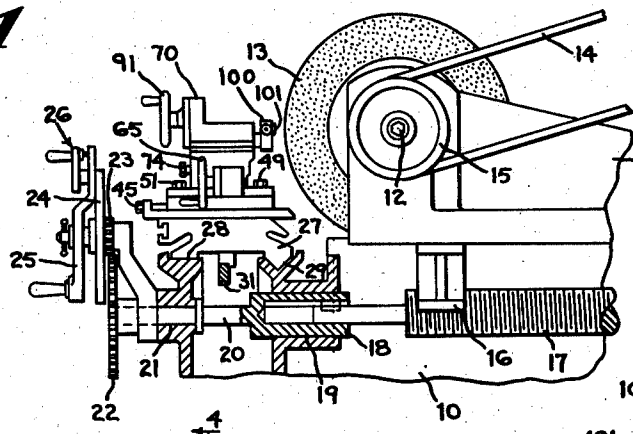
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GRINDING WHEEL TRUING APPARATUS

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Fig.1



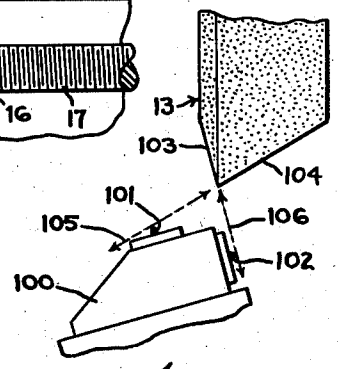


Fig.6

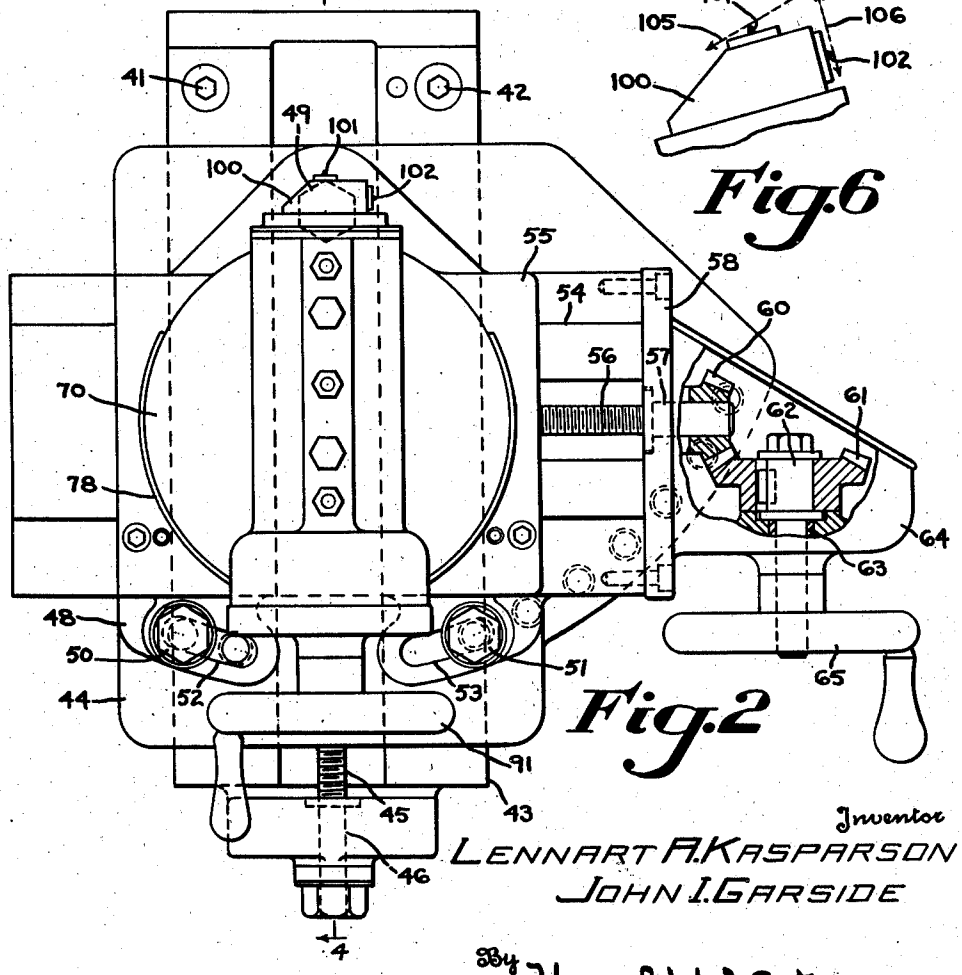


Fig.2

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GRINDING WHEEL TRUING APPARATUS

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Fig 3

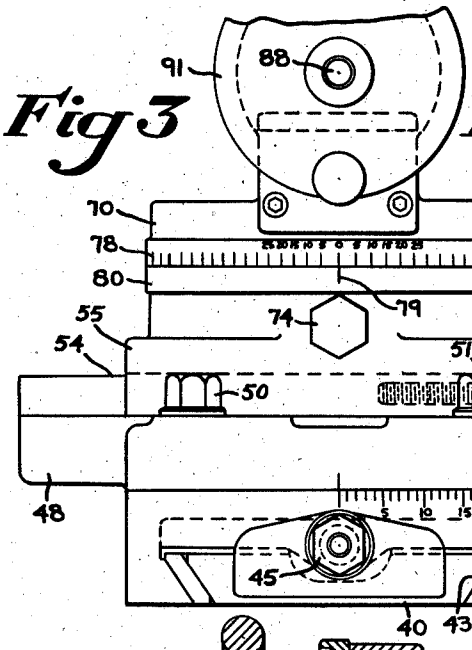


Fig 5

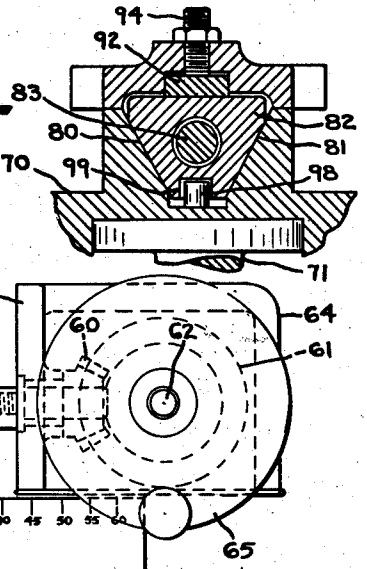
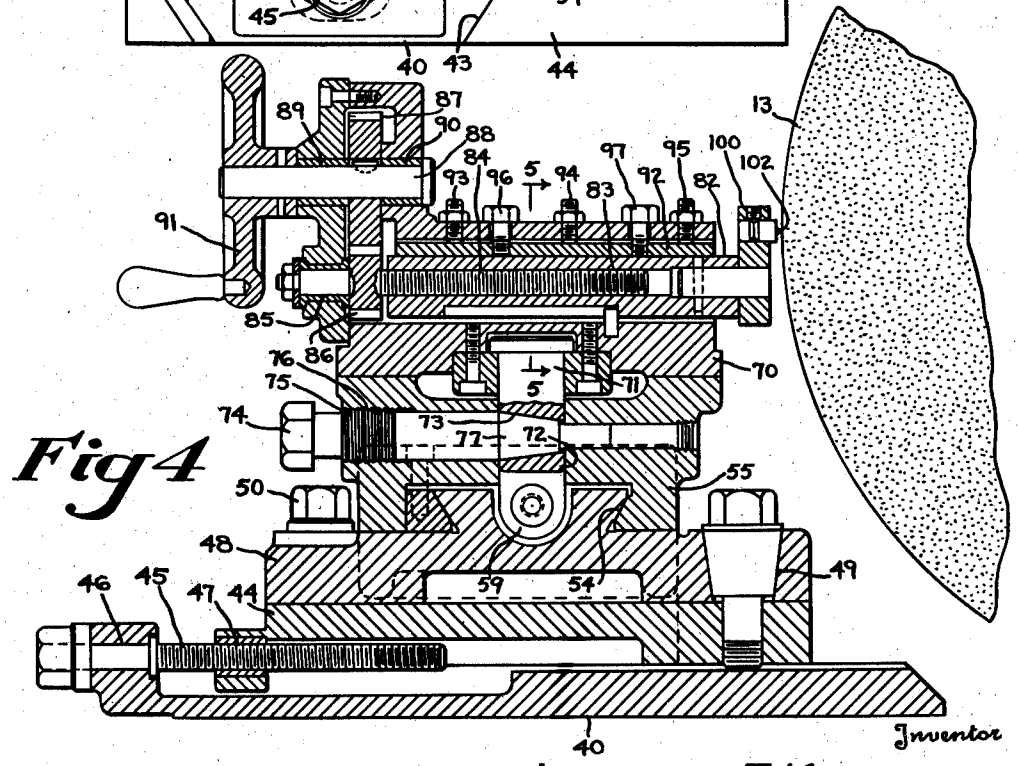


Fig 4



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2,292,947

GRINDING WHEEL TRUING APPARATUS

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Application July 23, 1941, Serial No. 403,738

3 Claims. (Cl. 125—11)

The invention relates to grinding machines, and more particularly to a grinding wheel truing apparatus.

One object of the invention is to provide a simple and thoroughly practical double angle grinding wheel truing apparatus. Another object of the invention is to provide an improved angular grinding wheel truing apparatus in which a pair of diamonds or truing tools are arranged for an angular traversing movement to true either a cylindrical face or to true diverging angular faces on a grinding wheel. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, as will be exemplified in the structure to be hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is shown one of various possible embodiments of the mechanical features of this invention,

Fig. 1 is a fragmentary cross sectional view through a grinding machine, illustrating the improved grinding wheel truing apparatus in elevation and showing the grinding wheel feeding mechanism partly in section;

Fig. 2 is a plan view, on an enlarged scale, of the grinding wheel truing apparatus;

Fig. 3 is a fragmentary front elevation, on an enlarged scale, of the improved grinding wheel truing apparatus;

Fig. 4 is a vertical cross-sectional view, taken approximately on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary cross sectional view, taken approximately on the line 5—5 of Fig. 4; and

Fig. 6 is a fragmentary plan view, showing the relation of the truing tools and their paths of travel to the operative face of the grinding wheel.

A grinding machine has been illustrated in the drawings comprising a base 10 having a transversely movable grinding wheel slide 11 mounted on the usual V-way and flat way (not shown) on the base 10. The wheel slide 11 serves as a support for a rotatable grinding wheel spindle 12 which in turn serves as a support for a rotatable grinding wheel 13. The grinding wheel spindle 12 may be driven by any suitable source of power, such as those well known in the art, that is, either an electric motor mounted on the wheel slide 11, or an overhead drive shaft. A driving belt 14 transmits power from the source (not illustrated) to a pulley 15 mounted on the end of the wheel spindle 12.

The grinding wheel slide 11 may be moved transversely relative to the base 10 by a suitable wheel feeding mechanism such as, for example, that shown in the prior U. S. patent to Charles H. Norton, No. 762,838 dated June 14, 1904, to which reference may be had for details of disclosure not contained herein. This feeding mechanism may comprise a depending half nut 16 which is fixedly mounted on the under side of the wheel slide 11 and meshes with a rotatable cross feed screw 17. The cross feed screw 17 is journalled in bearings (not shown) in the base 10. The forward end of the feed screw 17 is slidably keyed within a rotatable sleeve 18 which is journalled in a bearing surface 19 formed within the base 10.

A shaft 20 is formed integral with the sleeve 18 and is journalled in a bearing 21 formed in the base 10. A gear 22 is mounted on the outer end of the shaft 20 and meshes with a pinion 23. The pinion 23 is rotatably supported on a stud (not shown) to rotate with a gear 24 which is formed as a part of a manually operable feed wheel 25. A micrometer wheel feed adjusting mechanism 26 is provided whereby the infeeding movement of the grinding wheel 13 may be stopped in a desired adjusted position.

A longitudinally reciprocable work supporting table 27 is slidably supported on a flat way 28 and a V-way 29 formed on the upper surface of the base 10 to support the table 27 for a longitudinal reciprocatory movement relative to the base 10. The table 27 serves as a support for a rotatable work supporting mechanism and also as a support for a truing apparatus to be hereinafter described. The table 27 is arranged to be traversed longitudinally by means of a rack bar 31 depending from the under side of the table 27 by means of either a power operated or a manually operable traversing mechanism (not shown) such as, for example, substantially the same as that shown in the prior expired patent to Norton above referred to.

The improved truing apparatus comprises a pair of angularly adjustable and traversable diamonds or truing tools which are supported so that the entire assembly may be moved transversely in a path substantially normal to the pivotal axes of the two angular adjustments to facilitate truing two angular operative faces on the periphery of a grinding wheel 13. The improved truing apparatus comprises a base plate 40 which is preferably clamped to the upper surface of the table 27 by bolts 41 and 42 (Fig. 2). A dovetailed slideway 43 (Figs. 2 and 3) is formed

on the member 40 and is arranged to mate with a correspondingly shaped dovetailed slideway formed in the underside of a platen 44 (Fig. 3). A feed screw 45 is rotatably supported in a bearing 46 formed integral with the base plate 40. The screw 45 meshes with or engages a nut 47 carried by the platen 44. By rotation of the screw 45, the platen 44 supporting the truing apparatus may be adjusted transversely relative to the machine to position the truing apparatus in the desired position relative to the grinding wheel 13.

The platen 44 serves as a support for a pivotally mounted plate 48 which is pivotally supported on a tapered stud 49 (Fig. 4). Clamping screws 50 and 51 are provided for clamping the plate 48 in adjusted position. The clamping screws 50 and 51 pass through elongated arcuate-shaped slots 52 and 53 formed in the plate 48 and are screw threaded into the transversely movable supporting platen 44. The platen 44 is provided with a graduated scale 54 to facilitate angular adjustment of the plate 48 as desired. It will be readily apparent from the foregoing disclosure that the plate 48 may be readily adjusted angularly by loosening the clamping screws 50 and 51 and then swivelling the plate 48 to the desired angular position, after which the plate 48 may be readily clamped in adjusted position by tightening the clamping screws 50 and 51.

A dovetailed slideway 54 is formed on the upper surface of the plate 48 and is arranged to extend in a direction normal to the path of transverse adjustment of the platen 44 when the platen 48 is set at zero according to the scale 54. A longitudinally movable slide 55 is provided having a dovetailed slideway formed on its under surface which mates with the dovetailed slideway 54. In order to facilitate a longitudinal traversing movement of the slide 55, a rotatable feed screw 56 is journalled in a bearing 57 formed in an end cap 58 supported at one end of the platen 48. The screw 56 meshes with or engages a nut 59 depending from and formed integral with the under side of the slide 55.

A manually operable traversing mechanism is provided for the feed screw 56, comprising a bevel gear 60 which is fixedly mounted on the right-hand end of the feed screw 56 (Fig. 2). The bevel gear 60 in turn meshes with a bevel gear 61 which is fixedly mounted on a rotatable shaft 62. The shaft 62 is journalled in a bearing 63 carried by a projecting portion 64 of the end cap 58. A manually operable hand wheel 65 is mounted on the outer end of the shaft 62. It will be readily apparent from the foregoing disclosure that a manual rotation of the hand wheel 65 will be transmitted through the gears 61 and 60 to rotate the feed screw 56 so as to traverse the slide 55 longitudinally relative to the supporting plate 48.

The longitudinally movable slide 55 in turn supports a swivel head 70. The swivel head 70 serves as a support for a pivot stud 71 (Fig. 4) which passes through a central aperture 72 formed in the longitudinally movable slide 55. The stud 72 is provided with a frusto-conically shaped aperture 73. A clamping bolt 74 having a threaded portion 75 is screw threaded into an aperture 76 formed within the longitudinally movable slide 55. The clamping bolt 74 is provided with a frusto-conically shaped portion 77 which passes through the frusto-conical aperture 73 in the stud 71. The aperture 73 is larger in size than the frusto-conical portion 77 of the clamping bolt 74. It will be readily apparent from the foregoing disclosure that when it is desired to clamp the swivel head 70 in adjusted position, the binder or clamping screw 74 may be tightened so that the frusto-conical portion 77 is moved toward the right, thus producing a wedging action and causing a downward pull upon the pivot stud 71 to clamp the head 70 in the desired adjusted position. The swivel head 70 is provided with a graduated scale 78 on its peripheral surface. An index point 79 is provided on a cylindrically shaped portion 80 of the longitudinally movable slide 55 to facilitate angular adjustment of the head 70 to the desired position.

The swivel head 70 is provided with a transversely extending V-way comprising a pair of angular positioned plane surfaces 80 and 81 which serve as a support for a transversely movable slide 82. The slide 82 is provided with a V-shaped slideway having surfaces mating with the surfaces 80 and 81 of the swivel head 70. A nut and screw mechanism is provided for traversing the slide 82 transversely relative to the swivel head 70, comprising a rotatable feed screw 83 which engages or meshes with a threaded aperture 84 within the slide 82. The screw 83 is journalled in a bearing 85 which is supported in fixed position on the swivel head 70. A gear 86 formed integral with the feed screw 83 meshes with a gear 87 which is fixedly supported on a rotatable shaft 88. The shaft 88 is journalled in bearings 89 and 90 which are supported in fixed relationship with the swivel head 70. A manually operable wheel 91 is mounted on the outer end of the shaft 88 by means of which the gear 87, the gear 86, and the feed screw 83 may be rotated as desired to traverse the slide 82 transversely relative to the swivel head 70.

In order to maintain the slide 82 in sliding engagement with the V-way 80—81, a shoe 92 extends longitudinally along the upper surface of the slide 82 (Fig. 4). A plurality of adjusting screws 93, 94 and 95 are provided for manually adjusting the position of the shoe 92 so that the slide 82 may be maintained in sliding engagement with the supporting ways without any lost motion. A pair of pull screws 96 and 97 are provided to cooperate with the screws 93, 94 and 95 to facilitate adjustment of the shoe 92.

A stud 98 mounted on the upper end of the pivot stud 71 is located within a groove 99 formed in the under surface of the slide 82. It will be noted in Fig. 4 that the groove 99 extends only part of the length of the slide 82 and is arranged to limit the transverse movement of the slide 82 in either direction.

The slide 82 serves as a support for the truing tools. A truing tool head 100 is fixedly mounted on the forward end of the slide 82 and is arranged to serve as a support for a pair of diamonds or truing tools 101 and 102 which are arranged to true two angularly disposed adjacent faces 103 and 104 (Fig. 6), respectively, on the grinding wheel 13.

The operation of this improved truing apparatus will be readily apparent from the foregoing disclosure. The supporting platen 44 is first transversely adjusted to position the truing apparatus with respect to the grinding wheel 13. The swivel platen 48 is then adjusted angularly to the desired extent so that when the hand wheel 65 is rotated to produce a longitudinal traversing movement of the slide 55, the truing tool 101 will travel in a direction indicated by the

arrow-headed broken line 105 (Fig. 6), after which the clamping screws 50 and 51 are tightened to lock the swivel plate 48 in the desired adjusted position.

Similarly, the swivel head 70 may be adjusted angularly relative to the longitudinally movable slide 55 so that the truing tool 102 will travel in a path indicated by the arrow-headed broken line 106 to true the face 103 of the grinding wheel 13. The swivel head 70 may then be clamped in adjusted position by tightening the binder bolt or screw 74.

The grinding wheel 13 may then be trued by first rotating the hand wheel 65 to traverse the slide 55 longitudinally to traverse the truing tool 101 across the face 104 of the grinding wheel 13 (Fig. 6). After the face 104 has been trued to the desired extent, the truing tool 102 may be traversed transversely by rotation of the hand wheel 91 to true the face 103 of the grinding wheel 13. Before or during the truing operation, the grinding wheel 13 may be advanced to compensate for wheel wear to present the face of the grinding wheel 13 for a truing operation by adjustment of the micrometer feed device 26 and rotation of the feed wheel 25 and feed screw 17.

It will be readily apparent from the foregoing disclosure that either a cylindrical face, a single angular face, or a pair of angular faces of the desired degree may be trued upon the periphery of a grinding wheel 13. It is merely necessary to adjust the path of travel of the longitudinal slide 55 and the swivel head 70 to obtain the desired traversing movement of the truing tools 101 and 102 to generate the desired operative face on the grinding wheel 13.

It will thus be seen that there has been provided by this invention apparatus in which the various objects hereinabove set forth together with many thoroughly practical advantages are successfully achieved. As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

We claim:

1. In a grinding wheel truing apparatus having a base, a longitudinally movable slide thereon, a transversely movable slide on said longitudinally movable slide, means adjustably to swivel said longitudinally movable slide relative to said base, means adjustably to swivel said transversely movable slide relative to said longitudinally movable slide, and a truing tool head on said transversely movable slide having a pair of spaced truing tools which are arranged repeatedly and successively to true angularly disposed faces on a grinding wheel when the longitudinal and transversely movable slides are traversed without angular readjustment of said slides.

2. In a grinding wheel truing apparatus having a base, a longitudinally movable slide thereon, a transversely movable slide on said longitudinally movable slide, means adjustably to swivel said longitudinally movable slide relative to the base, means adjustably to swivel the transversely movable slide relative to the longitudinally movable slide, a truing tool head on said transversely movable slide having a pair of spaced truing tools thereon, means to traverse said longitudinally movable slide to pass one of said diamonds across an angular face of a grinding wheel, and means to traverse the transversely movable slide to traverse the other of said diamonds across a second angularly disposed operative face on the grinding wheel, said slides and truing tools being arranged so that predetermined angular faces on the grinding wheel may be repeatedly and successively trued without readjustment of the slides or truing tools.

3. In a grinding wheel truing apparatus, a base, a transversely movable slide thereon, an angularly adjustable platen on said slide, a longitudinally traversable slide on said platen, an angularly adjustable head on said slide, a transversely traversable slide on said head, and a truing tool head having a pair of truing tools which are arranged to true diverging angularly disposed faces on a grinding wheel when the longitudinally and transversely movable slides are traversed, said slides and truing tools being arranged so that predetermined angular faces on the grinding wheel may be repeatedly and successively trued without readjustment of the slides or truing tools.

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