 58.

The work carriage 13 (FIG. 2) includes a lower slide 68 and an upper pivot member 72 which is pivotably connected to the lower slide 68 by means of a pivot post 74. The post 74 extends through a boss 72a in the pivot member 72 and through a boss 77 in the slide 68. Between the head 75 of the pivot post 74 and the boss 72a of the pivot member 72 is a fiber washer 78. A spring washer 79 is mounted on the pivot post 74 between a lock nut 76 and the bottom of the lower slide 68. By adjusting the nut 76, a desired amount of frictional resistance can be obtained between the lower bearing surface 73 of the pivot member 72 and the upper bearing surfaces of a pair of guide rails 64 and 65 that are secured to the base 10 by capscrews 66. The left guide rail 64 is adjustable transversely of the base by means of slots 64a to com-

pensate for wear of the lower slide. It will be noted in FIGURE 5 that the lower slide 68 has two upstanding longitudinally extending flanges 68a and 68b that fit alongside the inner face of the rails 64 and 65 in guided relation.

When the face of an article, such as a brake shoe, is ground on the present machine, it is moved across the face of the grinding disc by swinging the pivot member 72 about axis X—X through the center of post 74 to move the surface of the brake shoe along arc Y—Y (FIG. 1). Thus the radius of the surface that is eventually ground on the shoe will depend upon the distance that the axis X—X is spaced from the face of the disc. Accordingly if a segmental cylindrical surface of a predetermined radius is to be ground on a brake shoe, the slide 68 must be initially adjusted so that the pivot axis is spaced from the disc 52 a distance equal to said predetermined radius. In the present machine this initial adjusting movement of the lower slide 68 and the attached pivot member 72 in the track formed by the guide rails 64 and 65 is controlled by a fast or rough adjustment mechanism 80 and a fine adjustment mechanism 82.

The fast adjustment mechanism is comprised of a detent shaft 84 which is slidably mounted in a cylindrical bushing 85 having a keyway 87 and a pointer 86 secured in upright position, as by a press fit, on the outward end thereof. A pin 88 is diametrically mounted in shaft 84 and extends into the key-way 87 thus permitting only longitudinal relative movement between the bushing 85 and the shaft 84. The outer end of the bushing 85 and the shaft 84 extend outwardly from the lower slide 68, to the left in FIGURE 5, through a slot 90 in the base 10. A plastic ball 91 is fastened to the outer end of the detent shaft 84 and provides a grasping means for pulling on the shaft. The pointer 86 mounted on the outer end of the bushing 85 is adjacent a scale plate 92 mounted on the base 10 above the slot 90 which is calibrated to correspond to various brake drum diameters. The bushing 85 extends into a bore 94 in the lower slide 68 and is fastened against movement therein by a set screw 95. A spring 96 encircles the shaft 84 and abuts the inner end of bushing 85 and the outer end of a detent 97 which is integral with the detent shaft 84. The inner end of the detent 97 is chamfered to form a wedge-shaped leading edge which is adapted to be selectively positioned in one of a series of vertical generally V-shaped notches 99a in a horizontal index bar 99 which is positioned in a chamber 98 in the base. One end of the bar 99 is disposed in a smooth bore 100 (FIG. 1) in the base 10 while the other end is supported by a screw 101 (FIG. 2) associated with the fine adjustment mechanism 82 which will be described presently. A spring 102 (FIG. 1) that encircles the left end of the index bar 99 abuts the base at one end and, at the other end, abuts a washer 102a that in turn abuts a spring clip 102b which is locked in a groove in the bar 99. With this arrangement, the spring 102 continually urges the bar 99 to the right and presses threads of a tapped hole 99b in the end of the bar against the mating threads of the screw 101. The bar 99 is therefore locked in position in the base at the time the rough adjusting mechanism 80 is operated, and the slide is moved relative to the bar 99 during this initial adjustment.

When the plastic ball 91 (FIG. 5) is pulled away from the base, the detent is withdrawn from the groove 99a in the index bar 99, and the slide 68 can then be moved relative to the base to shift the axis X—X toward or away from the grinding disc 52. As previously mentioned, the scale 92 (FIG. 1) is calibrated in increments indicating brake drum diameters. Such calibration has been chosen since each brake shoe is ground to operate with a brake drum having a predetermined internal diameter. Actually the distance between adjacent numerals, for example "10" and "11," on scale 92 is so chosen that, when the pointer moves from "10" to "11," the pivot axis X—X has been moved to a point one-half

inch further away from the grinding disc than its former position. This indicates then that the radius of the arc on which the brake shoe is increased one-half inch to accommodate an eleven inch brake drum when the previous setting was for a ten inch drum.

After the above-mentioned rough adjustment is made by manipulating the plastic ball 91, the fine adjustment mechanism 82 is operated to more accurately position the axis X—X. The fine adjustment mechanism 82 is best shown in FIGURE 2, and comprises the outer end of the bar 99, or the end farthest from the grinding disc, which contains an external slot 106 and the centrally left hand threaded bore 99b. The adjustment screw 101 is threadably engaged in the bore 99b and extends outwardly along the longitudinal axis thereof. Circumscribing the outer end of the index bar is a bushing 108. The bushing 108 is mounted in a cylindrical bore 105 that is aligned with the smooth bore 100 at the other end of the base and is provided with a circumferential groove 109. A set screw 110 extends through a threaded hole in the base 10 and engages the circumferential groove 109 of the bushing 108 to prevent movement of the bushing in the central bore 105 of the base 10. A set screw 111 is threaded radially through a hole in the bushing 108 and engages the slot 106 of the index bar 99 and prevents relative rotational movement between the bushing and the bar. A pin 113 is pressed into a hole 114 in the outer end surface 115 of the base 10 to act as a stop in a manner to be described presently. Mounted adjacent the outer end surface 115 of the base 10 is a dial wheel 116 whose upper peripheral surface is adjacent an index mark 115a on the base. A radial set screw 117 threaded through dial wheel 116 engages a circumferential groove 118 in the outer end of the adjustment screw 101 to lock the screw to the dial wheel 116 so that rotation of the wheel causes rotation of the screw. A stop screw 119 is threaded into a bore in the dial wheel 116 which is parallel to the longitudinal axis of the dial wheel and the index bar. The screw 119 is at the same distance from the longitudinal axis of the adjusting screw 101 as in the pin 113 in the base 10 and when the screw 119 is in its innermost position, it engages the stop pin 113 to stop the wheel. The outer circumference of the dial wheel is marked with one hundred marks or indentations 120, the distance between marks being calibrated to correspond to one one-thousandth ($\frac{1}{1000}$) of an inch of brake drum diameter. However, movement of the dial wheel a distance equal to the spacing between two adjacent marks will cause the axis X—X to move only one two-thousandth ($\frac{1}{2000}$) of an inch toward or away from the grinding disc.

Accordingly, the fine adjustment mechanism 82 is operated by turning the dial wheel 116 which turns the fine adjustment screw 101. Since the screw 101 cannot move axially, the index bar 99 moves a predetermined distance. It should be noted, that by virtue of the spring 102 pressing against the index bar 99 along its longitudinal axis and away from the grinding disc 52 the threads of the index bar always bear against one side of the threads of the fine adjustment screw 101 and thereby eliminate backlash in the threads assuring accurate adjustment.

The work holder 14 is slidably mounted in the pivot member 72 so that the brake shoe can be moved progressively into engagement with the grinding disc while being pivoted about axis X—X. The work holder comprises a slide 125 which is slidably retained in a milled track 126 of the pivot assembly 72 by two flat retainer plates 127. Since the slide 125 is a few fractions of an inch thinner than the track 126 in which it moves, two springs 128 (one only being shown) are provided in shallow holes 130 drilled in the upper surface of the pivot member 72. Each spring 128 biases a pressure pad 129 upwardly into engagement with the undersurface of the slide 125 to maintain a tight assembly of the slide in the ways defined by the two retainer plates 127. Mounted on the slide 125 is a plate 125a containing a scale, which is calibrated

to indicate various brake diameter sizes. The rear edge 127a of the left hand retainer plate as shown in FIGURE 1, provides an indicator with which to align the various graduations of the scale on the name plate 125a.

Movement of the feed slide 125 is carried out by either a fine feed mechanism or a fast feed mechanism.

The fine feed mechanism comprises a feed screw anchor 132 which is attached to one end, to the right as viewed in FIGURE 2, of the slide 125 and is held securely by screws 133. The feed screw anchor 132 has a central bore 134 in which is rotatably journaled a feed screw 135. A feed handle 137 is mounted on the outer end of the feed screw 135 and is fixed against movement relative thereto by a set screw 138 which engages the base of a circumferential groove 136 in the screw. The feed screw 135 is threaded along the major portion of its length and is journaled at its left end, as viewed in FIGURE 2, in a support member 139 which is fixed to the under surface of the slide 125 by two screws 140 (FIG. 3).

Rotation of the feed handle 137 causes longitudinal movement of the slide 125 in small increments due to the fact that the threads of a half nut 141 on the inner end of a locking mechanism 142 are normally engaged with the threads of the feed screw 135. Since the locking mechanism is anchored in the pivot member 72, rotation of the screw causes longitudinal movement of the upper slide 125.

The locking mechanism includes a shaft 145 which has the half nut 141 formed on its inner end and a plastic ball 146 threaded onto its outer end. The shaft 145 is slidably supported in a bushing 152 that is locked in a cylindrical opening in the pivot member 72 by a set screw 153.

A spring 149 encircles the half nut shaft 145 and abuts against the bushing 152 and against an enlarged portion of shaft 145 to urge the half nut into engagement with the threads of the feed screw 135. The shaft 145 has a pin 150 pressed diametrically therethrough and extending into engagement with a longitudinal key-way or slot 151 in the bushing 152 to maintain the half nut in proper alignment for engaging the threads of the feed screw 135. However, when the half nut 141 is withdrawn or pulled to the left, as viewed in FIGURE 5, the pin 150 travels beyond the end of the bushing 142 and can be rotated out of alignment with the key-way 151 to keep the half nut disengaged, as is sometimes desired.

Accordingly, a fast adjustment of the upper slide 125 on the pivot member 72 to position one of the calibrations on the slide opposite the index edge 127a may be made by grasping the plastic ball 146 and drawing the shaft 145 outwardly to disengage the half nut from the feed shaft 135. The slide 125 may then be quickly moved relative to the grinding disc. For finer feeding, the half nut is allowed to remain engaged with the threads of the feed screw 135, and the feed handle 137 is rotated to actuate the slide.

The shoe clamp assembly 18 comprises a rigid clamp base 155 which has a table 156 (FIG. 3) and a flange 157 that overlies the central portion of the table to define an open-ended slot 158. The base is fixed to the inner end of slide 125 by pins 154 and by the two screws 140. The flange 157 has a vertical central bore 159 and an intersecting horizontal bore 161. A connecting link 162 is fastened in the vertical bore 159 by a pin 160 passing through the link and engaging the bore 161. The rigid post 162 passes through a similar vertical bore 163 in a clamp member 164 and is connected at its upper end to a cam 165 by a pin 166. A spring 167 encircles the post 162 and abuts the flange 157 and the clamp member 164 to keep the clamp member in an open or raised position when the cam 165 is in an upright position. The vertical bore 163 has a large diameter portion 168 which receives a force-applying spring 169 that encircles the post 162. Mounted between the spring 169 and the cam 165 is a washer 170 which transmits the force exerted by the cam

to the spring. A handle 171 is fixed to the cam 165 for pivoting the cam 165 about the pin 166 and compressing the spring 169. Shown in FIGURE 5 are two guide pins 173 that are pressed into the clamp member 164 and are slidably disposed in close fitting holes 174 in the shoulder 157. The guide pins 173 maintain the clamp member 164 in properly aligned relation to the clamp base 155. Threaded through clamp member 164 are two upper clamp screws 175 which may be locked into an adjusted position by nuts 176. Two lower clamp screws 177 are threaded through the table 156 and locked therein by nuts 178, each screw 177 being in alignment with one of the screws 175.

Both table 156 and the clamp member 164 have two spaced projections 180 that have positioning faces formed on an arc that corresponds to the arc of the inner surface of a brake shoe so that when a shoe is in clamped position as shown in FIG. 4, the faces abut the inner surface. A horizontal bore 182 is provided in the clamp base 155 transverse to the longitudinal axis of the upper slide 125 for receiving part of an accessory anchor locator for use with the grinder. Similarly a pair of holes 184 are drilled in the base 155 and intersect the bore 182 for use with the accessory.

In the operation of the shoe clamp assembly, the handle 171 is raised, disengaging the cam 165 from the washer 170 and relieving the pressure on the force-applying spring 169. This action permits the spring 167 to raise the clamp member 164 and the clamp screws 175 attached thereto. The web W of a brake shoe is then inserted in the slot 158 between the clamp screws 175 and 177 with the machined ends of the projections 180 abutting the inner surface of the brake shoe. The handle 171 is then lowered, causing the cam 165 to compress the washer 170 and the spring 169 and lower the upper clamp screws 175 into engagement with the brake shoe web W to clamp the web securely between the upper clamp screws 175 and the lower clamp screws 177. Thus, with the projections 180 and the clamp screws 175 and 177 engaging the brake shoe, the shoe is firmly held in the clamp assembly 18.

In the operation of the grinding device, a brake drum should be measured with an instrument of the type described in the patent to Barrett No. 2,769,241 to determine the diameter to which the brake shoes must be ground. The lower slide 68 is then quickly positioned by using the fast adjustment mechanism 80 by pulling out the plastic ball 91 to release the detent 97 and setting the pointer 86 to the appropriate diameter setting on the scale diameter plate 92. For example, if the brake drum has an internal diameter of 11.030", the pointer 86 is brought to the "11" mark on plate 92 as seen in FIGURE 1. The ball 91 is then released so that the detent 97 firmly engages a notch 99a of the index bar 99.

The fine adjustment mechanism 82 is then used by turning the dial wheel 116 counterclockwise (FIG. 1) to compensate for the amount of oversize that the actual diameter of the brake drum is relative to the setting on the scale diameter plate 92. Thus if the drum diameter is 11.030" and the scale 92 has been set at the "11" mark, the wheel 116 in rotated counterclockwise to position the "30" mark opposite the index mark 115A. The threads on the screw 101 and in the index bar 99 are such that counterclockwise rotation of wheel 116 causes the slide 68 to move to the left (FIG. 2).

The upper feed slide 125 is quickly set, by using the fast feed mechanism, at the same diameter measurement on the plate 125a as was set on the scale diameter plate 92 by pulling out the plastic ball 146 which disengages the half nut 141 from the screw threads on the upper feed screw 135 and then sliding the feed slide until the proper diameter mark is aligned with the rear edge 127a of the left retainer plate 127. As was previously described, the brake shoe is placed in the shoe clamp assembly 18 and after proper alignment is securely clamped.

The fine feed mechanism is then used by rotating the

feed handle 137 until the brake shoe lining is advanced to a position just touching the abrasive disc 52 through the hold 53a in the front cover 53. The electric motor 30 is started and the brake shoe lining is oscillated slowly past the grinder disc 52 by pivoting the work carriage 13 about the pivot post 74. While continuously moving the brake shoe lining to the left and right, the feed handle 137 is slowly rotated clockwise advancing the lining against the grinding disc 52 until a completely ground surface is obtained thereon. The shoe is then backed off and removed and the procedure repeated for another shoe.

The ends of the brake shoe lining may be chamfered by positioning the end of the lining so that it touches the abrasive disc 52. The half-nut 141 is then locked out by pulling the plastic ball 146 out and turning slightly to engage the pin 150 against the outer surface of the bushing 152. The pivot member 72 is then pivoted to the desired angle and the upper slide 125 moved toward the disc 52 until the proper chamfer is obtained.

It should be noted, that the pivot post 74 is reamed out as at 186, shown in dotted lines in FIGURE 2. The reamed hole 186 of the pivot post is accessible from above by pulling the plastic ball 146 to release the upper feed screw 135 and moving the slide 125 outwardly or to the right, as viewed in FIGURE 2, as far as possible. The concentric reamed hole 186 may then be used as a starting point from which calibrations of the device can be made during manufacture.

The advantageous of the improved grinding device should be readily apparent from the previous description. Briefly, the angular relationship between the grinding disc 52 and the lower slide 68 effectively distributes wear at different points on the disc for each size brake shoe lining and consequently increases the life of the disc. The ease of exposure of the concentric ream hole in the pivot post 74 provides for effective calibration during manufacture. The combination of the index bar 99 with the notches 99a thereon, the detent shaft 84 with a detent 97 to engage the notches, and the rotationally adjustable guide bushings 85 and 108 around the detent shaft and the index bar 99, respectively, provide precise perpendicular relationship between pitch lines of the notches and the axis of the detent shaft. The parallel adjustable retaining bars 64 and 65 make smooth travel of the lower adjustment slide 68 possible and the adjustability of the left hand retainer plate 64 provides an efficient way of compensating for wear on the lower adjustment slide. Another advantage lies in the improved shoe clamp assembly 18 which provides a simple apparatus for rapid removal and insertion of brake shoe linings while providing an effective clamping action. Still another advantage is the improved blower assembly 12 which effectively removes any dust particles caused by the rotating abrasive disc 52 engaging the brake shoe lining and deposits the dust in a removable bag. Still further advantages are presented by the interrelation of the index bar 99, the detent shaft 84, and the dial wheel 116 which permit a first quick adjustment and a second fine adjustment. Also the interrelation between the upper feed screw 135 and the half nut shaft 145 provides for an effective fast feed and a controlled slow feed. These adjustment and feeding advantages become even more important since they require relatively few hand motions and permit an operator to more rapidly and accurately align and grind the brake shoe liners.

Inasmuch as the device has been described for use with a brake shoe lining, it should be noted that it is equally for grinding other objects, such as, pieces of plastic and that the novel clamp assembly could be used on other machines requiring a quick clamping holder for a work piece.

While a preferred apparatus for carrying out the invention has been described, it will be understood that it is capable of modification and variation while still applying the principles of the invention. It is to be understood, therefore, that the scope of the invention should be limited only by the scope and proper interpretation of the claims appended thereto.

Having thus described the invention, that which is believed to be new and for which protection by Letters Patent is desired is:

1. A grinding device comprising a base, grinding means mounted on said base, said grinding means having a flat grinding surface, means for rotating said grinding means, carriage means slidably mounted on said base for linear movement toward and away from said grinding means at an acute angle with respect to said grinding surface, said carriage means including a lower slide and a pivot member, said pivot member being pivotably mounted on said lower slide, work holder means slidably mounted on said pivot member for additional linear movement toward and away from said grinding means, said work holder means including a clamp assembly, means for adjusting said carriage means along its path of movement including a fast adjustment mechanism having detent means mounted on said lower slide for reciprocal movement transversely thereof and a fine adjustment mechanism, said fine adjustment mechanism including an index bar mounted in said base for longitudinal movement with respect thereto, said detent means being adapted for engaging said index bar so that said carriage means is locked against movement relative to said bar and said detent means being further adapted for disengaging said index bar permitting relative movement between said carriage means and said bar.

2. The grinding device as defined by claim 1 wherein said index bar has a series of longitudinally spaced notches thereon, said detent means including a bushing adjustably mounted in said lower slide, a detent shaft reciprocally mounted within said bushing and having an inner and an outer end, a detent on said detent shaft inner end, and means fastened to said detent shaft outer end for manually reciprocating said detent shaft in said bushing for engaging and disengaging said detent with said index bar.

3. The grinding device as defined in claim 1, said fine adjustment mechanism further including means on one end of said index bar to prevent rotation thereof, a threaded bore in the end of said bar, an adjusting screw threaded in said bore, a bushing mounted in said base circumscribing the end of said index bar and said adjusting screw, a dial fastened to said adjusting screw and adapted to rotate said screw whereby rotational movement of said screw causes said index bar to move longitudinally with respect to said base.

4. The grinding device as defined by claim 1 including a blower assembly for removing dust particles caused by the engagement of the grinding means by said work piece.

5. The grinding device as defined by claim 1 wherein said work piece clamp assembly comprises a clamp base having a table and a flange providing a slot therebetween, said table having lower clamp screw means mounted thereon, a post fixed at one end to said flange, an upper clamp member having a vertical bore therethrough, said post mounted for reciprocable movement in said bore with respect to said upper clamp member, compressible means circumscribing said post and engaging said upper clamp member within said bore, cam means pivotably mounted to said post and engageable with said compressible means, means for pivoting said cam means whereby movement of said cam pivoting means engages said cam means against said compressible means and lowers said upper clamp member, upper clamp screw means mounted on said upper clamp member, said upper clamp screw means adapted to move toward said lower clamp screw means when said upper clamp member is lowered whereby a work piece positioned between said clamp screw means is held securely thereby.

6. The grinding device defined by claim 2 including means engaging one end of said index bar to prevent rotation thereof, a threaded bore in the end of said bar, an adjusting screw threaded into said bore, a bushing mounted in said base and circumscribing the end of said

index bar and said adjusting screw, a dial fastened to said adjusting screw and adapted to rotate said screw whereby rotational adjustment of said screw causes the index bar to move longitudinally with respect to said base, and wherein the longitudinal axes of the detent shaft and the index bar are perpendicular to each other.

7. A blower assembly for use in a device of the type having dust producing grinder and means for rotating said grinder mounted on a base comprising a back wall, a cover plate having an opening, and a substantially circular side wall having forward and rear portions which terminate to form a discharge passage, a baffle plate connected to said rear portion of said side wall, said back wall, rear side wall portion and baffle plate forming a housing, and said baffle plate, forward side wall portion and cover plate forming a dust collecting compartment, said baffle having an opening communicating with said housing and said compartment, an impeller mounted on said grinder rotating means, and a plurality of vanes fixed to said baffle plate whereby rotation of said impeller induces a flow of air through said opening in said cover plate, around said guide vanes into said housing and discharged through said passage.

8. The blower assembly defined by claim 7 including a hub, said grinder including a backing disc having an abrasive disc mounted thereon, said backing disc, impeller and hub being removably interconnected, said base having an exhaust duct therein adjacent said discharge passage, a spout communicating with said duct, and a permeable bag connected to said spout whereby said flow of air enters said discharge duct and passes out through said bag.

9. A grinding device comprising a base, a grinding disc mounted upright on said base and with the side of the disc defining a flat grinding surface, means for rotating said disc, carriage means slidably mounted on said base including a lower slide movable on the base at an acute angle with respect to said grinding surface, and including a pivot member mounted on said lower slide, work holder means slidably mounted on said pivot member, a clamp assembly mounted on said work holder means for successively engaging a plurality of work pieces wherein the angular relation between the grinding disc and the longitudinal axis of the base provides for engagement of the disc by different sized work pieces at different points along the radius of the disc for distributing wear over the entire disc.

10. A grinding device comprising a base, grinding means mounted on said base, means for rotating said grinding means, carriage means slidably mounted on said base for linear movement toward and away from said grinding means, said carriage means including a lower slide and a pivot member, said pivot member being pivotably mounted on said lower slide, work holder means slidably mounted on said pivot member for additional linear movement toward and away from said grinding means, said work holder means including a clamp assembly, means for adjusting said carriage means along its path of movement including a fast adjustment mechanism having detent means mounted on said lower slide for reciprocal movement transversely thereof and a fine adjustment mechanism, said fine adjustment mechanism including an index bar mounted in said base for longitudinal movement with respect thereto, said detent means being adapted for engaging said index bar so that said carriage means is locked against movement relative to said bar and said detent means being further adapted for disengaging said index bar permitting relative movement between said carriage means and said bar, a blower assembly for removing dust particles caused by the engagement of the grinding means by said workpiece, said blower assembly comprising a back wall, a cover plate having an opening, and a substantially circular side wall having forward and rear portions which terminate to form a discharge passage, a baffle plate connected to said rear portion of said side wall, said back wall, rear side wall portion and baffle plate form-

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ing a blower housing, and said baffle plate, forward side wall portion and cover plate forming a dust collecting compartment, said baffle plate having an opening communicating with said housing and said compartment, an impeller mounted on said grinder rotating means for rotation therewith, and a plurality of vanes fixed to said baffle plate whereby upon rotation of said impeller a flow of air is induced through said opening in said cover plate, guided by said vanes through said compartment and said housing and discharged through said passage formed by said terminating side wall.

11. In a brake shoe lining grinding device, a grinding member and a pivot member, one of said members relatively adjustable along a line towards and away from the other member, said grinding member having a flat planar grinding surface making an acute angle with said line, said pivot member having a pivot axis, means mounted on said pivot member to hold a brake shoe at a selected distance from said axis with the lining of the brake shoe in contact with the grinding surface at a point on the grinding surface determined by the spacing between said pivot axis and said grinding surface, said pivot member swingable about said pivot axis to sweep the lining on the brake shoe in an arc back and forth in abrading contact with the grinding surface at said point on the grinding surface.

12. In a brake shoe lining grinding device, a grinding disc having a flat planar grinding surface, means to rotate said grinding disc, a pivot member adjustable along a

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line making an acute angle with said grinding surface toward and away from said grinding disc, said pivot member having a pivot axis parallel to said grinding surface, a slide mounted on said pivot member, a clamp mounted on said slide to hold a brake shoe at a selected distance from said pivot axis with the lining of the brake shoe in contact with the grinding surface at a point on the grinding surface determined by the spacing between said pivot axis and said grinding surface, said pivot member swingable about said pivot axis to sweep the lining on the brake shoe in an arc back and forth in abrading contact with the grinding surface at said point on the grinding surface.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,394,500

July 30, 1968

Melvin H. Lill et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 55, "duct" should read -- dust --; line 40, "in" should read -- is --. Column 8, line 29, "advantageous" should read -- advantages --; line 60, "important" should read -- apparent --; line 65, after "equally" insert -- useful --.

Signed and sealed this 17th day of March 1970.

(SEAL)

Attest:

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Attesting Officer

WILLIAM E. SCHUYLER, JR.

Commissioner of Patents