

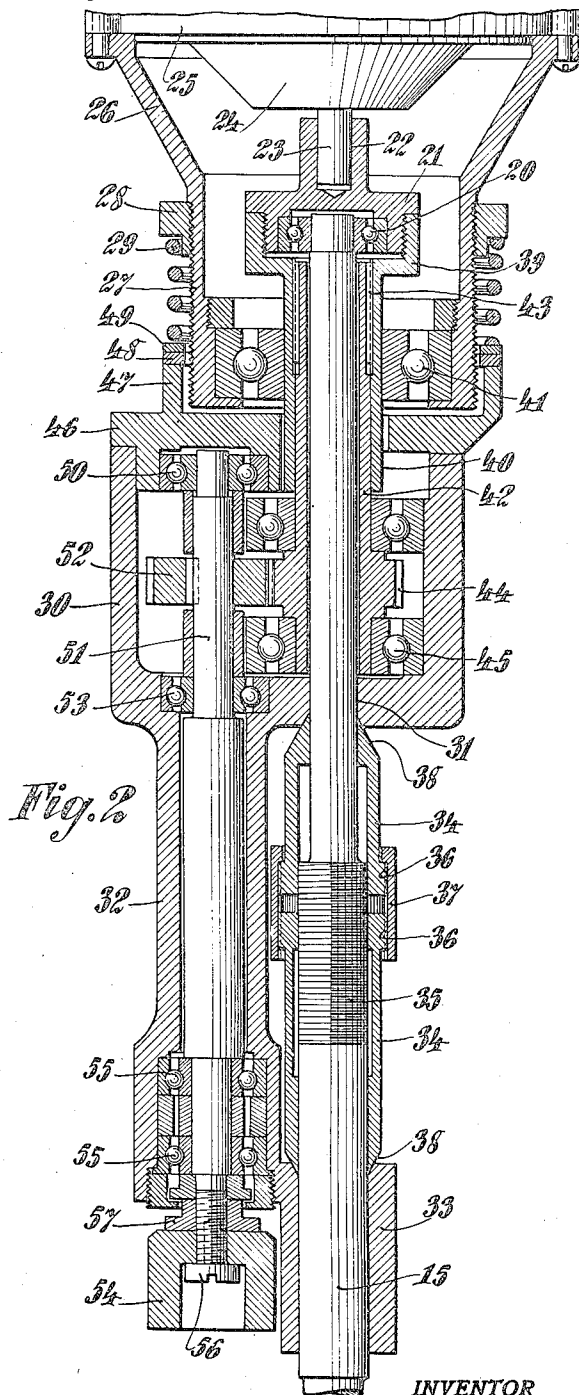
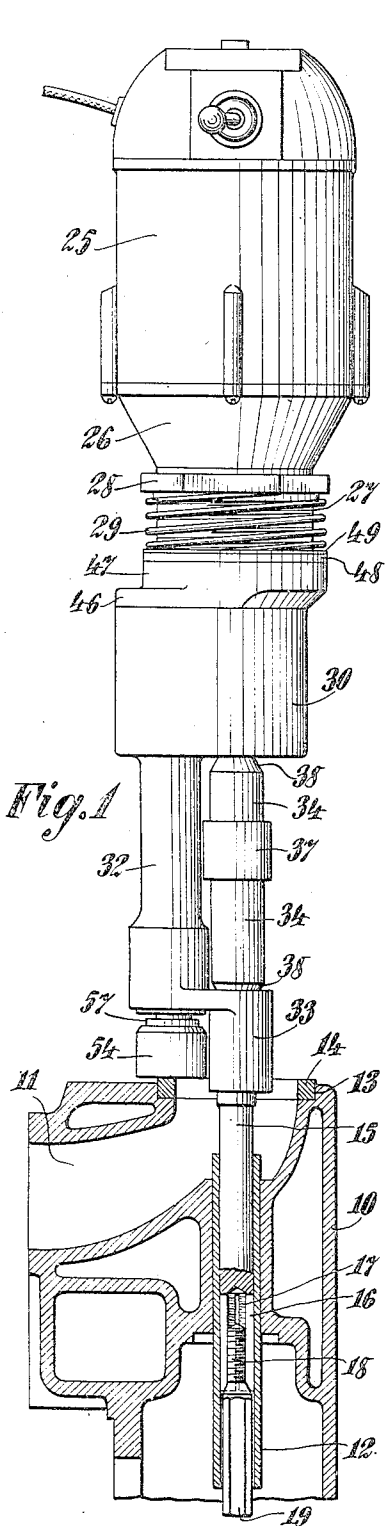
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1,941,918

VALVE GRINDING MACHINE

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VALVE GRINDING MACHINE

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8 Claims. (Cl. 51--241)

The present invention relates to grinding devices and embodies, more specifically, an improved mechanism for grinding seats for the valves of internal combustion engines. The great difficulty in grinding valve seats of the above character is to preserve an absolute uniform seat surface for engagement by the cooperating valve surface. If the valve seat is plane, the surface must be ground to a sufficient smoothness without destroying the uniformity of the surface in a plane perpendicular to the axis of the valve and if the valve seat is tapered, this taper must be exactly symmetrical with respect to the axis of the valve.

In order that an absolute uniform surface which is symmetrical with the axis of the valve be provided, the power source, such as an electric motor, is attached directly to the machine, thereby eliminating holding mechanism which would destroy the symmetrical or uniform nature of the face of the seat. Furthermore, the device is mounted by means of a valve pilot which is adapted to be inserted within the valve guide and thus secure the device in a position which is absolutely coaxial with the valve stem. In this position, the grinding takes place to insure the proper relationship of valve seat to the valve.

An object of the invention, accordingly, is to provide a grinding mechanism for valves of internal combustion engines by means of which an absolutely square or symmetrical seat surface is produced.

A further object of the invention is to provide a device of the above character, wherein means is incorporated for mounting the device in a position which is coaxial with the valve stem and effecting the grinding operation while in such position.

A further object of the invention is to provide a device of the above character which affords a means for regulating the feed of the machine, such means further eliminating end play.

Further objects, not specifically enumerated above, will be apparent as the invention is described in greater detail in connection with the accompanying drawing, wherein:

Figure 1 is a view in front elevation, partly broken away and in section through the valve pilot and valve guide showing the manner in which the device is mounted for grinding a valve seat.

Figure 2 is a view in vertical section taken on a plane passing through the valve pilot and the driving mechanism of the device.

Referring to the above drawing, an internal combustion engine block is shown at 10 and is provided with a plurality of passages one of which is indicated at 11.

The block carries a valve guide 12, of usual construction and the block may be counterbored at the opening of each passage 11 as shown at 13. Within this counterbore a valve insert 14 may be provided which may be formed of an alloy of any type now in common use. While, to facilitate the description and showing of the valve seat, an insert 14 has been shown, it will be understood that the invention is equally adapted to the grinding of valve seats upon blocks where the surface of the block is used directly and without the valve seat insert 14.

The grinding mechanism described hereinafter is mounted upon the block for grinding by means of a valve pilot 15. This pilot is formed with a split end 16 which is threaded internally at 17 to receive the threaded extremity 18 of an expansion nut 19. The valve pilot 15 is thus inserted within the guide 12 and the nut threaded home to expand the extremity of the pilot against the guide, thus securing the grinding mechanism rigidly upon an axis which corresponds to that of the valve guide and valve. The upper extremity of the valve pilot is provided with a bearing 20 which is received within a fitting 21 having a recess 22 for receiving the armature shaft 23 of an electric motor 24, thus centering the same. A motor housing is shown at 25 and is provided with a shroud 26 which extends downwardly and is coaxial with the pilot 15. The lower extremity 27 of the shroud 26 is of cylindrical shape and threaded externally to receive a bushing 28 upon which an expansion spring 29 seats. Below the extremity of the extension 27, a transmission housing 30 is provided. This housing is apertured at 31 to receive the pilot 15 and is formed with an offset extension 32 which is spaced from the pilot 15 and parallel thereto. The lower end of the extension 32 is formed with an offset bracket 33 which is formed with a cylindrical hollow portion coaxial to the aperture 31 to receive the pilot 15. It will thus be seen that the housing 30 is journaled upon the pilot 15 and is adapted to rotate thereabout.

The vertical adjustment of the transmission housing 30 is effected by means of two aligned nuts 34 which are threaded upon an enlarged threaded portion 35 of the pilot and which are formed with enlarged roughened portions 36 which are adapted to be engaged by a keeper 37 to prevent them normally from turning. The nuts

34 may be adjusted individually to space them snugly between the opposed portion of housing 30 and the bracket 33. After such adjustment has been effected, all end play of the device is removed and the bearing of the transmission housing upon the nuts is facilitated by tapering the extremities 38 of the nuts and forming cooperating tapered seats on the housing and bracket. This mechanism will thus be seen to provide a device for fitting the grinding mechanism on to the valve seat and, inasmuch as the thread 35 is very fine, a very sensitive adjustment may be obtained. The serrated collar or keeper 37 may be lifted and the nuts adjusted individually to space the same individually after which the collar and nuts are rotated simultaneously to effect the foregoing adjustment.

To transmit the drive from the armature shaft 23 to the grinding element, the fitting 21 is secured to the enlarged extremity 39 of a sleeve 40. The sleeve is journaled within the cylindrical extension 27 of the shroud 26 by means of a bearing 41 and is keyed to a sleeve 42 at 43. The lower extremity of the sleeve 42 is preferably formed with gear teeth 44 and is journaled upon opposite sides of the teeth 44, by means of bearings 45. These bearings are secured within the housing 30 and center the sleeve 42 properly with respect thereto.

Upon the top of the housing 30, a closure 46 is provided, the closure being formed with a vertically extending flange 47 upon which a friction ring 48 and a thrust ring 49 are mounted. Spring 29 engages the ring 49 and thus, through the friction disc 48, resists relative movement between the housing 30 and motor housing 25. Within the closure 46 a bearing 50 is provided for centering a shaft 51 which carries a gear 52, engaging the gear 44. A lower bearing 53 cooperates with the upper bearing 50 to journal the shaft 51 and this shaft extends downwardly through the extension 32 and carries a grinding element 54. Suitable thrust take-up bearings 55 are provided for the lower extension of the shaft 51 and the grinding tool is secured by means of a set screw 56 and suitable bushings 57.

In the operation of the mechanism it will be seen that the torque reaction is taken by the motor housing which in turn transmits the same to the housing 30. The rapid rotation of the grinding element, as driven by the armature shaft 23 and transmission mechanism described above, takes place simultaneously with the rotation of the extension 32 and shaft 51 about the axis of the valve pilot due to the torque reaction to the grinding element. This reaction is transmitted through the shafts and gears to the motor, motor housing 25, spring 29 and friction ring 48 to the housing 30. It will thus be seen that regardless of the irregularity of the grinding tool or valve seat surface, the grinding operation finishes the same off effectively and accurately. The grinding tool may take the form of a conical tool, such as used in common practice, and the specific form thereof constitutes no part of the present invention inasmuch as the device may be used for grinding valve seats of any symmetrical shape.

While the invention has been described with specific reference to the accompanying drawing, it is not to be limited, save as defined in the appended claims.

I claim as my invention:

1. Valve grinding mechanism comprising a valve pilot means, a motor carried by the pilot, a grinding tool, a transmission between the motor

and tool driven by the motor armature, a transmission mounting carried by the pilot to rotate about the axis of the pilot, and means to mount the motor housing upon the transmission mounting yieldingly.

2. Valve grinding mechanism comprising a valve pilot means, a motor carried by the pilot, a grinding tool, a transmission between the motor and tool driven by the motor armature, a transmission mounting carried by the pilot to rotate about the axis of the pilot, and a coil spring and friction means between the motor housing and transmission mounting.

3. Valve grinding mechanism comprising a valve pilot means, a motor carried by the pilot, a grinding tool, a transmission between the motor and tool driven by the motor armature, a transmission mounting carried by the pilot to rotate about the axis of the pilot, a coil spring and friction means between the motor housing and transmission mounting, and means to position the device positively upon the pilot for rotation in a given plane perpendicular to the axis of the pilot.

4. Valve grinding mechanism comprising a valve pilot means, a motor coaxial to the pilot and journaled thereon, a housing for the motor, a driving sleeve on the pilot and driven by the motor armature, a grinding tool, a shaft parallel to the pilot and mounting the tool, gears between the sleeve and last named shaft, a housing rotatably mounted on the pilot and enclosing the shaft, gears and sleeve, and means to mount the motor housing on the last named housing.

5. Valve grinding mechanism comprising a valve pilot means, a motor coaxial to the pilot and journaled thereon, a driving sleeve on the pilot and driven by the motor armature, a grinding tool, a shaft parallel to the pilot and mounting the tool, gears between the sleeve and last named shaft, a housing rotatably mounted on the pilot and having an offset portion enclosing the shaft, said housing having spaced portions between which the pilot extends, yielding means to mount the motor housing on the last named housing, sleeves threaded independently upon the pilot between the spaced portions of the housing, and means to move the sleeves simultaneously.

6. Valve grinding mechanism comprising a valve pilot means, a motor coaxial to the pilot and journaled thereon, a driving sleeve on the pilot and driven by the motor armature, a grinding tool, a shaft parallel to the pilot and mounting the tool, gears between the sleeve and last named shaft, a housing rotatably mounted on the pilot and having an offset portion enclosing the shaft, said housing having spaced portions between which the pilot extends, yielding means to mount the motor housing on the last named housing, sleeves threaded independently upon the pilot between the spaced portions of the housing, serrated flanges on the sleeves, a sleeve movable axially over the flanges and having serrations to engage those of the flanges, whereby the sleeves may be moved independently or simultaneously.

7. Valve grinding mechanism comprising a valve pilot means, means to expand the pilot into engagement with a valve guide, a motor coaxial to the pilot and journaled thereon, a driving sleeve on the pilot and driven by the motor armature, a grinding tool, a shaft parallel to the pilot and mounting the tool, gears between the sleeve and last named shaft, a housing rotatably mounted on the pilot and having an offset portion enclosing the shaft, said housing having

- spaced portions between which the pilot extends, yielding means to mount the motor housing on the last named housing, sleeves threaded independently upon the pilot between the spaced portions of the housing, serrated flanges on the sleeves, a sleeve movable axially over the flanges and having serrations to engage those of the flanges, whereby the sleeves may be moved independently or simultaneously.
- 10 8. Valve grinding mechanism comprising a valve pilot means, means to expand the pilot into engagement with a valve guide, a motor coaxial to the pilot and journaled thereon, a driving sleeve on the pilot and driven by the motor armature, a grinding tool, a shaft parallel to the pilot and mounting the tool, gears between the sleeve and last named shaft, a housing rotatably mounted on the pilot and having an offset portion enclosing the shaft, said housing having spaced portions between which the pilot extends, yielding means to mount the motor housing on the last named housing, sleeves threaded independently upon the pilot between the spaced portions of the housing, said sleeves being formed with tapered seats to engage cooperating seats on the spaced portions of the housing, serrated flanges on the sleeves, a sleeve movable axially over the flanges and having serrations to engage those of the flanges, whereby the sleeves may be moved independently or simultaneously.
- EMIL F. SCHWAKOPF.

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55	130
60	135
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