June 3, 1930. E. P. CAMPBELL 1,761,326

UNIVERSAL VALVE SEATING AND COUNTERBORING TOOL

Filed Aug. 24, 1927

Fig. 1

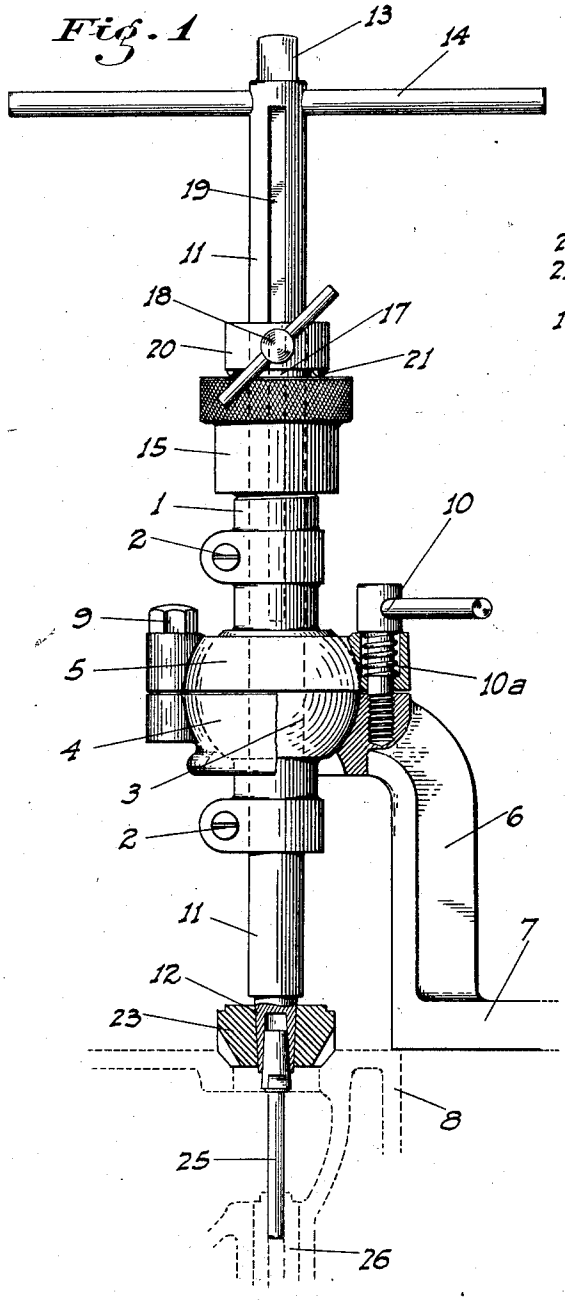


Fig. 2

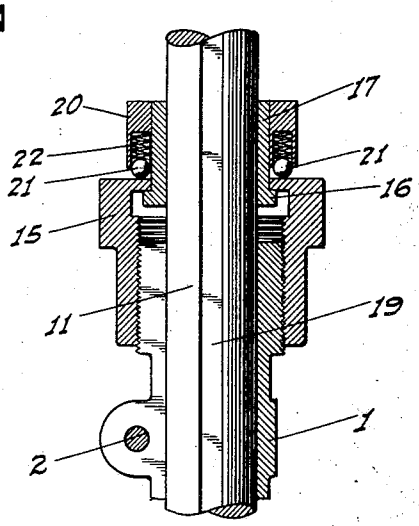
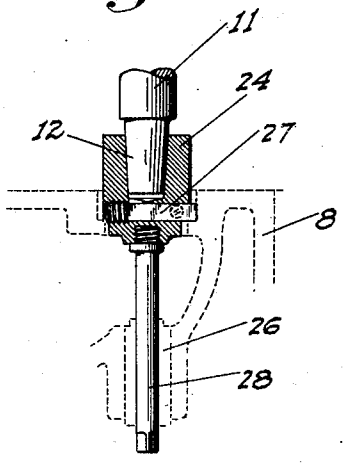


Fig. 3



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UNIVERSAL VALVE SEATING AND COUNTERBORING TOOL

Application filed August 24, 1927. Serial No. 215,058.

This invention relates to improvements in tools for operating on the valve seats of internal combustion engines, and particularly represents improvements over the device for this purpose shown in my co-pending application for Patent Serial No. 152,601, filed December 4th, 1926.

The present tool, like the previous one, is intended for use on engines having removable cylinder heads, the supporting bracket of the tool being detachably clamped on top of the cylinder block while the valve seats are being operated upon. In certain engines now being built the axial lines of the valve seats and stems are not at right angles to the face of the block.

The principal object of the present invention therefore is to provide an implement so constructed that the seat engaging tool may be set to conform to the axial line of the valve seat whatever its angle relative to the upper face of the block may be; while maintaining the supportng bracket of the implement clamped against the horizontal face of the block.

A further object of the invention is to provide a tool feeding structure so arranged that the tool holding mandrel may have a limited amount of retractive yield, when being forced toward the valve seat. By reason of this arrangement if the tool when being initially inserted into the seat and set, fetches up against a lower place in the seat, it can then retract a short distance so that an unduly heavy cut against the metal will be avoided.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of my improved tool as attached to and operating upon a cylinder block to ream a valve seat.

Fig. 2 is a fragmentary vertical sectional view showing the feeding structure.

Fig. 3 is a fragmentary vertical section showing the counterboring tool unit.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes a split vertical sleeve having vertically spaced clamping screws 2 on its split side so as to enable the bore of the sleeve to be contracted if desired. A ball 3 is formed on the sleeve intermediate its ends, which ball is turnable in sockets formed of separable members 4 and 5, through which the sleeve at both ends of the ball projects. The member 4, which is the lower one, is formed at the upper end of a supporting arm 6 which depends from said socket member to one side of the same and on its lower end is provided with a horizontal pad 7 for clamping engagement with the cylinder block 8 being operated on. The upper socket member 5 is secured to the member 4 on one side by a cap screw 9 or the like and on the other side by a hand operated clamping screw 10. The bore of the members 4 and 5 is of such size relative to the diameter of the ball that when the clamping screw is turned down the ball will be firmly held against movement. When the screw is retracted the ball may turn through a certain arc in any direction, and consequently the axial line of the sleeve relative to a vertical plane will be correspondingly altered.

Slidably and turnably mounted in the sleeve 1 is a mandrel 11, the lower end of which is provided with a taper portion 12. The upper end of the mandrel, which is some distance above the sleeve, is squared as at 13, and just below the square portion has a transverse hole to removably receive a hand turning bar 14.

Adjustably screwed onto the top of the sleeve 1 is a knurled feed nut 15 which engages but is not fixed to a shoulder 16 formed on the lower end of a sleeve 17 which is slidable on the mandrel above the sleeve 1. The sleeve 17 carries a clamping screw 18 adapted to enter and bite the bottom of a longitudinal groove 19 cut in the mandrel.

The sleeve member 17 above the feed nut

has a portion 20 overhanging the same, said portion having balls 21 mounted therein which bear against the top surface of the feed nut and are yieldably held in engagement therewith by springs 22. The movement thus permitted between the feed nut and sleeve is very slight but is sufficient to permit the tool supported by the mandrel to retract clear of a low spot in the valve seat if the mandrel has been forced down as far as possible when initially setting the tool relative to the seat.

The mandrel taper 12 is arranged to removably receive a valve seat reamer 23 or a block 24. If the reamer is used a pilot stem 25 to fit the valve stem bushing 26 in the cylinder block is mounted on the lower end of the mandrel as shown. The block 24 below the mandrel carries a radial counterboring cutter 27 and is also arranged below said cutter to removably support a pilot stem 28 to fit the bushing 26.

In operation before clamping the supporting bracket to the cylinder block, the clamping screw 10 is loosened, and the tool and pilot stem are fitted in place relative to the seat, the mandrel and associated parts thus assuming the necessary angle relative to the top surface of the block. The bracket is then clamped to the block and the screw 10 is turned down. The mandrel and sleeve 17 are pressed down as far as possible and the screw 18 is tightened. Release of pressure on the mandrel then causes the mandrel to lift slightly, due to the action of the springs 22. The mandrel may be then rotated by the bar 14 and advanced by rotation of the feed nut as may be necessary to properly work on the valve seat, and as fully set forth in the previously mentioned co-pending application.

In order that the socket section 5 shall grip the ball 3 with a certain pressure even when the clamping screw 10 is loosened, so as to prevent undue freedom of movement of the ball and mandrel, a compression spring 10^a is placed between said socket member and the head of the screw.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. A tool including a sleeve, a mandrel slidable and turnable therethrough, a member slidable on the mandrel, clamping means between said member and mandrel, a shoulder on said member, a feed nut on the sleeve to engage the shoulder to advance said member toward the sleeve, balls mounted in said member to engage the outer face of the nut, and springs acting on the balls to force the same against the nut and to also cause the shoulder to be normally maintained in contact with the opposite face of the nut.

2. A tool including a sleeve, a mandrel slidable and turnable therein, a member slidable on the mandrel, clamping means between said member and mandrel, a feed nut threaded on the sleeve, a shoulder on the bottom of said member with which the top of the nut is normally engaged, said member above the nut overhanging the same, and compression springs mounted in said overhanging portion to normally hold the nut and shoulder engaged but permitting of depressing movement of said member relative to the feed nut.

In testimony whereof I affix my signature.

ERNEST P. CAMPBELL.