Aug. 3, 1943. H. B. BARRETT 2,325,826

GRINDING MACHINE

Filed April 3, 1941 5 Sheets-Sheet 1

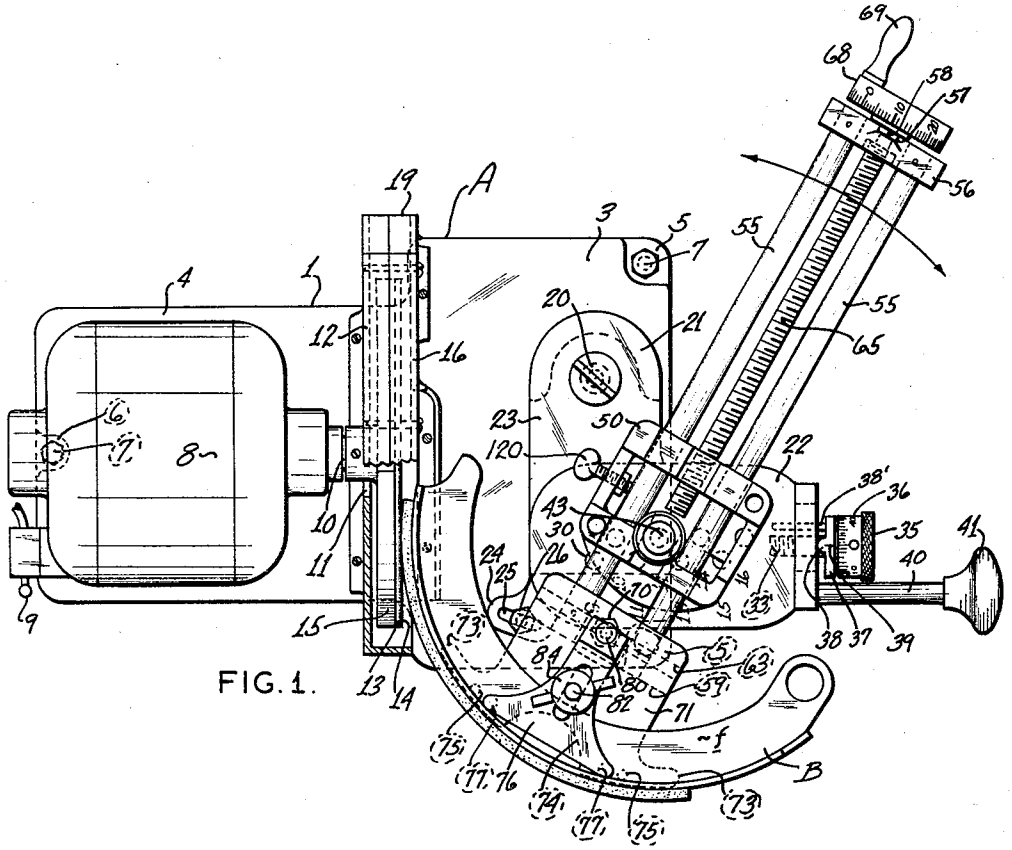


FIG. 1.

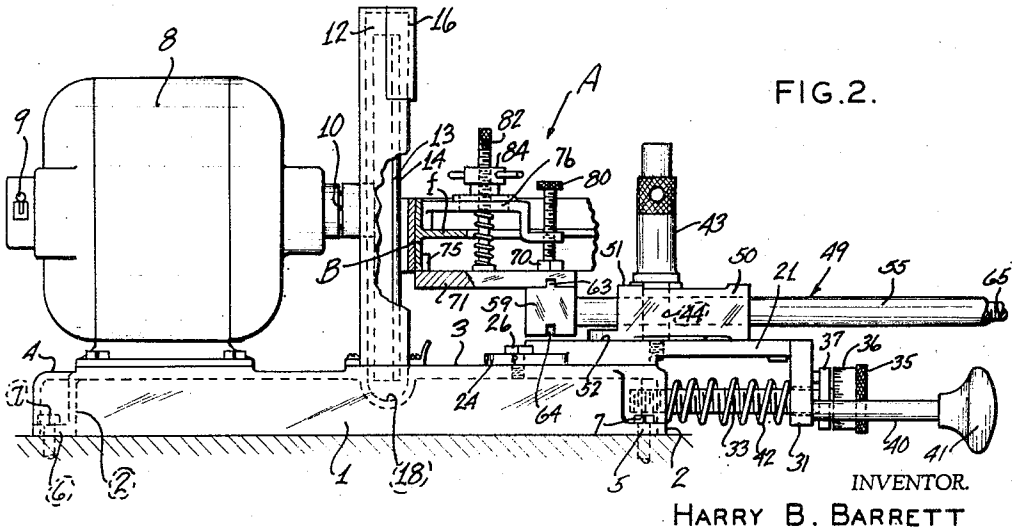


FIG. 2.

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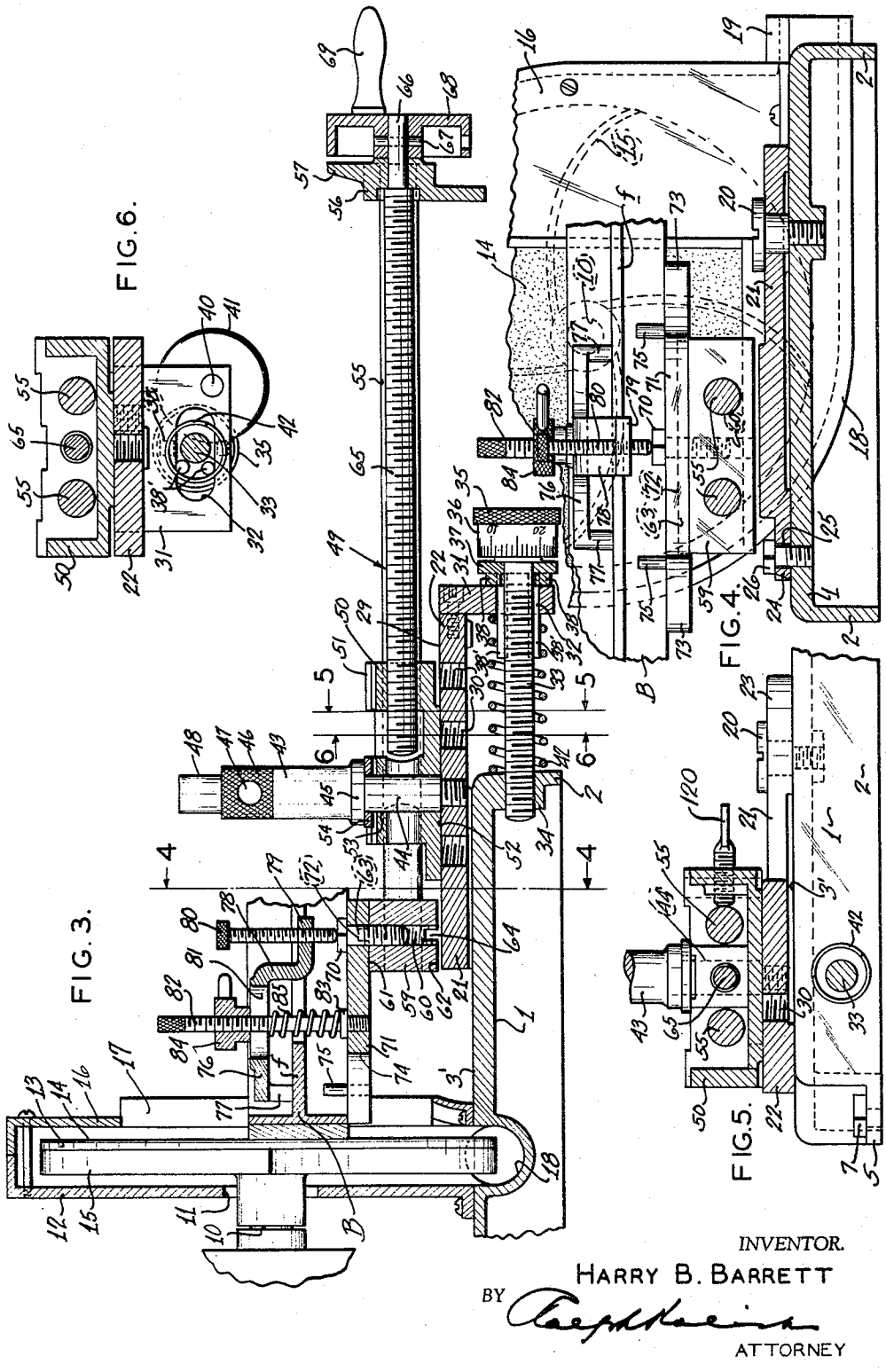


FIG. 3.

FIG. 6.

FIG. 5.

FIG. 4.

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GRINDING MACHINE

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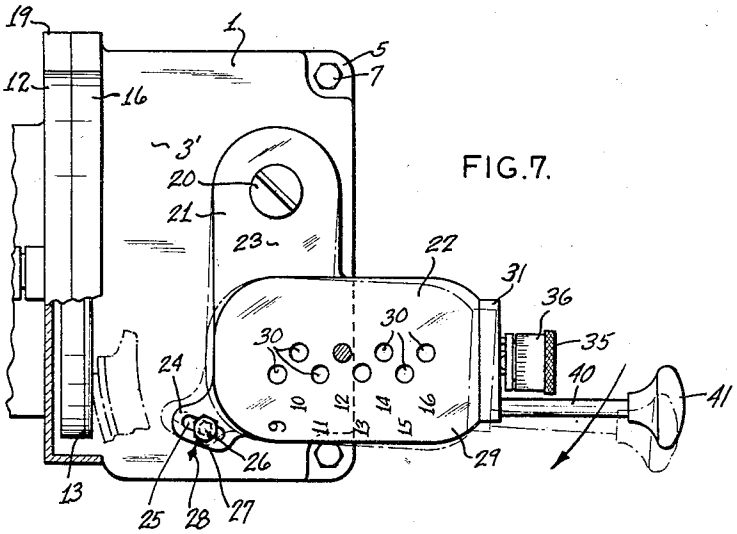


FIG.7.

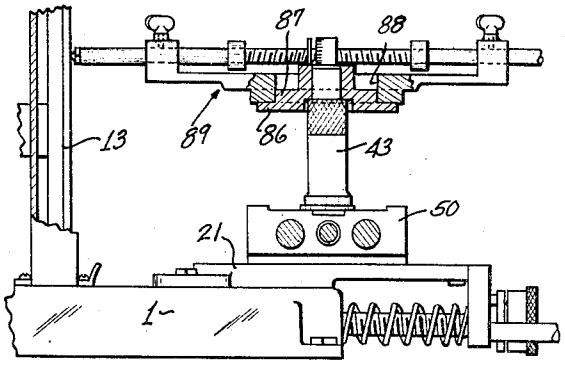


FIG. 9.

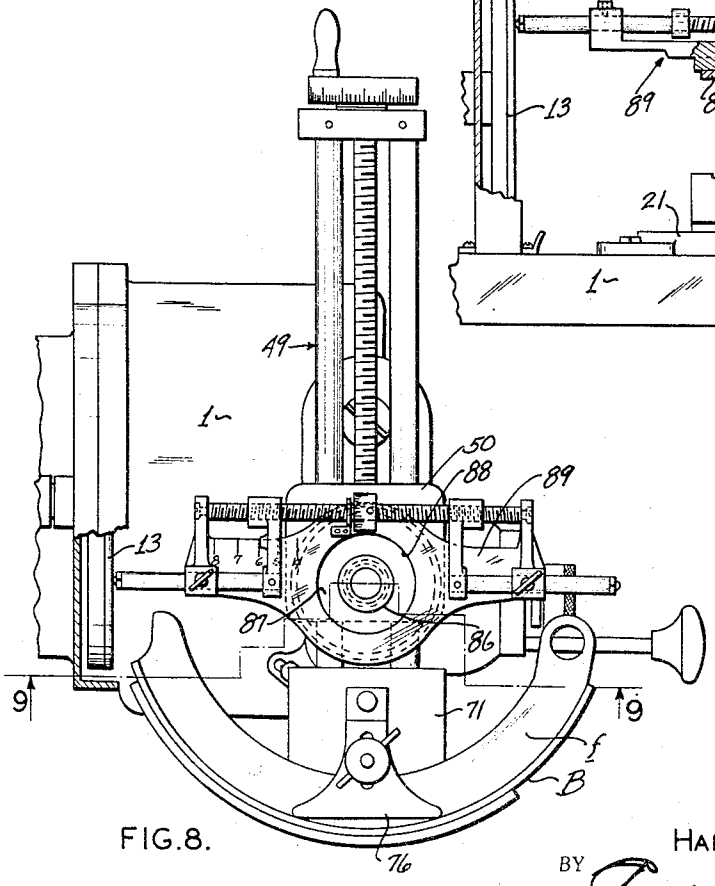


FIG.8.

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GRINDING MACHINE

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FIG. 10.

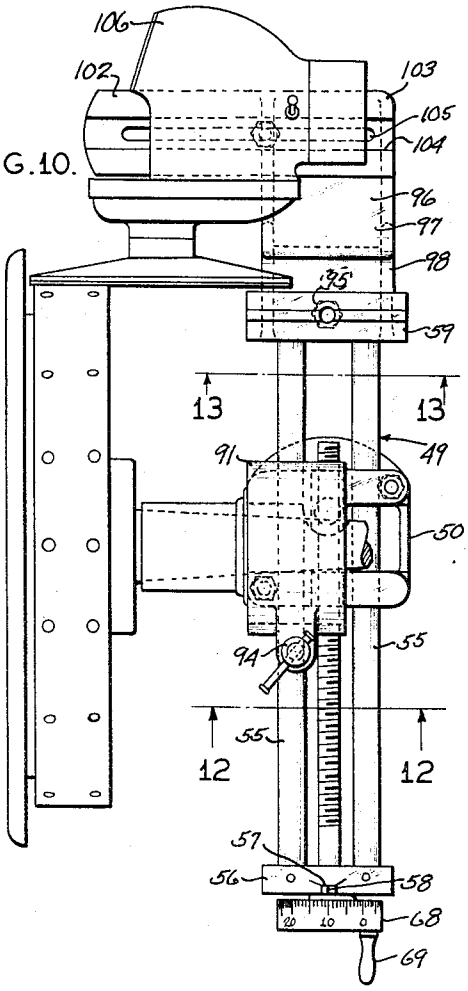


FIG. 11.

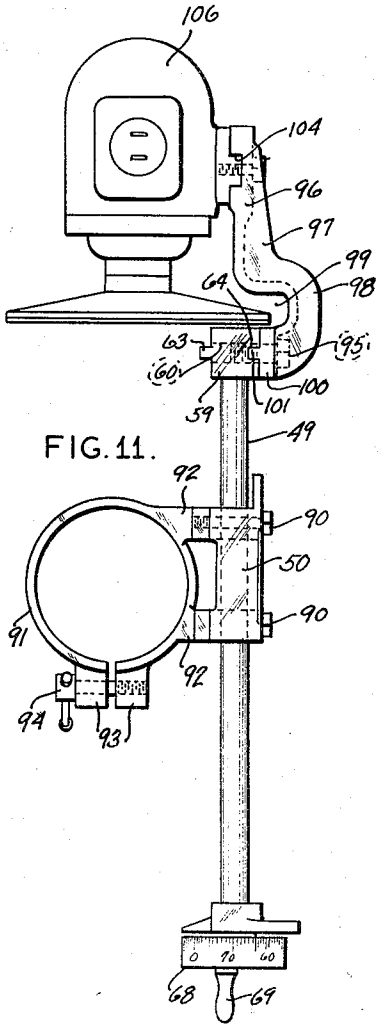


FIG. 12.

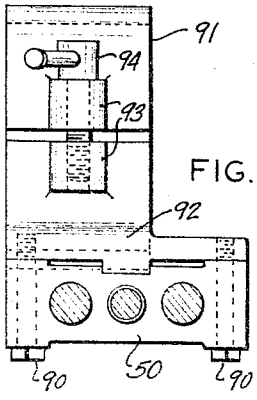
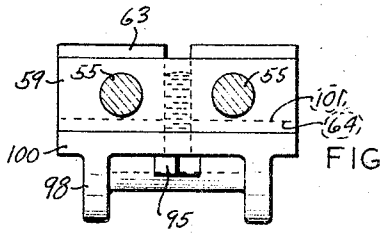


FIG. 13.



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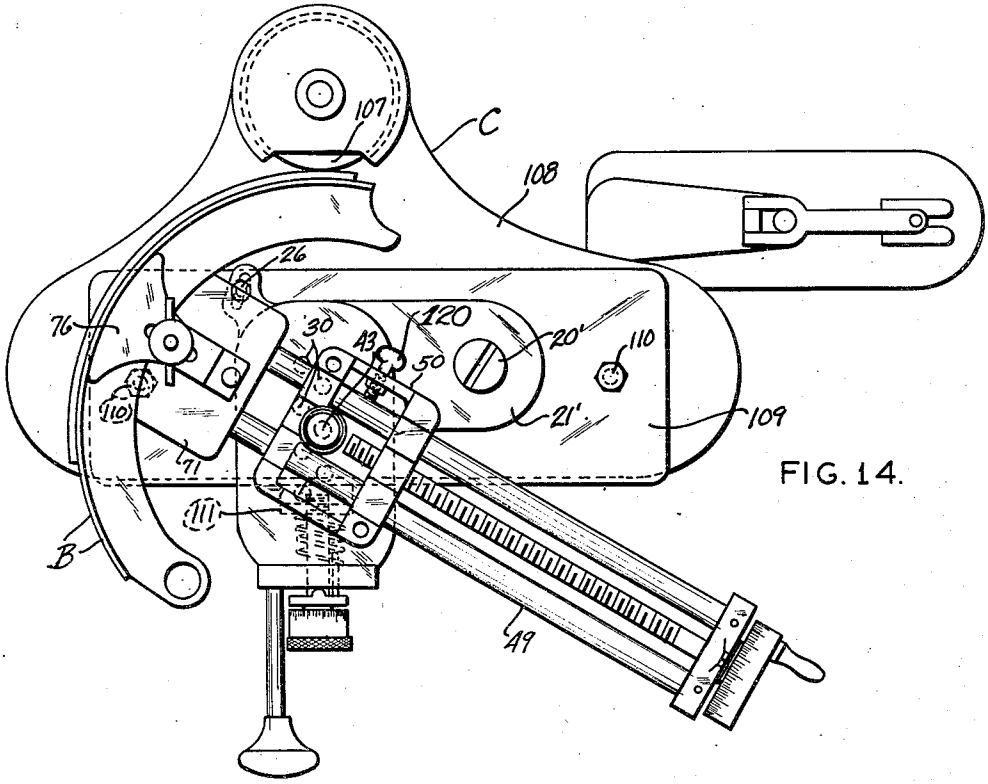


FIG. 14.

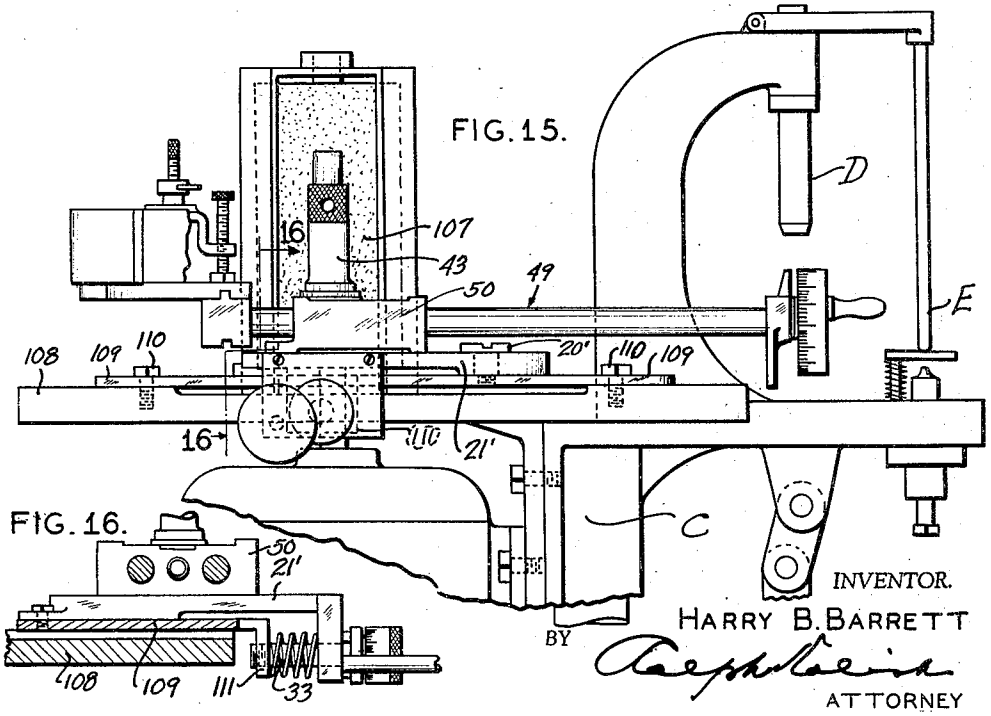


FIG. 15.

FIG. 16.

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Patented Aug. 3, 1943 2,325,826

UNITED STATES PATENT OFFICE

2,325,826

GRINDING MACHINE

Harry B. Barrett, St. Louis, Mo.

Application April 3, 1941, Serial No. 386,668

12 Claims. (Cl. 51—124)

This invention relates generally to abrading or grinding machines or apparatus and, more particularly, to certain new and useful improvements in abrading or grinding machines especially adapted for grinding arcuate surfaces, such, for instance, as applied automotive brake linings and the like.

My invention has for its primary object the provision of a grinding machine which is uniquely capable of producing to a selected or predetermined diameter a precise, accurate, smooth, and even surface upon the wearing face of a lined brake-shoe either when the brake-shoe is separate or detached from the brake-assembly or when the brake-shoe is fully assembled in its operating position, so as to obtain substantially perfect braking engagement between the brake-shoe and its companion drum.

My invention has for a further object the provision of a machine of the type and for the purposes stated which is simply and conveniently manipulable for the performance of accurate work even in the hands of relatively unskilled mechanics, which is rugged, durable, and economical in construction, which is extremely adaptable to a wide range of diametral sizes and is hence substantially universal in character, which, in association with a few simple readily applied accessories, is readily capable of performing all of the essential grinding operations required in the relining of automotive brakes, and which is highly efficient in the performance of its stated functions.

And with the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawings (five sheets)—

Figure 1 is a top plan view of an abrading or grinding machine constructed in accordance with and embodying my present invention;

Figure 2 is a side elevational view of the machine;

Figure 3 is an enlarged longitudinal sectional view of the machine;

Figures 4, 5, and 6 are detail transverse sectional views of the machine taken along the lines 4—4, 5—5, and 6—6, respectively, Figure 3;

Figure 7 is a fragmentary top plan view of the machine, illustrating in detail several selected positions of the swingable carriage-plate;

Figure 8 is a fragmentary top plan view of the machine, illustrating the operation of the accessory or associated calipers;

Figure 9 is a vertical sectional view of the machine taken approximately along the line 9—9, Figure 8;

Figures 10 and 11 illustrate in front and side elevation, respectively, a jig-frame fitted with suitable accessory or associated elements in the provision of a portable concentric abrading tool adapted for grinding certain types of brake-shoes in situ;

Figures 12 and 13 are transverse sectional views taken approximately along the lines 12—12 and 13—13, respectively, Figure 10;

Figure 14 illustrates in top plan view a combination tool comprising an adapter plate for accommodating the carriage plate and jig-frame of the present machine;

Figure 15 is a fragmentary side elevational view of the combination tool or machine of Figure 14; and

Figure 16 is a detail vertical sectional view taken approximately along the line 16—16, Figure 15.

Referring now in more detail and by reference characters to the drawings, which illustrate a preferred embodiment of my invention, the primary grinding machine, generally designated A, comprises a preferably cast-iron base-plate 1 having a depending marginal flange 2, the plate 1 being of T-shape in horizontal contour and preferably integrally including a forward portion 3 and a slightly reduced rear portion 4, and the former portion centrally and at its front corners being provided with apertured ears 5, 6, for receiving suitable attachment bolts or lag screws 7 by which the entire machine may be secured upon a work-table, bench, or other support.

Bolted or otherwise suitably secured to and upon the rear base-portion 4, is a conventional preferably high-speed electric motor 8 controlled by a manually actuable switch 9 and connected by suitable conduit means (not shown) to any conventional source of electric current, the motor shaft 10 projecting forwardly through a registering aperture 11 in a shallow cast-iron wheel guard 12, in turn, upstanding from, and rigidly bolted or otherwise suitably secured to and along the rear transverse margin of, the forward base-portion 3, as best seen in Figure 2. Keyed upon the shaft 10 for rotation within the confines of the guard 12, is a grinder wheel 13 renewably provided upon its front face with a suitable abrasive surface or disk 14 and upon its rear face with preferably integral radially curved impeller flanges 15, a supplemental or front guard closure 16 having a suitably flanged opening 17 for permitting convenient access to the abrasive surface or disk 14 being removably or detachably fastened upon the guard 12, as shown.

Registrably beneath the wheel-guard 12, the base 1 is provided transversely with a somewhat semi-circular depression or trough 18 which opens upon a side face of the base 1 in the provision of a tubular discharge pipe 19 for connection to a suitable catch-bag or other dust disposal means (not shown).

Attached as by means of a removable pivot-

screw 20 for swingable movement to and upon the base-portion 3, is an L-shaped carriage 21, which includes a forwardly or longitudinally projecting leg 22 and a transversely extending leg 23. On its under face, the lateral leg 23 is accurately machined to be truly perpendicular to the axis of the pivot-screw 20 for riding smoothly over the machined upper face 3' of the base 1 and along its rear margin is provided with a rearwardly projecting ear 24 having an arcuate slot 25 substantially concentric with the axis of the pivot-screw 20 for accommodating a clamping bolt 26 threaded into the base 1. On its lateral face, the ear 24 is provided with a reference line or graduation 27 for coincidence with an index-mark 28 suitably inscribed upon the base 1, as best shown in Figure 7.

The forwardly or longitudinally extending carriage leg 22 is machined upon its upper face in the provision of a reference surface 29 accurately parallel to the plane of the machined base-surface 3' and is formed with a plurality of vertically disposed openings 30, the centers of which are accurately located at predetermined distances forwardly from the grinding plane or face of the grinder wheel 13 and are each suitably marked with appropriate designating numerals. As shown, in the present instance, the openings or apertures 30 are located respectively at distances of five, five and one-half, six, six and one-half, seven, seven and one-half, and eight inches from such grinding surface and are, accordingly, designated by the numerals "10," "11," "12," "13," "14," "15," and "16" to indicate respective brake shoe diameters, for the accommodation of which the present machine may be accordingly adjusted, as will presently be fully described.

Bolted or otherwise suitably secured to and upon the forward margin of, and projecting vertically downwardly from, the carriage-leg 22, is a flange or plate 31 apertured, as at 32, for loosely embracing the shank of a horizontally disposed carriage-adjustment screw 33 threaded at its rear end in a suitably drilled and tapped boss 34 registrably located in the forward transverse portion of the base-flange 2.

At its forward end, the screw 33 is provided with a knurled knob 35 having a cylindrical skirt 36, suitably inscribed upon the peripheral face of which is an annular series of circumferentially spaced graduations forming a scale extending from "0" to "99."

Rotatably mounted upon the screw 33 intermediate the knob 35 and the depending plate 31, is an indexing thrust collar 37 machined upon its forward face for smooth rotatable engagement with the rearwardly presented face of the knob-skirt 36 and provided upon its rear face with a rearwardly projecting arcuate engagement boss 38 for abutment against the forwardly presented face of the plate 31. Fixed in, and extending horizontally from the rear face of, the collar 37, is a pair of spaced parallel pins 38' sized for snug-fitting slidable engagement with the upper and lower faces of the aperture 32 for holding the collar 37 against rotation when the screw 33 is turned, the collar 37, upon its peripheral face, being provided with a single reference mark 39 for indexing co-operation with the graduations on the knob-skirt 36. In this connection, it should be noted that the "0" graduation of the knob-skirt 36 and the reference mark 39 are so set in relation to the threads of the screw 33 as to be in precise registration when the graduation line 27 of the carriage-ear 24 and its associated reference mark 28 are in precise alignment.

Suitably fixed in the plate 31 in laterally spaced relation to the aperture 32 and projecting forwardly beyond the knob 35, is a horizontally disposed carriage-shifting rod 40 provided at its outer end with a suitably shaped handle or knob 41.

Coiled loosely about the screw 33 and impinging at its opposite ends against the base flange 2 and the plate 31, is a compression spring 42 for yieldingly retaining the plate 31 and the associated carriage 21 normally in outwardly disposed abutment against the boss 38 of the thrust collar 37, all as best seen in Figures 2, 3, and 7 and for purposes presently fully appearing.

Adapted and designed for threaded disposition at its one or lower end in any selected one of the carriage-apertures 30 to upstand from, and substantially at a right-angle to, the carriage 21, is a suitable pintle 43 formed intermediate its ends with a diametrally reduced bearing-section 44 and a thrust-shoulder 45. Adjacent its upper end, the pintle 43 is provided with a knurled section 46 having a diametral bore 47 for removably accommodating a suitable tightening rod or other tool, not shown, the pintle 43, at its upper end, having a diametrally reduced cylindrical portion 48 registering with the bearing portion 44.

49 designates a jig-frame which includes a body-member preferably in the form of a rectangular casting 50 having accurately machined parallel upper and lower faces 51, 52, respectively, and a centrally disposed bearing 53, the axis of which is perpendicular to the plane of such machined faces 51, 52, for accurate engagement around the bearing portion 44 of the pintle 43 for detachably securing the member 49 for swingable movement horizontally over the carriage 21, a free-rotating thrust washer 54 being preferably disposed between the upper face of the casting 50 and the thrust collar 45 of the pintle 43.

Extending for lengthwise movement through the casting 50 and forming a part of the jig-frame 49, is a pair of spaced slide rods 55 preferably parallel with the machined casting faces and rigidly cross-connected at one end by a transverse casting 56 having an upstanding preferably integral index-finger 57 provided upon its upper face with a suitable index-line 58.

At their opposite end, the rods 55 are rigidly cross-connected by a head-block 59 having a centrally disposed tapped drill hole 60 and provided with accurately machined upper and lower faces 61, 62, respectively, having a laterally projecting tongue 63 and a transverse milled slot 64, the tongue 63 and slot 64 both being preferably disposed accurately at right angles to the longitudinal axis of the frame 49.

The jig-frame 49 further includes a lead-screw 65, which is disposed preferably midway between and parallel to the slide rods 55, and which at one end is threaded through the casting 50 and at its other end is provided with a diametrally reduced smooth end-portion 66 fitting for rotation in, and extending through, the cross-casting 56. Fixed, as by means of a diametral pin 67, upon the end-portion of the screw 66, is a flanged or skirted feed-wheel 68, in turn, provided with a projecting handle 69 and having inscribed upon its peripheral face a suitable circumferential series of graduations or scale markings, all as best seen in Figures 1 and 3.

Secured to and upon the head-block 59 as by means of an attachment bolt 70 threaded into

the tapped drill hole 60, as best seen in Figure 3, is a jig-plate 71 provided on its under face with a milled slot 72 for snug-fitting engagement with the tongue 63.

At its outer or free end, the jig-plate 71 is laterally extended, as at 73, and is arcuately curved along its outer margin for substantially conforming to the shape or contour of the brake shoe B, the plate 71 centrally of its outer or arcuate margin being recessed or cut away in the provision of a clearance space, as at 74.

Set into the upper face of, and spaced inwardly from the outer arcuate margin of, the jig-plate 71, is a pair of upstanding pins 75 positioned equidistantly on opposite sides of the longitudinal axis of the jig-frame 49 for engagement with the rear arcuate face of the brake shoe B.

In this connection, it should be noted that a jig-plate, such as the plate 71, should be provided for each different size of brake shoe, and in each case the several different jig-plates 71 differ from each other only in that the pins 75 are located at a distance from the vertical axis of the pintle 43 which is substantially equivalent to the radius of the inner face of the particular brake shoe which the selected jig-plate is designed to support.

Removably co-operable with the several jig-plates 71, is a somewhat triangular jig clamp 76 provided at its one or base end with a pair of depending prongs 77 for engagement with the upper face of the brake shoe flange *f* and at its other or apex end with a depending lug 78 having a lateral arm 79, in turn, equipped with a thumb-screw 80 for engagement at its lower end with the bolt 70 or some other suitable portion of the jig-plate 71 for adjusting the main body of the clamp 76 to substantially parallel relation with the jig-plate 71.

The clamp 76 is further provided with a closed-end slot 81 for loosely accommodating a jig clamp attachment screw 82 preferably integrally provided adjacent its lower end with a diametrally enlarged abutment collar 83 for stop-engagement with the upper face of the jig-plate 71 and at its upper end with a spoke-handled clamp nut 84.

Coiled on the screw 82 intermediate the under face of the jig clamp 76 and the upper face of the abutment collar 83, is a compression spring 85 for normally urging the jig clamp 76 upwardly against the clamping nut 84 for facilitating attachment and removal of the jig clamp 76 from any selected one of the jig-plates 71 with which it is to be used during a given grinding or abrading operation.

Adapted for rotatable disposition upon the upper bearing-forming end portion 48 of the pintle 43, as best shown in Figures 8 and 9, is a measurement adapter including a hubbed disk 86 provided with an intermediate portion 87 contoured for fitting snugly within an opening 88 of a brake drum caliper 89 of the type fully disclosed and described in Letters Patent No. 2,187,962, issued to me on January 23, 1940.

Also provided for detachable engagement as by means of bolts 90 to the casting 50 when the jig frame 49 is removed from the pintle pin 43, is a split collar or bearing hub 91 having a pair of laterally projecting suitably tapped bosses 92 for receiving the attachment bolts 90 and a pair of opposed clamping ears 93 drawn together by a conventional clamp screw 94.

Similarly mounted upon the jig frame cross head 59 by means of a suitable bolt 95 threaded into the tapped hole 60, is an L-shaped bracket 96 having a leg portion 97 offset, as at 98, to provide a clearance recess 99 and at its lower end provided with a transverse shoulder 100 machined upon its outwardly presented face and having a centrally disposed lengthwise extending tongue 101 for snug-fitting engagement in the slot 64 of the jig frame head block 59. At its other end, the bracket leg 97 is preferably integrally connected with a laterally extending arm 102 having an outwardly presented machined face 103 disposed in a plane parallel to the longitudinal axis of the jig frame 49 and provided with a lengthwise extending slideway 104, in turn, provided in its bottom wall with a closed-end slot 105 for adjustably accommodating a self-contained motor-driven face wheel grinder 106 of the type substantially more fully described in my said Letters Patent No. 2,187,962.

In use and operation, the jig frame 49 may be mounted, as described, on the carriage 21 by inserting the lower bearing-portion 44 of the pintle 43 through the journal 53 of the jig frame casting 50, and the pintle 43 threaded into a selected tapped opening 30 of the carriage 21 corresponding to the diameter of the work, that is to say, in the present instance, the particular brake shoe being ground. Thus, if a shoe for a twelve inch brake drum is being ground, the pintle 43 will be threaded into the tapped drill hole or opening 30 marked "12," as best seen in Figure 1.

The appropriate jig-plate 71 also designed for a twelve inch brake drum is bolted upon the jig frame head block 59, and a brake shoe B clamped thereon with its rearwardly presented arcuate face held tightly against the pins 75 by means of the jig clamp 76, care being observed to adjust the jig clamp thumb screw 80 in such manner that, when the clamp nut 84 is tightened, the web or body portion of the jig clamp 76 will be substantially parallel to the jig plate 71, as best seen in Figures 2 and 3.

Thereupon, the feed wheel 68 of the jig frame 49 is appropriately rotated to shift the jig frame rods 55 and the associated jig-plate 71, together with the clamped brake shoe B, longitudinally with respect to the jig frame casting 50 for engaging the particular brake shoe B with the abrading disk or surface 14 of the grinder wheel 13 when the jig frame 49 is oscillated upon the pintle 43. The entire jig frame 49 and its supported brake shoe is then manually oscillated in a horizontal plane around the pintle 43 as a bearing, and once the brake shoe B has been fed toward, and comes into contact with, the abrading surface 14, the oscillations of the jig frame 49 will effect a truly concentric arcuate surface to be ground on the brake shoe B.

It is preferable that the feed increment after each cut should be small, so that the successive cuts will be relatively light. Obviously in such case, the first few cuts which are ground off of the particular brake shoe B will ordinarily fail to grind a complete and continuous surface, by reason of eccentricities and irregularities in the surface which must first be removed by the initial grinding operations. After several successive cuts have been taken, however, a smooth continuous and truly concentric surface will be formed upon the brake shoe B. As soon as the ground surface becomes continuous over the entire operating face of the brake shoe B, the grinding operation may be continued or stopped, depending upon the thickness of the lining or block which has been applied to the brake shoe B, but it should be specifically noted that, irre-

spective of the number of successive "cuts" taken, only the thickness of the lining will change. The curvature of the ground surface will always remain identical, that is to say, the surface formed upon the particular brake shoe B will always be the segment of a truly concentric cylinder having a radius exactly equal to the distance between the plane of the grinding surface 14 and the pintle 43.

In many instances, after the braking surface has been satisfactorily ground, it becomes desirable to chamfer or bevel the outer transverse margins of the attached brake lining. To accomplish this result, the particular brake shoe B is ground in the manner described, and, upon completion of such grinding operation, the clamp portion 26 of the carriage 21 is loosened and the jig frame 49 shifted to, and held in, such position as to present the transverse margin of the particular brake lining toward the grinding wheel 13. Thereupon, the handle 41 is swung in the direction of the arrow, Figure 7, effecting through engagement with the grinding wheel 13 a chamfering of such transverse margin of the brake shoe lining. As soon as the brake shoe lining has been sufficiently beveled, the handle 41 is released and the carriage 21 yieldingly returns to original position under influence of the spring 33. Thereupon the operation may be repeated for the opposite transverse margin of the brake shoe lining.

In numerous cases, brake shoes and drums which must be ground are known to be over-sized or under-sized by a certain amount. If, for example, in the particular automobile or truck which is being repaired, the manufacturer has designed the brake drum and shoe to be a twelve inch drum which is 0.010 under-size, the carriage clamping portion 26 is loosened and the knob 35 of the carriage feed screw 33 turned to bring the appropriate graduation opposite the index or reference mark 39, so as to swing the carriage 21 about the pivot screw 20, shifting the pintle 43 away from the grinding plane of the wheel 13 by a sufficient distance to compensate for the under-size measurement of such particular brake shoes and drums.

Frequently the brake drums and shoes of a particular truck or automobile will have been turned down and resurfaced to such an extent that the amount by which the drum is over-size is not known. It, therefore, becomes necessary to measure the brake drum by means of the brake drum calipers 89, the latter being employed in the manner described in my said Letters Patent No. 2,187,962. The caliper is then fitted with the hubbed disk or adapter 86 and placed upon the upper bearing-forming end of the pintle 43. The carriage 21 is thereupon shifted inwardly or outwardly by means of the knob 35, as described, until the calipers may be swung around into bearing touching contact with the abrading surface 14 of the grinder wheel 13, as shown in Figures 8 and 9. Finally, the carriage clamping bolt 26 is tightened down to hold the carriage 21 in such adjusted position and the grinding operation carried out in the usual manner.

It often is desirable in brake repair work to grind a brake lining surface on the wheel. In such case, the jig frame 49 may be bodily removed from the carriage 21 and fitted with the accessory bearing hub 91, the grinder support bracket 97, and the portable grinder 106, as shown in Figures 10 and 11, thus forming a portable grinder substantially of the type disclosed and described in my said Patent No. 2,187,962, which may be used in precisely the manner therein set forth.

I may also provide a combination brake relining machine C including a vertically disposed grinding cylinder 107 mounted on a single support 108 with suitable rivet upsetting and removing devices D, E, of the type substantially described in Letters Patent No. 2,109,327, issued to me on February 22, 1938, and No. 1,949,070, issued to me on February 27, 1934, and having a flat steel adapter plate 109 suitably bored for attachment by means of bolts 110 to the machine support or base 108 of such a combination brake relining machine C. Swingably mounted upon the upper machined face of the adapter plate 109 by means of a pivot screw 20', is a carriage 21', identical in every respect to the carriage 21, for receiving a pintle 43 and a jig frame 49. Welded or otherwise suitably secured upon the forwardly presented transverse margin of the adapter plate 109 and positioned in outwardly spaced relation to the adjacent margin of the machine bed 108, is a suitably bored and tapped depending flange 111 for receiving the carriage feed screw 33. The adapter plate 109 is suitably drilled and tapped for receiving a carriage clamping screw 26 for holding the carriage plate at the proper position of "0" adjustment in reference to the grinding plane of the vertical grinding cylinder 107, so that the centers of the several tapped holes 30 will be properly positioned, the carriage 21 and frame 49 functioning as described in abrading a particular brake shoe.

It will be noted that the slide rods 55 of the jig frame 49 are very conveniently secured in adjusted positions by means of a suitable set screw or the like 120 threaded in the frame or casting 50, as best seen in Figures 1 and 14.

The machine fulfills in every respect the objects stated, and it should be understood that other changes and modifications in the form, construction, arrangement, and combination of the several parts of the machine may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a grinding machine, in combination, grinding means, a base, a jig-member pivoted on the base for oscillation, a pair of spaced parallel slide-bars extending lengthwise for movement through the jig-member, a block mounted on said rods for supporting a brake-shoe for oscillation with the jig-member relatively to the grinding means, and means for longitudinally shifting said bars for selectively locating the block and its supported shoe with respect to the grinding means and jig-member.

2. In a grinding machine, in combination, grinding means, a base, a jig-member pivoted on the base for oscillation, a pair of spaced parallel slide-bars extending lengthwise for movement through the jig-member, a block mounted on said rods for supporting a brake-shoe for oscillation with the jig-member relatively to the grinding means, a cross-bar fixed to the slide-bars, and a threaded member having rotary connection with said cross-bar and threaded connection with the jig-member for longitudinally shifting the slide-bars for selectively locating the block and its supported shoe with respect to the grinding means and jig-member.

3. In a grinding machine, in combination, grinding means, a base, a jig-member pivoted on the base for oscillation, a pair of spaced parallel slide-bars disposed upon opposite sides of the pivot of, and extending lengthwise for movement through, the jig-member, a block mounted on the forward end of said rods for supporting a brake-shoe for oscillation with the jig-member relatively to the grinding means, a cross-bar fixed to and upon the rear end of the slide-bars, and a threaded member disposed lengthwise intermediate and in parallel relation to said bars and having rotary connection with said cross-bar and threaded connection with the jig-member for longitudinally shifting the slide-bars for selectively locating the block and its supported shoe with respect to the grinding means and jig-member.

4. In a grinding machine, in combination, grinding means, a base, a jig-member pivoted on the base for oscillation, a pair of spaced parallel slide-bars extending lengthwise for movement through the jig-member, a block mounted on said rods for supporting a brake-shoe for oscillation with the jig member relatively to the grinding means, means for longitudinally shifting said bars for selectively locating the block and its supported shoe with respect to the grinding means and jig-member, and means for indexing the longitudinal movement of the bars and their supported block with respect to the grinding means.

5. In a grinding machine, in combination, grinding means, a base, a jig-frame including a head-block pivoted on the base for oscillation relatively to the grinding means, a jig-plate secured on the block for supporting a brake-shoe, said plate being laterally extended and arcuately curved along its outer margin for substantially conforming to the contour of a supported brake-shoe, spaced pins upstanding from the plate equidistantly on opposite sides of the longitudinal axis of the jig-frame for engagement with the rear arcuate face of the supported brake-shoe, a triangular jig-clamp adapted for disposition over the jig-plate and the supported brake-shoe, said clamp being provided at its base end with a pair of depending prongs for engagement with the upper face of the supported brake-shoe and at its apex with a depending lug having a lateral arm, means engaging said arm for adjustably disposing the jig-clamp in substantially parallel relation with said plate, and means for securing the clamp to said plate in shoe engagement.

6. In a grinding machine, in combination, grinding means, a base, a carriage in the form of a flat rectangular plate disposed over the base, said plate having an ear projecting from a corner thereof and at said ear being pivotally attached to the base, and a brake-shoe supporting jig-frame pivoted for oscillation on the carriage with its pivot point disposed on a line at right angles to the grinding means for normally concentrically engaging the supported shoe with the grinding means, the carriage being arcwise adjustable with respect to the base for angularly shifting the pivot point of the jig-frame from said line for correspondingly shifting the jig-frame for abnormally eccentrically engaging the supported shoe with the grinding means.

7. In a grinding machine, in combination, grinding means, a base, a carriage in the form of a plate disposed over, and for swingable adjustment pivotally attached to, the base, a brake-shoe supporting jig-frame pivoted for oscillation on the carriage, and means including an arcuate pin-accommodating slot on the carriage for securing the carriage in selected swingable adjustment to the base for angularly varying the location of the pivot point of the jig-frame with respect to the grinding means.

8. In a grinding machine, in combination, grinding means, a base, a carriage in the form of a plate disposed over, and for swingable adjustment pivotally attached to, the base, a brake-shoe supporting jig-frame pivoted for oscillation on the carriage, means for securing the carriage in a selected swung position on the base for angularly varying the location of the pivot point of the jig-frame with respect to the grinding means, and means for indexing the selected swung position of the carriage with respect to the base.

9. In a grinding machine, in combination, grinding means, a base, a carriage in the form of a plate disposed over, and for swingable adjustment pivotally attached to, the base, a brake-shoe supporting jig-frame pivoted for oscillation on the carriage, means for securing the carriage in a selected swung position on the base for angularly varying the location of the pivot point of the jig-frame with respect to the grinding means, and means including a threaded member having engagement with the carriage and the base for indexing the swung position of the carriage with respect to the base.

10. In a grinding machine, in combination, grinding means, a base, a carriage in the form of an L-shaped plate comprising longitudinally and transversely extending arms disposed over, and for swingable adjustment pivotally attached at the free end of its transverse arm to, the base, the longitudinal arm of said plate being provided with a line of spaced apertures, a pivot-pin disposed in a selected aperture of said arm, and a brake-shoe supporting jig-frame engaged with said pivot for oscillation on the carriage relatively to the grinding means and base.

11. In a grinding machine, in combination, grinding means, a base, a carriage in the form of an L-shaped plate comprising longitudinally and transversely extending arms disposed over, and for swingable adjustment pivotally attached at the free end of its transverse arm to, the base, the longitudinal arm of said plate being provided with a plurality of series of spaced apertures, a pivot pin disposed in a selected aperture of said arm, and a brake-shoe supporting jig-frame engaged with said pivot for oscillation on the carriage relatively to the grinding means and base.

12. In a grinding machine, in combination, grinding means, a base, a carriage in the form of an L-shaped plate comprising longitudinally and transversely extending arms disposed over, and for swingable adjustment pivotally attached at the free end of its transverse arm to, the base, a brake-shoe supporting jig-frame pivoted for oscillation on the carriage, and means including an arcuately pin-accommodating slotted ear projecting outwardly from the opposite end of the transverse arm of the carriage for securing the carriage in selected swung position on the base for angularly varying the location of the pivot point of the jig-frame with respect to the grinding means.

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