This invention relates to an improved tool, especially designed for grinding internal combustion engine valves, and it has particular reference to a tool of this class, which serves to continuously and alternately oscillate the valve for grinding the surface thereof against its seat.

Briefly, the invention comprises a vertically disposed shaft, on the upper end of which is a swivelly mounted handle, novel adjustable and efficient valve engaging means being located at the lower end of the shaft. Slidable upon the intermediate portion of the shaft is a hand grip, which is made in a special manner for cooperating with the especially constructed shaft to alternately rotate the shaft in opposite directions, while moving the hand grip in the same direction, whereby to impart the desired oscillatory movement to the valve.

One feature of the invention is the hand grip at the top which is connected with and rotatable upon the upper end of the shaft.

Another feature is the valve engaging means which includes a pair of adjustable pointed legs to rest upon the cylinder block, together with means for yieldably connecting these legs with the shaft, whereby to permit the valve to be held against the seat, under yieldable pressure.

The valve engaging means also specifically includes a screw driver blade, and a special contrivance for use with spanner wrench sockets.

A no less important feature of the invention is the specific construction of the slidable hand grip, which is provided with practical means for cooperation with the especially constructed shaft for alternately rotating the shaft in opposite directions without a break, and while moving the hand grip in the same direction, whereby to permit the hand grip to transverse the shaft from substantially one end to the other.

Numerous other features will become apparent from the following description and drawings.

In the accompanying drawing, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same.

Figure 1 is a side elevation of a tool, constructed in accordance with the present invention.

Figure 2 is a sectional and elevational view of the lower portion of the shaft and the valve engaging means.

Figure 3 is a central vertical section through the hand grip.

Figure 4 is a transverse section, taken approximately upon the plane of the line 4—4 of Figure 3.

Figure 5 is a detail sectional and elevational view of the handle at the top of the shaft.

Figure 6 is an enlarged elevational view of the screw driver blade and spanner socket engaging device.

Figure 7 is a side or edge elevation of Figure 6.

Figure 8 is a perspective view of a keeper used in Figure 6.

Referring to the drawings in detail, the reference character 1 designates a shaft which is adapted for vertical disposition when in use.

While this shaft could be constructed otherwise to accomplish the purpose specified, it is preferably provided with a pair of substantially diametrically opposite ribs 2 and 3 and from Figure 1, it will be seen that these ribs extend substantially from one end to the other of the shaft. Especial attention is directed to the fact that the ribs are twisted spirally, but the direction of twist of the spiral is reversed, at equi-distant longitudinally spaced points. Observing Figure 1, for instance, it will be seen that the spiral twist, starting at the top, continues in one direction to the point indicated at 4. At this point, the direction of twist is reversed and extends to about the point 5, where it reverses and travels in the first named direction. The ribs are so reversed as to cause the points at the juncture, as at 4 and 5, to merge into each other.

On the upper end of the shaft is a handle 6, which is more plainly shown in Figure 5. Referring to this figure, it will be seen that the handle comprises more specifically a wooden knob 7, to which a ferrule 8 is fastened, the ferrule extending beyond the end of the knob and serving to house the spool 9, one end flange of which bears against the stop collar 10, and the other end flange of which rests upon the ball race 11. The handle is thus swivelly mounted upon the shaft, and permits free rotation of the shaft.

Referring now to Figure 2, it will be seen...
that a sleeve 12 is riveted upon the lower end of the shaft, and this sleeve is provided at diametrically opposite points with guide slots 13. Telescoping into the sleeve is the shaft of a screw driver blade 14, which carries a cross pin 15 sliding in the slot. Interposed between the screw driver shank and the shaft is a coiled spring 16, for exerting the downward yielding pressure upon the screw driver blade. It will be noted that the lower end of the blade is widened and shaped for reception in the usual kerf in the top of the valve. In order to support the sleeve above the cylinder block, I provide a pair of point ed legs 17, the upper ends of which are threaded through a cross head 18, and are adjustably clamped thereto by nuts including the thumb nuts 19. Connected to the center of this cross head is a bearing includinging a ball race 20. This allows free rotation of the sleeve with respect to the leg supported cross head. Inasmuch as some valve heads are provided with spanner wrench sockets, instead of the usual screw driver kerf, I provide the novel tool or contrivance indicated generally by the reference character 21. This is made up of a U-shaped member 22, to which a pair of arms 23 are pivoted. Cooperative with the arms is a keeper 24. The particular construction of the keeper will be apparent from Figure 8. Under the arrangement shown, the arms 23 may be spread into diverging relation for reception in spanner wrench holes of different distances apart, and they will be held by the keeper. Also, the entire contrivance 21 can be removed from the screw driver blade and reversed with the arms 23 disposed upwardly and held tightly against the screw driver blade, in an out of the way position, when the screw driver blade is used alone.

Another detail, now to be considered, is shown in Figures 3 and 4 more particularly. This detail is the sliding hand grip, indicated by the reference character 25. This hand grip comprises an outer cylindrical casing 26, provided with internal washers 27, at its opposite ends. Disposed at the center of the casing is a casting made up of sections 28, having their meeting faces recessed to provide for anti-friction roller bearings 29. As shown from Figure 4, these roller bearings are disposed to engage opposed bevelled sides of the ribs 2 and 3, of the rhomboidal shaft. Some little clearance is provided between the peripheral portion of the casing sections and the wall of the casing. Also a pair of open ended cylinders 30 are fastened, at their inner ends to the sections, and have their outer end portions slide able through the washers 27 and open ends of the casing 26. Coiled springs 31 are interposed between the casing sections and the washers. Also, in one side, the casing 26 is formed with a vertically elongated slot 32, and the casing carries a stop pin 33, which is movable in this slot. Inasmuch as this pin moves crosswise of the slot under the action of the casting, acting upon the spiral ribs, the same is preferably covered by an annular band 34, to prevent injury to the user's hand.

The operation of the improved valve grinder is as follows:

It is first necessary to remove the cylinder head to expose the discular heads of the valve. The valve grinder is then placed in position over the selected holes leading to the valve, and when in position, the pointed screw threaded legs straddle the hole and rest directly on the top surface of the cylinder blocks. In this connection, the lengths of the legs may be varied, so that the spring pressure of the screw driver blades 14 may be varied. It will be noted that the cross head 18 and bearings are held in place by a nut, and are held against rotation by the screws projecting into the aforesaid slots 13. If the valve head has a screw driver kerf and spanner socket, the lower widened end of the screw driver blade is inserted into the kerf while the inwardly directed ends of the arms 23 of the device 21 are seated in the spanner socket. The device 21 may be moved up on the screw driver; to dispose it out of the way, temporarily, for instance, as indicated in Figure 1; the knob on the handle 6 is now grasped, and downwardly pressure is exerted upon the shaft 1, pressing the screw driver blade into yielding engagement with the valve. It has been authoritatively said that about three pounds of pressure upon the valve is exceedingly efficient, and for this reason I have provided a graduated device 21 to be considered, the device 21 being limited by the stop pins 33 engaging the opposite vertical edges of the slots 32.
Tools have actually been constructed in accordance with the invention as shown and described, and have proved to be exceptionally practical and successful. It is of course obvious that the reverse action is also given to the shaft, when the hand grip is moved upwardly. A continued downward pressure, from one end of the spiral to the other, however, serves as an effective means for accurately grinding valves. Inasmuch as the several features and advantages of the invention have doubtless been made apparent by the description and drawings, a more lengthy description will not be entered.

While the preferred embodiment of the invention has been shown and described, it is to be understood that minor changes coming within the field of invention claimed may be resorted to, if desired.

I claim:

1. In a valve grinder, a spiral shaft, a valve engaging means carried by the lower end of the shaft, a handle on the upper end of the shaft, means for effecting the oscillatory movement of said shaft, said means comprising a hand grip slidable on the spiral shaft, said hand grip including an outer casing, a sleeve yieldably supported within the casing, and anti-friction rollers carried by the sleeve and cooperating with the spiral shaft.

2. In a valve grinding tool, a shaft having spiral ribs extending substantially from one end to the other end thereof, the twist of the ribs being reversed at predetermined longitudinal spaced points, a valve engaging means carried by the lower end of the shaft, a handle on the upper end of the shaft, a hand grip slidable on the ribbed portion of the shaft, the same including an outer casing, a sleeve yieldably supported within the casing, and anti-friction rollers carried by the sleeve and cooperating with the spiral shaft for alternately rotating the shaft in opposite directions during the sliding movement of the hand grip on the shaft from one end thereof to the other end.

3. In a valve grinder, a spiral shaft, a valve engaging means carried by the lower end of the shaft, a handle on the upper end of the shaft, means for effecting the oscillatory movement of said shaft, said means comprising a hand grip slidable on the spiral shaft, said hand grip including an outer casing, a sleeve yieldably supported within the casing, anti-friction rollers carried by the sleeve and co-operating with the spiral shaft, and cooperative means between the sleeve and the outer casing for limiting the rotation of said sleeve with respect to the casing and the shaft.

4. In a valve grinder, a spiral shaft, a valve engaging means carried by the lower end of the shaft, a handle on the upper end of the shaft, means for effecting the oscillatory movement of said shaft, said means comprising a hand grip slidable on the spiral shaft, said hand grip including an outer casing, a member yieldably supported within the casing, anti-friction rollers carried by the member and cooperating with the spiral shaft, cooperative means between the member and the outer casing for limiting the rotation of said member with respect to the casing and the shaft, said last mentioned means comprising a pin projecting outwardly from said member, the outer casing being provided with a slot through which the free end of said pin projects.

In testimony whereof I affix my signature.

JOHN ORAWIEC.