Dec. 29, 1953 H. B. BARRETT 2,663,975

BRAKE DRUM LATHE

Filed Aug. 28, 1950 4 Sheets-Sheet 1

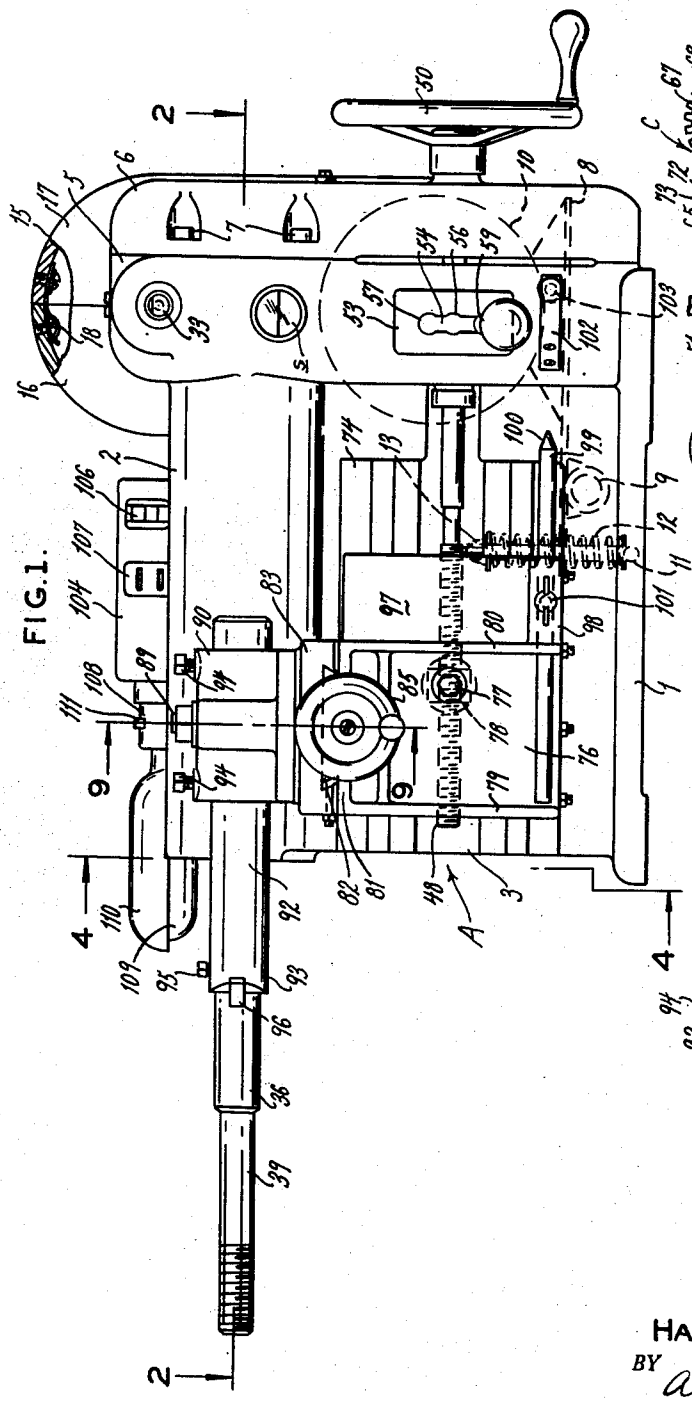


FIG. 1.

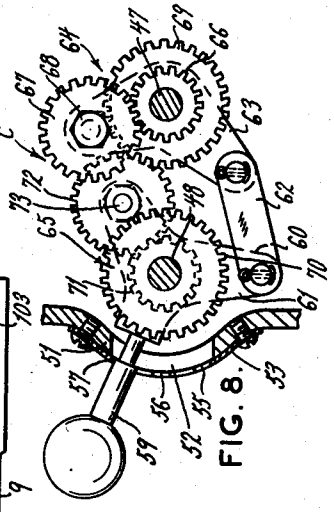


FIG. 8.

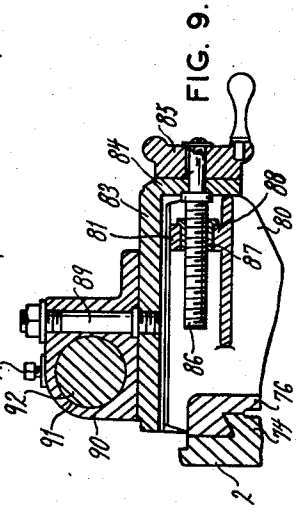


FIG. 9.

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BRAKE DRUM LATHE

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4 Sheets-Sheet 2

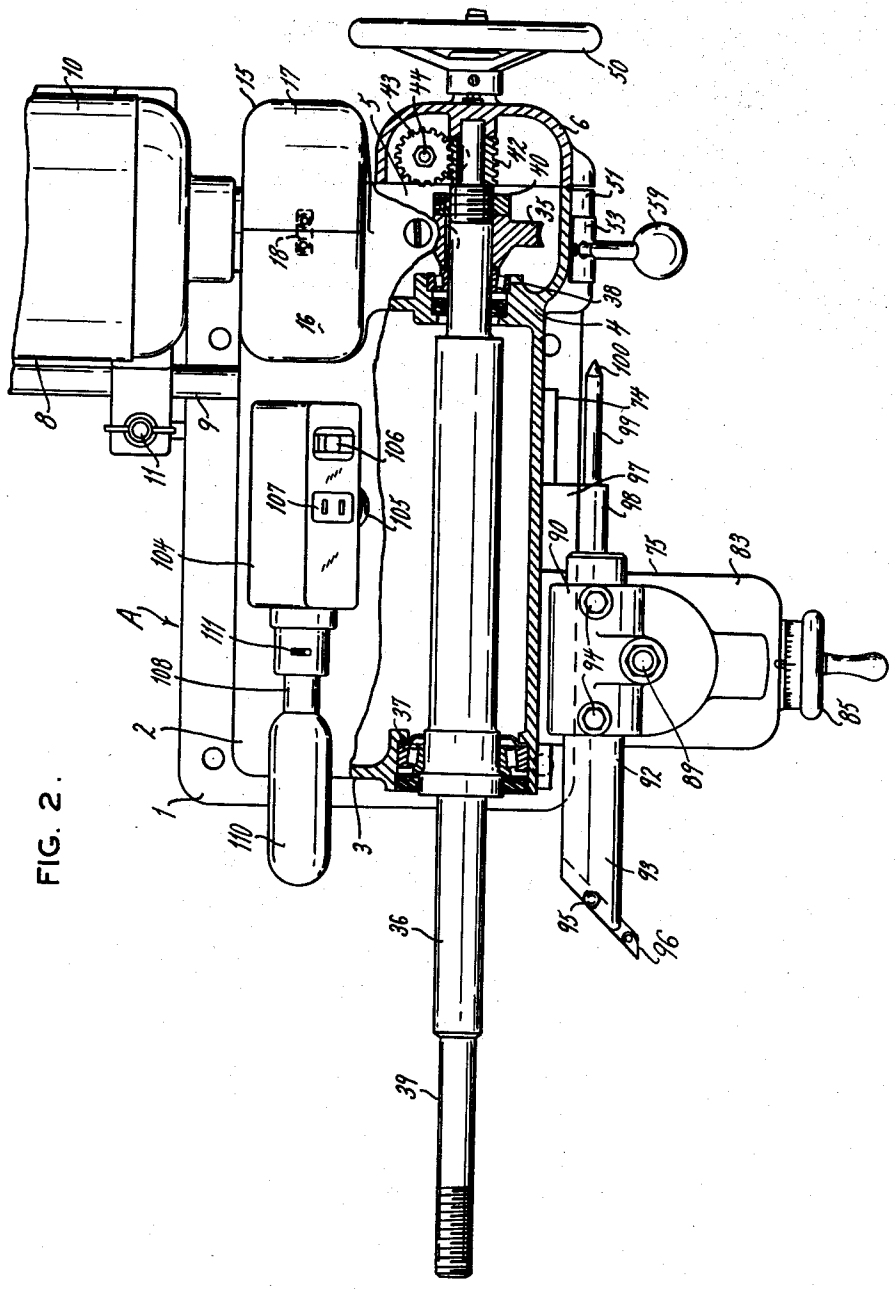


FIG. 2.

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BRAKE DRUM LATHE

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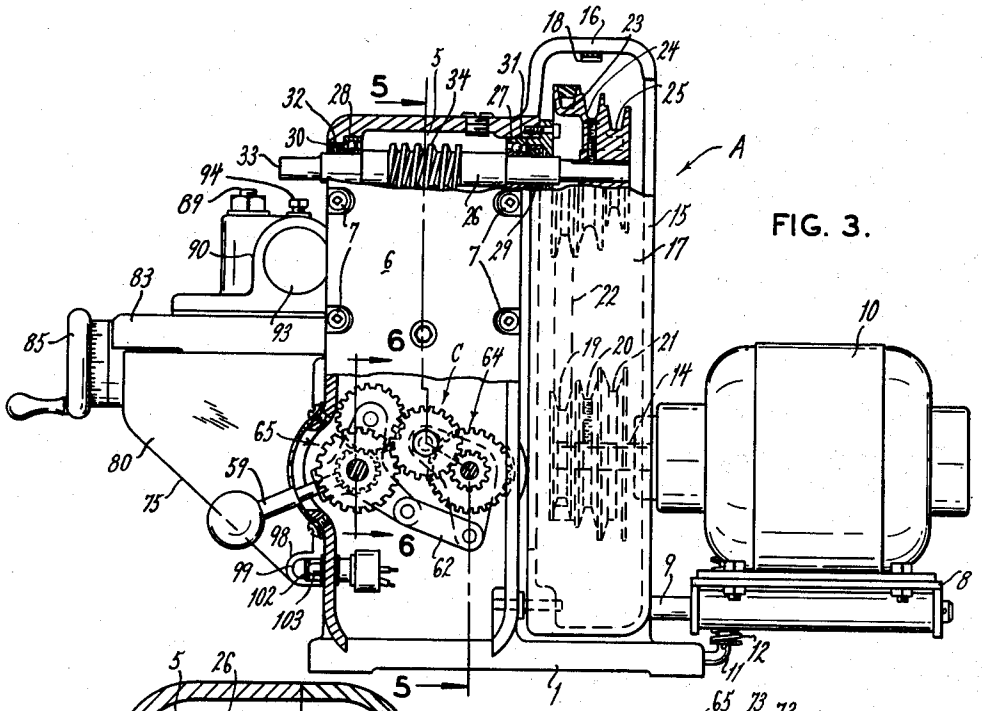


FIG. 3.

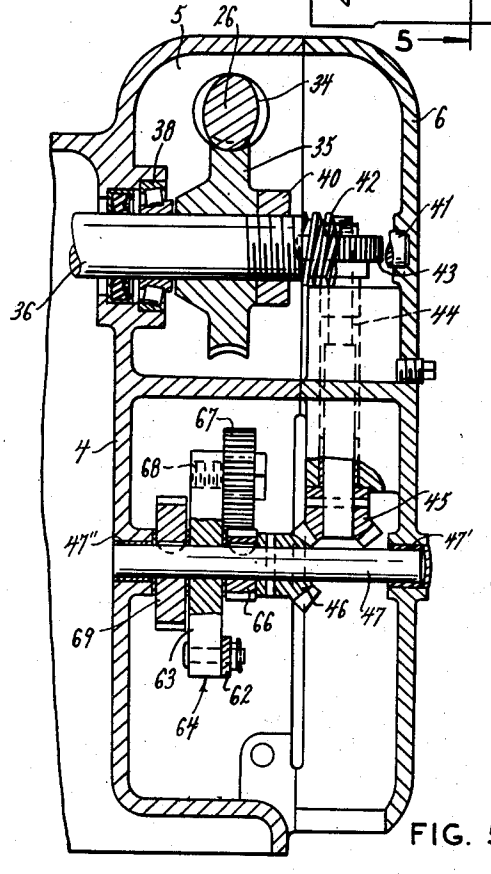


FIG. 5.

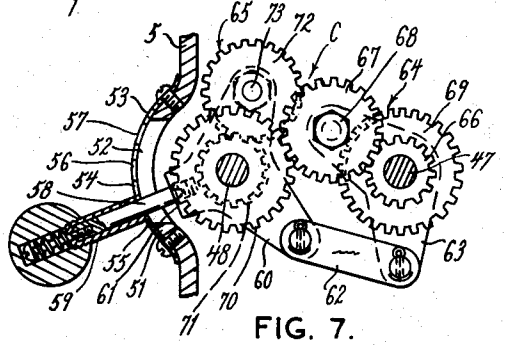


FIG. 7.

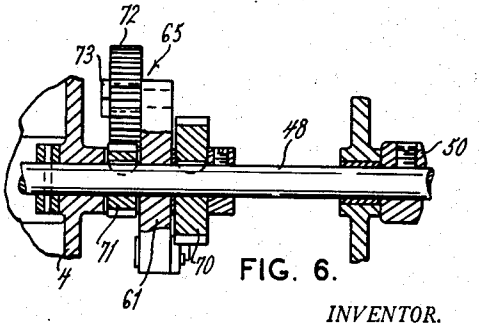


FIG. 6.

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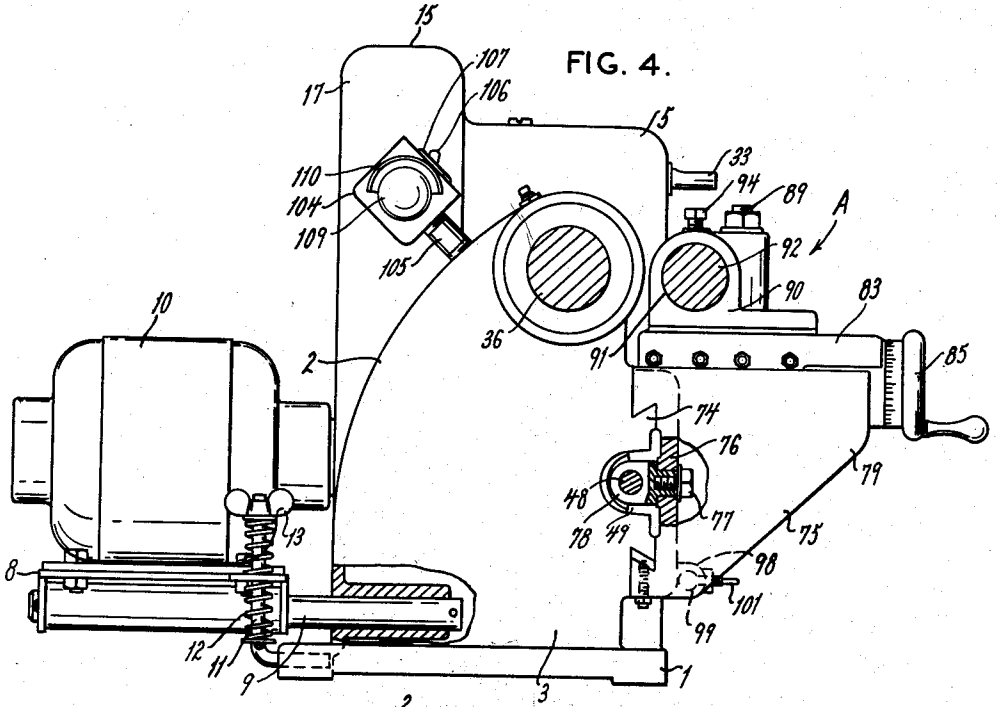
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Dec. 29, 1953 H. B. BARRETT 2,663,975

BRAKE DRUM LATHE

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FIG. 4.



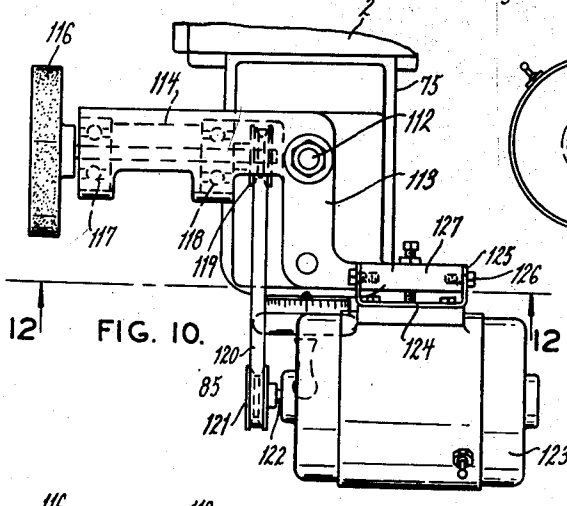


FIG. 10.

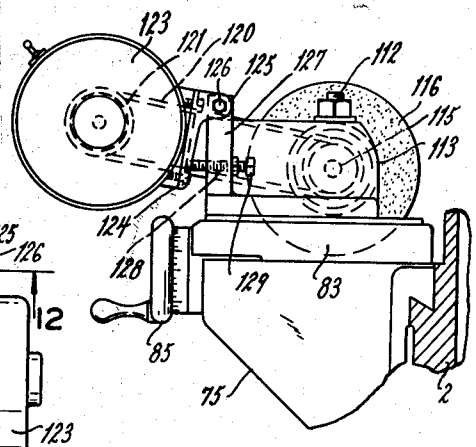


FIG. 11.

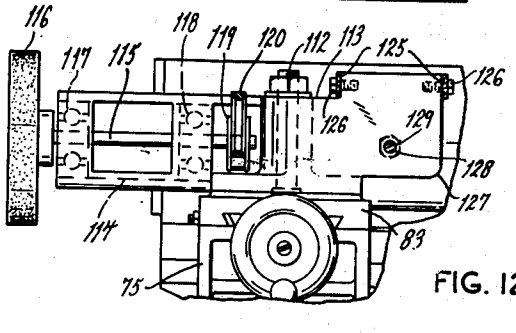


FIG. 12.

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UNITED STATES PATENT OFFICE

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BRAKE DRUM LATHE

Harry B. Barrett, St. Louis, Mo.

Application August 28, 1950, Serial No. 181,784

3 Claims. (Cl. 51—37)

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This invention relates in general to machine tools and, more particularly, to certain new and useful improvements in lathe-type turning machines adapted for use in the finishing and truing of brake drums and the like, although the same is not necessarily limited to such particular use.

The primary object of the present invention is to provide a lathe of the type stated which is provided with motor cut-off means whereby the machine will be stopped upon completion of the tool feeding stroke, which means may be adjusted for the particular operation.

A further object of the present invention is to provide a lathe of the type stated which integrally contains an auxiliary power take-off which provides a suitable mounting for tools such as drills, grinding wheels, and the like whereby the lathe becomes a combination machine capable of use in a multiplicity of brake relining operations, such as drilling, honing, reaming, tool-resharpening, and the like.

It is an additional object of the present invention to provide a lathe of the type stated which is simple, durable and economical in construction, which is accurate and precise in metal turning operation and which is adaptable for a wide variety of work such as turning, grinding, truing, and work surfacing on various types and sizes of brake drums.

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 (four sheets)—

Figure 1 is a front view of a brake drum lathe constructed in accordance with and embodying the present invention;

Figure 2 is a transverse sectional view taken along line 2—2 of Figure 1;

Figure 3 is an elevational view with part of the housing wall cut away;

Figure 4 is a transverse sectional view taken along line 4—4 of Figure 1;

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

Figures 7 and 8 are fragmentary sectional views showing the changers in slow and fast position respectively;

Figure 9 is a transverse sectional view taken along line 9—9 of Figure 1;

Figure 10 is a fragmentary top plan view showing the carriage as adapted for supporting a grinding wheel;

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Figure 11 is an end view thereof; and

Figure 12 is a transverse sectional view taken along line 12—12 of Figure 10.

Referring now by reference characters to the drawings which illustrate a preferred embodiment of the present invention, A designates a brake drum lathe having a base plate 1 upon which is suitably mounted a longitudinally extending housing 2 having at one end a side wall 3 and at its opposed end a partition 4 forming a common wall with an integrally cast, enlarged compartment 5. To permit access to the interior of the compartment 5 an end plate 6 is removably mounted by bolts 7 extending through registering apertures provided in the margins of the compartment 5. Disposed to the rear of, and in elevated relation to, the base plate 1 is a platform 8 supported by a bar 9 which is secured at its inner end to the housing 2. Bolted upon the platform 8 is a conventional type electric motor 10 and provided upon the platform 8 for vibration dampening purposes when the motor 10 is actuated, is an arm 11 extending upwardly through the platform 8 and having a lower bent end suitably fitted in the plate 1, with a compression spring 12 disposed about the vertical portion of the rod 11 and extending through the platform 8 so that the latter is, in effect, engaged in one of the central convolutions of the spring 12 and is resiliently suspended therein. At its upper end the spring 12 bears against a wing nut 13 threadedly mounted upon the upper end of the rod 11 for adjusting the tension of the spring 12 as requisite for absorbing the vibrations caused by the selected speed of the motor 10.

Projecting from the motor 10 is a drive shaft 14 which extends into the lower portion of a generally cylindrically shaped housing 15 of two-part construction, having a stationary section 16 integrally formed with, and to the rear of, the compartment 5, and a removable section 17 attached to the section 16 by means of a latch 18. Splined or otherwise suitably mounted upon the projecting end of the shaft 14 is a series of, preferably three, graduated cone pulleys 19, 20, 21, having provided for disposition thereon an endless belt 22, the upper portion of which is trained about the selected one of a series of corresponding cone pulleys 23, 24, 25, in respective alignment with the cone pulleys 19, 20, 21, and being splined or otherwise mounted on one end of a transmission shaft 26. It is to be noted that the cone pulleys 19, 20, 21, and 23, 24, 25, are paired in the conventional manner to provide a range of three speeds of rotation for the trans-

mission shaft 26. Said shaft 26 is journaled in ball bearings 27, 28, and thrust bearings 29, 30, disposed in aligned apertures 31, 32, respectively, in the rear and forward walls 1, respectively, of the compartment 5. At its forward end the shaft 26 is diametrally reduced and projects outwardly beyond the forward face of the compartment 5 to provide an auxiliary power take-off 33 for such purposes as a mechanic may elect, as for supporting a drill, milling cutter, and the like.

Keyed centrally upon the shaft 26 within the compartment 5, is a worm 34 in meshing engagement with the worm gear 35 mounted upon a longitudinally extending spindle 36 which extends through the housing 2 being journaled in pairs of thrust bearings 37, 38, provided in the side wall 3 and the partition wall 4, respectively. The spindle 36 projects at one end substantially beyond the side wall 3, projecting end portion being diametrally reduced as at 39 for supporting the work, such as an automotive brake drum, and is threaded at its end extremity for receiving a work-retaining collar (not shown). At its other end the spindle 36 is threaded for receiving a collar 40 and is diametrally reduced, as at 41, for supporting a worm 42 keyed or otherwise mounted thereon, with its end extremity bearinged in the plate 6.

In meshing engagement with the worm 42 is a horizontally disposed worm gear 43 suitably mounted upon the upper end of a vertically extending jack shaft 44, on the lower end of which is disposed a bevel gear 45 for engagement with a pinion 46 mounted upon a longitudinally extending feed shaft 47 journaled at its ends in aligned bearings 47', 47'', in the end plate 6 and the partition wall 4 of the compartment 5, respectively. Presented in forwardly spaced relation, and parallel to, the feed shaft 47 is the base portion of a lead screw 48 which is journaled in and extends through a partition wall 4, with projecting portions of the screw 48 passing longitudinally along, and forwardly of, the outer face of the housing 2 within an arcuate recess 49 formed therein. At its other end the lead screw 48 is bearinged in, and projects through, the end plate 6 of the compartment 5, having mounted upon its projecting end a hand wheel 50. It will be noted by reference to Figure 1 that the portion of the lead screw 48 which extends through the partition wall 4 is plain or unthreaded and that between such plain portion and the commencement of the threads, the lead screw 48 is undercut as at 48' for purposes presently more fully appearing.

Formed in the forward face of the compartment 5 is an outwardly bulging portion 51 having a vertically elongated aperture 52 provided therein. Disposed across the aperture 52 and suitably affixed to the outer face of the compartment 5 is a plate 53 arcuately shaped in conformity with the radius of the portion 51 and having a central aperture 54 aligned with the aperture 52. About the vertical margins of the aperture 54 there are provided aligned pairs of recesses or notches 55, 56, 57. Extending loosely through the aperture 54 is a gear shift lever 58 provided on its extended end with a snug fitting spring biased sleeve-like handle 59 which is diametrally reduced at its inner end for optional engagement in any selected pair of notches 55, 56, 57. Rockably mounted upon the unthreaded portion of the lead screw 48 is a change plate 60 integrally provided with a boss 61 which is threaded and tapped for receiving the inner

threaded end of the lever 58. The change plate 60 forms an essential element of a change-gear transmission generally designated C. The change plate 61 is substantially V-shaped and at its apex is centered upon the lead screw 48 for rockable movement thereon and being pivotally attached at its lower end to one end of a link 62 which, at its other end, is pivotally attached to the lower end of a second V-shaped plate member 63 mounted upon the feed shaft 47 for pivotal movement thereon.

The change gears C comprise horizontally aligned gear clusters 64, 65, disposed upon the feed shaft 47 and the base portion of the lead screw 48, respectively. The gear cluster 64 includes a small diameter driving gear 66 in constant meshing engagement with an intermediate or idler gear 67 of relatively increased diameter and disposed for rotation upon a bolt 68 engaged in the upper portion of the plate 63. Keyed upon the feed shaft 47 on the side of the plate 63 opposite to the gear 66 is a large diameter driving gear 69. The gear cluster 65 on the lead screw 48 correspondingly includes a large diameter pinion or driven gear 70 and a small diameter pinion 71 keyed upon the lead screw 48 on opposite sides of the plate 60 and in alignment with the driving gears 66, 69, respectively. The pinion 71 is in meshing engagement with an intermediate or idler gear 72 rotatably mounted upon a bolt 73 threadedly engaged in the upper portion of the change plate 60. As may be seen in Figure 6 the idler gear 72 is in laterally spaced relation to the idler gear 67 of the cluster 64. Thus, by operation of the lever 59, the change plate 60 may be swung to effect gear ratios for imparting either a relatively fast or slow speed of rotation to the lead screw 48. Referring now to Figure 8, it will be seen that when the lever 59 is in its uppermost position, within the notches 57, the idler gear 72 will be shifted into engagement with the large driving gear 69, whereby the small diameter pinion 71 is brought into train so that a speed increase is accomplished, causing the lead screw 48 to rotate at a relatively fast rate. As shown in Figure 7, with the lever 59 in its lowermost position, as engaged within the notches 55, the idler gear 72 will be shifted out of engagement and the intermediate gear 67 will have been swung into engagement with the large diameter pinion 70, which is thereby brought into train with the small driving gear 66 to cause a speed reduction whereby the lead screw 48 will rotate at a relatively slow speed. When the lever 59 is moved into its central position, within the notches 56 the change plate 60 will be pivoted so as to break engagement between the gear clusters 64, 65, whereby rotation of the lead screw 48 may be effected by manual operation of the hand wheel 50.

Integrally formed on the forward face of the housing 2 and extending longitudinally therealong is a dovetail slide-track 74 having its ways disposed on opposite sides of, and equidistant, to the recess 49. Mounted on the dovetail slide-track 74 for translation therealong is a carriage 75 having a vertical web 76 centrally upon which is mounted, by means of a bolt 77, a nut 78 projecting into the recess 49 and threadedly engaged upon the lead screw 48. Formed with the vertical web 76 are forwardly projecting side plates 79, 80, which at their upper ends are integral with a transverse web 81, which is provided on its upper surface with a transversely extending dovetail slide 82, for engagement with

a cross slide 83. On its forward end the cross slide 83 is provided with a depending skirt portion 84 upon the outer face of which is suitably mounted a cross feed knob 85 operatively secured to one end of a cross feed screw 86 threadedly engaged in a nut 87 supported within a bearing 88 integrally formed with and depending from the under face of the transverse web 81. By operation of the cross feed knob 85 the slide 83 may be translated along the slide way 82 in a direction normal to the axis of the spindle 36. Detachably mounted upon the upper face of the slide 83 by a bolt 89 is a tool support 90 having an enlarged bore 91 for receiving the shank 92 of a tool-holder 93 and being provided with set screws 94 for maintaining the tool-holder 93 securely in position. Mounted by a screw 95 in the end of the tool-holder 93 is a tool 96, having a replaceable tip *t* as more fully described in my copending application Serial No. 156,836, filed April 19, 1950. Integrally cast with the carriage 75, and in lateral relation to the side plate 80 is a vertical web section 97 having at its lower end, a forwardly presented sleeve 98, axially parallel to the lead screw 48, for receiving a tripping rod 99 which is beveled at one end, as at 100. Provided for rigidly maintaining the rod 99 within the sleeve 98 in selected relative position therein, is a bolt 101 threaded in a suitable aperture within the sleeve 98. In alignment with the axis of the rod 99 and projecting from the forward face of the compartment 5 in downwardly spaced relation to the lever 59 is a spring-leaf type lever 102 resting at its free end against the outer end of the plunger 103 of a conventional electric switch, as best seen in Fig. 3, the latter being conventionally connected to the motor 10 by suitable leads. In outward, laterally spaced relation to the lever 102 and connected in series thereto is an indicating lamp *s* mounted within a suitable socket provided in the face of the compartment 5. It will thus be seen that upon translation of the carriage 75 along the lead screw 48 in the direction toward the compartment 5 the beveled end 100 of the rod 99 will be brought into contact with the lever 102 and upon continued movement, the rod 99 will trip the lever 102 into switch-open position whereupon the motor 10 will automatically stop. It should be noted in this connection that the heel of the rod 99 abuts against the inner face of the side plate 79 when the rod 99 is pushed all the way to the left (reference being made to Figure 1). In this latter position the right-ward distance between the right hand face of the web 97 and the beveled end 100 is only slightly greater than the distance from the undercut 48' to the left hand face of the partition wall 4. This provides a necessary double safety feature, in that the lever 102 is so positioned that, when the switch plunger is pressed inwardly by interaction between the beveled end 100 of rod 99 and the lever 102, the free end of the lever 102 will shift inwardly far enough to allow the beveled end 100 of the rod 99 to slide over the outwardly presented face of said lever 102 without damage in case the switch does not, for some reason, break the electrical circuit promptly. In such case the nut 78 will run off into the undercut 48' and the carriage 75 will come to a stop anyway. It is, of course, obvious that, when the carriage has stopped in this manner, the machine can be returned to operative condition by manually shutting off the switch and manually pushing the carriage 75 to the left. The indicating lamp *s* which will be illuminated during operation of the motor will be simultaneously turned off. As will be shown more fully hereinafter, the switch tripping means thus provided, assures that the lathe A will only operate for periods of time determined by the length of travel of the feed stroke, and, thus, a marked economy is effected. Additionally, the indicating lamp *s* will at all times serve to visually inform a mechanic as to whether the lathe A is in operation or not.

Finally, a switch box 104 is disposed forwardly of the cylindrical housing 15, being mounted upon the upper end of a conduit section 105 which is threadedly engaged at its lower end in a suitable aperture in the housing 2 (see Figure 4). The switch box 104 is connected by suitable leads passing through the conduit 105 to the motor 10 and is provided with a master switch (not shown) having a tumbler 106 and a socket 107 to provide an electrical output connection. Projecting from the outer end of the box 104 is a socket-forming conduit 108 for receiving a work lamp 109 having a shade 110 for optional energization by a switch button 111 to provide illumination directly to the work surface being operated upon.

In usage, the work, such as an automotive brake drum is suitably positioned upon the end of the spindle 36. The particular tool 96, requisite for the operation indicated, is properly secured in the tool holder 93. The gear shift lever 59 is then moved into neutral position, within the notches 56, to permit the operator to translate the carriage 75, by manual operation of the hand wheel 50, along the lead screw 58 in order to bring the tool 96 into the initial or starting feed position with reference to the work. The cross feed knob 85 is then turned to move the cross slide 83 transversely to present the tool 96 to the work in proximate position for the depth of cut to be taken. Ordinarily, when the work is an automotive brake drum the tool 96 will be presented to the inner face of the drum. The cross slide, 83, thus, provides a range of adjustment for positioning the tool 96 properly with brake drums of varying diameters, as by moving it forwardly for larger diameter drums and rearwardly for smaller diameter drums. Additionally, it is to be noted that with various types of work, other than brake drums, the tool-holder 93 may be secured in the tool-support 90 for presenting the tool 96 upon the exterior surfaces of the work. With the tool 96 substantially positioned for the operation, the operator will then turn the hand wheel 50 in the reverse direction to effect a so-called "dry run" to determine the length of the feed stroke required for the operation. Upon determination of this distance, the operator may then adjust the tripping rod 99 longitudinally within the sleeve 98 so that upon completion of the feed stroke the beveled end 100 of the rod 99 will contact and trip the toggle lever 102 for automatically shutting off the motor 10. It is, of course, apparent that the rod 99 will be so adjusted so as to permit a slight time delay after the operation will have terminated to assure that the toggle lever 102 will not be prematurely tripped. With the longitudinal adjustment of the rod 99 completed, the operator will manually return the carriage to the work and position the tool 96 for the operation. The gear shift lever 59 will then be shifted into either its upper or lower position to bring the change gears C into proper meshing relationship for

the speed of rotation of the lead screw 48 desired. With the endless belt 22 trained about the selected cone pulleys for rotating the spindle 36 at the required speed, the motor 10 is then actuated to operate said spindle 36. Thereupon, through the worm 34 and the worm gear 35, rotation is imparted to the feed shaft 47, through the jack shaft 44, with actuation of the lead screw 48 being effected by the change gears C. The carriage 75 will, thus, automatically traverse the lead screw 48 to feed the tool 96 to the work throughout the surface thereof to be machined. As described hereinabove, upon completion of the feed stroke the tripping rod 99 will trip the toggle lever 102 to stop the motor 10. By this automatic cut-off means, a mechanic could, during the operation of the lathe A, have his attention focused on some other matter with full assurance that the lathe A would stop upon completion of the job.

If desired, the tool-holder 98 may be removed from the carriage 75 by loosening the bolt 89 and there may be suitably affixed by a bolt 112 upon the upper transverse web 81 of the carriage 75 a casting 113 having an axial bore 114, for receiving a shaft 115 which projects at one of its ends beyond the adjacent end face of the casting 113 for supporting an abrasive grinding wheel 116 disposed thereon. The shaft 115 is journaled in ball bearings 117, 118, mounted in spaced, diametrally increased portions of the casting 113. At its opposite or inner end, the shaft 115 has mounted thereon a pulley 119 over which is trained a belt 120 connected at its other end to a pulley 121 disposed on the end of a driving shaft 122 of an auxiliary electric motor 123. Said motor 123 is integrally provided with a mounting plate 124 having lugs 125 for pivotal attachment by bolts 126 to a support plate 127 formed in the casting 113. Projecting through a threaded aperture 128 in the support plate 127 is an adjustment screw 129 for abutment against the mounting plate 124 to restrain the transmission of vibrations effected by the operation of the motor 123.

The motor 123 is connected by a conventional lead (not shown) to the socket 107 in the switch box 104 for direct connection to the motor 10. Thus, in operation, the carriage 75 may be translated along the lead screw 48 in order to present the grinding wheel 116 to the work surface. The tripping rod 99 may be adjusted in the manner hereinabove described to provide an automatic cut-off of the motor 10 upon completion of the feed stroke.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the brake drum lathe 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. A lathe for grinding brake drums and the like comprising a housing, a work-holding spindle journaled in and extending outwardly from the housing, a worm gear keyed upon the spindle within the housing, a cross-shaft journaled in the housing and extending transversely across the spindle in overlying relation to the worm gear, a worm keyed upon the cross-shaft and meshing with the worm gear, a prime mover mounted in the housing, motion transmitting means operatively connecting said cross-shaft with said prime mover, a carriage slidably mounted on the housing for movement therealong, a feed screw carried in the housing and engaged with the carriage, first and second spur gears rigidly mounted on the feed screw interiorly of the housing, a feed shaft journaled in the housing and positioned in spaced parallel relation to the feed screw, third and fourth spur gears rigidly mounted on the feed shaft, the first and third gears being positioned in edgewise alignment with each other and the second and fourth gears similarly being positioned in edgewise alignment with each other, a first crank-arm operatively mounted in the housing for rocking movement about an axis coincident with the center line of the feed screw, a second crank arm operatively mounted to the housing for rocking movement about an axis coincident with the center line of the feed shaft, a link pivotally connected at its ends to the first and second crank arms for causing the crank arms to rock simultaneously with each other, a first idler gear journaled upon the outer end of the first crank arm and being in toothed engagement with the first spur gear, said first idler gear being adapted upon swinging movement of the first crank arm to roll around the periphery of the first spur gear without interruption of its toothed connection with the first spur gear, a second idler gear journaled upon the outer end of the second crank arm and being in toothed engagement with the fourth spur gear, said first idler gear furthermore being adapted to swing around into toothed engagement with the third spur gear so as to effect driving connection between the first and third spur gears, said second idler gear being adapted to swing around into toothed engagement with the second spur gear so as to effect driving connection between the second and four spur gears, said first and second crank arms being so positioned in relation to each other that the second idler gear will be disconnected from the second spur gear when the first idler gear is drivingly connected to the third spur gear and so that the first idler gear will correspondingly be disconnected from the third spur gear when the second idler gear is drivingly connected to the second spur gear, and handle means operatively connected to said crank arms for permitting said crank arms to be manually swung to and fro.

2. A lathe for grinding brake drums and the like, as defined in claim 1, in which the cross-shaft extends at one end outwardly through the housing, and is adapted at its outwardly projecting end for receiving an auxiliary tool.

3. A lathe for grinding brake drums and the like comprising a housing, a work-holding spindle operatively journaled in and projecting at one end from the housing, a carriage slidably mounted on the housing for movement in outwardly spaced parallel relation to the spindle, a tool mounted on the carriage, a feed screw journaled in the housing and threadedly engaged with the carriage for feeding a tool to the work, said feed screw being provided adjacent one end with an unthreaded portion along which the carriage will become disengaged, an electric motor drivingly engaged with the spindle, a boss formed on the carriage and having a horizontal aperture, the axis of which is disposed in spaced parallel relation to the spindle, a rod mounted for slidable movement in the boss, a set screw threadedly mounted in the boss for optionally bearing against said rod to hold the rod in any

desired position of lengthwise adjustment within the limits of its slidable movement whereby the rod, when the set screw is tightened, will move to and fro with the carriage, a control switch electrically connected with the motor and having a switch-actuating element interposed in the path of the rod, and an inclined plate rigidly mounted at one end on the housing and having a rockable portion extending over the switch actuating element so as to be interposed between the switch actuating element and the rod whereby to stop the motor when the rod engages the plate at a selected point in the path of movement of the carriage in one direction.

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