Feb. 28, 1928. 1,660,810

J. L. PERKINS ET AL

GRINDING WHEEL DRESSER

Filed Dec. 4, 1926

FIG. 1

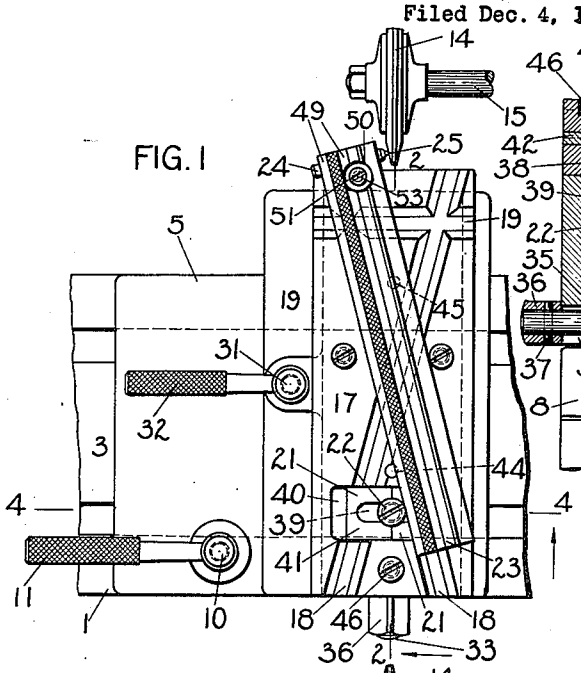


FIG. 2

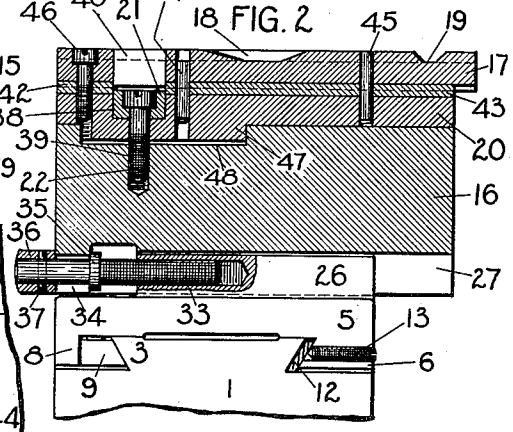


FIG. 3

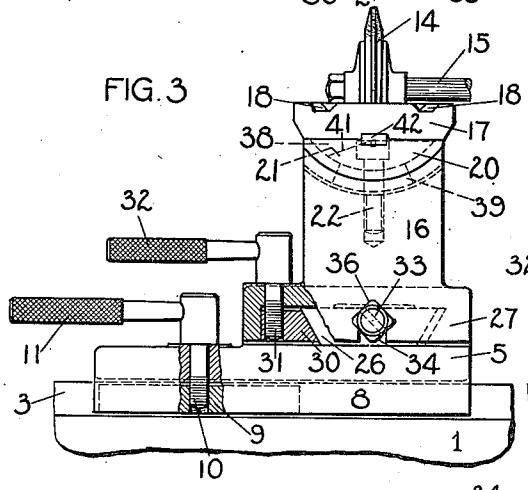


FIG. 4

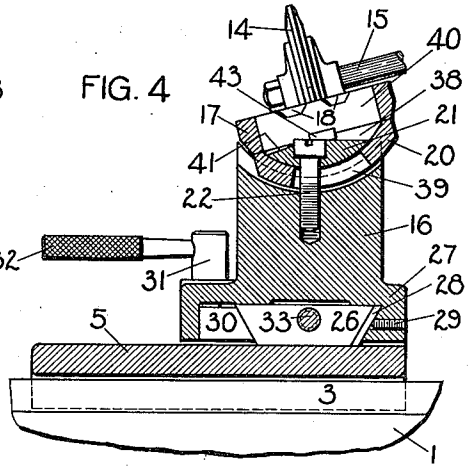


FIG. 5

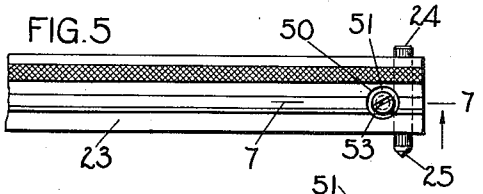


FIG. 6

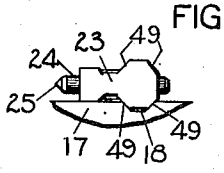
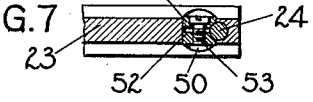


FIG. 7



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UNITED STATES PATENT OFFICE.

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GRINDING-WHEEL DRESSER.

Application filed December 4, 1926. Serial No. 152,612.

Our invention relates to improvements in machines for dressing the peripheral surfaces of wheels made of abrading material and used for grinding the teeth of gears and the threads or spiral teeth of worms, and consists in general of a table slotted or grooved in a certain peculiar manner, a slide bar adapted to carry a wheel-dressing point, which bar is designed to be received on said table and guided by the grooves therein to carry said point across the peripheral surfaces of the wheels to be dressed, means to tilt the table so that one longitudinal edge shall be higher than the other longitudinal edge thereof, and means to adjust the table longitudinally, together with supporting elements and such other parts and members as may be necessary or desirable in order to render the dresser complete and serviceable in every respect, all as hereinafter set forth.

The primary object of our invention is to produce a machine or mechanism with which to cut away or dress the peripheral surfaces of grinding wheels with the utmost accuracy, and expeditiously, such mechanism being comparatively simple in construction and operation.

Another object is to provide this dresser with an adjustment which enables the same to be employed for dressing grinding wheels used on worms, as well as those used on gears.

Other objects and advantages will appear in the course of the following description.

We attain the objects and secure the advantages of our invention by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a top plan of a grinding-wheel dresser which embodies a practical form of our invention; Fig. 2, a longitudinal, vertical section through said dresser, taken on lines 2—2, looking in the direction of the associated arrow, in Fig. 1; Fig. 3, a front elevation of the dresser, with certain parts broken away to afford a better view of other parts; Fig. 4, a transverse, vertical section through the dresser, on lines 4—4, looking in the direction of the associated arrow, in Fig. 1; Fig. 5, an enlarged, top plan of a portion of the slide bar; Fig. 6, an enlarged, rear end elevation of said bar, and, Fig. 7, a vertical section through the bar, on lines 7—7, looking in the direction of the associated arrow, in Fig. 5.

Similar reference characters designate similar parts throughout the several views.

Although our dresser might be mounted, either directly or indirectly, on a supporting part of a grinding machine, or of a machine of some other type, or, in fact, on any suitable support or supports that may or may not be adjustable, we have here shown the same indirectly mounted on a fixed base 1 which has extending longitudinally on top thereof a dove-tail guide 3, and directly on a movable base 5. The base 5 is mounted to slide on the guide 3.

The movable base 5 is held and may be rigidly secured to the guide 3 by means of a depending part 6 of said base on one side of said guide, a depending part 8 of said base on the other side of said guide, a wedge block 9 interposed between said part 8 and the adjacent side of the guide, and a vertical lock screw 10 having a horizontal handle 11. The inner face of the part 6 is inclined to correspond with the adjacent side of the guide 3. A shim 12 and an adjusting screw 13 therefor are provided as usual to take up wear of the parts. The screw 10 extends downwardly through the base 5 and is tapped into the wedge block 9, the inner end of which block is beveled to correspond with the inclination of the contiguous side of the guide 3, and when said screw is tightened said block is forced against said guide and forces said guide against the shim 12, whereby said base is rigidly secured to the base 1. To adjust the base 5 on the base 1, it is merely necessary to loosen the screw 10 and slide said first-named base on the guide 3, after which said screw is again tightened.

In Figs. 1, 3, and 4, a grinding wheel to be dressed is represented at 14, and portions of a shaft upon which said wheel is mounted is represented at 15. The shaft 15, in practice, is capable of being moved bodily to locate the wheel 14 in position to be dressed.

The dresser itself comprises a body or bed 16; a table 17 having in the top lengthwise thereof oblique, intersecting grooves 18—18, and in said top transversely thereof a groove 19 which intersects said first-named grooves; an arcuate bottom or base 20 for said table, said base being mounted on or in

said bed, and having said table rigidly attached thereto; a clamping block or clamp 21 and a bolt 22 by means of which said base is secured to said bed, and a slide bar 23 provided with securing means (hereinafter described) for a diamond or dressing point rod or holder 24. A dressing or diamond point 25 is secured in one end of the holder 24 with the apex of said point located in front of such end.

The adjustable base 5 is provided with a dove-tail guide 26 which is at right-angles to the guide 3, and the bed 16 has a base 27 that is mounted for longitudinal adjustment on said first-named guide. The base 27 inside, on one side of the guide 26, has an inclination which corresponds with the inclination of such side, a shim 28 and an adjusting screw 29 therefor are provided here, as in the other case. Within the base 27, between the side of the guide 26, which is opposite to that where the shim 28 is located, and the adjacent side of said base, is a wedge block 30 having its inner end beveled to correspond to the bevel of the contiguous side of said guide. A screw 31, similar to the screw 10, extends downwardly through the top of the base 27 and is tapped into the block 30. This screw also is provided with a horizontal handle, as 32. When the screw 31 is tightened, the block 30 is forced against the guide 26 and forces the latter against the shim 28, and thus securely holds the bed 16 against longitudinal movement on the base 5. Upon loosening the screw 31, the bed 16 can be adjusted on the base 5 or on its guide 26, and for this purpose a horizontal adjusting screw 33 is provided.

In the vertical center of the front end of the base 27 is a slot 34 which opens at the bottom through the lower edge of said base. The screw 33 at the inner terminal is tapped into the forward end of the guide 26, and said screw is provided with a collar 35 inside of and with an angular head 36 outside of the front end of the base 27, said head being pinned at 37 to said screw. The collar 35 and the head 37 on the screw 33, being located on opposite sides of the slotted end of the base 27, hold said screw against endwise movement independently of said base and the bed 16, consequently, if the screw 31 be loosened, and the screw 33, through the medium of said head, be rotated in one direction, said last-named screw enters farther into the guide 26, and carries with it the bed 16, and, if said last-named screw be rotated in the opposite direction, it moves farther out of said guide, and carries with it said bed, the latter moving rearwardly in the first case and forwardly in the second case. After adjustment the screw 31 is again tightened. Ordinarily the bed 16 is adjusted on zero, that is to say, it is set at a point which enables the dressing point to face off or remove from the grinding wheel no more than exactly the right amount.

The top of the bed 16 in cross section is made arcuate to receive the base 20. The base 20 is recessed in the top, a short distance from the front end, as represented at 38, to form a segmental part having an arcuate surface above as well as below, and in such part is a slot 39 to accommodate the screw 22. The table 17 is slotted at 40 directly above the recessed part 38 of the slot 39 in the base 20. The clamping block 21 is received in the opening 38, fits snugly between the front and back sides of said opening, and has an arcuate bottom to correspond with the arcuate bottom of said opening. The screw 22 extends downwardly through the block or clamp 21 and through the slot 39 to be tapped into the bed 16, the head of said screw being countersunk in said clamp. When the screw 22 is tightened the block 21 is forced against the floor of the opening 38 and the base 20 is forced against the concave part provided to receive it in the top of the bed 16, and said base, with the table 17, is thus prevented from moving on its longitudinal axis or tilting. Upon loosening the screw 22, however, the base 20 can be moved in the top of the bed 16 to tilt the table 17. Inasmuch as the clamp 21 is in fixed relation to the bed 16, it is necessary to bevel, as at 41, the top of said clamp on one side of the axis of the screw 22, otherwise the clamp would be in the way of the underside of the table 17 and prevent said table from being tilted. Since it is necessary to tilt the table 17 in one direction only, that being the direction to elevate the right-hand longitudinal edge and lower the left-hand longitudinal edge of said table, the top of the clamp 21 to the right of the axis of the screw 22 is made horizontal.

The table 17 and the base 20 are made in two pieces for the reason that, in order to insure durability, and maintain accuracy, it is desirable, not to say necessary, to use special steel for the piece (said table) which carries and has reciprocated thereon the bar 23, while for the other piece (said base) ordinary material can be used.

In order to secure the table 17 immovably to the base 20, so that said table and base are as one piece, we make use of two keys or splines 42 and 43, pins 44 and 45, and a screw 46. The splines 42 and 43 are received in upper and under, oppositely disposed keyways in the underside of the table and the top of the base 20, respectively, said splines being in the longitudinal, vertical center of said table and base. The spline 42 extends from the front ends of the table 17 and the base 20 to the front sides of the openings or recesses 40 and 38, respectively provided in

said table and the base 20 to afford access to the screw 22 when it is desired to tighten and loosen the same, and for the reception of the block 21. The spline 43 extends from the back sides of the recesses 40 and 38 to the rear ends of the table 17 and base 20. The table 17 and the base 20 are bored vertically in the longitudinal center, as also is the spline 43, to receive the pins 44 and 45. The top of the pin 45 is approximately flush with the top of the bed 17, but the top of the pin 44 is approximately flush with the plane of the bottoms of the grooves 18 and 19, since said last-named pin is located at a point where portions of said grooves 18 intersect. The table 17 is bored and counterbored vertically to receive the screw 46 and its head, and the base 20 is tapped to receive said screw. The spline 42 is also bored to register with the openings or passages in the table 17 and the base 20 for the screw 46. The screw 46, when passed through the table 17 and the spline 42 into the base 20 and tightened, securely holds said spline against endwise movement, and the pins 44 and 45 perform a similar office for the spline 43. The screw 46 is in the same vertical plane with the pins 44 and 45.

The table base 20 has a downwardly extending part 47 which is received and fits between the ends of a transverse recess 48 in the bed 16. By this means and in this manner the base 20 is held against endwise movement relative to the bed 16.

Each of the grooves 18 and 19 in cross section has a bottom that is parallel with the top of the table 17, and sides that incline upwardly and outwardly from such bottom at angles of 45°, and the slide bar 23 has one longitudinal edge enlarged or projected on both sides, or on the top and bottom sides, and chamfered at 45° angles, as represented at 49. Each of these chamfered enlargements or sides is of a size to fit within any of the grooves 18 and 19, without, however, extending clear to the bottom of the groove, as clearly shown in Fig. 6. The other longitudinal edge portions of the bar 23 are adapted to rest on top of the table 17, when the beveled surfaces 49 on either side are in any of the aforesaid grooves. Then, owing to the shape and proportion of the parts, the bar 23 is maintained with its longitudinal, horizontal, central plane parallel with the top of the table 17. Preferably, the surfaces which are between the chamfered parts 49 on each side of the bar 17 are knurled to afford a gripping surface.

It will now be seen that, if the bar 23 be placed either side up on the bed 17, with the bottom chamfers 49 in any of the grooves 18 or 19, said bar can be pushed back and forth in an undeviating course.

The diamond-point holder 24 is received in a horizontal passage that extends through the bar 23, in the longitudinal, central plane, near one end, and from one vertical, longitudinal edge to the other, of said bar. The bar 23 has a vertical, longitudinally central opening 51 therethrough, into one side of which opens the passage for the holder 24. In the opening 50 are two round clamps 51 and 52 which are cut away in one side to receive a portion of the holder 24, as shown in Fig. 7. A screw 53 passes through the clamp 51, which is countersunk to receive the head of said screw, and is tapped into the clamp 52. The clamps 51 and 52 are held apart by the holder 24, so that said clamps can not come into contact with each other, when said holder is in place. Upon tightening the screw 53, however, the clamps 51 and 52 are drawn toward each other and caused firmly to grasp the holder 24 and secure the same in place in the bar 23. When it is desired to remove or adjust the holder 24, it is simply necessary to loosen the screw 53.

The holder 24 is long enough to support the diamond point 25 at a sufficient distance from the adjacent edge of the bar 23, and for whatever adjustment longitudinally may be needed.

When the dresser is to be used in dressing a grinding wheel for gears, the table 17 is positioned and secured in the horizontal position which it occupies in Figs. 1 and 3, and the shaft 15 is horizontal, but, when said dresser is to be used in dressing a grinding wheel for worms, said table is tilted to correspond with the pressure angle of the worms to be ground by said last-named wheel, which angle may be 14½°, 20°, or such other number of degrees as the case requires. In the latter case, the shaft 15 is located at an angle to agree with that at which the table is tilted. In Fig. 4 the table 17 and shaft 15 are shown in their tilted positions.

After the necessary adjustments have been made, if any be required, and the shaft 15 has been moved into position properly to locate the grinding wheel 14, and said shaft with said wheel has been set in motion, the operation of the dresser as a whole is described as follows:

The bar 23, held with the end adjacent to which the holder 24 and its diamond point 25 are located rearwardly disposed, and said point at the right, is placed in the groove 18 that extends obliquely to the left from the front end of the table 17, with said point forward of the wheel 14, and said bar is pushed rearwardly until said point passes in contact with and beyond the left-hand beveled surface of said wheel. As the diamond point passes in contact with the aforesaid surface of the revolving wheel 14, said surface is properly ground off and trued, or dressed. Next, the bar 23 is removed from

the groove 18 in which it was first placed, turned completely over, placed in the other groove 18, with the diamond point forward of the wheel 14, and pushed rearwardly into contact with and past the other beveled surface of said wheel. Finally, the bar 23 is transferred from the groove 18 in which it was last placed to the groove 19, and moved either to the right or to the left, as occasion requires, in contact with and across the extreme periphery of the wheel 14, or that part of the periphery of said wheel which is concentric with the axis of the shaft 15, and the same is dressed by the diamond point in a similar manner as were the two beveled portions of the wheel dressed. This time the bar 23 is positioned to locate the point 25 behind said bar. Inasmuch as the grinding wheel revolves rapidly, it is necessary generally to carry the diamond point only once across the surface to be dressed. These operations are repeated on each grinding wheel presented for dressing.

The diamond point is held absolutely true to its course across the surface of the grinding wheel by the bar 23 sliding on the table 17, with two of the beveled surfaces 50 in one of the grooves in said table, wherefore is performed work of the utmost accuracy and obtained results that are entirely satisfactory.

The above sequence of placing the slide bar 23 in the grooves 18 and 19 may be varied at will, said bar first being placed to dress any one of the three grinding surfaces of the wheel, next to dress either of the two remaining surfaces, and lastly the third surface.

The grinding wheel 14 in each and every case must be located, when in position to be dressed, with the central plane which is at right-angles to the axis thereof in a continuation of the plane, vertical or tilted, in which are located the intersecting points of the grooves 18, otherwise said wheel would be reduced by the diamond point more on one side than on the other. If the grinding wheel be located in position to be dressed on its major circumference by the diamond point when the bar 23 is in the groove 19, said wheel is in position to be dressed on either of its beveled portions by said point when said bar is in one or the other of the grooves 18.

The apex of the point 25 and the axis of the base 20 are always in the same horizontal plane, and the axis of the shaft 15 must be in said plane when the dressing operations take place, for reasons which will be well understood.

The transverse table groove (19) might not always be, as here, at right-angles to the longitudinal, central, vertical plane of the table when horizontally disposed, but might be at a different angle to said plane, and the angles of the oblique table grooves (18) will be varied to meet different conditions. In a dresser, such as the one illustrated in connection herewith, the angles of the oblique grooves must correspond to the pressure-angles of the worm or gear ground by the wheel to be dressed, whether that angle be 14½°, 20°, or some other number of degrees.

Without making changes which would materially affect our invention, the dresser might be adapted for other purposes than dressing grinding wheels for gears and worms, as hereinbefore intimated.

More or less change in the shape, size, construction, and arrangement of some or all of the parts of this dresser, in addition to those previously specifically pointed out, may be made without departing from the spirit of our invention or exceeding the scope of what is claimed.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, in a grinding-wheel dresser, with a bed having an arcuate recess in the top, the chord of the arc of said recess being approximately horizontal, of a table having slide-bar guide grooves therein, and provided with an arcuate recessed and slotted base mounted to move about its axis in said recess in said top, the bottom of the recess in said base being arcuate, and the slot in said base opening above into said second-named recess and below through the under side of the base, a clamp having an arcuate bottom to fit said bottom of said second recess, and a screw passing through said clamp and said slot and tapped into said bed, said screw bisecting said chord and arc, and therefore being approximately vertical.

2. The combination, in a grinding-wheel dresser, with a bed having an arcuate recess in the top, the chord of the arc being approximately horizontal, of a table having slide-bar guide grooves therein, and provided with an arcuate recessed and slotted base mounted to move about its axis in said recess in said top, the bottom of the recess in said base being arcuate, and the slot in said base opening above into said second-named recess and below through the under side of the base, a clamp having an arcuate bottom to fit said bottom of said second recess, and an approximately vertical screw passing through said clamp and said slot and tapped into said bed, said table being recessed above said screw to afford access thereto.

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