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VALVE SEAT GRINDING IMPLEMENT

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My Invention relates generally to grinding devices and more particularly to a tool or implement for grinding the seats for the valves of internal combustion engines.

Among the principal objects of my invention are, to generally improve upon and simplify the construction of the existing forms of valve seat grindings, to provide an improved grinder of the character referred to that is of simple and compact construction, capable of being readily manipulated when applied to or removed from the valve seat and the adjacent parts of the cylinder block and further, to provide a valve seat grinder that is especially applicable for use in connection with fluid pressure operated motors that impart oscillating rotary motion to a shaft or other member to which the valve seat grinding tool is detachably connected.

Further objects of my invention are, to provide a valve seat grinding implement that utilizes as an abrasive member, a solid disc-like body composed of powdered or pulverized abrasive metal, further, to provide an improved driving element between the oscillating shaft and the abrasive body and further, to provide a relatively simple and effective universal joint between the grinding tool and the motor driven shaft so that the stem and the grinding wheel carried thereby will rotate on a definite axis, even though the motor that drives the grinding wheel occupies an out-of-line position with the axis of said stem and grinding wheel.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawing in which:

Fig. 1 is a side elevational view of a valve seat grinding implement constructed in accordance with my invention and showing the same in position to grind a valve seat.

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail section taken through the side of the grinding disc and showing a portion of the driving washer that is applied to the under side of said disc.

Fig. 4 is an enlarged top plan view of the grinding washer with parts broken away.

Fig. 5 is a cross section taken on the line 5—5 of Fig. 3.

Referring by numerals to the accompanying drawing which illustrates a preferred embodiment of my invention, 10 designates a conventional fluid pressure motor of the type that imparts oscillating rotary motion to its shaft 11 and, detachably connected to the end of the motor shaft, preferably by means of a pin 12, is the upper flat portion 13 of a link, for instance, a flat plate 14, the lower portion 15 of which is disposed at right angles to the upper portion 13. The upper portion 13 of this link is notched to provide a pair of spaced shoulders 16 that function as stops to limit the pivotal or swinging movement between shaft 11 and plate 14. Likewise, the lower end of the lower portion 15 of plate 14 is notched to form a pair of spaced shoulders 16. The lower portion 15 of link 14 enters a slot that is formed in the upper end of a stem 17 and, passing through said stem to the sides of the slot therein and through the lower portion 15 of plate 14 is a connecting member 18, preferably a pin similar to pin 12. The shoulders 16 function as stops to limit relative swinging or pivotal movement between the stem 17 and lower portion 15 of the plate or link 14.

As a result of the construction just described, plate or link 14 functions as a universal joint between shaft 11 and stem 17, thus enabling the motor and its shaft to function properly and drive stem 17, even though the axes of said shaft and stem are not in alignment.

A short distance below the upper end of stem 17, the latter is provided with an external thread 19 and a short distance below this threaded portion, the stem is provided with an integral outwardly projecting flange 20. The portion 21 of the stem below flange 20 functions as a pilot that is adapted to enter the bearings that are formed in the cylinder blocks of engines below the valve seats thereof.

Removably positioned on flange 20 is a driving washer that comprises a disc 22, in the center of which is formed a non-circular opening 23 and which opening accommodates the correspondingly shaped portion of stem 17 immediately above flange 20.

Formed integral with and projecting upwardly from the marginal edge of disc 22 is a plurality of inclined fingers 24, having upwardly and outwardly inclined outer faces 25 and transversely curved inner faces 26. The lower inner portions of these fingers 24 extend upwardly from the upper surface of disc 22 adjacent its marginal edge, as illustrated in Figs. 3 and 4. As illustrated in Fig. 3, the thickness of the fingers 24 gradually decreases toward their upper ends, the purpose of which construction will be hereinafter set forth.
Removably positioned on the driving washer 22 is a grinding wheel or disc 27, preferably of the type composed of pulverized abrasive material, the lower portion of which disc is provided with a beveled surface 28 and, formed in said beveled surface is a series of radially disposed grooves 29, the number of which grooves corresponds with the number of fingers 24 on the driving disc.

Grooves 28 are practically semi-circular in cross section in order to receive the curved inner faces 26 of the fingers 24 and, the thickness of the fingers and the gradual taper thereof toward their upper ends permit said fingers to lie entirely below the inclined surface 28 of the grinding disc, so that said fingers do not contact with the valve seat while the disc is in grinding engagement therewith.

The driving washer 22 is clamped against the top of flange 20 and the grinding disc is clamped against said driving washer by means of a nut 30 that is mounted on the threaded portion 29 of the stem and, said nut bearing on a washer 31 that bears directly on top of the grinding disc 27 around the stem 17.

In the use of my improved valve seat grinding implement, the pilot portion 21 of the stem is inserted through the valve stem bearing in the cylinder block and, the stem connected by the universal joint member 4 to the motor shaft 11 is lowered until the inclined face 28 of the grinding disc engages the valve seat. Motor 10 operates to impart oscillating rotary motion to shaft 11 and such motion is imparted to stem 17 and the grinding disc carried thereby, so that the latter engages and grinds the valve seat to the desired degree.

It has been demonstrated in practice that by imparting oscillating rotary motion to the grinding disc, a much smoother and more evenly finished surface is produced on the valve seat than where the grinding is continuously rotated in one direction.

The driving washer 22 provides a simple and efficient connection between the stem and the grinding disc and, as the outer faces of the fingers 24 are positioned beneath the inclined face 28 of the grinding disc, there is no metal to metal contact between the grinder and the valve seat that is being ground.

The universal joint member 14 provides a simple and effective connection between the motor shaft and the upper end of the stem of the valve seat grinder and permits the grinder to function properly, even though the shaft of the motor is out of alignment with the axis of the grinder stem. Obviously, member 14 may be utilized as a simple and effective universal joint between any two shafts.

Grinding wheels or discs of different sizes may be interchangeably used on the stem of the grinding tool and with the driving washer that is carried thereby.

Thus it will be seen that I have provided a valve seat grinding implement that is relatively simple in construction, inexpensive of manufacture, and very effective in performing the functions for which it is intended.

It will be understood that minor changes in the size, form and construction of the various parts of my improved valve seat grinding implement, may be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claim.

I claim as my invention:

In a valve seat grinding implement, a stem, a shoulder formed thereon, a driving washer carried by said stem and positioned upon said shoulder a portion of the stem immediately above the shoulder thereon being non-circular in cross section and said driving washer being provided with a non-circular opening that receives the non-circular portion of the stem to provide a driving engagement between the stem and washer, fingers projecting upwardly and outwardly from said driving washer, a grinding disc composed of a solid body of abrasive material positioned on said stem and resting on said driving washer, said disc being provided with grooves for the reception of the fingers on said driving washer, the depth of which grooves is greater than the thickness of said fingers so that the outer faces of said fingers when positioned in said grooves are disposed below the grinding surface of said disc and means for clamping said disc and driving washer to said stem.

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