March 7, 1939. C. C. ALVORD 2,150,091

GRINDING WHEEL TRUING APPARATUS

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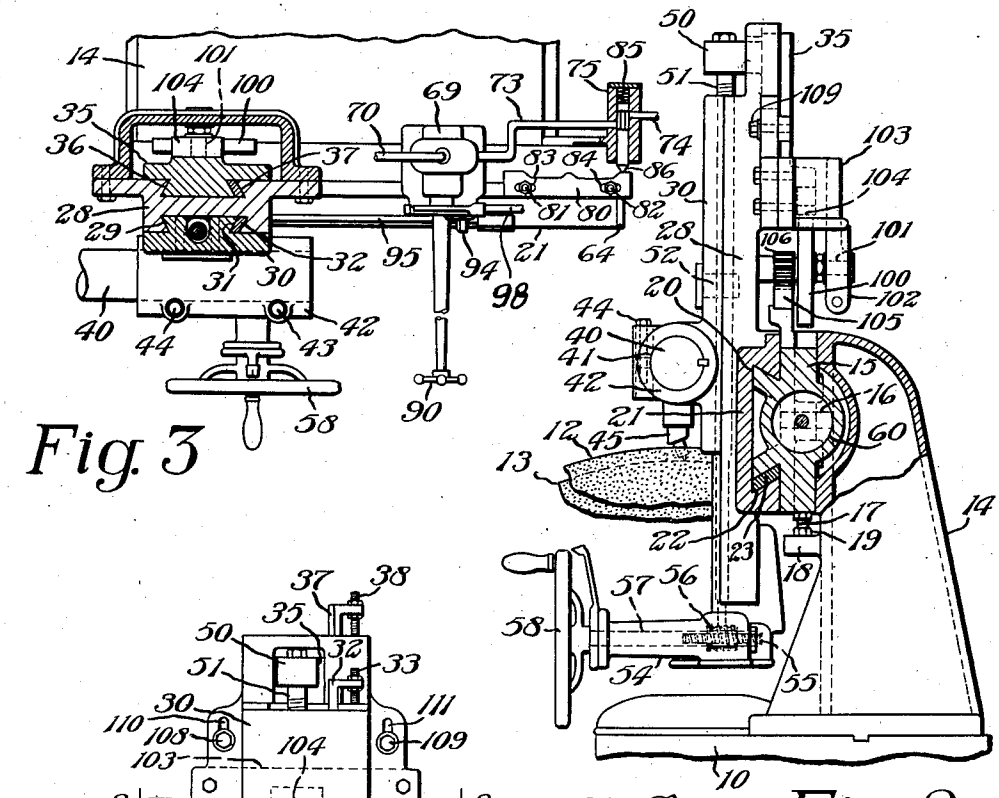


Fig. 3

Fig. 2

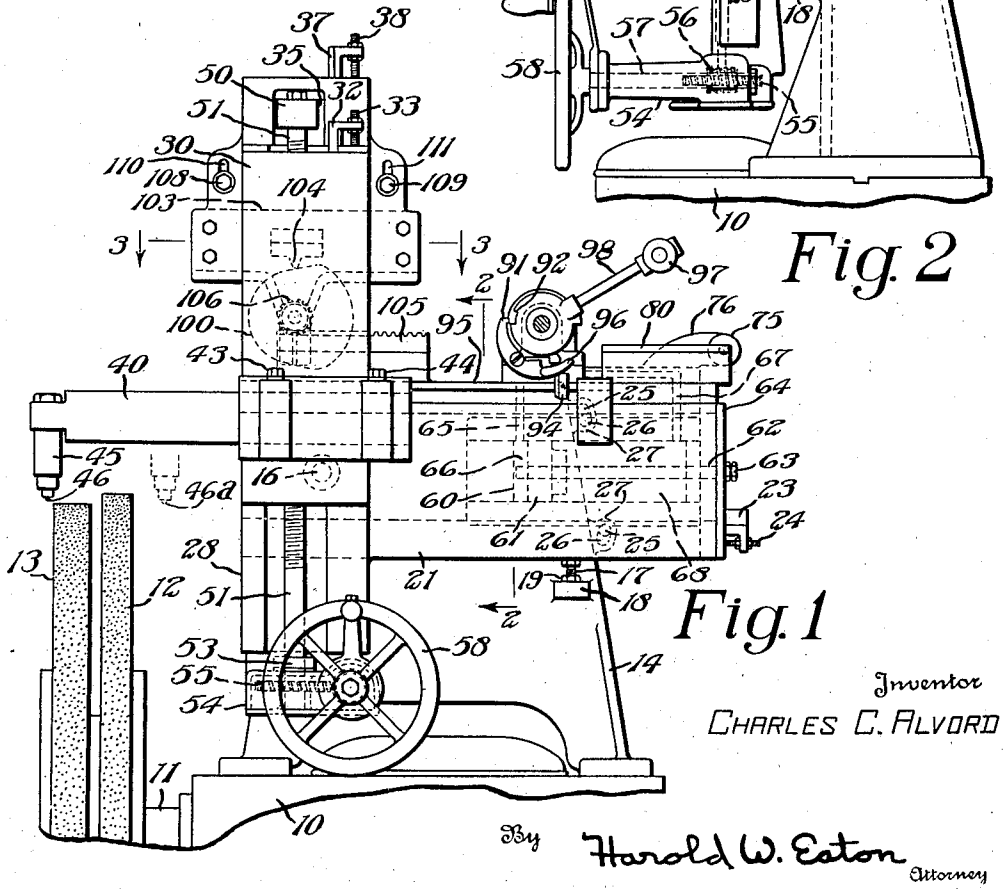


Fig. 1

Inventor
CHARLES C. ALVORD

By Harold W. Eaton
Attorney

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Fig. 4

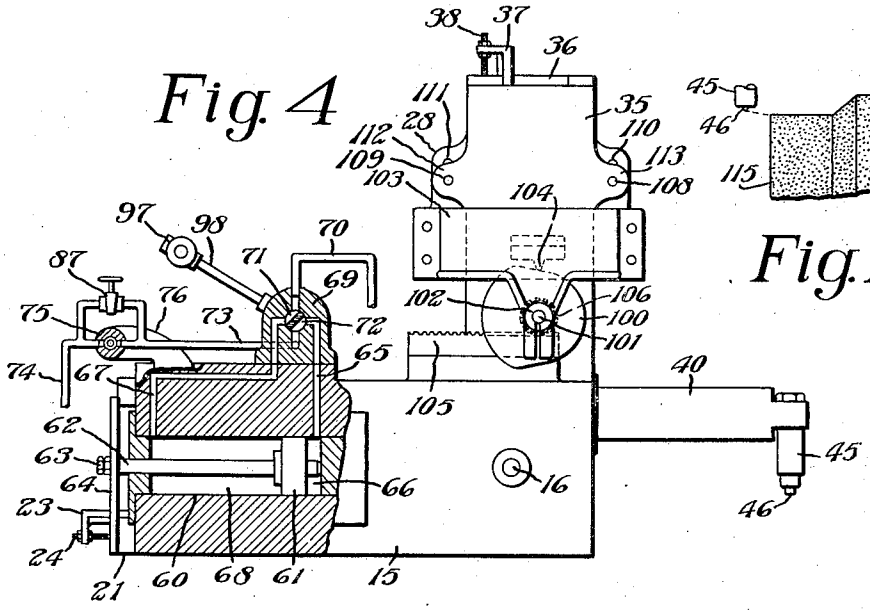


Fig. 10

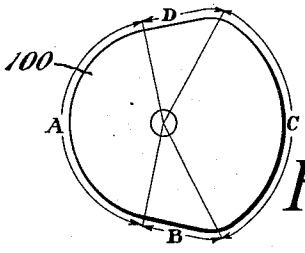


Fig. 7

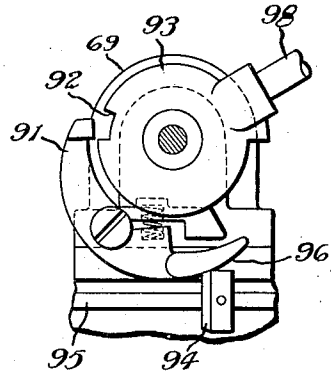


Fig. 5

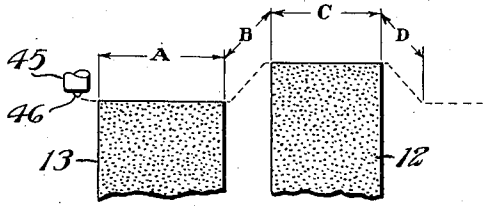


Fig. 6

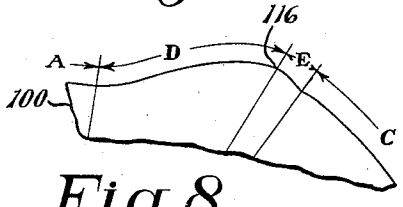


Fig. 8

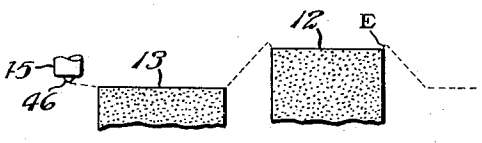


Fig. 9

Inventor
CHARLES C. ALVORD

By Harold W. Eaton
Attorney

Patented Mar. 7, 1939 2,150,091

UNITED STATES PATENT OFFICE

2,150,091

GRINDING WHEEL TRUING APPARATUS

Charles C. Alvord, Worcester, Mass., assignor to Norton Company, Worcester, Mass., a corporation of Massachusetts

Application March 15, 1937, Serial No. 130,863

13 Claims. (Cl. 125—11)

The invention relates to grinding machines, and more particularly to a truing apparatus for truing a plurality of spaced grinding wheels.

One object of the invention is to provide a simple, thoroughly practical truing apparatus for truing a predetermined form on a grinding element. Another object of the invention is to true a plurality of spaced cylindrical portions of different diameters on a grinding element. Another object of the invention is to provide an improved truing apparatus whereby a single truing tool is arranged to true a plurality of spaced grinding wheels in a multiple wheel grinding machine. Another object of the invention is to provide a truing apparatus for a multiple wheel grinding machine, in which a single truing tool is traversed across the faces of a plurality of wheels to true the same to predetermined relative diameters. A further object of the invention is to provide an improved hydraulically operated multiple wheel truing apparatus. A further object of the invention is to provide a power reciprocated, cam controlled truing tool which is arranged for movement in a path successively to true either a form on the periphery of a single grinding wheel or to true a plurality of grinding wheels of different diameters. 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 front elevation of the improved truing apparatus mounted on the wheel slide, having the wheel guard removed;

Fig. 2 is a right-hand end elevation, partly in section, taken approximately on the line 2—2 of Fig. 1, showing the horizontal slide and parts in section and the remaining parts of the mechanism in elevation;

Fig. 3 is a horizontal sectional view, taken approximately on the line 3—3 of Fig. 1, after showing the other parts of the mechanism in plan view;

Fig. 4 is a rear elevation of the truing apparatus, having parts of the main frame broken away and shown in section, together with a piping diagram of the hydraulic system;

Fig. 5 is a fragmentary front elevation, on an enlarged scale, of the latch and trip mechanism for the main control valve;

Fig. 6 is a fragmentary view, showing fragments of the grinding wheels and showing in dotted line the path of the truing tool across the wheel;

Fig. 7 is a detail view of the control cam, on an enlarged scale;

Fig. 8 is a fragmentary view, on an enlarged scale, of a portion of a modified cam;

Fig. 9 is a fragmentary view, showing fragments of the grinding wheels and showing in dotted line the path of the truing tool in accordance with the cam shown in Fig. 8; and

Fig. 10 is a fragmentary view, showing a portion of a single grinding wheel and showing in dotted line the path of the truing tool across the wheel.

The improved truing apparatus has been illustrated in the drawings as mounted fixedly on top of a wheel slide 10 which rotatably supports a wheel spindle 11 carrying a plurality of spaced grinding wheels 12 and 13 of different sizes or diameters.

The wheel slide 10 supports a frame or base 14 of the truing apparatus. An adjustable horizontally arranged member 15 is pivotally connected by a stud 16 with the frame 14. An adjusting screw 17 threaded into a lug 18 projecting from the base 14 serves to adjust the member 15 about its stud or pivot 16 to facilitate adjustment of the position of the member 15 relative to the base. A lock nut 19 serves to lock the screw 17 in adjusted position. The member 15 may be clamped in adjusted position on the frame 14 by means of clamping screws 25 which pass through elongated slots 26 in the lugs 27 on the frame 14 and are screw threaded into the member 15. A dovetailed slideway 20 is formed integral with the member 15 and is arranged to support a horizontally movable slide 21 having a dovetailed surface 22 which mates with the dovetailed slideway 20. An adjustable tapered gib 23, interposed between the dovetailed ways 20 and 21, serves to take up lost motion between the fixed and movable parts of the slide. A screw 24 is provided to facilitate endwise adjustment of the gib.

The horizontal slide 21 is provided with a vertically arranged member 28 which is formed integral therewith or fixed thereto. The vertically extending portion 28 of the horizontal slide 21 is provided with a dovetailed slideway 29 which supports a vertically movable slide 30 having a mating dovetailed way 31. An adjustable tapered gib 32 serves to take up lost motion between the dove-

tailed slideways 29 and 31, and a screw 33 serves to facilitate adjustment of the gib 32.

A second vertically arranged slide 35 is supported by a dovetailed slideway 36 formed in the member 28. The dovetailed slideway 36 is provided with an adjustable tapered gib 37 having a screw adjustment 38. The slide 35 is preferably arranged so that it may be moved vertically during the horizontal movement of the horizontal slide 21.

The vertical slide 30 adjustably supports a truing tool holder which in the present case is formed as a cylindrical bar 40 which slidably is keyed in an aperture 41 formed in a projection 42 of the slide 30. The truing tool holder or bar 40 is arranged to be clamped in adjusted position within the aperture 41 in the projection 42 of the slide 30 by binding screws 43 and 44. The truing tool support 40 carries at its outer end a truing tool 45 having a diamond point 46 arranged for successively truing the peripheral surfaces of the grinding wheels 12 and 13.

The slide 35 is preferably adjustably connected to the slide 30 so that during the traversing movement of the horizontal slide 21, the vertical slides 30 and 35 are moved together in a vertical direction to control the path of movement of the diamond or truing tool 46. The slide 35 is provided with a forwardly extending boss or lug 50. A vertically extending feed screw 51 is rotatably connected to the lug 50 and extends downwardly through a nut 52 carried by or formed integral with the vertically arranged slide 30. The lower end of the feed screw 51 is journaled in a suitable bearing 53 formed within a casing 54 which is integral with the vertical 50. A worm gear 55 is fixedly mounted on the lower end of the feed screw 51. The worm gear 55 meshes with a worm 56 formed on the inner end of a rotatable shaft 57. The shaft 57 is journaled in bearings (not shown) within the casing 54 and is provided at its outer end with a manually operable wheel 58. By adjustment of the wheel 58, the feed screw 51 may be rotated to adjust the position of the slide 30 relative to the vertically movable slide 35.

A power operated traversing mechanism is provided for producing a longitudinally traversing or reciprocating movement of the horizontally movable slide 21 to traverse the truing tool 46 relative to the periphery of the grinding wheels 12 and 13. In the preferred form, a fluid pressure traversing or reciprocating mechanism is provided comprising a cylinder 60 which is formed within the member 15. A slidably mounted piston 61 is mounted within the cylinder 60 and is connected to one end of a piston rod 62, the other end of which is fastened by nuts 63 to an end cap 64 formed integral with or fixedly mounted on the end of the horizontal slide 21. As fluid under pressure is admitted either through a passage 65 into a cylinder chamber 66 within the cylinder 60, or through a passage 67 into a cylinder chamber 68 within the cylinder 60, the piston is moved longitudinally to traverse or reciprocate the horizontally arranged slide 21 to traverse the truing tool 46 across the face of the grinding wheels 12 and 13.

The admission of fluid under pressure to the cylinder chambers 66 and 68 is preferably controlled by a control valve 69 which in the present case is a rotary type valve. Fluid under pressure from a suitable source, such as a fluid pressure pump (not shown), either within the base or separated therefrom, passes through a pipe 70, through a chamber 71 in the rotary part of the control valve 69, and through the passage 67 into the cylinder chamber 68 to cause the piston 61 and the slide 21 together with the truing tool 46 to move toward the right (Fig. 4). During the movement of the piston 61 toward the right (Fig. 4), fluid within the cylinder chamber 66 exhausts through the passage 65 and a valve chamber 72 and through a pipe 73 and a pipe 74 into a reservoir (not shown) within the base of the machine. A speed control valve 75 is interposed between the pipes 73 and 74. The valve 75 is preferably a balanced piston type valve which is supported by a bracket 76 projecting upwardly from the member 15. The valve 75, in the position illustrated in Fig. 3, allows unrestricted passage of fluid from pipe 73 into exhaust pipe 74 to allow the piston 61 and the horizontal slide 21 to move at a comparatively fast rate during the idle stroke of the slide.

During the truing operation, that is during the time when the truing tool 46 is in operative engagement with the grinding wheels 12 and 13, it is desirable to reduce the traversing speed of the slide 21 and the truing tool 46 to a very slow uniform speed for the truing operation. This is preferably accomplished by providing a cam bar 80 which is fastened to the slide 21 by screws 81 and 82. Elongated slots 83 and 84 in the cam bar 80 serve to facilitate a longitudinal adjustment of the cam 80 relative to the stem of the valve 75. The cam 80 is preferably so shaped that when the truing tool 46 engages the periphery of a grinding wheel, the valve is moved forward by a spring 85 so as to maintain a follower 86 on the valve stem in operative contact with the cam 80. When the truing tool 46 is about to engage the grinding wheel, the follower moves forwardly to close the valve 75 and thereby to prevent further passage of fluid therethrough. After the valve 75 is closed, fluid under pressure is by-passed through a throttle or needle valve 87 (Fig. 4), the adjustment of which serves to produce the desired slow traversing movement of the truing tool.

The cam bar 80 is preferably so shaped that the valve 75 will be so controlled that the truing tool 46 and its supporting slide 21 will be moved at a rapid rate until the truing tool engages the grinding wheels 12 or 13, after which a slow traverse will be obtained until the truing tool 46 passes entirely across the face thereof, after which a projection on the cam 80 serves again to open the valve 75 to speed up the movement of the slide 21 and the truing tool 46 during the idle stroke between the two wheels and thereafter slowing down the movement of the slide 21 and truing tool 46 to a truing speed as the truing tool 46 engages the periphery of the second wheel to true the same. By means of the valve control above described, the idle time of the truing operation is reduced to a minimum.

In truing a grinding wheel, it is desirable to reciprocate the truing tool across the surface of the wheel either one or more reciprocations for each truing operation. For many truing operations, a single complete reciprocation is sufficient to produce the desired results. In the disclosure in the drawings, a mechanism has been illustrated for controlling the valve 69 so that the truing tool 46 makes one complete reciprocatory stroke and then stops. A manually operable handle or knob 90 is fixed to the rotary part of the valve 69 and may be rotated in a counterclockwise direction (Figs. 1 and 5) until a spring actuated pawl 91 drops into and engages a notch 92

in a plate 93 supported by the rotary part of the valve 69. This movement of the valve starts the traversing movement of the slide 21 and the truing tool 46 toward the left (Fig. 1) to pass the truing tool across the faces of the wheels 12 and 13. The traversing movement of the tool 46 and slide 21 toward the left (Fig. 1) continues until an adjustably positioned collar or dog 94 on a rod 95 carried by the slide 21 engages a cam surface 96 on the spring actuated pawl 91, thereby withdrawing the pawl 91 from engagement with the notch 92. A weight 97 carried at the end of a lever 98 operating under the influence of gravity rocks the valve 69 in a clockwise direction (Figs. 1 and 5) to reverse the position of the valve and thereby reverse the movement of fluid within the system to reverse the movement of the truing tool 46 and the slide 21 to traverse the same in the reverse direction across the peripheral faces of the wheels 13 and 12, respectively. When the piston engages the end of the cylinder in its movement toward the right (Fig. 1), the truing tool 46 stops and remains in this position, when the grinding operation is resumed.

In order that the truing tool 46 may true a plurality of spaced grinding wheels of different diameters, such as a pair of spaced wheels 12 and 13, respectively, it is desirable to provide a suitable control mechanism to move the slides 30 and 35 vertically in timed relationship with the traversing or reciprocating movement of the slide 21 so that a single truing tool 46 may be utilized to true both wheels, that is so that the diamond may pass across the periphery of the wheel 12 and then the slides 30 and 35 may be moved into a second position to true the periphery of the wheel 13. Due to the short space between the two grinding wheels and due to the difference in their diameters, it is not feasible to utilize a fixed cam bar for this purpose. To overcome this difficulty, a rotatable cam 100 is preferably utilized to transmit a vertical motion to the slides 30 and 35, which movement is controlled by the longitudinal traversing movement of the truing tool 46 and the horizontal slide 21. The rotatable cam 100 is supported on a shaft 101 which is supported on the vertical member 28 which is integral with the horizontal slide 21. The outer end of the shaft 101 is supported in a bearing 102 formed integral with a bracket 103 which straddles the slide 35 and is fixedly mounted to the vertical member 28. A follower 104 is fixedly mounted on the vertically movable slide 35 and is arranged to engage the periphery of the rotatable cam 100.

In order to transmit the desired vertical movement to the truing tool 46 and its supporting slides in timed relation with the traversing movement of the horizontal slide 21, a rack bar 105 is fixedly mounted on the member 15. A gear 106, either formed integral with or connected to rotate with the cam 100, meshes with the rack 105 and transmits a rotary motion to the cam 100 as the shaft supporting the cam is moved longitudinally during the traversing movement of the slide 21 and the truing tool 46. The cam 100 is provided with portions A and C (Fig. 7) which are concentric with its axis of rotation so that when the diamond or truing tool 46 is in engagement with the wheels, the vertical slides 35 and 30 will be held stationary so as to permit the truing tool 46 to move in a straight-line path to produce a true cylindrical surface on the periphery of the wheels. Two of these concentric portions A and C are provided on the cam 100, each surface being arranged to position the truing tool for truing the respective surfaces of the two wheels. The rise B and fall D of the cam 100 (Fig. 7) between the two concentric surfaces serves to carry the truing tool 46 from one position to the other and, due to the fact that a rotary movement of the cam 100 is speeded up during the idle stroke of the slide 21 and truing tool 46 between the wheels 12 and 13, there is no difficulty experienced in raising the slide abruptly from one diameter to true a wheel of a larger diameter, or vice versa.

In truing a plurality of grinding wheels, such as wheels 12 and 13, each having a true cylindrical surface to be trued, it is desirable that the contour or shape of the cam 100 be such that the operative cutting point of the truing tool 46 be moved in the same path when traversed in each direction. In order to avoid the possibility of lost motion in the slides or parts affecting the positioning of the truing tool 46, it is desirable that the cam 100 be so designed (Fig. 8) that the slides 30 and 35 always move downwardly into a definite locating position when the concentric portions of the cams rotate into engagement with the follower, thereby accurately locating the diamond or truing tool 46 in the same identical position on each pass of the truing tool. To accomplish this result, it is desirable to lift the truing tool supporting slides 30 and 35 so that the tool 46 is raised slightly above the path of travel across the large diameter wheel. As illustrated in Fig. 8, a high point 116 is provided at each end of the concentric portion C of the cam 100, so that when the diamond or truing tool 46 approaches the position for truing the larger diameter wheel 12, the truing tool 46 and slides 30 and 35 are raised slightly above its truing position and then allowed to drop onto the concentric portion C. The truing tool 46 is thereby moved into the same identical position as it engages the wheel 12 in its path of movement in either direction, thus insuring a precise truing of the wheel face when the truing tool 46 is moved in either direction. Similarly, at the end of the travel of the diamond toward the left (Figs. 1 and 9), the diamond is raised to a position slightly above the path of travel across the wheel 13 so that when the traversing movement of the slide 21 and the truing tool 46 is started in the reverse direction, the truing tool 46 and the slides 30 and 35 are lowered to bring the truing tool into position for truing the wheel 13 as it passes in a direction toward the right (Fig. 1).

If desired, the truing apparatus may be utilized for truing a predetermined form or contour on a single grinding wheel (Fig. 10). In such a case, the truing tool 46 is traversed across the peripheral face of a grinding wheel 115 in the manner above described. The cam 100 (Fig. 7) is rotated by and in timed relation with the traversing movement of the slide 21 to cause a vertical movement of the truing tool 46 toward or from the operative face of the grinding wheel 115 to produce a predetermined contour thereon. A predetermined form or contour may be produced on the periphery of a single grinding wheel by providing a cam 100 which is shaped to produce the desired form. The cam 100 is preferably mounted so that it may be readily removed and replaced with a cam of a different shape when it is desired to true a grinding wheel or grinding wheels to a different shape or size.

If desired, the truing apparatus may be utilized for truing a single grinding wheel to a predetermined cylindrical surface without the use of the cam 100 and the follower 104. The

slides 30 and 35 are raised a sufficient distance to move the follower 104 out of engagement with the cam 100, and the slide 35 is then locked in adjusted position by clamping screws 108 and 109 which pass through elongated slots 110 and 111 in the vertically extending member 28 and are screw threaded into lugs 112 and 113 which project from the sides of the slide 35, thus locking the vertical slide so that the truing tool may be traversed by means of the piston and cylinder mechanism above described. The truing tool may be adjusted relatively toward and from the wheel to be trued by rotation of the feed wheel 58 which slides through the rotatable screw 51 and the nut 52 to adjust the position of the slide 30 relative to the slide 35.

The operation of this truing apparatus will be readily apparent from the foregoing disclosure. Assuming the cam 100 is mounted in place on the shaft 101, and the truing tool is adjusted into its proper position, the manually operable wheel 58 is rotated to cause a downward movement of the slide 30 relative to the slide 35 to position the truing tool 46 for a truing operation. The knob 90 is then turned in a counterclockwise direction (Figs. 1 and 3) which serves to move the arm 98 and weight 97 in a counterclockwise direction (Figs. 1 and 3) so as to position the rotary part of the valve 69 in the position illustrated in Fig. 4. In this position of the parts, the pawl 91 drops into the notch 92 and holds the valve 69 in this position while the truing tool 46 traverses from a right-hand position 46a, as shown in dotted lines in Fig. 1, toward the left into full line position 46. As the truing tool approaches the full line position (Fig. 1), a collar or dog 94 engages the cam 96 to rock the pawl 91 out of engagement with the notch 92, and the influence of gravity on the weight 97 and the arm 90 serves to reverse the position of the valve 69 to reverse the flow of fluid within the fluid pressure system so as to traverse the truing tool 46 toward the right (Fig. 1). The movement of the truing tool toward the right continues until the piston 61 engages the end of the cylinder 60 and the mechanism then stops in this position. A second reciprocation of the truing tool may be had, if desired, by again turning the knob 90 to shift the valve and start a second reciprocation. By adjusting the wheel 58, the desired amount may be trued from the periphery of the wheel.

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.

I claim:

1. In a grinding wheel truing apparatus, a truing tool, a longitudinally traversable truing tool holder, means to traverse said holder and truing tool across the peripheral face of a grinding wheel, and means including a rotatable cam and follower which are actuated by and in timed relation with the traversing movement of said holder and tool to move the tool toward and from the periphery of the grinding wheel to true a predetermined shape thereon.

2. In a grinding wheel truing apparatus, a truing tool, a longitudinally traversable truing tool holder, means to traverse said holder and truing tool across the peripheral face of a grinding wheel, means including a rotatable cam and a follower which are traversable with said holder and tool, and means actuated by and in timed relation with the traversing movement of said holder and tool to rotate said cam to move the tool toward and from the periphery of the grinding wheel to true a predetermined shape thereon.

3. In a grinding wheel truing apparatus, a truing tool, a longitudinally traversable truing tool holder, means to traverse said holder and truing tool across the peripheral faces of a plurality of grinding wheels of different diameters, means including a rotatable cam and a follower which are traversable with said holder to move said tool transversely toward and from the peripheries of said grinding wheels, and means actuated by and in timed relation with the longitudinal movement of said tool to rotate said cam successively to position the tool for truing wheels of different diameters during its continuous traversing movement thereacross.

4. In a grinding wheel truing apparatus, a truing tool, a longitudinally traversable truing tool holder, means to traverse said holder and truing tool across the peripheral faces of a plurality of grinding wheels of different diameters, means including a rotatable cam and a follower to move said tool transversely toward and from the peripheries of the grinding wheels, and means including a rack and gear mechanism actuated in timed relation with the longitudinal movement of said tool to rotate said cam and follower successively to position the tool for truing the grinding wheels of different diameters.

5. In a grinding wheel truing apparatus, a truing tool, a truing tool holder, a vertically movable slide therefor, a horizontal longitudinally movable slide which supports said vertical slide, means to reciprocate said horizontal slide so as to traverse the truing tool successively across the peripheral faces of a plurality of spaced grinding wheels of different diameters, means including a rotatable cam on said horizontal slide and a follower on said vertical slide to move said slide vertically to position the truing tool in operative relation with successive grinding wheels, a gear to rotate said cam and means including a stationary rack to rotate said gear and cam by and in timed relation with the movement of said horizoztal slide.

6. In a grinding wheel truing apparatus, a truing tool, a truing tool holder, means to adjust the holder and tool relative to the vertical slide, a vertically movable slide therefor, a horizontal longitudinally movable slide which supports said vertical slide, means to reciprocate said horizontal slide so as to traverse the truing tool successively across the peripheral faces of a plurality of spaced grinding wheels of different diameters, means including a rotatable cam and a follower to move said slide vertically to position the truing tool in operative relation with successive grinding wheels, and means including a rack and gear mechanism to rotate said cam by and in timed relation with the movement of said horizontal slide.

7. In a grinding wheel truing apparatus, a truing tool, a vertically movable slide therefor, a horizontal longitudinally movable slide which supports said vertical slide, a fluid pressure mech-

anism including a piston and cylinder operatively connected to reciprocate the horizontal slide so as to traverse the truing tool successively across the peripheral faces of a plurality of spaced grinding wheels of different diameters, means including a rotatable cam and a follower one of which is on the horizontal, and the other of which is on the vertical slide to move said slide vertically to position the truing tool in operative relation with successive grinding wheels, and means including a rack and gear mechanism which are actuated by the horizontal slide to rotate said cam.

8. In a grinding wheel truing apparatus, a truing tool, a vertically movable slide therefor, a horizontal longitudinally movable slide which supports said vertical slide, a fluid pressure mechanism including a piston and cylinder operatively connected to reciprocate the horizontal slide so as to traverse the truing tool successively across the peripheral faces of a plurality of spaced grinding wheels of different diameters, means including a rotatable cam and a follower to move said slide vertically to position the truing tool in operative relation with successive grinding wheels, means including a rack and gear mechanism which are actuated by the horizontal slide to rotate said cam, and a control valve mechanism for said fluid pressure mechanism to traverse the truing tool slowly when in engagement with the wheels and rapidly when out of engagement therewith.

9. In a grinding wheel truing apparatus, a truing tool, a truing tool holder, means to adjust the position of said holder and tool relative to said vertical slide, a vertically movable slide therefor, a horizontal longitudinally movable slide which supports said vertical slide, means including a piston and cylinder to reciprocate said horizontal slide so as to traverse the truing tool successively across the peripheral faces of a plurality of spaced grinding wheels of different diameters, means including a rotatable cam and a follower to move said vertical slide and position the truing tool successively in operative position with successive grinding wheels, means including a rack and gear operatively connected to rotate said cam when the horizontal slide is traversed, a reversing valve to control the admission of fluid to either end of said cylinder, and a speed control valve mechanism including a cam actuated valve and a by-pass valve associated therewith which are arranged to cause a rapid movement of said slide and tool when the tool is out of contact with the grinding wheels and to cause a slow uniform movement thereof when the tool is traversing across the faces of the grinding wheels.

10. In a grinding wheel truing apparatus, a truing tool, a truing tool holder, a vertically movable slide therefor, means to adjust the position of said holder and tool relative to said vertical slide, a horizontal longitudinally movable slide which supports said vertical slide, means including a piston and cylinder to reciprocate said horizontal slide so as to traverse the truing tool successively across the peripheral faces of a plurality of spaced grinding wheels of different diameters, means including a rotatable cam and a follower to move said vertical slide and position the truing tool successively in operative position with successive grinding wheels, means including a rack and gear operatively connected to rotate said cam when the horizontal slide is traversed, a reversing valve to control the admission of fluid to either end of said cylinder, a speed control valve to control the speed of movement of said tool, and a cam arranged to actuate said speed control valve so as to cause a rapid movement of said slide and tool when the tool is out of contact with the grinding wheels and to cause a slow uniform movement thereof when the tool is traversing across the face of the grinding wheels.

11. In a grinding wheel truing apparatus, a frame, a member adjustably mounted thereon, a longitudinally movable slide on said member, a vertically movable slide supported on said longitudinally movable slide, a truing tool holder on said vertical slide, manual means to adjust said holder vertically relative to said vertical slide, a truing tool thereon, means including a piston and cylinder to reciprocate said first slide longitudinally to traverse the truing tool across the peripheral faces of a plurality of spaced grinding wheels of different diameters, means including a rotatable cam and a follower to move said vertical slide, and means including a rack and gear mechanism which are actuated in timed relation with the longitudinal movement of the first slide to rotate said cam and shift the position of the vertical slide and truing tool.

12. In a grinding wheel truing apparatus, a frame, a longitudinally movable slide on said frame, a vertically movable slide on said horizontally movable slide, a truing tool holder on said vertical slide, a truing tool thereon, manual means to adjust said holder vertically relative to said vertical slide, means to reciprocate said first slide to traverse the truing tool across the peripheral faces of a plurality of spaced grinding wheels of different diameters, a rotatable cam on said horizontal slide, a follower on the vertical slide, a gear to rotate said cam, and a rack bar on said frame to rotate said gear and cam when the horizontal slide is traversed.

13. In a grinding wheel truing apparatus, a truing tool, a truing tool holder therefor, means including a piston and cylinder to traverse said truing tool across the face of a plurality of spaced grinding wheels of different diameters, means actuated in timed relation with the traversing movement of said tool to move the tool transversely relative to said wheels successively to position the tool for truing the grinding wheels of different diameters, a fluid pressure control valve, a weight normally to hold said valve in one position, manually operable means to move said valve to start the traversing movement of said holder, a latch to hold said valve in a traversing position, a speed control valve in said system, a cam to actuate said valve which is arranged to open said valve during the idle stroke of the truing tool as it approaches the operative faces of the grinding wheels and between grinding wheels and is arranged to close said valve while the truing tool is in operative contact with the grinding wheels, and an adjustable by-pass valve rendered effective when the throttle valve is closed to produce a slow uniform traversing movement of the truing tool across the faces of the grinding wheels, and an adjustable dog which is movable longitudinally with said truing tool holder to trip said latch after the holder has traversed to a predetermined extent in one direction to release said weight and thereby shift the control valve to reverse the movement of said truing tool.

CHARLES C. ALVORD.