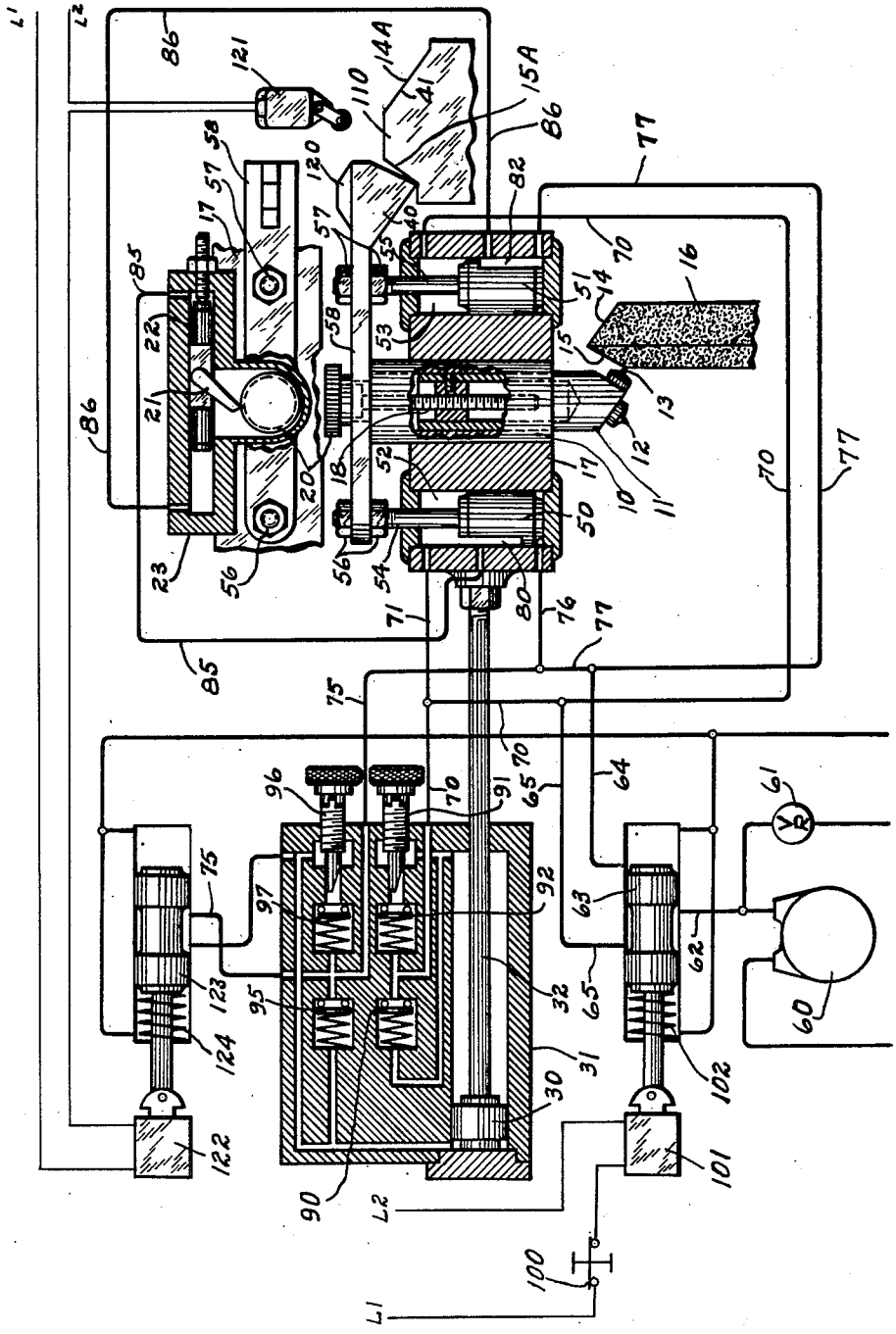
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GRINDING WHEEL DRESSER

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GRINDING WHEEL DRESSER

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This invention relates to grinding machines, particularly to apparatus for dressing the grinding wheel on such machines.

The invention relates more particularly to the dressing of grinding wheels having angularly related grinding surfaces. In the past, it has been necessary to use separate dressing devices, each positioned at an angle in accordance with the angle of the wheel face which it was to dress.

It is an object of this invention to provide a dressing device which will serve to dress both faces of an angle-faced wheel.

A further object is to provide means for holding the dresser out of contact with the grinding wheel during traverse in one direction.

The drawing is a diagrammatic sketch showing the essential elements of the invention.

Numeral 10 indicates a dresser housing for the diamond holder 11, on which are mounted in angularly spaced relation two diamonds 12 and 13 for dressing the faces 14 and 15 respectively of grinding wheel 16. Said diamonds are mounted in said holder at an angle to one another corresponding substantially to the angle between the faces of the wheel to be dressed. With this arrangement, each diamond is mounted in the position best suited to the wheel surface it is to dress. This dresser may be mounted in the fender of a grinding wheel. Axial adjustment of said diamonds relative to said grinding wheel may be effected by an adjusting screw (not shown) in housing 10. Said screw may be turned by means of a ratchet 20 actuated by pawl 21 on piston 22. Said piston is reciprocally mounted in a cylinder 23.

Housing 10 may be slidably mounted in a slide 17 for movement radially and axially of the grinding wheel. A traversing movement of dresser housing 10 may be effected by piston 30 slidably mounted in cylinder 31 and connected to slide 17 by means of piston rod 32. The dresser housing 10 is moved transversely of slide 17 as it passes across grinding wheel 16 by follower 40 in engagement with a template 41. Said template has a guide surface 14A corresponding to the surface 14 of grinding wheel 16 and a surface 15A corresponding to the face 15 of said grinding wheel. The wheel face 15 and the corresponding template face 15A are at such an angle that it is difficult for follower 40 to follow it during a traversing movement from left to right. For this reason, it is necessary that the dresser be withdrawn to a position where it can be traversed from left to right without engaging the grinding wheel.

The means for effecting this withdrawal movement consists of a pair of pistons 50 and 51 slidably mounted in cylinders 52 and 53. Piston rods 54 and 55, extending from the top of said cylinder, are attached to bar 58 or any other suitable means attached to or forming part of dresser housing 10.

Fluid under pressure for operating the various pistons is supplied by pump 60 having a relief valve 61 attached thereto. Said pump directs fluid through line 62 to reversing valve 63, which in turn directs fluid alternately through lines 64 and 65. Line 65 is connected to line 70 to direct fluid to the rod end of cylinder 31 and also to the upper end of cylinders 52 and 53. Cylinder 52 is connected to line 70 through line 71. Line 64 is connected to the head end of cylinder 31 through line 75 and also through lines 76 and 77 to the lower ends of cylinders 52 and 53 respectively. The connection to the lower end of cylinder 52 is through line 76. Piston 50 has a

slot 80 extending from the top of the piston to within a short distance of the bottom. Piston 51 has a slot 82 extending from the bottom of the piston to within a short distance of the top. A fluid line 85 extends from cylinder 52 to the right end of feed cylinder 23. Line 86 extends from cylinder 53 to the left-hand end of cylinder 23.

Fluid supplied to the rod end of cylinder 31 must pass through a check valve 90. Exhaust from this end of the cylinder must pass through a throttle valve 91 and a check valve 92. Fluid to the head end of said cylinder must pass from line 75 through a check valve 95. Exhaust fluid from the head end of cylinder 31 passes through throttle valve 96 and check valve 97. Said check valves are held closed by springs having sufficient force to prevent opening thereof until pistons 50 and 51 have acted.

Operation

In the position shown, dresser housing 10 has just completed a working stroke across the faces 14 and 15 of wheel 16. In order to return it to original position, switch 100 is opened to deenergize solenoid 101. Spring 102 shifts valve 63 to the right to direct fluid under pressure from line 62 through lines 64 and 75 and check valve 95 to the head end of cylinder 31 to shift slide 17 and dresser housing 10 to the right. At the same time, fluid is directed through lines 76 and 77 to the lower ends of cylinders 52 and 53 to move dresser housing 10 transversely away from grinding wheel 16. The fluid directed to cylinder 53 passes through slot 82, line 86 to the left end of cylinder 23 and shifts piston 22 and pawl 21 to the right to reset them for the next feed increment. The movement of piston 30 from left to right is an idle movement and, therefore, should be completed as quickly as possible. For this reason, throttle valve 91, through which exhaust fluid from the rod end of cylinder 31 must pass, is set to permit a comparatively rapid movement.

With the dresser housing 10 in withdrawn position, piston 30 is shifted to the right in preparation for another pass across grinding wheel 16. The operator then closes the circuit through switch 100 to solenoid 101, shifting valve 63 to the left and directing fluid through line 65 to line 70. In actual practice, this reverse is automatic. Manual reversing is described here for the purpose of a simplified illustration. From line 70, fluid enters the upper end of cylinders 52 and 53 to move pistons 50 and 51 downward to a position to locate dresser housing 10 transversely in operative relation to the grinding wheel. Fluid directed to the upper end of cylinder 52 passes through slot 80, line 85 to the right end of cylinder 23, shifting piston 22 and pawl 21 to the left to rotate ratchet 20 and dresser feedscrew 18 to advance diamond holder 11 for the next pass across wheel 16.

Fluid also passes through line 70 and check valve 90 to the rod end of cylinder 31 to move piston 30 therein and dresser housing 10 to the left. Movement of piston 30 from right to left must be at a rate suitable for dressing. Exhaust fluid from the head end of cylinder 31 must pass through valve 96, which controls the rate of this movement. This valve is set so as to provide a comparatively slow movement suitable for a dressing operation. During this movement, follower 40 rides along face 14A of template 41 to guide diamond 12 along face 14 of grinding wheel 16. Said follower lifts diamond holder 11 against the pressure in the tops of cylinders 52 and 53. When said follower reaches the top of surface 14A, it must pass across a flat portion 110, which permits it to travel to a point at which diamond 13 will be in position to dress face 15 of the grinding wheel. At this point, the follower begins to move downwardly on surface 15A of the cam bar; and diamond 13 passes across face 15 of the grinding wheel.

It is desirable that the traverse movement of the dresser during the period after the completion of dressing of grinding wheel face 14 and prior to the dressing of face 15, that is, while follower 40 is passing across surface 110, take place at a higher rate of speed than the dressing movement. One means for accomplishing this result consists of a cam 120 attached to bar 58 and having an operative surface of a length corresponding to the surface

110 of template 41. When follower 40 reaches the end of surface 111 and the beginning of surface 110, cam 120 engages a limit switch 121 to complete a circuit from L1 through valve solenoid 122 and line L2. Said solenoid shifts by-pass valve 123 so that exhaust fluid from the head end of cylinder 31 passes through said by-pass valve to exhaust through lines 75 and 64 and reverse valve 63 instead of passing through throttle valve 96. This portion of the traverse movement, therefore, occurs at a rapid rate. When follower 40 reaches the end of surface 110, cam 120 releases limit switch 121, deenergizing solenoid 122 so that spring 124 returns said valve to its original position, in which the by-pass is closed. Exhaust fluid from the head end of cylinder 31 must again pass through throttle valve 96, which reduces the traverse movement to a rate suitable for dressing the face 15 of grinding wheel 16.

We claim:

1. A grinding wheel having angular peripheral faces and a wheel truing apparatus therefor, comprising, a slide movable in a direction axially of said grinding wheel, a diamond holder mounted on said slide for movement transversely thereto, diamonds in said holder substantially 180° apart and inclined relative to the axis of said holder at an angle to one another equal substantially to the angle between said grinding wheel faces whereby one of said diamonds will engage one of said faces, and the other of said diamonds will engage the other of said faces, means responsive to movement of said slide for effecting said transverse movement of the diamond holder including a template, a follower attached to said diamond holder and yieldingly held in engagement with the contour of said template during said movement of said slide, said template having inclined surfaces corresponding to the angular faces of said grinding wheel, a flat horizontal surface between said angular surfaces equal substantially to the space between said diamonds whereby to permit an idle traverse movement of said diamond holder after dressing one of said wheel surfaces by one of said diamonds and before starting to dress said other wheel surface by the other of said diamonds.

2. A grinding wheel having peripheral faces and a wheel truing apparatus therefor, comprising, a slide movable in a direction axially of said grinding wheel, a diamond holder mounted on said slide for movement transversely thereto, diamonds in said holder substantially 180° apart and inclined relative to the axis of said holder at an angle to one another equal substantially to the angle between said grinding wheel faces whereby one of said diamonds will engage one of said faces, and the other of said diamonds will engage the other of said faces, means responsive to movement of said slide for effecting said transverse movement of the diamond holder including a template, a follower attached to said diamond holder and yieldingly held in engagement with the contour of said template during said movement of said slide, said template having inclined surfaces corresponding to the angular faces of said grinding wheel, one of said surfaces being too steep for the follower to move upwardly thereon in response to the longitudinal movement thereof and means for withdrawing said dressing tool from engagement with the grinding wheel when said dressing tool moves toward said steeply inclined surface.

3. A grinding wheel having peripheral surfaces at an angle to one another, one at a relatively steep angle, and means for dressing said surfaces, including a diamond holder movable toward and from said grinding wheel and having diamonds mounted thereon in angular relation corresponding to that of the wheel surfaces, means for traversing said diamond holder relative to said wheel, including a hydraulic motor, a supply of fluid under pressure for said motor, a reversing valve for directing said fluid under pressure alternately to opposite sides of said motor, hydraulic means for moving said diamond holder toward and from said grinding wheel including a template and follower yieldingly held in engagement with one another, one of which is attached to said diamond holder and traversible therewith, said template having one guide surface which is inclined too steeply to permit the passage of said follower in one direction, connections between said reversing mechanism and said hydraulic means whereby said hydraulic means is effective to position said diamond holder transversely in operative relation to said grinding wheel when fluid under pressure is directed to one side of said traverse motor and to withdraw said diamond holder to an inoperative position when said fluid is directed to the opposite side of said traverse motor.

4. A grinding wheel having peripheral surfaces at an angle to one another, means for dressing said surfaces, including a diamond holder movable toward and from said grinding wheel, means for traversing said diamond holder relative to said wheel including a hydraulic motor, a source of fluid under pressure connected thereto, a template having angularly related surfaces corresponding to the faces on said grinding wheel, a follower on said diamond holder engaging said template, a diamond on said diamond holder for engaging one face of said grinding wheel when the follower engages the corresponding face of the template and a second diamond on said diamond holder for engaging another face on said grinding wheel when said follower engages the corresponding surface on said template, a horizontal surface on said template between said faces corresponding to the space between said diamonds, and means for increasing the traverse speed during the passage of said follower along said horizontal surface including a valve for controlling the supply of fluid to said hydraulic motor, and a cam movable with said follower for actuating said valve.

5. A grinding wheel having peripheral surfaces at an angle to one another and means for dressing said surfaces including a diamond holder movable transversely toward and from said grinding wheel, means for traversing said diamond holder relative to said wheel, means responding to said traverse movement for effecting said transverse movement, including a template having angularly related surfaces corresponding to the surfaces on said grinding wheel, a follower yieldingly held in engagement with said template, a diamond on said diamond holder for engaging one face of said grinding wheel when the follower engages one face of the template and a second diamond on said holder at a predetermined angle to said first diamond for engaging another face on said grinding wheel when said follower engages the other face on said template, and a horizontal surface on said template between said faces for holding said diamond holder in an inoperative position while traversing from operative position for one diamond to operative position for the other.

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