

Feb. 7, 1933.

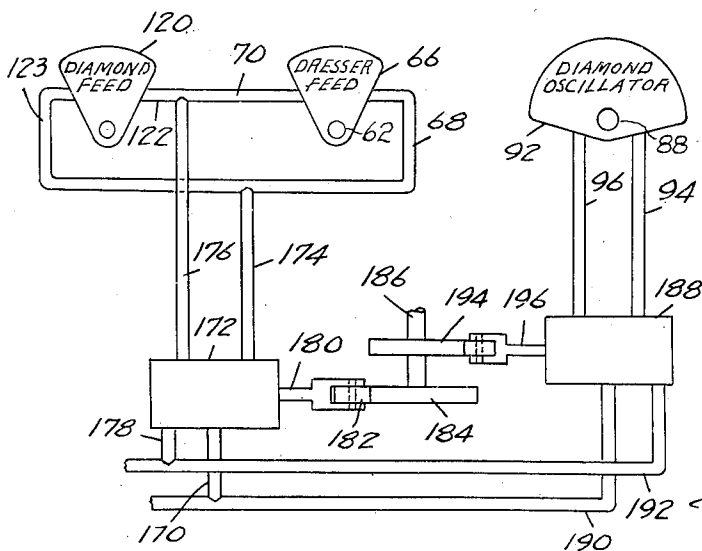
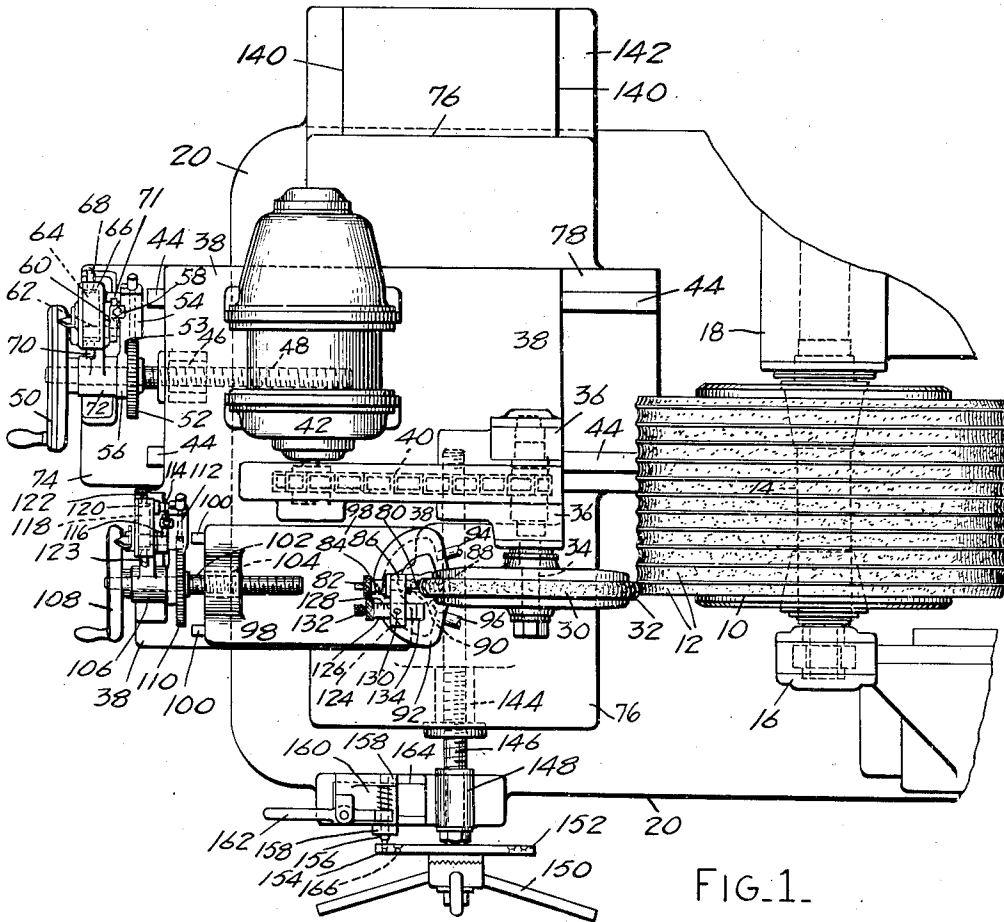
A. VUILLEUMIER

1,896,533

SHAPING OR DRESSING APPARATUS

Filed March 22, 1930

2 Sheets-Sheet 1



INVENTOR:
ALBERT VUILLEUMIER,
BY
Charles H. Hume
HIS ATTORNEY.

Feb. 7, 1933.

A. VUILLEUMIER

1,896,533

SHAPING OR DRESSING APPARATUS

Filed March 22, 1930

2 Sheets-Sheet 2

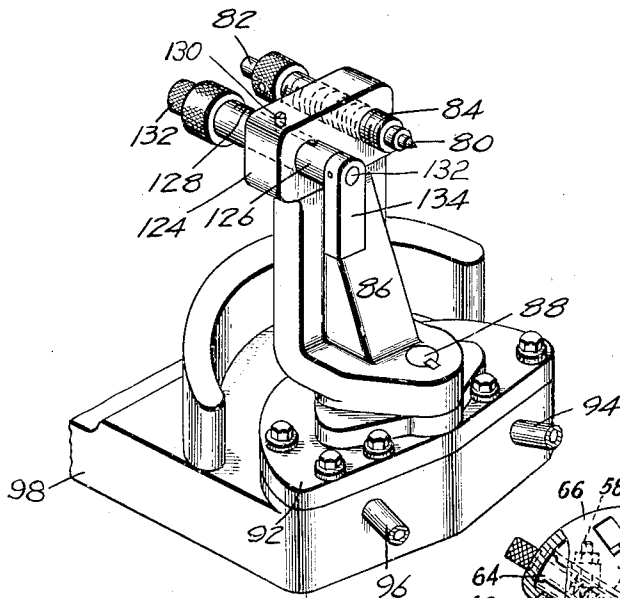


FIG. 3.

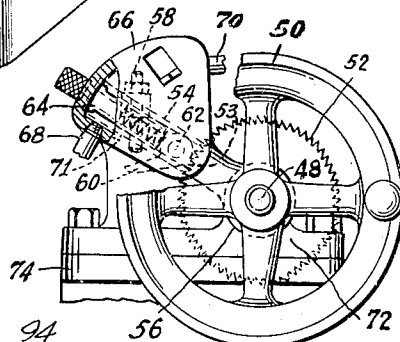


FIG. 5.

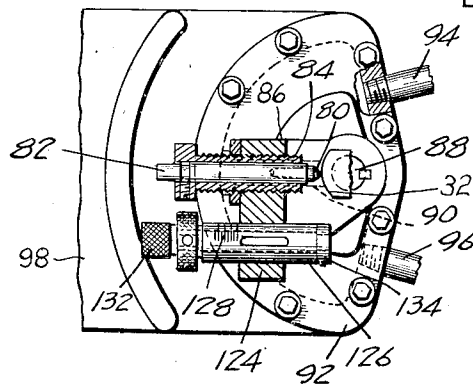


FIG. 4.

INVENTOR:
ALBERT VUILLEUMIER,
BY
Edw. J. Moore
HIS ATTORNEY.

UNITED STATES PATENT OFFICE

ALBERT VUILLEUMIER, OF BRISTOL, CONNECTICUT, ASSIGNOR TO THE NEW DEPARTURE MANUFACTURING COMPANY, OF BRISTOL, CONNECTICUT, A CORPORATION OF CONNECTICUT

SHAPING OR DRESSING APPARATUS

Application filed March 22, 1930. Serial No. 438,200.

This invention relates to shaping or dressing apparatus and comprises all the features and aspects of novelty herein disclosed. An object of the invention is to provide improved apparatus for shaping or truing a rotary member, and more especially for cutting grooves in an abrasive wheel such as commonly used for grinding balls. Another object is to provide an efficient apparatus for rapidly and accurately cutting grooves of a desired shape and size in a wheel. Another object is to provide improved mechanism for determining and maintaining the contour of a cutting wheel during a cutting operation. Still another object is to provide an improved method of cutting or truing grooves in a wheel.

To such ends and to improve generally and in detail upon apparatus of this character, the invention further consists in the various matters hereinafter described and claimed. In its broader aspects, the invention is not necessarily limited to the specific constructions and operations selected for illustrative purposes in the accompanying drawings in which

Fig. 1 is a plan view of the improved apparatus.

Fig. 2 is a diagrammatic view.

Fig. 3 is a perspective view of the diamond oscillator.

Fig. 4 is a plan view, partly in section, of the diamond oscillator.

Fig. 5 is an end view, partly in section, of the operating means for the feed screw of the lower slide.

A common form of machine for grinding balls uses two opposed abrasive wheels having ball grooves. It is a matter of considerable difficulty and expense to generate the grooves initially and to maintain them of proper size and shape. The present invention is especially concerned with such operations without being limited thereto. The numeral 10 indicates a wheel to be trued or shaped as by forming around its periphery a series of grooves 12 having arcuate walls. The wheel, which will ordinarily be of bonded abrasive material, is clamped to a drive shaft 14 mounted for rotation in standards

16 and 18 of a base or main frame 20. One standard 16 is removable to provide for easy application of the wheel to the drive shaft which is driven by any suitable motive devices, a speed of about 100 revolutions per minute being acceptable for a 24 inch wheel.

To impart the desired shape to the wheel 10, an abrasive cutting or dressing wheel 30 is rotated in contact therewith at high speed, say 6000 surface feet a minute. When the wheel 10 is to have arcuate grooves 12, the cutting wheel will have a crowned or convex periphery 32 of arcuate form and its shaft 34 will preferably be parallel to the shaft 14. The shaft 34 is shown mounted for rotation in standards 36 on an intermediate slide 38 and driven by sprocket wheels and a sprocket chain 40 from the shaft of a motor 42. The slide 38 is mounted for transverse sliding movement on dovetail ways 44 in order to provide a cutting feed for the dressing wheel towards the wheel 10. The slide has a nut 46 engaging a feed screw 48 which is operable by a hand wheel 50. The screw is also automatically operable by a ratchet wheel 52 receiving intermittent rotation from a pawl 53 slidable in a hollow arm 54 whose hub 56 is loose on the feed screw. The arm 54 carries an adjusting screw 58 arranged in the path of an arm 60 on a shaft 62 which is rocked by a vane 64 in a housing or cylinder 66. The cylinder is of sector form and pressure fluid is alternately admitted and exhausted through pipes 68 and 70 under control of a suitable valve. The amplitude of swing of the feed pawl is adjusted by initial spacing of the screw 58 from the arm 60, and the pawl carrying arm 54 returns by gravity against stop lug 71. The feed screw 48 is journaled for rotation without endwise movement in a standard 72 which rises from a side extension 74 on a main or lower slide 76. This main slide is movable from front to rear, as will later appear, and has a pad or raised portion 78 on which the ways 44 for the intermediate slide 38 are formed.

Inasmuch as the cutting or dressing wheel 30 will wear down and change in contour, especially at the points where most cutting is done, an oscillating diamond 80 or other

dressing tool is arranged to maintain the shape throughout the cutting operation. The diamond is carried by a grooved stud 82 held by a pin in a sleeve 84 threaded externally for longitudinal adjustment in a tapped opening in a standard 86 which is fixed to an oscillating pivot shaft 88. The shaft is fixed to a vane 90 in a housing or cylinder 92 of sector shape which alternately receives and exhausts pressure fluid through pipes 94 and 96 under control of a suitable valve. The center of oscillation is at the center of the arc of convexity 32 of the dressing wheel and is kept at such point during wheel wear by moving the diamond and its operating mechanism on an upper slide 98 towards the dressing wheel. The slide 98 is guided by ways 100 on the intermediate slide 38 and so will also partake of the cutting feed of the dressing wheel towards the grooved wheel 10. A feed screw 102 engages a nut 104 on the slide 98, the screw being journaled for rotation without endwise movement in a standard 106 on the intermediate slide 38. The feed screw can be turned manually by a hand wheel 108 but is also capable of automatic actuation by mechanism similar to that which actuates the intermediate slide. The mechanism comprises a ratchet wheel 110, a pawl in the hollow arm 112, an adjusting screw 114 on the arm and in the path of arm 116, and a shaft connecting the arm 116 to a vane 118 in a sector housing or cylinder 120 which alternately receives and exhausts operating fluid through pipes 122 and 123. These pipes can conveniently be branches of the pipes 68 and 70 and be controlled by the same valve.

The contour of the grooves 12 in the wheel to be shaped is controlled by the contour of the cutting or dressing wheel 30. The radius of curvature of the dressing wheel can be adjusted by moving the diamond towards or from the center of oscillation provided by the pivot shaft 88. To insure accurate adjustment of the diamond with reference to the pivot shaft 88, for any radius, the following gauge device is provided. The standard 86 has an offset 124 with a hole slidably receiving a splined sleeve 126 which is provided with index lines 128. A clamping screw 130 holds the sleeve in adjusted position. A shaft 132 is rockably mounted in the sleeve and carries a diamond locating arm 134 which can be swung from a vertically depending position to a horizontal position in front of the diamond point (assuming the upper slide 98 is retracted from the dressing wheel). The index lines 128 measure the distance of the rear face of arm 134 from the center of the pivot shaft 88 and the diamond is brought forward into contact with this face before being clamped in the standard.

The above described mechanism provides for grinding one groove in the wheel 10. To

grind other grooves, the cutting and truing mechanism is moved as a whole from front to rear, or longitudinally of the wheel 10. The lower slide 76 slides on dovetail ways 140 on a pad or raised portion 142 of the main frame. The slide carries a nut 144 engaging a feed screw 146 journaled for rotation, without endwise movement, in a lug 148 of the main frame and operated by a hand wheel 150. To insure accurate spacing of the grooves 12, the various positions of the main slide are determined by an index disc 152 having a circular series of openings 154 near the periphery for selective engagement with a spring pressed locking pin or plunger 156. The plunger is slidably mounted in lugs 158 of a plate 160 which has a forked lever 162 to withdraw the plunger from locking position. The plate 160 is slidably mounted on ways 164 so that the plunger can be selectively placed in line with another circular series of openings 166 nearer the center of the index disc, this additional series of openings to have an angular spacing different from that of the openings 154. This will provide means for accurately locating the main slide in case the grooves in another wheel to be shaped are to have a different width or spacing.

The convex edge of the high speed dressing wheel is first formed by oscillating the diamond at the selected distance from the center of the pivot shaft 88. The intermediate slide 38 is then moved to carry the dressing wheel against the wheel to be grooved, the particular location of the first groove being determined by the position of the main slide 76. During the cutting of the groove, the dressing wheel has an intermittent feed with the intermediate slide. The diamond partakes of the cutting wheel feed but additionally has an intermittent feed with its slide 98 to compensate for wearing down of the dressing wheel.

As indicated in the diagram, pressure fluid from a pump passes through a pipe 170 to a control valve 172 which directs the fluid alternately to pipes 174 and 176. Pipes 68 and 123 form branches of the pipe 174, and pipes 70 and 122 form branches of the pipe 176. The piping arrangement is such that the vane in the cylinder or housing 66 is given a feed stroke to advance the dressing wheel slide 38 when the vane in the cylinder or housing 120 (which controls the diamond slide 98) is retracted on an idle stroke. The cutting or dressing wheel 30 and the diamond are accordingly advanced alternately. When the liquid is exhausted from the pipe 174 or 176, it passes through the valve 172 and out of an exhaust pipe 178. The valve 172 may be a suitable piston valve whose stem 180 carries a roller 182 actuated by a cam 184 on a driven shaft 186. The diamond oscillation is controlled by a similar valve 188 receiving pres-

sure fluid from a pipe 190 and exhausting it through a pipe 192. A cam 194 controls the stem 196 of valve 188 in proper timed relation to the valve 172 in order that a feed stroke of the diamond slide may be completed before the diamond is oscillated.

I claim:

1. In a machine for shaping a rotary member, means for rotating the member around an axis, a cutting wheel for rotatably engaging the member, a truing tool for the cutting wheel, a slide for feeding the cutting wheel and the truing tool towards the rotary member, a slide for feeding the truing tool towards the cutting wheel, an oscillating support for the truing tool, and fluid pressure means for oscillating the support and actuating the slides; substantially as described.

2. In a machine for cutting a series of grooves in a rotary member, means for rotating the member around an axis, a cutting wheel for rotatably engaging the member, a truing tool, a slide, means for intermittently actuating the slide to produce a relative feeding movement of approach between the rotary member on the one hand and the cutting tool and the truing tool on the other, means for intermittently producing relative feeding movement of approach between the truing tool and the cutting wheel, means for oscillating the truing tool in a curved path across the edge of the cutting wheel, a second slide, means for actuating the second slide to produce a relative longitudinal traverse between the rotary member and the cutting wheel, and means for insuring the longitudinal traverse of said second slide in increments corresponding to the desired spacing of the grooves to be cut; substantially as described.

3. In a machine for grooving an abrasive wheel, means for rotating the abrasive wheel around its axis, a cutting wheel for rotatably engaging the abrasive wheel, a slide for producing relative feeding movement of approach between the cutting wheel and the abrasive wheel, a truing tool to engage the cutting wheel, a slide for producing relative feeding movement of approach between the truing tool and the cutting wheel, a reciprocating motor for operating each slide, each motor having a feeding stroke and an idle stroke, and means for causing each motor to have its feeding stroke when the other has its idle stroke; substantially as described.

4. In a machine for shaping a rotary member, means for rotating the member around its axis, a cutting wheel for engaging the rotary member, a truing tool for the cutting wheel, a slide for producing relative feeding movement of approach between the rotary member and both the cutting wheel and the truing tool, a slide for producing relative feeding movement of approach between the truing tool and the cutting wheel, said slide having a chamber containing a vane, a rock

shaft fixed to the vane and projecting from the chamber, a support secured to the shaft and carrying the truing tool, and means for oscillating the vane to move the truing tool in a curved path across the wheel; substantially as described.

In testimony whereof I hereunto affix my signature.

ALBERT VUILLEUMIER.

75

80

85

90

95

100

105

110

115

120

125

130