

H. M. EMGE
VALVE SEAT GRINDING TOOL

2 SHEETS—SHEET 1

Filed May 1, 1951

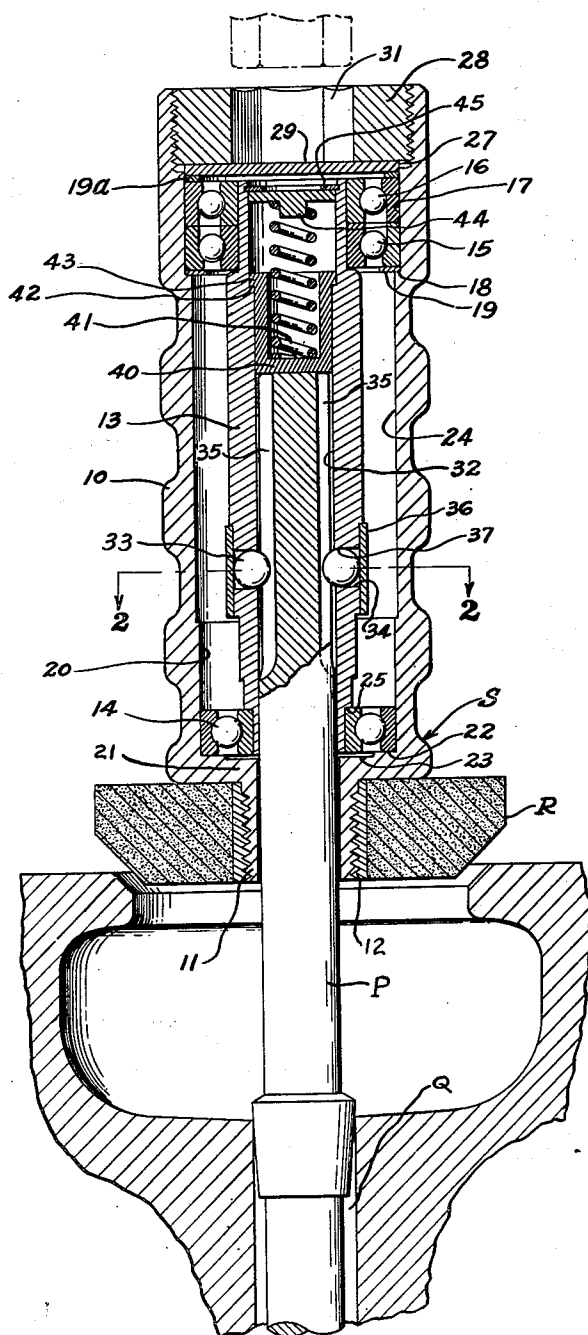


Fig. 1

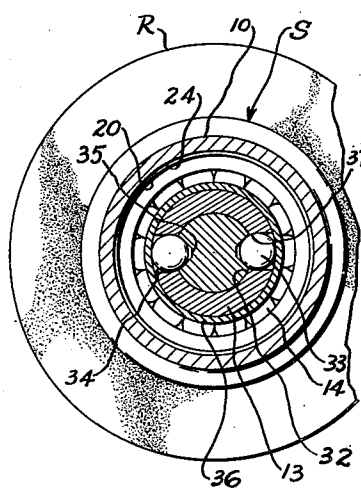


Fig. 2

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2 SHEETS—SHEET 2

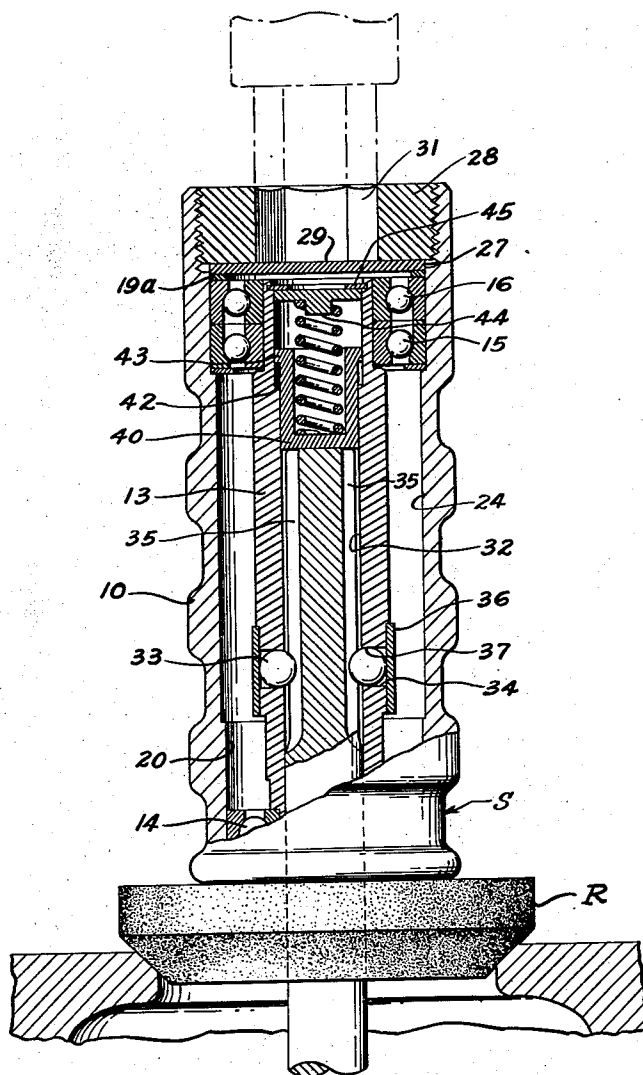


Fig. 3

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VALVE SEAT GRINDING TOOL

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3 Claims. (Cl. 51—241)

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The present invention relates to tools for grinding and finishing valve seats, especially automotive valve seats.

In grinding the valve seats in automobile motors one common method has used a rotating stone complementary in form or shape of grinding surface to the desired valve seat shape, the stone being in contact with the entire valve seat during the grinding operation. To secure accurate alignment of the stone with the seat during the entire grinding period, the stone is usually secured to the lower end of a rotatable stone sleeve which is slid over a pilot stem or guide spindle held in an accurately centered or coaxial position in the valve stem guide of the engine block. The grinding operation is usually effected through high speed rotation of the stone by means of a motor driven shaft or wrench or other power means coupled to the rotating sleeve. With the stone sleeves of the prior art, after the grinding operation is completed, when the power driving tool is removed from the stone sleeve, the stone remains in contact with the seat while still rotating by inertia. In consequence of this, there is a tendency for the stone to mar the finished seat before the sleeve and stone comes to a stop.

An object of the present invention is to provide a device wherein, upon release of the grinding pressure by removal of the power driving means, the rotating sleeve is immediately and accurately removed from contact with the ground seat, thereby preventing marring of the finished surface by the still rotating stone and sleeve.

Another object of the invention is the provision of a device which, within a certain range, accommodates pilot stems of different lengths and position with respect to the valve seat, while attaining the first mentioned object.

A further object is the provision of a spring lifted stone sleeve having means for retaining the lifting spring in assembled relation within the stone sleeve.

With the above and other objects in view, which will be apparent from the detailed description which follows, the invention consists in certain novel features of construction and combination of parts which will be readily understood by those skilled in the art to which the invention appertains. In the drawings which illustrate an embodiment of the invention

Fig. 1 represents in axial section a device of this invention with the pilot stem mounted in the valve guide of an engine block for grinding a valve seat, the sleeve and stone being in raised position;

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Fig. 2 is a cross section taken along the line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary view corresponding to Fig. 1, but showing the position of the inner parts of the tool when the stone sleeve is depressed to bring the stone in contact with the seat to be ground.

In the drawings a pilot stem P, shown mounted in the valve guide Q of an engine motor block, supports and guides a grinding stone sleeve S to which is secured a valve seat grinding stone R. A separate power driving means having a spindle or shaft engageable with the grinding stone sleeve is represented in part by dashed lines. Except as hereinafter noted, the pilot stem may be any of the types of guide spindles heretofore used since the means of centering and clamping the pilot stem in the valve guide form no part of the present invention. The stone sleeve S has an outer sleeve or body 10 in the form of a hollow cylinder having at the bottom a tubular extension or neck 11 upon which the stone is mounted. Threads 12 may be provided thereon to engage a threaded hub portion in the stone or the stone may be held in position by a nut and washer or similar means screwed onto the extension 11. The outer sleeve is rotatably mounted coaxially upon an inner stationary sleeve 13 by means of the ball bearings 14, 15, and 16. The top of the outer sleeve 10 has an accurate bore 17 ending at a bottom shoulder 18 to receive the outer races of the pair of ball bearings 15 and 16, the bearing 15 bottoming against the washer 19 resting on the shoulder 18. A second washer 19a rests on the top of the outer race of bearing 16, within the bore 17. The lower end of the outer sleeve is accurately bored at 20 to receive the outer race of bearing 14, which bottoms on the finished portion 22 of end wall 21. The end wall is relieved at 23 to ensure clearance between the end wall and the bottom of the inner sleeve and the inner race of bearing 14. The portion 24 of the outer sleeve above the bearing 14 is bored somewhat larger than bore 20 to afford clearance with the outer race of bearing 14 in assembling the device. The inner race of the bottom bearing 14 receives the lower end of the inner sleeve 13 and butts against the shoulder 25 provided thereon, while the inner races of bearings 15 and 16 are fitted onto the upper shouldered end of the inner sleeve.

The upper end of the outer cylinder is counterbored and threaded at 27 to receive a threaded plug 28, beneath which there is a spacer disk 29 bearing on washer 19a on the outer race of bearing 16. There is clearance between spacer 29 and

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both the inner race of bearing 16 and the upper end of the inner sleeve. A centered hexagonal socket 31 provided in plug 28 serves for the application of a portable motor driven wrench or other high speed stone rotating means. Thus the assembly is held together by the threaded plug or bushing 28 maintaining the bearings 15, 16 and hence the inner sleeve 13, in position.

The axial bore 32 of the inner sleeve is dimensioned for a close sliding fit about the removable pilot stem P. To prevent rotation of the inner sleeve about the pilot stem during the grinding operations, and hence to avoid wear therebetween, steel balls 33, movable in the radial pockets or holes 34 of the inner sleeve and projecting into longitudinal grooves 35 of the stem, provide rotational purchase between the inner sleeve and the pilot stem P. A taper or an inner retaining lip 37 at the inner part of the holes 34 and a ball retaining band or sleeve 36 prevent the balls from slipping out of the pockets. A slight rotation of the stone sleeve upon insertion of the pilot stem brings the balls into coincidence with the longitudinal grooves to allow the pilot to slide into the inner sleeve. Thereafter further rotation of the inner sleeve with respect to the pilot stem is prevented, though the inner sleeve is slidable freely on the pilot.

In the upper end of the inner sleeve there is provided a thimble-like plunger 40 urged downwardly by sleeve lifting spring 41 toward a limiting position determined by the shoulder 42 serving as a stop for the flange 43 on the upper end of the plunger. Hence, neither the plunger nor the lifting spring can escape from the stone-sleeve assembly when it is removed from the pilot stem. The upper end of the spring 41 is held in centered position by the spring locating disk 44 which is retained in the sleeve 13 by the snap ring 45 engaging a groove cut in the inner surface of the inner sleeve end. Thus, when the stone sleeve is on the pilot stem, as long as no downward pressure is applied to the stone sleeve, the plunger 40 in contact with the upper end of the pilot stem holds the stone lifted out of contact with the valve seat, as shown in Fig. 1, where the driving spindle of the power tool is represented in outline form out of driving engagement with socket 31. When a power wrench or other driving means is applied to the sleeve, (Fig. 3) the downward pressure thereof depresses the stone sleeve against the bias of the spring 41 as the plunger 40 is moved upwardly by the pilot stem P relative to the sleeve, thus allowing the stone to come to working contact with the seat to be ground. As soon as the grinding pressure is released or the driving tool is removed from the socket 31, the sleeve is immediately raised by the action of the spring to lift the stone out of contact with the surface. Hence, marring of the finished valve seat, caused by the stone dragging thereon during rotation after driving pressure is removed, is prevented. The length of the longitudinal grooves 35, of the plunger 40 and of the space between disk 44 and shoulder 42 are, of course, dimensioned to accommodate a variety of actual pilot stem lengths or effective lengths resulting from different clamping adjustments and use in valve stem guides of varying lengths.

This invention may be embodied in other forms than that shown specifically in the drawings and described in the foregoing specification, and hence the scope of the invention is indicated by the following claims rather than the foregoing

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illustrative description. All changes coming within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

I claim:

1. A valve seat grinding stone sleeve adapted for use on a pilot stem clamped coaxially in a valve stem bore comprising a rotatable hollow cylinder provided at its upper end with means for a driving engagement by a separate power driving means and at its lower end with a coaxial tubular extension for mounting a valve seat grinding stone thereon, an inner sleeve to receive the upper end of a pilot stem inserted through said tubular extension, anti-friction bearing means rotatably mounting said hollow cylinder to said inner sleeve, a plunger movable in the upper end of the bore of said inner sleeve to engage the top of a pilot stem, the upper end of said inner sleeve being counterbored to provide an internal shoulder in the bore thereof and the plunger being provided with a retaining rim to engage said shoulder, bore closure means within said counterbore including a disc and a snap ring outward of said disc and engaged in a snap ring groove in said counterbore, and a compression spring interposed between said closure and said plunger biasing said plunger toward said shoulder, whereby the stone sleeve may be depressed relative to the pilot stem and will be lifted relative to the stem upon release of the depressing force.

2. A valve seat grinding mechanism comprising a pilot stem clampable coaxially in a valve stem bore and a rotary grinding stone carrier, said carrier comprising a rotatable hollow cylinder provided with means for a driving engagement by a separate power driving means and at its lower end with a coaxial tubular extension for mounting a valve seat grinding stone thereon, an inner sleeve to receive the upper end of said pilot stem inserted through said tubular extension, anti-friction bearing means rotatably mounting said hollow cylinder to said inner sleeve, pilot stem engaging means carried by the inner sleeve adapted to prevent rotation of said inner sleeve on the pilot stem, a plunger movable in the upper end of the bore of said inner sleeve to engage the top of said pilot stem, the upper end of said inner sleeve being counterbored to provide an internal shoulder in the bore thereof and the plunger being provided with a retaining rim to engage said shoulder, bore closure means within said counterbore including a disc and a snap ring outward of said disc and engaged in a snap ring groove in said counterbore, and a compression spring interposed between said closure and said plunger biasing said plunger toward said shoulder, whereby the stone sleeve may be depressed relative to the pilot stem and will be lifted relative to the stem upon release of the depressing force.

3. A valve seat grinding stone sleeve adapted for use on a pilot stem clamped coaxially in a valve stem bore comprising a rotatable hollow cylinder provided at its upper end with means for driving engagement by a separate power driving means and at its lower end with a coaxial tubular extension for mounting a valve seat grinding stone thereon, an inner sleeve to receive the upper end of a pilot stem inserted through said tubular extension, anti-friction bearing means rotatably mounting said hollow cylinder to said inner sleeve, a plunger movable in the upper part of the bore of said inner sleeve

to engage the top of a pilot stem, the upper end of said inner sleeve being counterbored to provide an internal shoulder in the bore thereof and the plunger being provided with a retaining rim to engage said shoulder, bore closure means within said counterbore including a disc and a snap ring outward of said disc and engaged in a snap ring groove in said counterbore, and a compression spring interposed between said closure and said plunger biasing said plunger toward said shoulder, said plunger being coaxially recessed to receive one end of said spring and the disc of said closure means being provided with an inwardly projecting spring centering boss about which the other end of said spring is disposed.

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