July 8, 1941. C. L. OTT ET AL 2,248,463

GRINDING WHEEL DRESSING MECHANISM

Filed July 22, 1938 2 Sheets-Sheet 1

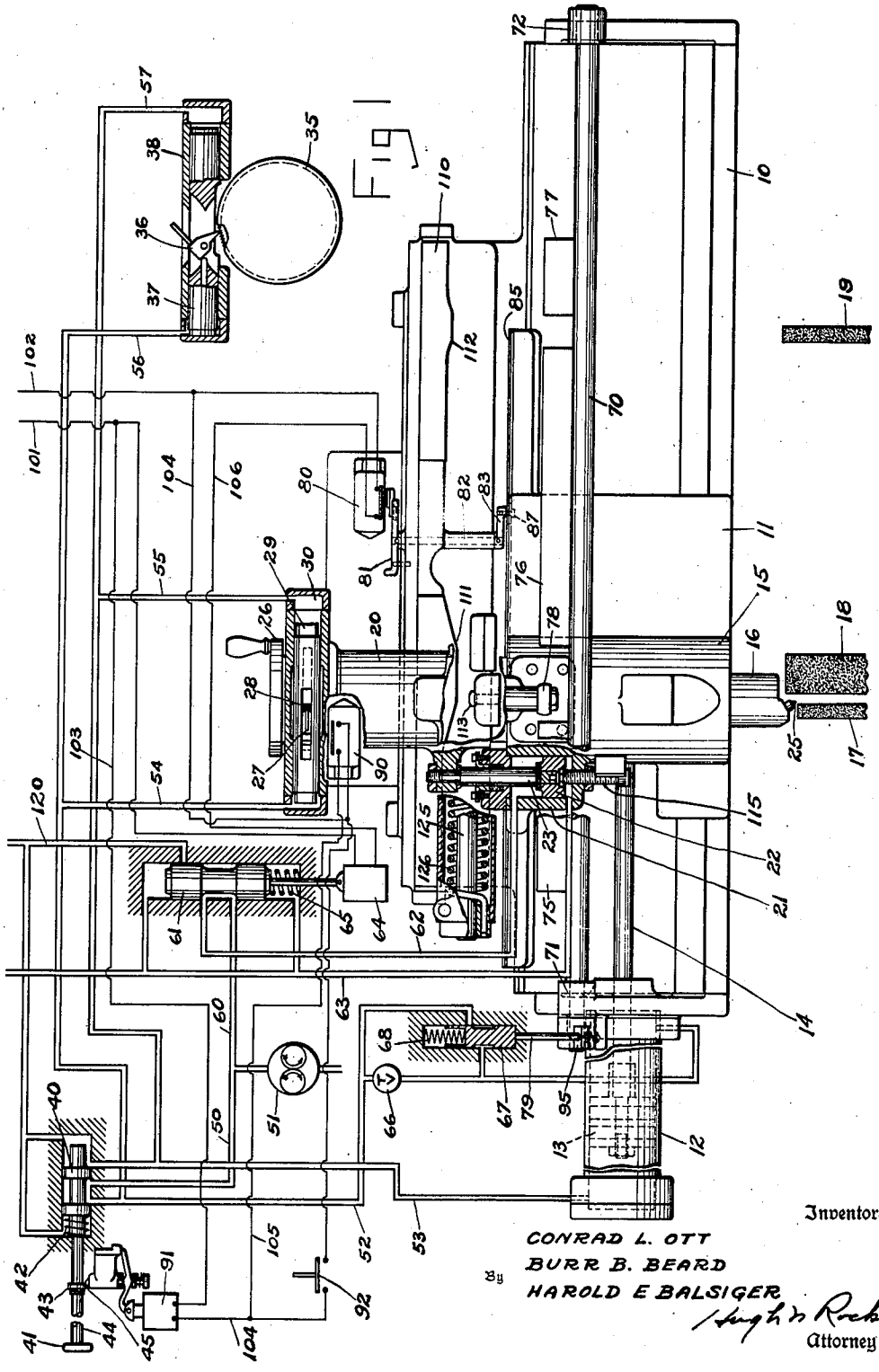


Fig. 1

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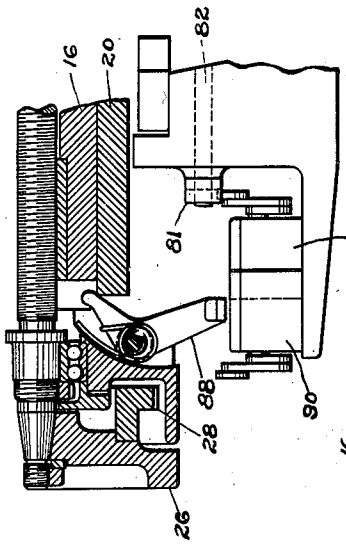



Fig. 4

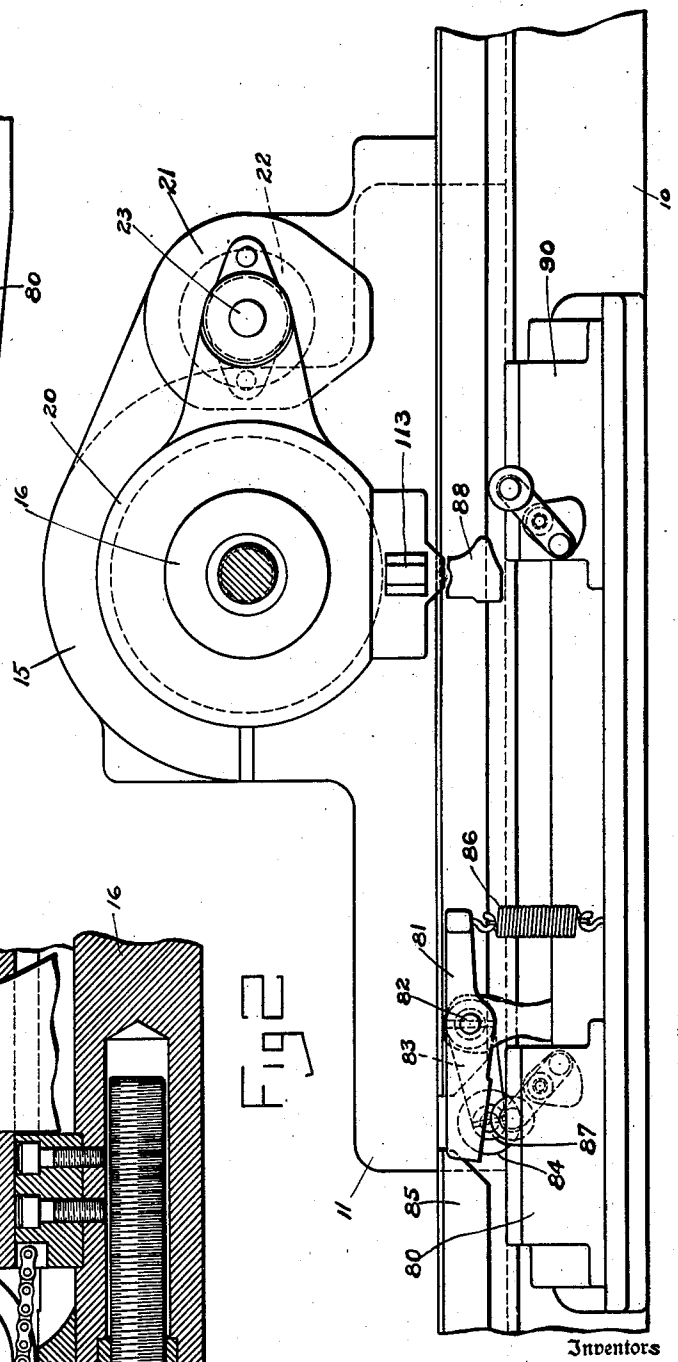



Fig. 2

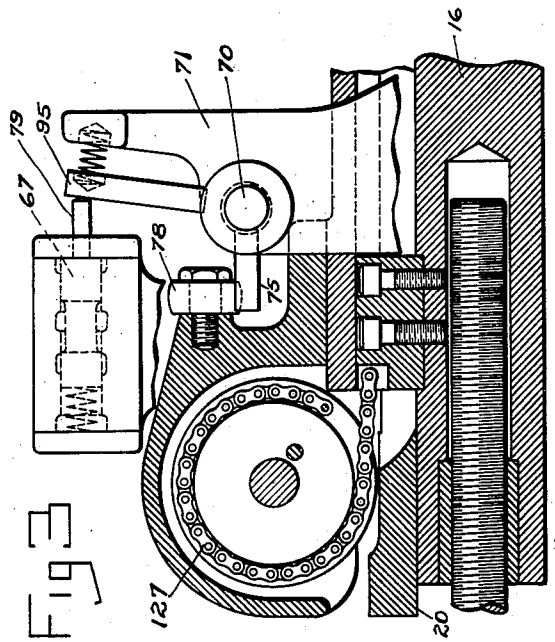



Fig. 3

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## GRINDING WHEEL DRESSING MECHANISM

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Application July 22, 1938, Serial No. 220,776

5 Claims. (Cl. 125—11)

Our invention relates to dressing devices for grinding wheels, particularly on machines having two or more wheels of varying diameters mounted on the same spindle.

One object is to provide means whereby the dressing tool may be advanced or retracted automatically as it passes from one wheel to another in order to position it for each diameter.

Another object is to provide means for causing the rate of the traverse movement to be increased as the dresser passes from one wheel to another.

A further object is to provide means whereby wheels varying considerably in diameter and spaced close together may be dressed automatically and successively.

Figure 1 is a plan view of my device including a diagram of the piping and wiring.

Figure 2 is a rear view of the dressing tool and the switches for same.

Figure 3 is a left hand end elevation of the means for intermittently changing the speed of traverse.

Figure 4 is a partial left end elevation showing the means for automatically operating the reversing switch.

In the drawings numeral 10 indicates a base member mounted on the bed of a machine at the rear of the grinding wheels, upon which is slidably mounted a support 11 for a dressing mechanism. A cylinder 12 secured to said base contains a piston 13 which is connected to support 11 by connecting rod 14 for traversing same along the base 10. Support 11 has a cylindrical portion 15 in which a diamond bar 16 with a diamond 25 is slidably mounted for movement toward and from the grinding wheels 17, 18 and 19. Wheels 17 and 18 differ considerably in diameter and are mounted close together. The portion of said diamond bar extending beyond said support 11 is enclosed in a housing 20. A cylinder 21 on the side of cylindrical portion 15 contains a piston 22. Said piston is connected to housing 20 thru piston rod 23 and serves to effect a rapid adjustment of the diamond 25 as it passes from wheel 17 to wheel 18 or vice versa. A feeding movement of the diamond is provided by a handwheel 26 and screw mechanism similar to that disclosed in co-pending application Speed control mechanism, Serial No. 203,668 filed April 22, 1938. Said feeding mechanism may be actuated by pressure actuated pawl 27 in engagement with a ratchet 28 on the handwheel shaft. Said pawl may be reciprocated by a piston 29 in cylinder 30. A second pawl and ratchet mechanism similarly operated serves to advance the grinding wheels by the amount to be removed by dressing. This mechanism consists of a ratchet wheel 35 and a pawl 36. Said pawl is pivotally supported in a slotted piston 37. Said piston may be reciprocated by fluid under pressure in cylinder 38.

Fluid under pressure is supplied simultaneously to cylinders 12, 30 and 38 from valve 40. Said valve may be moved in one direction manually by a knob 41 and in the opposite direction by a spring 42. A collar 43 on stem 44 of said valve is engaged by a latch 45 and held thereby in the position to which it has been moved by hand.

Fluid is supplied to said valve thru line 50 from pump 51 and distributed thru lines 52 and 53 to cylinder 12, lines 54 and 55 to cylinder 30 and lines 56 and 57 to cylinder 38.

Pump 51 also supplies fluid under pressure thru line 60 to valve 61 from which it is directed thru line 62 to cylinder 21. A drain line 63 permits removal from cylinder 21 of any fluid which may leak past piston 22. Valve 61 is actuated in one direction by a solenoid 64 and in the opposite direction by a spring 65.

Fluid supplied to line 52 may enter cylinder 12 without any restriction thru valve 67. If valve 67 is closed fluid must pass thru throttle valve 66. The means for actuating valve 66 includes a shaft 70 rotatably mounted in bearing brackets 71 and 72 on base 10. A series of tongues 75, 76 and 77 are adjustably secured to said shaft at spaced intervals. A roller 78 is mounted on support 11 in such a manner that it extends in overlapping relation to said tongues with its lower side below the upper surface of said tongues. At the valve end of shaft 70, said shaft extends thru the bearing 71. To this extended portion of said shaft is attached another tongue 95 in position to engage the end of the stem 79 on valve 67. Said valve is moved in the opposite direction by spring 68. Housing 20 and diamond bar 16 are urged toward a withdrawn position by a back lash mechanism consisting of a shaft 125 about which is wound a spring 126 and a chain 127 attached to some suitable part of the diamond bar 16 or associated parts. The movement in this direction is limited by a shoe 113 on said housing engaging a profile bar 110 having a locating surface 111 for positioning diamond 25 to dress wheel 18. Another locating surface 112 serves to position the diamond 25 for dressing wheel 19. An adjustable screw 115 limits the forward movement of the piston 22 and locates the diamond 25 for dressing wheel 17.

A limit switch 80 is attached to the base 10 on the side opposite the grinding wheels. A lever 81 is rotatably mounted on a shaft 82 which extends thru a portion of said base 10. Said lever is yieldingly held against counter-clockwise movement by spring 86. At the other end of said shaft is secured an arm 83. In the end of said arm is a roller 84 in a position substantially parallel to shaft 82. A cam bar 85 is secured to support 11. Roller 84 is held in contact with said bar by spring 86.

Another switch 90 is mounted on base 10 and adapted to be actuated by pivoted dog 88 to energize solenoid 91. This switch is a safety device to prevent an extended traverse of the diamond in its forward position. A push button switch 92 in parallel with switch 90 is the normal means for energizing solenoid 91 to reverse the traverse movement. Thus, solenoid 91 may be energized thru either of said switches. Said dog is pivotally mounted in the bearing housing of handwheel 26. A spring tends to rotate said dog in a clockwise direction which movement is limited by housing 20 or diamond bar 16. When stop 113 engages bar 110 at the left hand end thereof, housing 20 and dog 88 will have moved so that said dog is aligned with the roller on the arm of switch 90. Movement of the diamond bar to the rear by means of handwheel 26 will be effective to rotate said dog out of position to engage the roller of switch 90.

Current is supplied to said solenoids 64 and 91 from lines 101 and 102. Line 101 leads direct to solenoid 64. Line 103, a branch of line 101, leads direct to solenoid 91. A return line 104 passes thru the push button switch 92 and returns to supply line 102. A branch 105 from said return line by-passes said push button switch and returns to line 104 after passing thru limit switch 90. The return line 106 from solenoid 64 passes thru switch 80 before returning to line 102.

*Operation*

The normal inoperative position of the dressing tool is at the right end of its travel. In order to initiate the dressing operation the operator shifts valve 40 to the left against spring 42. Latch 45 holds the valve in this position and fluid under pressure is directed thru line 52 to the right end of cylinder 12 causing piston 13 and support 11 to move toward the left. At the same time fluid is also directed thru line 54 to cylinder 30 to actuate pawl 27 to feed diamond 25 toward the grinding wheels and thru line 56 to cylinder 38 to actuate pawl 36 and ratchet 35 to effect a movement of the grinding wheel to compensate for the amount removed by wear and by dressing. When valve 40 is shifted in the opposite direction, fluid is directed to the other ends of cylinders 30 and 38 and the two feed pawls are reset by returning them to their original position. The rate of movement of support 11 depends upon whether the fluid under pressure entering said cylinder passes first thru unrestricted valve 67 or thru restricted valve 66. The tongues 75, 76 and 77 are spaced so that each space is opposite a grinding wheel. When the dressing operation is initiated, roller 78 is in contact with tongue 77 and valve 67 is thus positioned to permit an unrestricted flow of fluid to cylinder 12. Support 11 will move rapidly to the left until roller 78 reaches the space between tongues 76 and 77 when diamond 25 will be positioned by locating surface 112 and valve 67 will be released and shifted by spring 68 to shut off the flow of fluid there thru. Said fluid must then pass thru valve 66 and thus the rate of movement of support 11 is reduced while diamond 25 passes across wheel 19. After said diamond has passed across wheel 19, roller 78 rides over tongue 76 depressing same and shifting valve 67 to open position so that diamond 25 may pass from wheel 19 to wheel 18 at a high speed. Surface 111 on profile bar 110 will locate the diamond for wheel 18, and roller 78 passing off tongue 76 will initiate the slow, dressing traverse movement.

As the diamond passes off wheel 18, pin 87 in arm 83 will be guided in such a manner as to rotate shaft 82 in a clockwise direction viewed from the front of the machine. Lever 81 will thus be rotated against the action of spring 86 and will depress the arm of switch 80 to break the circuit there thru. This will deenergize solenoid 64 and permit spring 65 to shift valve 61 to direct fluid under pressure thru line 63 to cylinder 21 and shift diamond 25 toward wheel 17 until stopped by adjusting screw 115.

After diamond 25 has passed across wheel 17 the operator presses push button switch 92 to energize solenoid 91 which withdraws latch 45 and permits spring 42 to shift valve 40 to the right. If the operator fails to close switch 92, and the diamond remains in advanced position, dog 88 will close switch 90 to energize solenoid 91. Fluid under pressure is directed thru line 53 to the left end of cylinder 12 to move piston 13 and support 11 to the right. During the traverse movement to the right the same control is exercised over the speed except that the exhaust fluid instead of the incoming fluid is controlled. After the diamond has passed across wheel 17 switch 80 is opened and solenoid 64 deenergized. Spring 65 shifts valve 61 to a position to cut off the supply of fluid under pressure and to connect line 62 with exhaust 120. As the pressure on piston 22 is released, the back lash mechanism moves housing 20 and diamond 25 until shoe 113 engages the locating surface again. The remainder of the traverse movement is the reverse of the movement to the left. At the end of the movement to the right, support 11 comes to rest against a positive stop, not shown, and remains in this position until valve 40 is again actuated.

In case it is desired to continue the movement of the dresser to the left for the purpose of placing the diamond bar in a position where the diamond may be easily replaced, it is necessary to run the diamond bar 16 back by means of handwheel 26 far enough to engage dog 88 and swing it out of position to operate switch 90. In this position the diamond bar will be able to pass thru an opening in the wheel fender to a position where the operator may replace the diamond.

We claim:

1. A mechanism for dressing a plurality of axially aligned grinding wheels comprising a base member, a dressing tool slidably mounted for movement longitudinally and transversely of said base, a contour bar for limiting said transverse movement in one direction, yielding means for holding said dressing tool against said contour bar, power means for moving said dressing tool in the opposite direction, a positive stop for limiting said movement in said opposite direction and means operable at a predetermined point in said longitudinal movement for controlling the operation of said power means.

2. A mechanism for dressing a plurality of axially aligned grinding wheels comprising a base member, a dressing tool slidably mounted for movement longitudinally and transversely of said base, a contour bar for limiting said transverse movement in one direction, yielding means for holding said dressing tool against said contour bar, power means for moving said dressing tool in the opposite direction, an adjustable positive stop for limiting said movement in said opposite direction, means operable at a predetermined point in said longitudinal movement for controlling the operation of said power means, fluid pressure means for effecting said longitudinal movement whereby to subject said wheels successively to said dressing tool and a valve for varying the speed of said movement during each dressing operation.

3. A mechanism for dressing a plurality of axially aligned grinding wheels of different radii where the space between some of the wheels is greater than the difference in radius and where the space between other wheels is equal to or less than the difference in radius comprising a base member, a dressing tool slidably mounted for movement longitudinally and transversely of said wheels, a cam bar for effecting said transverse movement between said widely spaced wheels, and a motor for effecting said transverse movement between said closely spaced wheels.

4. A mechanism for dressing a plurality of grinding wheels of different radii where the space between some of the wheels is greater than the difference in radius and where the space between other wheels is equal to or less than the difference in radius comprising a base member, a dressing tool slidably mounted for movement longitudinally and transversely of said wheels, cam surfaces for locating said dressing tool transversely for dressing said widely spaced wheels, and a motor for positioning said dressing tool transversely for dressing said closely spaced wheels.

5. A mechanism for dressing a plurality of axially aligned grinding wheels comprising a base member, a dressing tool slidably mounted for movement longitudinally and transversely of said base, a contour bar for limiting said transverse movement in one direction, yielding means for urging said dressing tool in one direction relative to the contour bar, power means for moving said dressing tool in the opposite direction, a positive stop for limiting said movement in said opposite direction, and means operable at a predetermined point in said longitudinal movement for controlling the operation of said power means.

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