Dec. 1, 1942. C. C. ALVORD ET AL 2,303,715

GRINDING WHEEL TRUING APPARATUS

Filed Feb. 12, 1941 2 Sheets-Sheet 1

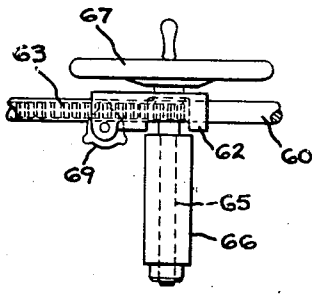


Fig. 3

Fig. 1

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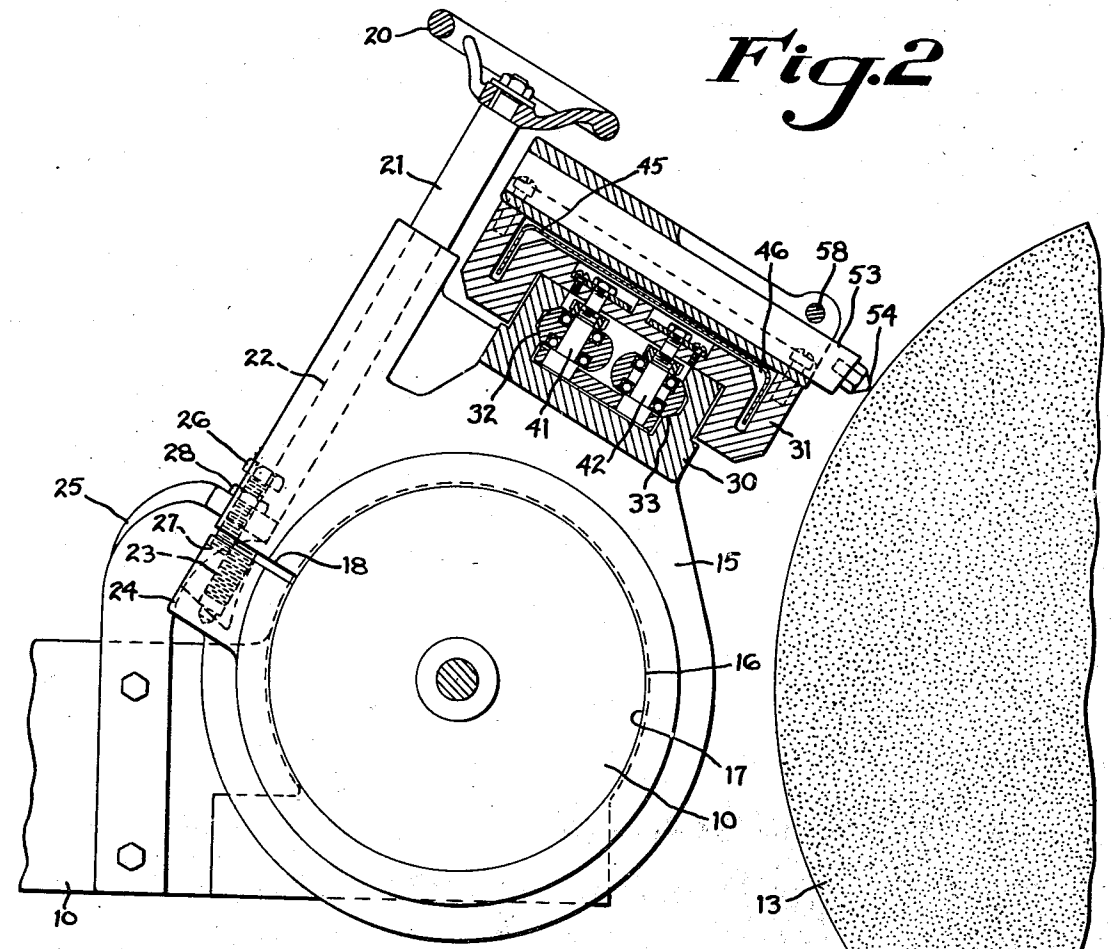


Fig. 2

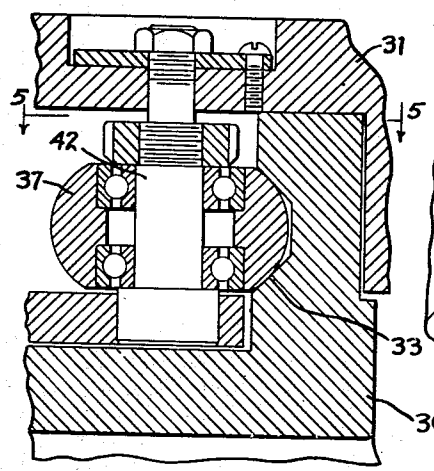


Fig. 4

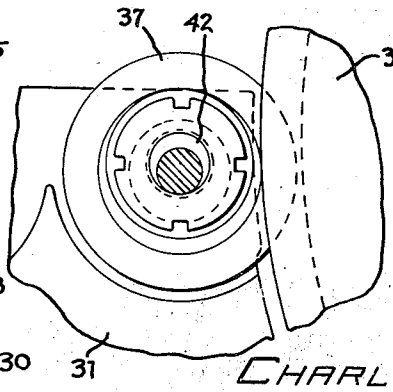


Fig. 5

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GRINDING WHEEL TRUING APPARATUS

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1 Claim. (Cl. 125—11)

The invention relates to grinding machines, and more particularly to a grinding wheel truing apparatus for truing a radius or curved face on the periphery of a grinding wheel.

One object of the invention is to provide a simple and thoroughly practical radial truing device for a grinding machine. Another object of the invention is to provide a radial truing device which is arranged to be readily moved to and from an operative position. Another object of the invention is to provide a radial truing apparatus which is rotatably supported on a grinding machine footstock. A further object of the invention is to provide an improved radial truing apparatus including a semi-circular or arcuate-shaped slideway having a truing tool supporting slide supported thereon. 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 claim.

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

Fig. 1 is a fragmentary plan view of the improved radial grinding wheel truing device, shown in operative position on a grinding machine;

Fig. 2 is a cross-sectional view taken approximately on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary detail view, taken approximately on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view, on an enlarged scale, through one of the anti-friction rollers which support the truing tool slide; and

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

Fragments of a cylindrical type grinding machine have been illustrated in the drawings, comprising a footstock 10 which serves as a support for the truing apparatus to be hereinafter described. A transversely movable wheel slide 11, which may be any of the old and well known types, rotatably supports a wheel spindle 12 which in turn serves as a support for a grinding wheel 13.

A truing apparatus supporting frame 15 is provided with a cylindrical hole or aperture 16 (Fig. 2) which mates with a cylindrical surface 17 formed on the footstock 10. The frame 15 is provided with a radial slot 18. A clamping device is provided for clamping the frame 15 in either an operative or inoperative position. This clamping device comprises a hand wheel 20 which is mounted on the upper end of a rotatable shaft 21. A reduced portion 22 of the shaft 21 passes through a clearance hole formed in the frame 15. The lower end of the shaft 21 is provided with a screw threaded portion 23 which is screw threaded into a lug 24 which projects from the frame 15 and extends below the slot 18. It will be readily apparent from the foregoing disclosure that by rotating the hand wheel 20, the frame 15 may be rigidly clamped in adjusted position relative to the footstock 10.

A stop is provided for locating the truing apparatus frame 15 in the desired operating position. A bracket 25 is fixedly mounted on the footstock 10. The bracket 25 supports a stop screw 26 which is arranged in the path of a stop abutment 27 formed adjacent to and integral with the lug 24 of the frame 15. The stop screw 26 is provided with a lock nut 28 by means of which the screw 26 may be readily locked in adjusted position. The parts have been shown with the frame 15 positioned in an operative position. After a truing operation has been completed, the truing apparatus may be readily swung out of an operating position by rotation of the hand wheel 20 to turn the screw 23 so as to unclamp the frame 15, after which the frame 15 together with the truing apparatus supported thereby may be swung in a counter-clockwise direction (Fig. 2) so that the truing tool and apparatus may be swung to an inoperative position.

The frame 15 is provided with an enlarged integral semi-circular shaped head 30 which serves as a support for a truing tool slide 31. The head 30 is provided with a pair of opposed V-ways 32 and 33 which are semi-circular in shape and serve to guide the truing tool slide 31 in a semi-circular path. A plurality of anti-friction rollers 34, 35, 36, 37 and 38 are provided to support and guide the slide 31. The peripheries of the rollers 34, 35, 36, 37 and 38 are provided with curved or spherical faces which engage the V-ways 32 and 33 and serve accurately to guide the truing tool slide 31 in a semi-circular path. The rollers 34, 35, 36, 37 and 38 are mounted on anti-friction bearings and are supported by studs 39, 40, 41, 42 and 43 which are in turn adjustably supported on the slide 31. The main portions of the studs 39, 40, 41, 42 and 43 are eccentric relative to their supporting axes to facilitate adjustment of the rollers so that all of the rollers are maintained in the desired operative engagement with their respective V-shaped guideways

32 and 33, thus providing a means for taking up wear and lost motion between the truing tool slide 31 and the V-shaped guideways 32 and 33.

An arcuate-shaped sheet metal cover plate 45 is fastened at its opposite ends to the ends of the arcuate head 30. A clearance aperture 46 is formed in the slide 31, through which the plate 45 passes. The cover plate 45 serves to enclose the ways 32 and 33 and rollers 34, 35, 36, 37 and 38 so that no grit or foreign material may readily work its way into the bearing surfaces. A pair of stop plates 47 and 48 (Fig. 1) are fastened to the ends of the head 31 and serve as supports for adjustable stop screws 49 and 50, respectively, which are arranged to engage the end faces of the slide 31 to limit its arcuate movement as desired.

The truing tool slide 31 is provided with two upwardly extending bosses 51 and 52 which are provided with cylindrical apertures to support a truing tool holder 53 having a diamond truing tool 54 in one of two positions. The end portion of the bosses 51 and 52 are provided with cylindrical apertures to support a truing tool holder 53 having a diamond truing tool 54 in one of two positions. The end portion of the bosses 51 and 52 are provided with slots 55 and 56 which serve as clamping mediums for clamping the truing tool holder 53 in adjusted position on the slide 31. A binding or clamping screw 57 serves to lock the truing tool 53 in position in the boss 51 and a clamping screw 58 is arranged to clamp the truing tool when supported within the boss 52.

As shown in Fig. 1 of the drawings, the truing apparatus is set up to true a radius on the left-hand corner of the abrasive wheel 13, that is, the truing tool supporting slide 31 is arranged to swing through an arc of 90 degrees so that the truing tool 54 travels through a quarter-circular path to generate a radius of the desired extent on the right-hand corner of the abrasive wheel 13. The truing tool supporting slide 31 is shown in its extreme left-hand end position with the truing tool 54 at the end of its stroke. The slide 31 traverses in a semi-circular path to swing the diamond or truing tool 54 from the full line position (Fig. 1) into the broken line position 54*a*, in which position the truing tool holder is shown as 53*a* and the slide 31 moved so that its right-hand end face is in engagement with the stop screw 50.

It will be readily apparent from the foregoing disclosure that the extent of movement of the truing tool slide 31 is governed by the adjustment of the stop screws 49 and 50. The truing tool 54 and its supporting holder 53 are adjustably supported in the boss 51 and are adjusted so that the distance from the point of the diamond 54 to the axis of movement of the slide 31 is equal to the radius it is desired to generate upon the periphery of the grinding wheel 13.

If it is desired to generate a radius on the right-hand corner of the periphery of the grinding wheel 13 (Fig. 1), the truing tool holder 53 may be adjustably positioned within the boss 52 so that the slide 31 may swing from the full line position (Fig. 1) in a counterclockwise direction until the slide 31 engages the stop screw 50.

A suitable manually operable mechanism for traversing the truing tool slide 31 in its arcuate path is provided. In the preferred construction a rod 60 is pivotally connected to the slide 31 by means of a stud 61. The rod 60 passes through and is slidably supported in a sleeve 62. The left-hand end of the rod 60 is provided with a rack 63 which meshes with a small gear or pinion 64. The pinion 64 is rotatably supported on a stud 65 which is in turn supported on a bracket 66 formed integral with the head 30. A manually operable hand wheel 67 is rotatably supported on the stud 65 and is fixedly mounted to rotate with the gear 64. It will be readily apparent that manual rotation of the hand wheel 67 will impart a rotary motion to the gear 64 which in turn will transmit a movement through the rack 63 and bar 60 to move the arcuate slide 31 in its arcuate path relative to the head 30. The sleeve 62 is pivotally supported on the stud 64 so that it may turn as the slide 31 travels in its arcuate path. The direction of movement of the slide 31 is determined by the direction of manual rotation of the hand wheel 67.

If desired, the slide 31 may be locked in any adjusted position so that after truing a radius on one corner of the wheel, the diamond or truing tool supporting slide 31 may be locked in one end position while a relative traversing movement between the truing tool and grinding wheel is provided to true the peripheral face adjacent to the radius formed on the grinding wheel. The sleeve 62 is provided with a slot 68 by means of which it may be readily clamped to the rod 60, if desired. A clamping screw 69 passes through a clearance hole in the sleeve 62 on one side of the slot 68 and is screw threaded into the portion on the opposite side of the slot 68. It will be readily apparent from this disclosure that by tightening the clamping screw 69, the sleeve 62 may be readily locked to the rod 60 to clamp the truing tool slide 31 and the truing tool 54 in any position desired.

The operation of this improved radial truing device is readily apparent from the foregoing disclosure. When it is desired to true the grinding wheel 13, the hand wheel 20 is turned to unclamp the frame 15 and the frame 15 together with the truing apparatus is rotated on the surface 17 of the footstock 10 until the stop abutment 27 engages the stop screw 26 to position the truing tool 54 in operative relation with the grinding wheel 13. The truing tool holder 53 is positioned either in the supporting boss 51 or the supporting boss 52, depending upon the position of the radius to be produced on the grinding wheel. The diamond tool holder 53 is positioned axially within the boss so that the diamond 54 is spaced from the axis of movement of the arcuate slide 31 by a distance equal to the radius it is desired to produce on the grinding wheel face, after which the clamping screw 57 is tightened to lock the truing tool in adjusted position. The stop screws 49 and 50 are then adjusted to limit the path of movement of the truing tool 54, after which the truing apparatus is ready for operation. The grinding wheel 13 may then be advanced to bring the periphery of the wheel into operative engagement with the diamond 54, and the truing tool slide 31 may then be traversed in its arcuate path by rotation of the manually operable traverse wheel 67. The diamond 54 may be traversed across the surface of the wheel 13 as many times as desired to produce the desired and predetermined radius or curved face thereon. After the truing operation has been carried on to the desired extent, the hand wheel 20 may again be turned to unclamp the bracket 15, and the bracket 15 together with the truing apparatus may then be swung in a counterclockwise direction to swing the truing tool 54 and other parts to an inoperative position so that they are out of the way for the next grinding operation.

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:

In a grinding machine having a footstock, a radial truing apparatus therefor having a frame rotatably supported on the footstock, a semi-circular shaped slideway formed on said frame, a truing tool slide supported on said slideway, means to traverse said slide in either direction through an arcuate path as determined by the shape of said slideway, and a truing tool adjustably supported in one of two positions on said slide to facilitate truing a radius at either end of the peripheral operative face of a grinding wheel.

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