Dec. 27, 1927. 1,654,219

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VALVE SEAT RECONDITIONING MACHINE

Filed May 7, 1927 2 Sheets-Sheet 1

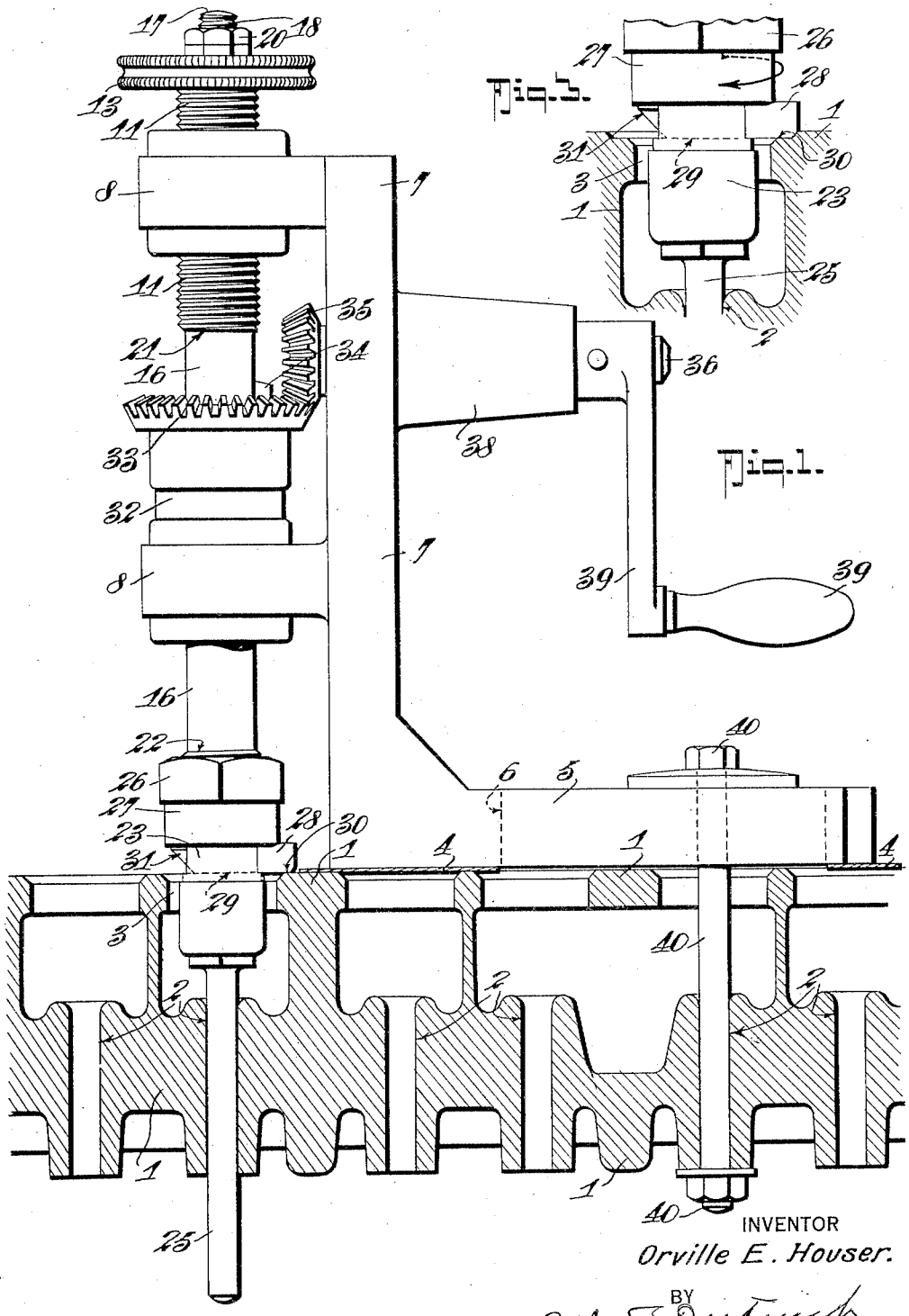



Fig. 2.

Fig. 1.

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Fig. 2.

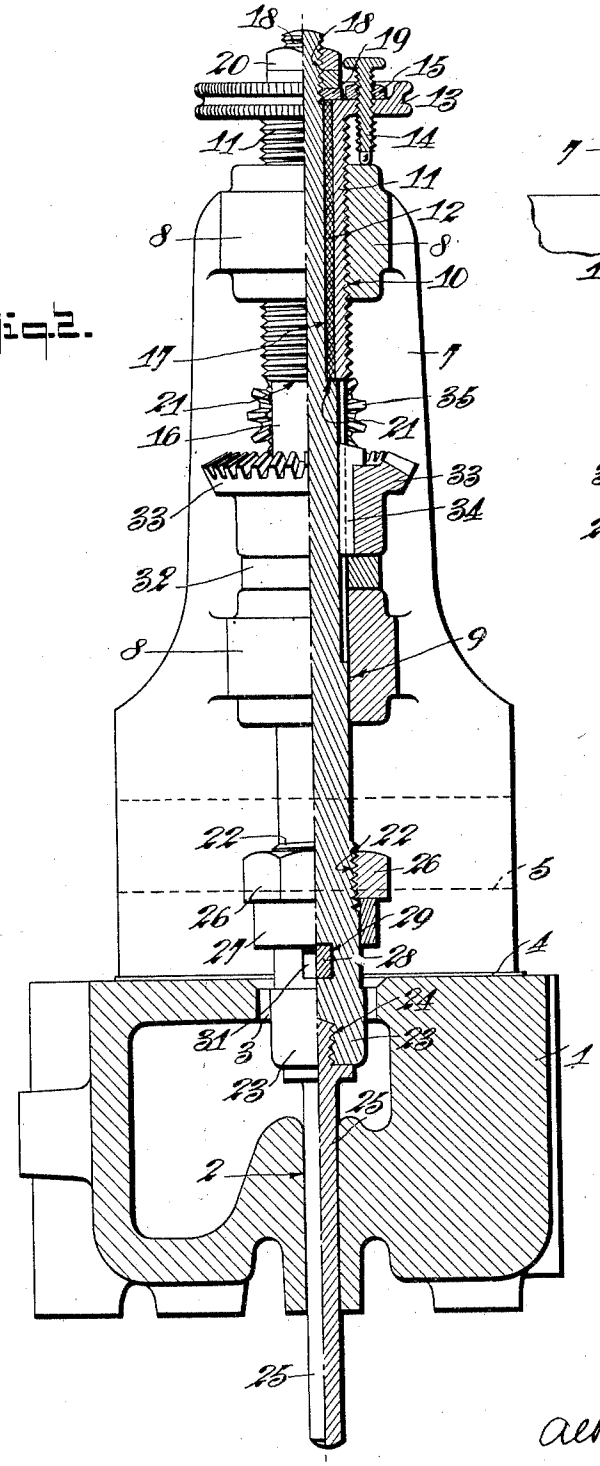
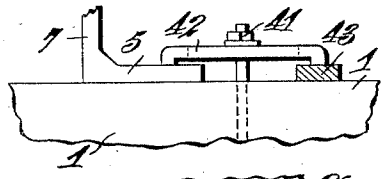



Fig. 3.



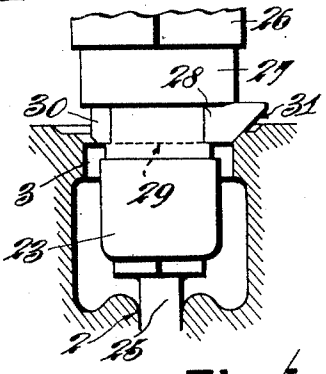
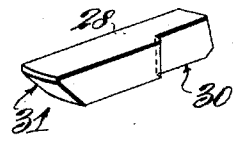




Fig. 4.

Fig. 5.




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Patented Dec. 27, 1927. 1,654,219

# UNITED STATES PATENT OFFICE.

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## VALVE-SEAT-RECONDITIONING MACHINE.

Application filed May 7, 1927. Serial No. 189,629.

The invention primarily has for its object to provide a simple, compact and efficiently operable valve seat reconditioning machine that may be readily carried about and easily secured to operative position upon the engine part equipped with the valve seats needing such reconditioning.

When the valve seats of a poppet valve motor become worn from long use and frequent valve grinding the valves tend to stick and operate inefficiently and it becomes necessary to reduce the diameter of or narrow the valve seats to provide for efficient operation.

Therefore, in its more detailed nature the invention resides in the provision of a portable valve reconditioning machine comprising a support body mountable on varied types of motors and having provision for mounting and operating a double or single cutting element selectively adjustable to effect a "narrowing" of the valve seat or for rebevelling it to the proper size, a single securing means operable in and through a valve guide hole being employed to secure the machine to position, and a pilot being provided and insertible into an adjacent valve guide hole to guide the reconditioning operation but not forming a part of the securing means.

With the above and other objects in view that will hereinafter appear, the invention still further resides in the novel details of construction, combination and arrangement of parts, all of which will be first fully described, then be particularly pointed out in the appended claims, reference being had to the accompanying drawing, in which:—

Figure 1 is a side elevation illustrating the invention mounted for use.

Figure 2 is a face view, parts being in section.

Figures 3 and 4 are diagrammatic sections illustrating the cutters adjusted for "narrowing" and for "rebevelling" the valve seat respectively.

Figure 5 is a detail perspective view of the cutter element.

Figure 6 is a diagrammatic side view illustrating a modified means for clamping the device upon the work.

In the drawings, 1 indicates a motor cylinder head, 2 the valve guide holes thereof and 3 the valve aperture the seat of which is to be reconditioned.

It is to be understood that the invention may be used on cylinder heads removed from a motor, when the said head is equipped with the valve seats, or upon the cylinder block when that is equipped with the valve seats. In this illustration, however, I have shown the invention mounted upon a removed cylinder head.

In the practical adaptation of my invention I provide any suitable inlay 4 of paper or other suitable material and insert the same between opposed faces of the cylinder head or block and the support which carries the invention. The device comprises a base block 5 having a longitudinal slot 6 therein and an upstanding support standard 7 having two spaced bearings 8 in vertical alignment, the lower one of which is provided with a smooth bore 9 and the upper one of which is provided with a threaded bore 10.

An adjuster sleeve screw 11 is operable in the threaded bore 10 and is equipped with a bronze bearing sleeve 12 and a knurled turning head 13. The head 13 is provided with an eccentrically positioned threaded aperture to receive a gauge or stop screw 14 upon which is mounted a jam nut 15, the purpose for all of which will later be apparent.

A shaft 16 is rotatably and slidably mounted in the lower bearing 9 and has its upper end provided with a reduced vertical extension 17 which is rotatable in the sleeve screw 11, and is threaded as at 18 at its upper end which projects through that sleeve to receive the washer 19 and nut and jam nut equipment 20.

The provision of the reduced extension 17 provides for an abutment shoulder 21 on the shaft 16, which said shoulder is adapted to engage the lower end of the sleeve screw 11. With the lower end of the sleeve screw thus engaging the shaft shoulder and the upper end thereof engaging the washer and nut equipment 19 and 20, as the sleeve screw 11 is rotated in the threaded bearing 10 by manipulation of its turning head 13 the shaft 16, 17 will be caused to move longitudinally with the said sleeve. It will be observed, however, that the said shaft 16, 17 is capable of free rotation in the sleeve screw 11 independently of its longitudinal adjustment movement. As will later be described this adjustment or longitudinal movement of the shaft 16, 17 serves to force the cutting elements to the work or withdraw them from

the work as may be desired, and the gauge or stop screw equipment 14, 15 may be employed to limit the movement of the shaft in the cutting direction.

Toward its lower end the shaft 16 is provided with a threaded portion 22 formed in the enlargement 23, into the tapped bore 24 of which the pilot 25 is secured to project axially downwardly from the said shaft.

A securing nut 26 is operable on the threaded portion 22 and acts against a clamp ring 27 mounted on the smooth part of the enlarged end and which serves to securely clamp to position the cutter element 28 longitudinally adjustably mounted in the cross slot 29 formed in the said shaft end. By turning down on the nut 26 the ring 27 is clamped tightly against the cutting element to secure the same to position. The cutting element 28 is provided at one end with a face cutting edge 30 and at its other end with a bevel cutting face 31 so that it may be projected from either side of the cross slot to effect the desired cut, and of course the degree of projection and hence the diameter of cut may be varied at will.

A bronze bearing ring 32 encircles the shaft 16 immediately above the lower bearing 8 and a bevel gear 33 is spline connected as at 34 upon the shaft 16 above and in engagement with the said bearing ring. By spline-connecting the gear means is provided for imparting rotation to the shaft 16 through the said gear while permitting the necessary longitudinal movement of the shaft through the gear.

Rotation is imparted to the gear 33 through the bevel gear 35 secured on the end of the driver shaft 36 having bearing in the extension boss 38 carried by the standard 7 and equipped with an operating handle or crank 39.

In operation, the base block 5 is mounted upon the cylinder head or block (the inlay paper 4 first being inserted therebetween) with the pilot 25 inserted into the valve guide hole 2 associated with the valve seat 3 to be reconditioned, thus serving to assure the desired relation of the cutting element with the said seat. A clamping bolt 40 is inserted through the longitudinal slot 6 of the base block and through a convenient one of the remaining valve guide holes and the said base block is thus securely clamped to position. The pilot merely forms a guide member and has no part in the actual securing of the device to position. By providing the elongated slot in the base block use of the device upon engines in which the distance between valve guide holes varies is facilitated.

With the device thus mounted and the cutting element adjusted to project the proper distance outwardly and to present its flat cutting face to the work the head 13 is rotated to force the shaft 16 and the cutting element down to the work, the stop screw 14 being adjusted to limit the depth of the cut if desired. By rotating the shaft 16 through the gears 33 and 35 and crank 39 the face of the block or head may be cut as indicated in Figure 3 of the drawings to suitably narrow the valve seat.

By now loosening up on the cutter securing devices and projecting the opposite end of the cutter so as to present its bevel edge 31 to the work and by repeating the operation just above described, the bevel valve seat may be formed to the size desired.

In the foregoing description I have disclosed a simple and compact and portable valve reconditioning device which is efficient in its operation and provides for a saving of time in the operation necessary to recondition the valve seats and also an economy in the time necessary to sharpen the cutting elements and in the expense of providing such cutting elements as it is possible in this machine to use a "fly cutter" which is particularly desirable on account of its low cost and the ease with which the same may be sharpened. It is to be understood, of course, that formed milling cutters may be used if desired.

It should be noted that the cutting edges of the cutting element are in advance of its center so that a shearing action is produced thereby providing for very smooth work.

If desired, the device may readily be used to bore out the clear diameter of the valve hole to fit the same for the use of larger sizes of valves. In this case a short cutting element having only one cutting edge at one end is substituted for the double element disclosed.

It should still further be stated that by reason of the removable means for mounting the pilot, interchangeable pilots to fit different sizes of valve guides and of sufficient length to insure perfect alignment may be employed. Also, in Figure 6 I have shown a modified means for clamping the device upon the work in which the head stud or cap screw 41 may be utilized in conjunction with the holding down bar 42 which, when mounted as illustrated with one end thereof resting upon the base 5 and the other end on the block 43, serves to secure the device in operative position.

From the foregoing description, taken in connection with the accompanying drawings, it is thought that the novel details of construction, the manner of use and the advantages of my invention will be readily apparent to those skilled in the art to which it relates.

What I claim is:

1. A device of the character described comprising a base having a longitudinal slot therein, a supporting standard carried by

the base, a shaft having rotatable bearing on the standard, means to move the shaft longitudinally in its bearing on the standard, a cutter element carried by the shaft, means to rotate the shaft, a guide pilot projecting axially from the shaft and insertible into a valve guide hole to pilot the operation of the device, and means insertible through an adjacent valve guide hole and the base slot to secure the device in operative position.

2. A device of the character described comprising a base having a supporting standard equipped with upper and lower bearings, a shaft rotatably mounted in the lower bearing, means to rotate the shaft, means to secure the base upon the work, a cutter carried by the shaft, said shaft having a reduced end portion forming a shoulder and passing through the upper bearing, a sleeve screw threaded through the upper bearing and having a bore to rotatably receive the reduced shaft end and abutting the shaft shoulder, said reduced shaft end being extended through the sleeve, and an abutment head on the said extended end to coact with the shoulder in causing the shaft to move longitudinally with the sleeve screw to feed the cutter toward or from the work.

3. A device of the character described comprising a base having a supporting standard equipped with upper and lower bearings, a shaft rotatable in the bearings, means to rotate the shaft, said shaft having a cross groove and a threaded portion, a cutter element slidable in the groove, a clamp ring encircling the shaft and engaging the cutter element, and a clamp nut on the threaded portion and active against the clamp ring to secure the cutter element to adjusted positions.

4. A device of the character described comprising a base having a supporting standard equipped with upper and lower bearings, a shaft rotatable in the bearings, means to rotate the shaft, said shaft having a cross groove and a threaded portion, a cutter element slidable in the groove, a clamp ring encircling the shaft and engaging the cutter element, and a clamp nut on the threaded portion and active against the clamp ring to secure the cutter element to adjusted positions, said cutter element having a face cutting edge at one end and a bevel cutting edge at its other end whereby a selected end may be operatively presented to the work by loosening the clamp nut and sliding the element in the cross groove and retightening the clamp nut.

5. A device of the class described comprising a base having an elongated slot therein and an upstanding supporting standard, an upper and a lower bearing projecting from one face of the standard, an extension boss projecting from the other face of the standard, said lower bearing having a smooth bore therethrough and said upper bearing having a threaded bore therethrough in alignment with the smooth bore, a shaft rotatable in the lower bearing bore and having a reduced extension passing through the upper bore, an adjuster screw sleeve operable in the upper bearing bore and forming a bearing for the reduced extension and having its lower end in engagement with the shaft shoulder, an abutment head on said shaft extension above and in engagement with the screw sleeve, a bevel gear spline connected upon the shaft, a crank shaft rotatable in the extension boss and having a bevel gear thereon to mesh with the first mentioned bevel gear, a pilot projecting axially from the shaft and operable in the valve guide hole associated with a valve seat being reconditioned, said shaft having a cross bore in its lower end, a cutter element having selective cutter ends and adjustable in the groove, means to secure the cutter element in its adjusted positions, and a securing bolt to be passed through the base slot and a convenient valve guide hole to secure the device to operative position.

6. A device of the character described comprising a base having a supporting standard equipped with upper and lower bearings, a shaft rotatably mounted in the lower bearing, means to rotate the shaft, means to secure the base upon the work, a cutter carried by the shaft, said shaft having a reduced end portion forming a shoulder and passing through the upper bearing, a sleeve screw threaded through the upper bearing and having a bore to rotatably receive the reduced shaft end and abutting the shaft shoulder, said reduced shaft end being extended through the sleeve, and an abutment head on the said extended end to coact with the shoulder in causing the shaft to move longitudinally with the sleeve screw to feed the cutter toward or from the work, a hand wheel on the sleeve screw, and an adjustable stop screw mounted on the wheel and adapted to engage the upper bearing to limit the movement of the shaft in one direction.

7. A device of the character described comprising a base having a longitudinal slot therein, a supporting standard carried by the base, a shaft having rotatable bearing on the standard, means to move the shaft longitudinally in its bearing on the standard, a cutter element carried by the shaft, means to rotate the shaft, a guide pilot projecting axially from the shaft and insertible into a valve guide hole to pilot the operation of the device, and means insertible through an adjacent valve guide hole and the base slot to secure the device in operative position, and means to removably mount said pilot on said shaft whereby pilots of varied length and diameter may be interchangeably employed.

8. A device of the character described comprising a base having a longitudinal slot therein, a supporting standard carried by the base, a shaft having rotatable bearing on the standard, means to move the shaft longitudinally in its bearing on the standard, a cutter element carried by the shaft, means to rotate the shaft, a guide pilot projecting axially from the shaft and insertible into a valve guide hole to pilot the operation of the device, and means insertible through an adjacent valve guide hole and the base slot to secure the device in operative position, said cutter having a face cutting edge at one end thereof positioned in advance of an imaginary line drawn centrally longitudinally through the cutter whereby said edge will bear angular relation to said imaginary line and provide for a smooth shearing cut.

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