

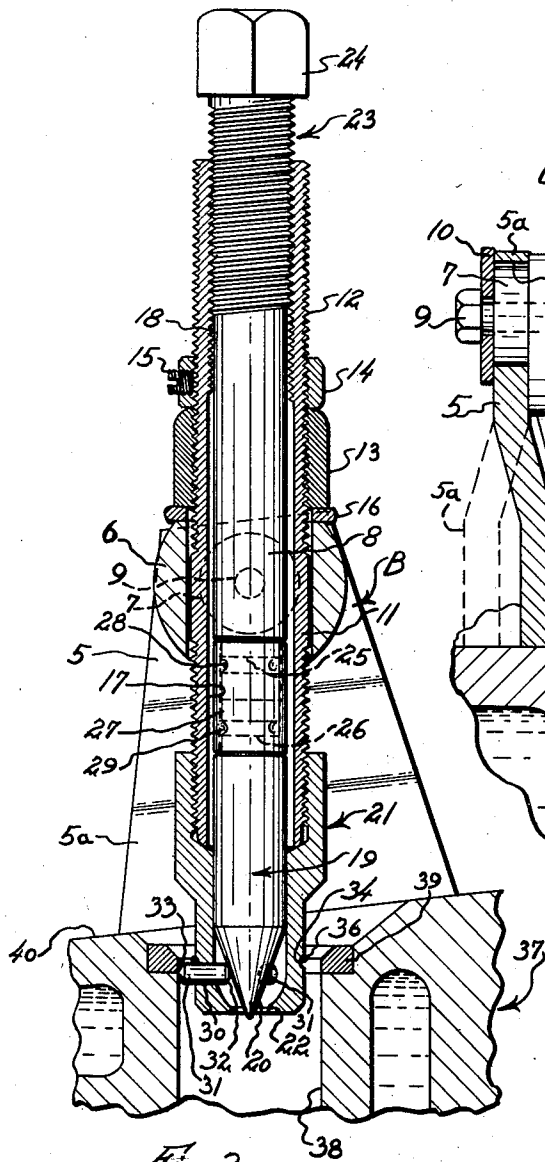
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VALVE SEAT PULLER

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1

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VALVE SEAT PULLER

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This invention relates to valve seat pullers. More particularly it refers to a valve seat puller for extracting valve seats from internal combustion engines regardless of the slope of the upper surfaces of the engine block adjacent the valve opening.

This invention is an improvement on the valve seat puller disclosed and claimed in Patent No. 2,623,276 issued on December 30, 1952, to Oscar R. Anderson. The valve seat puller shown in said patent performs very satisfactorily when the upper surface of the engine block adjacent the valve openings extends in a plane normal to the axis of the bore of the valve opening and parallel to the plane in which the valve seat is set. However, in recent years new types of motor blocks have been produced having surfaces adjacent the valve openings which are inclined. When the upper surface of the engine block adjacent the valve opening is other than normal to the axis of the bore of the valve opening and other than parallel to the plane in which the valve seat is set, the pull on the valve seat will be at an angle to the axis of the bore of the valve opening if a device such as shown in said patent is used and the ends of the legs of the device will not rest firmly upon the upper surface of the engine block if the pulling mechanism is arranged to pull directly upwardly from the valve opening. It can be readily seen therefore that the valve seat puller disclosed and claimed in said patent and other valve seat pullers previously known are unsatisfactory for use in removing valve seats from motors of the type described hereinabove. My invention is directed toward overcoming these disadvantages and providing a valve seat puller which will readily and efficiently remove valve seats from such motors.

It is a general object of my device to provide a novel and improved valve seat puller of inexpensive and simple construction and operation.

A more specific object is to provide a valve seat puller which can be readily applied to valve seats in all types of motors and can extract the valve seat regardless of the type of motors.

Another object is to provide a novel and improved valve seat puller constructed to permit a valve seat to be pulled along the bore of the valve opening wherein the valve seat is set even though the surface supporting the puller extends at an angle other than normal to the bore of the valve opening and other than parallel to the plane in which the valve seat is set.

Another object is to provide a novel valve seat puller constructed to facilitate the extraction from valve engine blocks of valve seats of various diameters.

Another object is to provide a novel and unique valve seat puller having reversible parts which will enable a single puller to be readily modified in order to be utilized in extracting valve seats of both small and relatively large diameters.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying draw-

2

ings, wherein like reference characters refer to similar parts throughout the several views, and in which:

Figure 1 is a fragmentary vertical sectional view of an engine block showing in elevation a valve seat puller constructed in accordance with my invention being utilized in removing a valve seat, only the legs and securing washers of the device being shown in section.

Figure 2 is a vertical sectional view taken along lines 2—2 of Fig. 1 and illustrating the type of motor block upon which the device is especially adapted for use.

One embodiment of my invention may include as shown in Figures 1—2 a body indicated generally as B. This body B may have a pair of opposed downwardly extending and readily detachable leg members 5. These leg members 5 have lower end portions 5a and upper end portions 5b. These upper end portions 5b are connected by a cross member 6, which has a pair of reduced end portions 7 pivotally mounted in openings 5c in the upper end portions 5b of the legs 5. The leg members 5 together with the cross member 6 comprise a yoke member, the cross member constituting the intermediate portions of the yoke.

The cross member 6 has a vertically and transversely extending bore 8. Its reduced end portions 7 are tapped to receive screws 9 which carry washers 10 to hold the leg members 5 to the cross member 6 in free pivoting relation. When the screws 9 are removed the legs 5 may be reversed as shown in broken lines in Figure 1 so that the lower end portions 5a will be more widely spaced and adapted to be used in the extraction of valve seats of relatively large diameter by merely substituting a larger head (to be hereafter described) than that shown. The lower end portions 5a of the leg members 5 extend in one vertical plane while the upper end portions 5b extend in another vertical plane lateral of and outside the plane of the lower end portions when connected as shown.

A sleeve 11 is slidably received in the vertical opening 5c and it has an upper portion which is threaded as at 12. A nut 13 is threaded on the upper portion 12 of the sleeve 11 and is held in position by a collar 14 secured by a set screw 15. A suitable washer 16 is interposed between the nut 13 and the cross member 6 of the body B. It will be noted that the pulling mechanism disclosed herein is substantially identical to that shown in the Anderson Patent No. 2,623,276 and that the invention herein involved is the combination of such a pulling mechanism or other suitable pulling mechanism in combination with the type of supporting structure shown herein.

The sleeve 11 is provided with a smooth bore 17 in its lower portion and a slightly smaller threaded bore 18 in its upper portion. In the larger bore 17 is a longitudinally slidable wedge member 19 having a conical lower point 20 which in its lowermost position extends into a head 21. The conical point 20 extends normally partially through a lower opening 22 in said head 21. The sleeve 11 and the head 21 together constitute a shank and wherever hereinafter the term shank is used it is intended to include these two elements or their combined equivalent.

Threaded in the internally threaded upper portion or bore 18 of the sleeve 11 is a bolt 23 having an exposed head 24. The lower portion of the bolt 23 is provided with an annular groove 25 shown in broken lines in Figure 2 and the upper end of the wedge member 19 is provided with a similar groove 26 also shown in broken lines in Figure 2. A sleeve 27 is adapted to receive the adjacent ends of the bolt 23 and wedge member 19 and said sleeve is deformed into the grooves 25 and 26 as shown in 28 and 29 so as to provide a swivel connection between the bolt 23 and the wedge member 19. The adjacent ends of the bolt 23 and the wedge member 19 are recessed to accommodate a bearing in the form of a

ball which is not shown and which keeps the adjacent ends of the above referred to members slightly spaced and provides a thrust member between them. This construction is clearly shown in U. S. Letters Patent No. 2,623,276, referred to above.

The head 21 at the lower end of the sleeve 11 is provided with a plurality of radially extending bores 30 which communicate with the interior of the head 21. Slidably mounted in the radial bores 30 are pins 31 which have abruptly tapered inner ends 32 and sharply tapered outer ends 33. The conical point 20 of the wedge member 19 is adapted to engage the inner abruptly tapered ends of the pins 31 and when the wedge member 19 is forced downwardly by the action of the bolt 23, the pins 31 will be forced outwardly.

The lower portion of the tool head 21 is provided with a circumferential groove 34, as best shown in Figure 2, and a spring ring 36 which is seated in the groove 34 is adapted to bear against the radially movable pins 31 and by reason of the slanting wall 35 of the groove 34 the spring ring 36 is always urged into frictional engagement with said pins 31.

In Figures 1 and 2, the tool is shown in position for removing a valve seat. A portion of an internal combustion engine block is shown at 37. A valve opening 38 is provided in the engine block 37 and a portion of this opening is defined by a valve seat 39. To use the puller, the tool head 21 is first adjusted vertically by manipulation of the nut 13 which is normally held by the collar 14 and set screw 15. The vertical adjustment of the tool head 21 should be such that the pointed outer ends 33 of the pins 31 lie at the inner section of the lower inner corners of the valve ring 39 and the engine block 37. When thus positioned, the nut 24 is turned to move the screw 23 downwardly and force the wedge member 19 downwardly between the inner ends of the pins 31 so that its conical end 20 will force the radially slidable pins 31 outwardly, thus dislodging the valve seat 39 and forcing it upwardly so that it will thereby be loosened and may be removed. If the valve seat is tightly fitted in the engine block the large nut 13 can be turned downwardly on the threaded portion 12 of the sleeve 11 to exert an upward pull on said sleeve and the head 21 after the pins 31 are forced beneath the valve seat 39. This will positively pull the valve seat upwardly toward the cross member 6 and free of the valve opening.

The slidable pins 31 and frictional spring retaining ring 36 provide a simple but effective means for keeping the pins 31 from dropping out of the tool although they will be readily pushed inwardly after the wedge member 19 has been retracted upwardly.

It will be noted that this device provides a valve seat puller which has the same automatic seating feature which facilitates the removal of valve seats, even though these valve seats may vary substantially in depth, just as has the valve seat puller disclosed in the Anderson Patent No. 2,623,276. All of the advantages of the pulling mechanism of that patent are retained in this device by utilizing substantially the same construction.

In addition to the above, however, my new valve seat puller has added advantages. It will be readily seen by reference to Figure 2, for example, that even though the upper surface 40 of the engine block 37 extends at an angle other than normal to the bore of the valve opening 38, the pulling mechanism will be securely supported by the legs 5 because the pulling mechanism is pivotally supported between these leg members until the puller has been positioned for use and the screws 9 tightened. This permits the leg members to rest flush upon the inclined upper surface 40 to provide a sturdy support which will not slip away when the valve seat is drawn upwardly by the pulling mechanism. This also enables the pulling mechanism to draw the valve seat upwardly along the axis of the bore of the valve opening 38 despite the fact

that the supporting surface 40 of the engine block 37 is so inclined. Thus it can be seen that my valve seat puller may be used to extract valve seats regardless of the inclination of the supporting surface adjacent the valve opening. In other words, my valve seat puller can be used safely and proficiently to extract valve seats of motor engine blocks regardless of the slope of the surface adjacent the valve openings upon which the valve seat puller must necessarily rest during the extracting operation.

It should also be noted that my valve seat puller can be readily adapted for use in extracting valve seats of various diameter. For example, if the valve seat is of diameter substantially larger than that shown in Figure 1 the operator need only remove the screws 9 and the washers 10 and reverse the positions of the leg members 5 so that the supporting leg members will extend as shown in the broken lines in Figure 1. This provides a broader support which will engage the upper surface 40 of the engine block immediately adjacent the larger valve opening and the operator need only substitute a larger head constructed similarly to the head 21 but not shown herein. Thus through having heads of various sizes my valve seat puller can be utilized to extract valve seats of various diameters in a more efficient manner.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportion of the various parts without departing from the scope of my invention.

What I claim is:

1. A valve seat puller for removing valve seats from a motor head the upper surface of which extends at an angle other than parallel to the plane in which the valve seat is set within the motor head, said valve seat puller comprising a pair of upright spaced non-extensible leg members each of which has upper and lower end portions, the lower end portions of said leg members being adapted to rest upon the upper surface of such a motor head on opposite sides of the valve seat to be pulled, a cross member extending between the upper end portions of said leg members, mechanism for engaging and drawing a valve seat, said mechanism being supported by said cross member for pivotal movement about an axis extending transversely to said leg members, said mechanism including a reaction member abutting said cross member, said cross member including reduced substantially cylindrical portions at opposite ends thereof, the upper end portions of each of said leg members having openings formed therethrough receiving said reduced end portions, clamping members disposed adjacent the outer ends of each of said reduced end portions for engaging the outer ends of said reduced end portions and adjacent portions of the associated leg members, and adjustable members supported by said reduced end portions for engaging said clamping members and urging them into engagement with the adjacent outer ends of the reduced end portions and adjacent portions of the associated leg members for locking the leg members in various positions relative to the cross member.

2. Apparatus as defined in claim 1 wherein the upper end portions of each of said leg members are substantially planar, and the lower end portions of each of said leg members are also planar and are offset to be disposed in a different plane than said upper end portions, whereby said leg members may be reversibly attached to said cross member to permit said valve seat puller to be utilized in removing valve seats of different diameters.

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