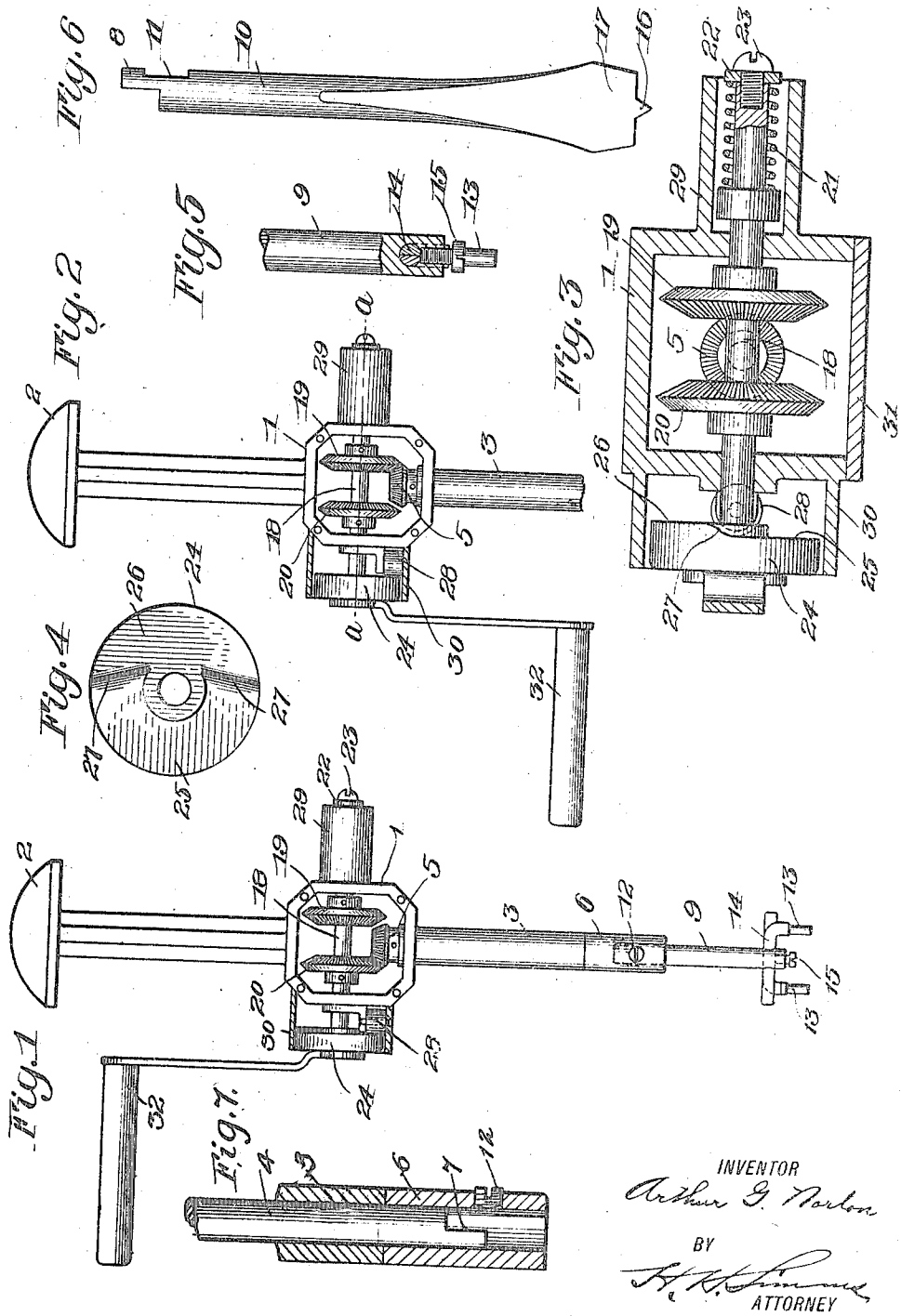
A. G. NORTON.

VALVE GRINDER.

APPLICATION FILED JUNE 1, 1915.

1,180,416.

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VALVE-GRINDER.

1,180,416. Specification of Letters Patent. Patented Apr. 25, 1916.

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To all whom it may concern:

Be it known that I, ARTHUR G. NORTON, of Rochester, in the county of Monroe and State of New York, have invented a new and useful Valve-Grinder, fully set forth in the following specification and shown in the accompanying drawings.

The present invention relates to valve grinders and more particularly to the type in which the tool is caused to oscillate, an object of this invention being to provide a simple and inexpensive construction which would cause the tool to move farther in one direction than in the other so that it progresses in one direction while oscillating and, in this way, produces a better grinding action.

Another object of the invention is to provide a simple and improved means for converting rotary into oscillatory motion.

Still another object of the invention is to provide an adjustable tool adapted to coöperate with valves having openings or pockets therein at different distances from each other.

To these and other ends, the invention consists in certain parts and combinations of parts all of which will be hereinafter described, the novel features being pointed out in the appended claims.

In the drawings: Figure 1 is a view in side elevation of the improved grinder showing the cover plate removed; Fig. 2 is a view similar to Fig. 1 showing the parts shifted and portions of the grinder removed; Fig. 3 is an enlarged section on the line *a*—*a*, Fig. 2; Fig. 4 is a face view of the cam which effects the longitudinal movement of the driving shaft; Fig. 5 is a detail sectional view of the tool shown in Fig. 1; Fig. 6 is a detail view of another form of tool adapted for use with the grinder, and Fig. 7 is a detail view of the socket and of the tool.

Referring more particularly to the drawings, 1 indicates a casing portion from which may extend a handle 2 of any suitable construction and also a sleeve or tubular portion 3 which is preferably in line with the handle 2. Within this tubular portion, a driven shaft 4 may turn being held against axial movement by a beveled gear 5 keyed thereto within the casing 1 and a socket piece 6 rigidly secured thereto at the outer end of the tube or sleeve 3, the extreme end of the shaft being cut away within the socket 6 at 7 in order to receive an extension 8 on the tool 9 or 10. Each of said tools may also be provided with a recess 11 for receiving a set screw 10 which, together with the extension 8, causes the tool to turn with the shaft 4.

The tools may be of any suitable construction designed for engaging the valve but there has been herein shown two forms adapted for engaging two different types. One of these forms embodies two parallel projections 13 which are adjustable toward and from each other to vary the distance between them in order that they may be received within two pockets or openings in a valve to turn the latter in engagement with its seat. Each of these projections 13 extends laterally from a portion 14 which is of semi-circular cross section, the two portions 14 being fitted through a single transversely-extending opening in the stem of the tool 9 and being longitudinally adjustable in said opening to effect the adjustment of the projections 13 toward and from each other. A set screw 15 operates in a longitudinally-extending opening in the end of the tool to bind against the portions 14 and hold them in their adjusted positions. The form of tool shown in Fig. 6 is similar to a screw driver to fit within the slot of a valve and, in addition, it has an extension 16 at the central portion of the wedge 17 to serve as a rocking point for the wedge and, in this way, prevent unequal pressure on the valve when the tool is inclined slightly to the axis of rotation of the valve.

For effecting the oscillation of the driven shaft 4, a drive shaft 18 is employed which is adapted for longitudinal movement and carries a pair of beveled gears 19 and 20 rigidly secured thereto and adapted for alternated engagement with the beveled gear 5 at diametrically opposite points on the latter. The longitudinal movement of this shaft in one direction is effected by a coil

spring 21 which surrounds the shaft 18 on the exterior of the casing 1, abutting against said casing at one end and against a shoulder 22 at the other end, the shoulder 22 being in the form of a washer secured to the end of the shaft 18 by a screw 23. The movement of the shaft 18 in the other direction may be effected by a cam 24 which preferably is mounted on the shaft 18 on that side of the casing opposite the spring 21 and has a depressed portion 25 and an elevated portion 26 connected by inclined portions 27 forming a cam face concentric with the axis of rotation of the shaft 18. This cam face coöperates with a portion on the casing and this portion is preferably in the form of a stationarily mounted roller 28 for the purpose of reducing friction on the cam, the roller being mounted between the casing 1 and the cam.

The spring 21 may be surrounded and protected by a tubular extension 29 on the casing 1, and the cam 24 together with the roller 28 may be surrounded and protected by a tubular extension 30 on the opposite side of the casing 1. The casing may be closed by a cover plate 31 removably secured in place, and a crank handle 32 may be attached to the shaft 18 to permit the manual operation of said shaft.

The operation of the invention is as follows: The grinder is supplied with a tool adapted for connection with the valve which coöperates with the seat to be ground. Pressure is then applied to the handle 4, and the crank handle 32 is rotated. With the rotation of this handle, the drive shaft 18 turns in one direction and when the roller 28 is engaged by the elevated portion 26 of the cam, the shaft 18 will be moved to compress the spring 21 and carry the gear 19 into engagement with the gear 5, rotating said gear in one direction. As the roller 28 passes onto the depressed portion 25, the spring 21 acts to move the shaft 18 in the opposite direction and to carry the gear 20 into engagement with the beveled gear 5 so that the driven shaft will be rotated in the opposite direction. It is possible, by varying the relative lengths of the depressed portion and the elevated portion 26 to cause either one of the gears 19 or 20 to maintain its engagement with the gear 5 a greater or less time and, in this way, the oscillations of the shaft 4 may be made greater or less in either direction. In this instance, the depressed portion of the cam is slightly longer than the elevated portion and consequently the gear 20 meshes with the gear 5 a greater length of time than the gear 19, thus causing the shaft 4 to move longer in one direction than in the other so that all unevenness in the grinding action is eliminated.

The reversing mechanism herein shown is capable of being adapted for use in various machines and devices where it is desirable of converting a rotary into an oscillatory motion and particularly is this mechanism advantageous in a valve grinder as it permits the oscillations in one direction to be made longer than those in the other direction.

What I claim as my invention and desire to secure by Letters Patent is:—

1. Means for converting rotary into oscillatory motion comprising a driven member, a beveled gear thereon, an axially movable drive shaft, a pair of beveled gears rigidly secured to said drive shaft for alternate engagement with the bevel gear on the driven shaft, a spring for moving said longitudinally movable shaft in one direction, and a cam for moving said drive shaft in the other direction.

2. Means for converting rotary into oscillatory motion comprising a driven member, a beveled gear thereon, an axially movable drive shaft, a pair of beveled gears rigidly secured to said drive shaft for alternate engagement with the beveled gear on the driven shaft, a spring for moving said longitudinally movable drive shaft in one direction, a cam arranged on said axially movable drive shaft and means for coöperating with said cam to move the latter against the action of the spring.

3. Means for converting rotary into oscillatory motion comprising a driven member, a beveled gear thereon, an axially movable drive shaft, a pair of beveled gears rigidly secured to said drive shaft for alternate engagement with the beveled gear on the driven shaft, a spring for moving said longitudinally movable drive shaft in one direction, a cam arranged on said axially movable drive shaft and having a cam face concentric with the drive shaft and formed with a depressed portion and an elevated portion, and a stationarily mounted roller for cooperation with said cam face to move the drive shaft against the action of the spring.

4. In combination with the casing, a handle thereon, a driven shaft mounted to turn on said casing in line with the handle, a tool socket carried by said shaft, a beveled gear on said driven shaft, an axially movable drive shaft mounted on the casing and carrying a pair of beveled gears adapted alternately to mesh with the beveled gear on the driven shaft, and means for alternately shifting said drive shaft in opposite directions to cause the gears to alternately cooperate with the beveled gear on the driven shaft.

5. In combination with a casing, a handle thereon, a driven shaft mounted to turn on said casing in line with the handle, a tool socket at its outer end of the driven shaft,

a beveled gear on said driven shaft, an axially movable drive shaft extending through the casing and projecting from opposite sides thereof, a pair of beveled gears arranged on the axially movable shaft within the casing, a coil spring surrounding one projecting end of the axially movable drive shaft, a cam on the other projecting end of the drive shaft, a roller mounted on the casing to coöperate with the cam to shift the drive shaft against the action of the spring and a handle connected to said axially movable drive shaft.

ARTHUR G. NORTON.

Witnesses:
H. H. SIMMS,
ADA M. WHITMORE.