Oct. 3, 1950 L. SICHEL 2,524,332

PORTABLE SLIDEWAY GRINDER

Filed Feb. 14, 1947 3 Sheets-Sheet 1

FIG. 1.

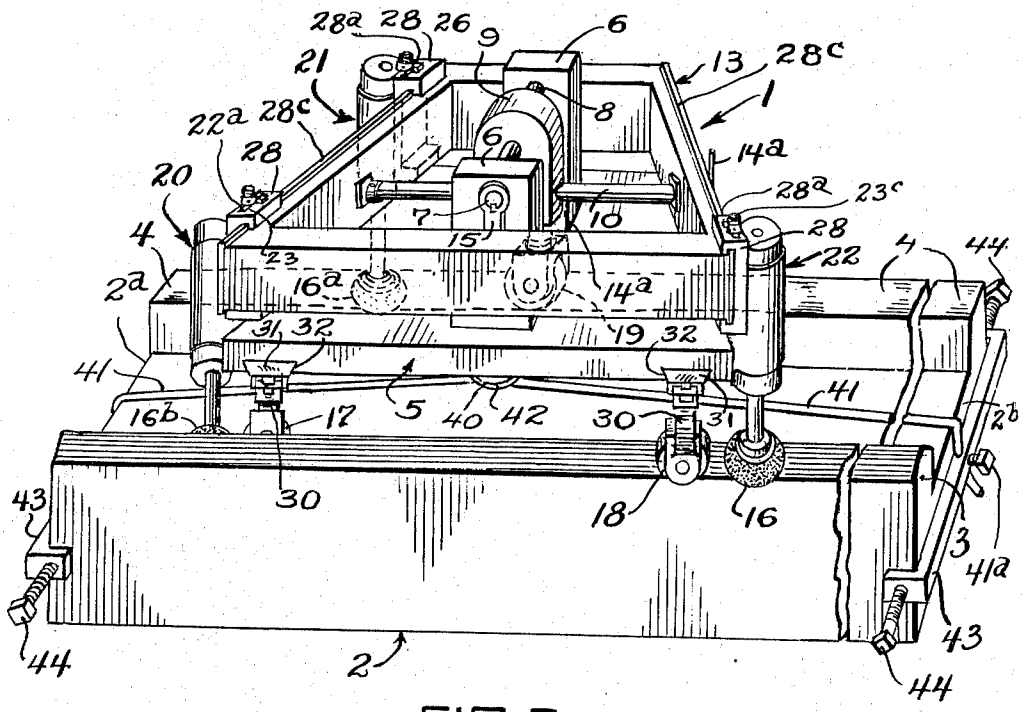
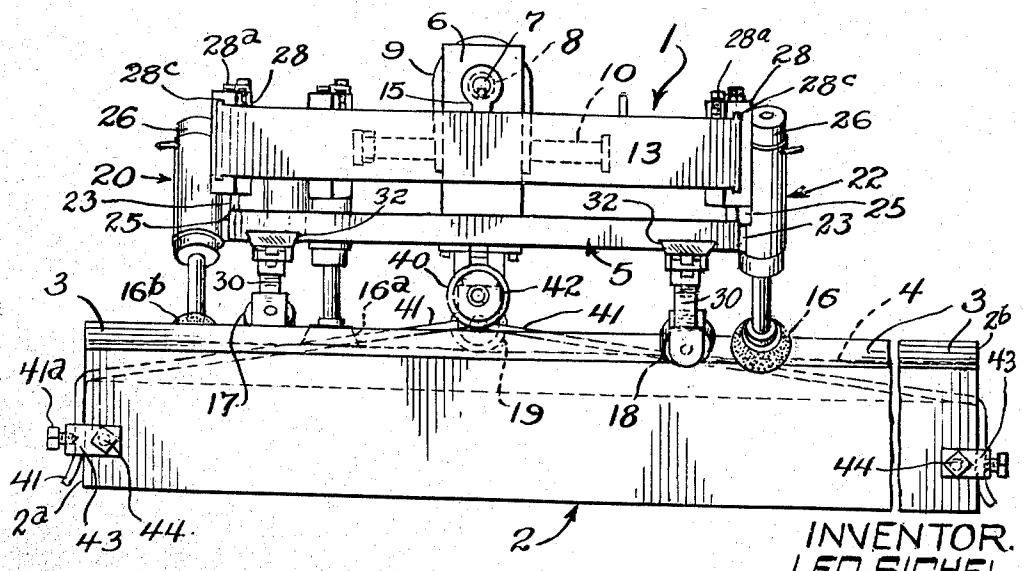


FIG. 2.



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FIG. 3.

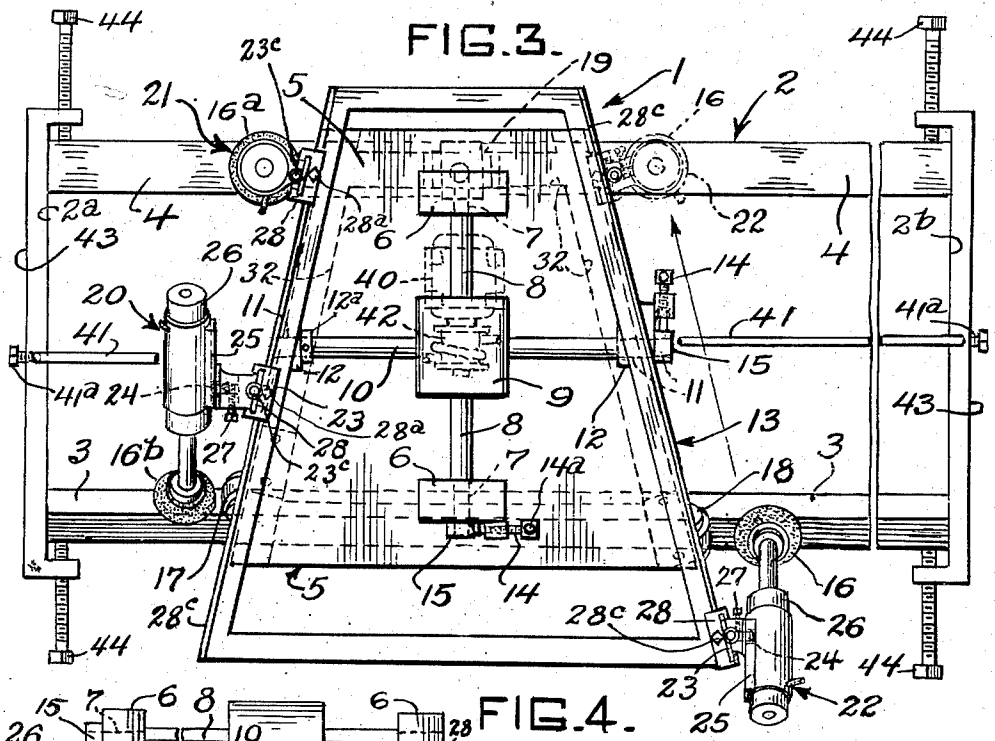


FIG. 4.

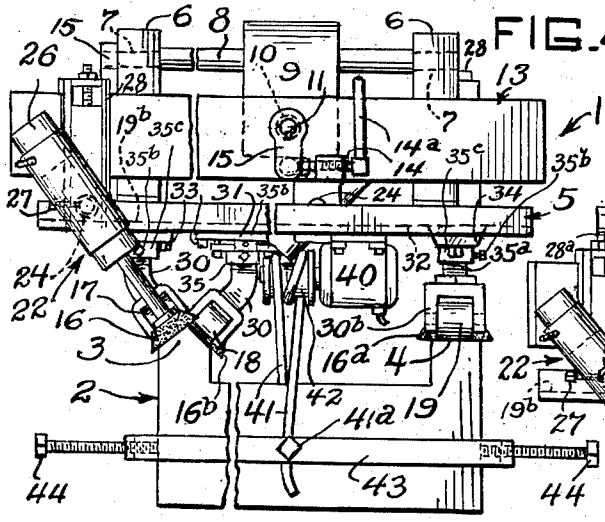


FIG. 5.

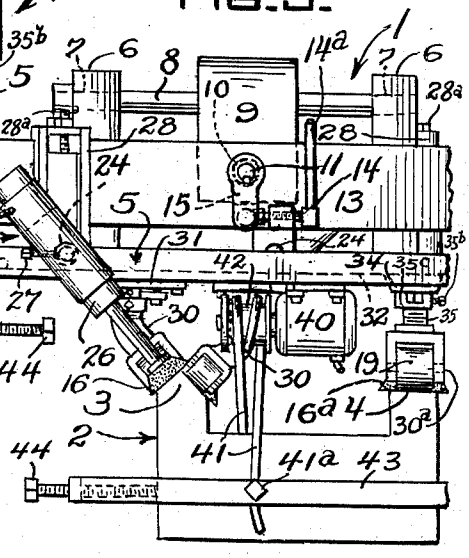


FIG. 6.

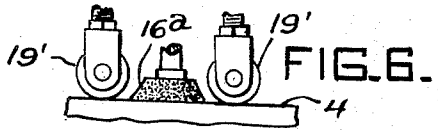
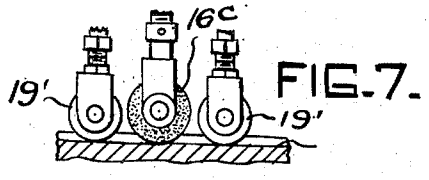


FIG. 7.



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FIG. 8.

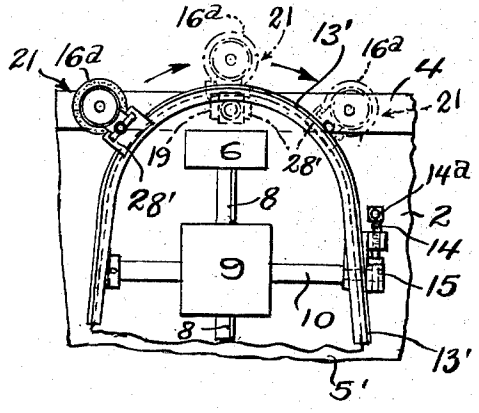


FIG. 9.

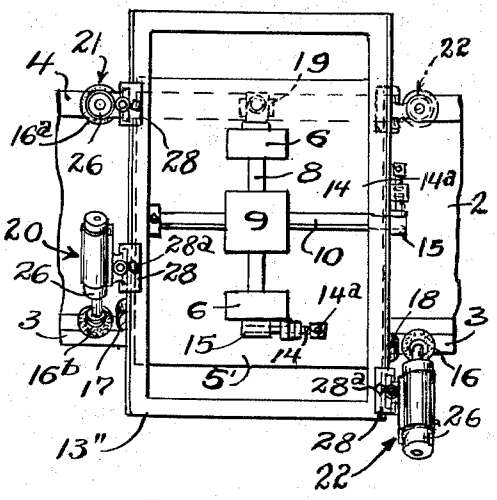


FIG. 11.

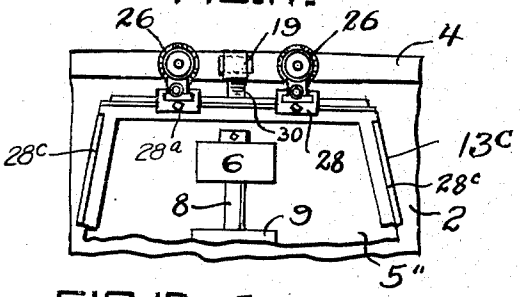


FIG. 10.

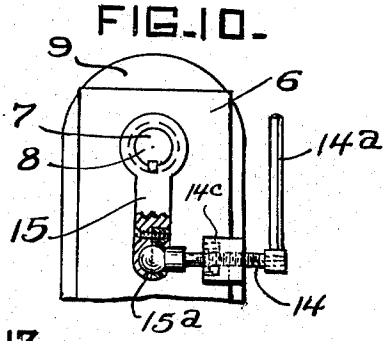


FIG. 12.

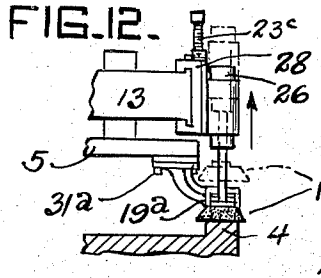


FIG. 13.

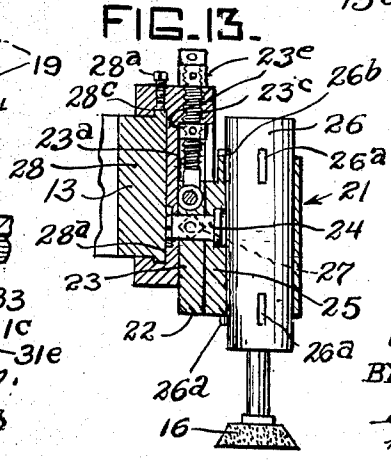


FIG. 15.

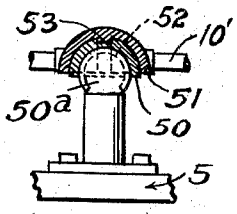
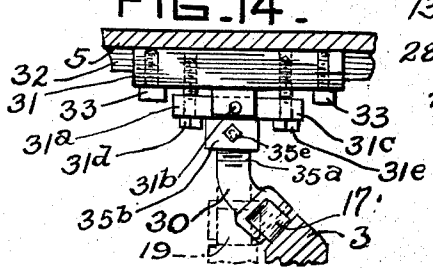


FIG. 14.



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PORTABLE SLIDEWAY GRINDER

Leo Sichel, St. George, N. Y.

Application February 14, 1947, Serial No. 728,475

8 Claims. (Cl. 51—241)

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My invention relates to a portable slideway grinding and milling apparatus for finishing guideways of machine tool beds, and is an improvement over my Patent No. 1,775,000.

The main object of my invention is that at least three grinding heads are used in as close proximity to each of the roller bearings as permissible, two of the grinding heads and two of the roller bearings operating on a V guideway, one grinding head and one roller on each beveled surface thereof, and on the flat guideway one grinding head and one roller bearing operates, thereby providing a three point bearing, or three bearing contact that determines a true plane, such a bearing constellation can be used to indicate deviations.

Another object of my invention is the adjustability of my grinder to any required gauge of guideways, in which the grinding heads and their respective roller bearings, may be moved towards each other or from each other, and set at an angle desired for V, flat or recessed guideways, and locked securely thereat.

Another object of my invention is the tilting means for the grinding heads, which is provided with further means to adjust minutely the tilting means to bring the required grinding head with its disk or wheel, to its original assumed plane. The tilting operation is accomplished by two different shafts extending through a floating center rocker block, the ends of one of the shafts being journaled in a suspended frame having the grinding heads, and the ends of the other shaft being journaled in upright bearings fixed on the base-plate or common support, thereby allowing the frame to tilt in both the longitudinal and crosswise direction with respect to the base-plate or common support.

Another object of my invention is the use of one of the two grinding heads on the V guideway to be shifted to the unfinished end of the other guideway having the third bearing.

Another object of my invention is the means for varying the distance and angularity between the bearings and their common support, and further means for placing and adjusting the bearings to any desired working angle or plane, and the height thereof.

A further object of my invention is the use of a bearing or roller bearing on each side of the grinding heads, this being used for a single grinding head on a flat guideway, so that one of the bearings remains on the guideway during the grinding operation.

An important object of my invention is the

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minute adjustment of the tilting means, as for instance, a hand lever is instantly operated during the grinding operation to compensate any variation of the grinding heads and disk or wheel, from their true working plane on the guideways, in which positive locking means may or may not be adopted, such as for example, very fine micro-threaded portions provide the precise adjustment required.

Still a further object of my invention is the alternative part of the frame end for shifting the third grinding head past the third bearing contact, instead of shifting the grinding head from the V guideway for finishing the unfinished portion of the other guideway.

Another further object of my invention is the alternative means of tilting the frame, such as for example, by a universal ball joint socket, having superimposed segments, each with a tongue and groove for the longitudinal and crosswise tilting, being in principle the same as in the original rocker shaft formation.

Another further object of my invention is the shape and design of the component parts such as the frame and common support, in which a frame of a rectangular, square, or triangular shape may be adopted, the three bearing contact, however, should be symmetrically balanced with the distributed weight. One advantage of the right angle frame and common support, such as the rectangular or square, is that all machine work is symmetrical, and all grinding heads are of the same structure and design, so either may be interchangeable with each other, if so desired. The longitudinal adjustment, as well as the crosswise adjustment of the bearings, is also more symmetrical in design, the grooves being parallel with each other and right angle to guideways upon which the bearings roll during the grinding operation. In the triangular shape frame and common support, the grooves are at an offset angle to the guideways, hence it is evident the machined parts are difficult and more expensive, however the frame being streamlined and proportionally balanced, therefore, either type of above shapes or designs may be adopted, if so desired.

A still further object of my invention is the provision of three roller bearings, or any other type of bearings, providing a three line or point contact on guideways of a machine tool bed, grinding means therewith, said bearings and grinding means being adjustably arranged on a common support.

Other objects of my invention will appear as the description proceeds in the following specifica-

tion, accompanied by the annexed drawings, in which

Figure 1 is a plan view in perspective of my portable slideway grinder or miller, and is shown operating on one V guideway and one flat guideway of a machine tool bed.

Figure 2 is an elevational view of my portable slideway grinder on side of the V guideway, shown in Figure 1.

Figure 3 is a plan view of my portable slideway grinder as shown in Figures 1 and 2.

Figure 4 is an elevational view of one end of my portable slideway grinder as shown in Figures 1, 2 and 3.

Figure 5 is a similar view as Figure 4, except the grinding heads and wheels have been brought closer together upon narrow gauge guideways, than shown in Figure 3.

Figure 6 shows diagrammatically in elevation, a fragmentary part of two roller bearings for each grinding head, if so desired.

Figure 7 is a similar view, except a cylindrical wheel is shown in place of the bevel disk in Figure 6.

Figure 8 is a fragmentary plan view of a single roller bearing end of frame having a curved track, so the grinding head and grinding disk may pass the bearing to the other unfinished end of guideway.

Figure 9 shown a much preferred form on a reduced scale of a rectangular frame with a common support or base-plate, in which all machined parts and elements thereto are in parallel relationship to each other, and at right angle to the guideways, thereby forming a symmetrical design, as in the original triangular-like shape the machined portions are arranged at an offset angle, and the grinding heads are of various sizes and proportions, in order to provide a balanced design.

Figure 10 is a fragmentary elevational view showing one end of the bearing blocks for longitudinal and crosswise shafts for adjusting means for said shafts in their tilting positions, in which a hand lever may be instantly operated to bring back the grinding head and disk or wheel to the original true working plane during the grinding operations.

Figure 11 is an alternative fragmentary view of the third roller bearing provided with a grinding head on each side thereof.

Figure 12 is also a fragmentary view in elevation, showing another alternative form of shifting the grinding head, raising same to pass over the roller bearing for the unfinished end of guideway.

Figure 13 is a cross-sectional view of one of the grinding head units, showing the swivel connection and the adjusting plate in a recessed groove of frame sliding block along the walls of the frame, in which is shown the motor attachment therewith.

Figure 14 is a fragmentary view on an enlarged scale, showing the adjusting means for setting the roller bearings in their true working plane on the guideways.

Figure 15 is a diagrammatic elevational view showing an universal ball joint for the tilting means, in which tongue and groove segments provide longitudinal and crosswise tilting means for the suspended frame structure of my portable grinding apparatus.

Referring to the drawings, which are shown more or less diagrammatically, the numeral 1 designates my complete portable slideway grinder in operation on a machine tool bed 2 having one V guideway 3 and a flat guideway 4. My grinder, which may be also used as a miller, comprises a base-plate or common support 5 onto which is provided fixed bearings 6 in an upright position, into which are journaled the ends 7 of a shaft 8 extending through a center rocker block 9, through which another shaft 10 also extends having its ends 11 journaled in the bearings 12 of a suspended frame 13, thereby providing a crosswise and longitudinal tilting means having grinding heads 20, 21 and 22 thereon.

A minute adjustment of the tilting means is shown in Figures 10 and 15, in which one end portion 7 of the shaft 8 and one end of the shaft 10, as indicated by the numerals 7 and 11, respectively, have secured thereon a lever 15 provided with a ball socket 15*a*, having a ball end of a threaded rod 14 extending through a fixed bearing on the upright bearing 6, and frame 13, the rod being actuated by the hand lever 14*a*. The fixed bearing 14*c* is tapped for micro-threads as well as the rod 14, these fine micro-threaded portions forming locking means, however, if so desired, means may be adopted to insure positive locking means to hold the adjusted lever 14*a*. Such a minute adjustment eliminates the stopping of the grinder during its grinding operations, and forms an essential part of my grinder.

Grinding disks 16, 16*a* and 16*b* and the grinding heads 20, 21 and 22, are adjustable and swiveled for their different working planes or positions, see Figure 13, in which they may be raised or lowered by a plate 23 sliding in a groove 23*a*, the plate 23 being swivelly connected at 24 to a grinding head bracket 25 securely holding the motor 26 receiving its source of current from any suitable supply (or may be any type of power motor), the motor being secured at 26*a* and 26*b*. Set-screw 27 locks the swivel connection 24, however, any other suitable swiveling means may be adopted, if so required. The plate 23 is adjusted by a threaded screw rod 23*c* and nut 23*e*, the plate 23 being slidable in the groove 23*a* of the frame block 28, which is slidable on rails 28*c* of frame 13, and may be secured at any desired working position desired by a set-screw 28*a*. However, the adjustment of the grinding heads may be done otherwise than shown, just so the same principles are accomplished.

The roller bearings 17 and 18 may or may not be offset as at 30, adjustably secured to a base-plate or common support 5, in which set-screws 33 secure plate 31 slidable in a dove-tail groove 32, so they may be moved to any desired working position, clearly shown in Figure 14. The roller bearings may be raised and lowered by means of a threaded shank 35*a* and nut 35*b* having a set-screw 35*e* to lock same. The roller bearing 19 is shown with a straight shank for reason they operate on flat or recessed guideways, while the bearings 17 and 18 operate on the tapered V surfaces. The roller bearings are minutely adjusted by means of a rocker plate 31*a* fulcrumed at 31*b* to lugs 31*c* of slidable plate 31, in which each end of rocker plate 31*a* may be slightly tilted for the grinding operation by either of the screws 31*d* and 31*e* in threaded portions of sliding plate 31.

In operating my portable slideway grinder back and forth upon guideways 3 and 4, see Figures 3, 4 and 5 a reversible motor 40 drives a drum 42 having wound thereon a cable 41 with its ends secured to an attachable clamping member 43 to the end portions of the machine tool bed 2 having

guideways 3 and 4, a set-screw 41*a* securing the cable 41 to the bed 2, the reversible motor 40 operates my portable suspended frame structure back and forth during the grinding operation. The member 43 with clamping screw-rods 44 is adjustable to fit any gauge of guideways, however, this merely is an example, and may adopt other means, if so desired.

In Figures 6 and 7, two roller bearings are shown, one on each side of the grinding heads 16*a* and 16*c*, respectively, so either grinding head may be passed by either roller bearing to finish grinding that part of the guideway not ground.

In Figure 8, a modified form of a frame 13' is shown, having a round or arcuated end portion, so as to allow the grinder 16*a* to pass by the roller bearing 19, to the unfinished end of the guideway 4.

In Figure 9, a much preferred form of a rectangular frame 13 and base-plate 5 is shown in which all machined portions, such as the original groove 32, and the rails 19*c* are in parallel relationship to each other, and at right angle to the bed guideways 3 and 4. Such a design provides easier machining and more symmetrical designs of the grinding heads, each interchangeable with each other, if so desired, all having the same dimensions thereof. The object of frame to be well balanced, but it is considered essential that proportionally it should be well balanced on its bearings, especially my three bearing contact on the guideways.

Similar parts in the drawing are primed to the original numeral, this applies to Figures 10, 11 and 13 particularly.

Figure 14 has been hereinbefore described, and similar numerals of the original grinder, are primed accordingly.

In Figure 15, an alternative form of tilting of my grinding apparatus is shown, having an universal ball bearing 50*a*, upon which are superimposed segments 50 and 51, provided with tongue and groove portions 52 and 53 for the longitudinal and crosswise tilting of the frame 13 and the grinding heads thereon. This alternative means of tilting is shown merely that I do not confine myself to one way of tilting, or any other means of my invention, and reserve all right to alter and amend any part or detail of my portable slideway grinder, providing same comes within the appended claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States of America, is as follows:

1. In a portable slideway grinder and miller of the character described, a grinding apparatus consisting of a grinder having at least three grinding heads arranged on a frame member and located in as close a proximity to roller bearings as permissible, two of said grinding heads and two of said roller bearings operating on one guideway of a machine tool bed, and a third grinding head and a third roller bearing operating on the other guideway, thereby providing a three bearing contact for said portable slideway grinder, means for adjusting said grinding heads to raise and lower same, for their true working plane on said guideways, means to swivel said grinding heads at any desired working angle or position, means to vary the distance between the two grinding heads on one guideway, and the third grinding head on the other guideway, means to vary the distance between two roller bearings on one guideway, and the third roller bearing on the other guideway, and means to operate said portable slideway grinder back and forth on said machine tool bed during the grinding operation, and further means to shift one of said two grinding heads to the guideway having the third grinding head, in order to finish grinding the unfinished end of said guideway.

2. In a portable slideway grinder of the character described, and as defined in claim 1, said means for operating said portable slideway grinder back and forth consisting of a reversible power motor arranged on a base-plate having said roller bearings, said motor driving a drum having a cable wound thereon, the ends of said cable being secured at each end of said tool bed being ground.

3. In a portable slideway grinder of the character described, a grinding apparatus consisting of a base-plate or common support, a frame above said base-plate, said base-plate having adjustable roller bearings arranged thereon, said frame having arranged thereon grinding heads with abrasive disks or wheels, means for tilting said frame and grinding heads thereon in both a longitudinal and crosswise direction of motion of said portable slideway grinder operating on guideways of a machine tool bed, further precise adjusting means to correct said tilting means to bring back the grinding disks or wheels of grinding heads to their original true plane, means to place and lock said grinding heads at any desired angle, means to adjust the working height of said grinding heads, means to adjust said roller bearings for their true bearing plane, and means to minutely adjust said roller bearings in any angularity plane, and means to vary the distance between said grinding heads and their respective roller bearings on different gauge machine beds, and means by a reversible electric motor and a cable to operate said portable slideway grinder back and forth during its grinding operation on said guideways.

4. In a portable slideway grinder of the character described, consisting of a grinding apparatus having an open frame member of at least three grinding heads, and a three roller bearing contact on guideways of a machine tool bed, said grinding heads arranged on said frame, said roller bearings adjustably secured to a base-plate or common support below said frame, suspension of said frame being provided by two separate shafts, one extending through a center rocker block, the other shaft extending through said center block at right angle to first instance shaft, first instance shaft having its ends journaled in upright bearings fixed to said base-plate, and the other shaft having its ends mounted to and on said frame, thereby providing tilting means in both the longitudinal and crosswise direction of motion of said portable slideway grinder during its grinding operation on said guideways, means to further adjust said tilting means to bring back the grinding heads and their disks or wheels to their original true working plane, and means to adjust said roller bearings for their true bearing plane, and means to vary the distance between the grinding heads on one guideway and the grinding heads on the other guideway, said roller bearings being similarly adjusted with respect to said grinding heads, and power means to operate said portable slideway grinder back and forth on said guideways during the grinding operations.

5. In a portable slideway grinder and miller of the character described, a grinding apparatus having the provision of a precise balance by three

bearings providing a three point contact on guideways of a machine tool bed, two bearings arranged on one V guideway, and one or the third bearing on a flat guideway, each of said two bearings being on opposite tapered sides of said V guideway, grinding heads arranged on opposite said bearings, a grinding head adjacent said third bearing on the flat guideway, means to adjust all of said bearings on a common support, means to adjust said grinding heads on a frame suspended from said common support, means to set said bearings at any angle or working plane, means to set said grinding heads at any required angle or working plane, means to vary the distance between the two bearings on said V guideways and the third bearing on the flat guideway, and said grinding heads similarly adjusted, means to tilt said frame in both the longitudinal and crosswise direction of motion of said portable slideway grinder during its grinding operation, and means to adjust said tilting means to bring back the grinding heads to their original assumed plane, suitable power means to operate said portable slideway grinder back and forth during its grinding operation, such as by a reversible motor, drum and cable having ends secured to the end portions of the machine tool bed.

6. In a portable slideway grinder and miller of the character described, consisting of at least three grinding heads and three roller bearings, one bearing to each grinding head, said grinding heads mounted from a frame, said roller bearings arranged on a base-plate or common support on which said frame is suspended, said frame suspended by means of upright bearings fixed to said base-plate common-support, a shaft journaled in said upright bearings, said shaft extending through a center rocker block, another shaft extending through said center rocker block at right angle to first instance shaft, second instance shaft having its ends mounted on said frame, thereby providing tilting means for both the longitudinal and crosswise direction of motion for said portable slideway grinder operating on guideways of a machine tool bed, means to vary the distance between the two grinding heads, and their respective bearings on one guideway, and the third grinding head and its respective bearing on the other guideway, means to vary the distance between the roller bearings and their common support, further means to adjust said roller bearings for their true bearing plane, means to adjust said grinding heads for their working height, means to swivel said grinding heads at any working angle or position, means to minutely adjust said tilting means to bring back said grinding heads with their grinding disks or wheels to their original true plane, means to adjust said roller bearings to their true bearing plane, means to operate said portable slideway grinder back and forth by means of a reversible power motor arranged underneath said base-plate or common support, said motor driving a drum that winds and unwinds a cable having its ends secured by suitable means at each end portion of said machine tool bed.

7. In a portable grinding and milling apparatus of the character described, the combination of an open frame member having grinding heads spaced apart thereon, said frame suspended by a cross-shaft journaled thereto, with said shafts extending through a floating center block, a second cross-shaft extending through said floating center block having its ends journaled in upright bearings mounted on a base-plate within said open frame, said base-plate being adjacent and below said frame, power driven grinding heads arranged on said frame, guideway rotary bearings arranged on said base-plate, each of said grinding heads provided with adjustable means to space them apart as required for different widths of guideways of tool bed machines, said grinding heads further adapted to be set at their true working plane during the grinding operation, a reversible power motor mounted underneath said base-plate, which drives a drum having a wound cable with its ends secured to the end portions of the tool bed machine, thereby, providing an anchorage therefore, so the complete grinding and milling apparatus may be operated backward and forward by said motor for the grinding and milling of said guideways.

8. In a portable grinding and milling apparatus of the character described, and as defined in claim 7, said adjustable means consisting of one end of each cross-shaft being locked by a hand lever, said lever adapted to actuate a threaded rod secured in a fixed threaded bearing, said threaded portions being of close micro-threads to retain the locking means, but when rotated slightly by said lever, the cross-shafts will be actuated by a crank lever connecting to said threaded rod, thereby adjusting minutely either of said shafts as may be required.

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