April 25, 1933. F. O. ALBERTSON 1,905,879

VALVE SEAT RING DRIVER

Original Filed Feb. 18, 1929

Fig. 3.

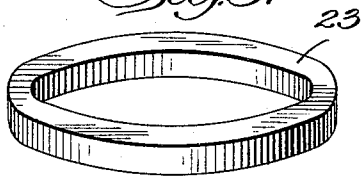


Fig. 1.

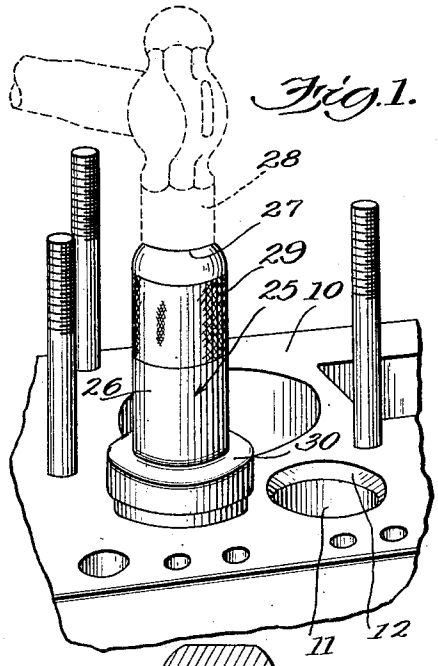


Fig. 2.

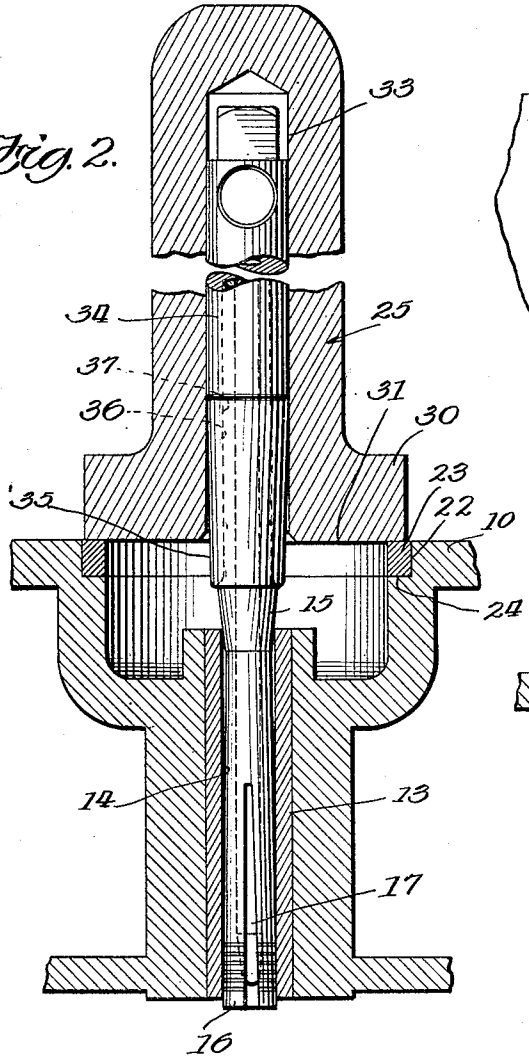
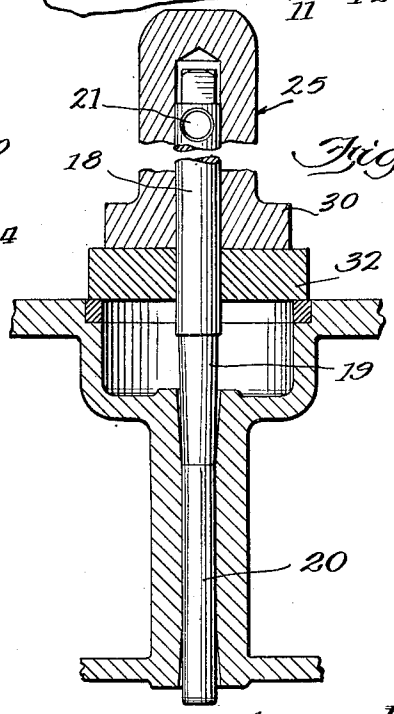


Fig. 4.



Inventor:
Frans O. Albertson
By Williams, Bradbury,
McCabe & Hinkle. Attys.

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UNITED STATES PATENT OFFICE

FRANS O. ALBERTSON, OF SIOUX CITY, IOWA, ASSIGNOR TO ALBERTSON & COMPANY, INC., OF SIOUX CITY, IOWA, A CORPORATION OF IOWA

VALVE SEAT RING DRIVER

Original application filed February 18, 1929, Serial No. 340,770. Divided and this application filed December 7, 1931. Serial No. 579,433.

The present invention relates to valve seat reconstruction tools, and is particularly concerned with the provision of improved tools for providing the valve seat of an internal combustion engine with a new valve seat ring or for installing valve seat rings as a part of the original equipment of the internal combustion engine.

It is often desirable to provide the block of an internal combustion engine with a valve seat of different material from that of which the block itself is constructed. The valve seat is subjected to harder wear than other parts of the engine block and it is desirable that the valve seat should be constructed of metal peculiarly adapted to resist the heat and withstand the pounding of the valve. Furthermore, if an ordinary valve seat of an internal combustion engine has been subjected to a certain amount of grinding, the material is worn away to such an extent that it is highly desirable and often absolutely necessary to provide a new valve seat ring.

Such valve seat rings may be made of the best iron alloy having qualities of heat resistance and uniform hardness which will be retained after the ring is inserted in the motor block and exposed to heat from explosion in a running motor, and the valve seats may be made more durable and efficient than it is possible to make a valve seat which is formed in the material of the motor block.

The present application is a division of my prior application, Serial No. 340,770, filed February 18, 1929.

One of the objects of the invention is the provision of improved tools for installing valve seat rings of the class described.

Another object is the provision of an improved valve seat tool assembly which is peculiarly adapted to be utilized in installing new valve seat rings in the motor blocks of internal combustion engines.

Another object is the provision of an improved valve seat ring installing tool with adapters which may be utilized in installing valve seat rings of different sizes.

Another object is the provision of an improved valve seat construction including a valve seat ring which may be installed most economically and efficiently.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawing, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the single sheet of drawings;

Fig. 1 is a view in perspective, showing the operation of installing a valve seat ring;

Fig. 2 is a vertical, sectional view taken along the axis of the pilot stem, with the pilot stem shown in elevation;

Fig. 3 is a view in perspective of one of the valve seat rings;

Fig. 4 is a view similar to Fig. 2, of another modification.

Referring to Fig. 1, 10 indicates in its entirety the block of an internal combustion engine which is provided with a plurality of valve apertures 11 surrounded by valve seats 12. The motor block 10 is also provided with a valve stem guide 13 adapted to receive the stem of a poppet valve, and 14 indicates in its entirety a pilot stem adapted to be used in the grinding or reconstruction of the valve seat. The pilot stem 14 may be of the type shown in Fig. 2, and described in detail in my prior patent, No. 1,806,190, issued May 19, 1931, or the pilot stem of the type shown in Fig. 4 may be used. Either one of these pilot stems has its lower end fixedly secured in the guide 13, the axis of the pilot being located along the line of the axis of the guide 13.

The pilot 14 is provided with a frusto-conical portion 15 engaging the upper end of the guide 13 to center the pilot at that end, and with a split end 16 having a camming rod 17 for camming apart the parts of the ends 16 to center and secure the lower end of the pilot.

The pilot 18 shown in Fig. 4 is provided with a gradually tapered surface 19 which is adapted to be frictionally engaged and wedged into the upper part of the guide 13 to secure the pilot in place. The taper of the portion 19 is so gradual that the pilot may be forcibly wedged into the guide and

secured in place, without the necessity for any other securing devices. The taper is preferably within the limits of fifteen to thirty thousandths of an inch taper per foot of length, and preferably about twenty-two one-thousandths of an inch per foot, that is, the diameter of the pilot increases twenty-two one-thousandths of an inch for each foot of its length. This pilot, per se, forms the subject of another application, Serial No. 538,504, filed May 19, 1931.

The pilot 18 has the major portion of its lower end 20 formed cylindrically and corresponding closely to the size of the guide 13. The pilots 18 are furnished in sizes differing only by one-thousandth of an inch, so that they fit the guides very closely, and they may be secured in place by the use of a pin passing through the aperture 21 by means of which the pilots are rotated and pushed downward to secure them in place in the guide 13.

The motor block 10 shown in Fig. 2 has already been subjected to a cutting operation by means of the tools described in the prior application, of which this application is a continuation in part.

The motor block 10 has been formed with an annular recess 22 which is slightly smaller in diameter than the exterior diameter of the valve seat ring 23. The annular recess 22 has a substantially cylindrical, vertical wall, and a substantially flat base 24, the base and outside being complementary in shape to that of the valve seat ring 23, except that the ring is slightly larger in diameter, as previously described.

The ring 23 preferably comprises an annular member having a substantially rectangular cross-section, and preferably formed by casting and machining the ring out of an iron alloy adapted to resist heat and to withstand the pounding of the valve. Any material having more desirable characteristics than those of the internal combustion engine block 10 itself, may be used.

The ring 23 is placed above the recess 22 and driven into the recess by means of a driver 25. The ring 23 being slightly larger than its recess, considerable force must be used in driving the ring, and when the ring is driven, its outer surface frictionally engages the inner surface of the recess 22 to secure the ring in place.

The driver 25 preferably comprises a substantially cylindrical metal body 26 having a substantially flat upper end 27 to be engaged by a hammer 28 in driving the ring 23 home. The driver may be provided with a knurled surface 29 to be grasped by the hand, and it is preferably provided with an enlarged base 30 of substantially disc shape and extending radially sufficiently so that the flat bottom 31 of the base 30 engages the upper side of the ring 23.

The base 30 preferably does not project beyond the outer surface of the ring 23, so that the base 30 merely engages the ring without engaging the motor block, and it is thus enabled to be used in driving the ring home, even though the recess be slightly deeper than the thickness of the ring. It is also for this reason that adapters 32 are employed for larger rings instead of making the driver large enough for the largest ring and smaller adapters may be employed for driving smaller rings.

In case the valve seat ring 23 is larger than the base 30 of the driver 25, an adapter 32 may be utilized. The adapter 32 merely comprises a disc of metal having an aperture for receiving the pilot 14 and adapted to engage the upper side of the valve seat ring 23.

The driver 25 is provided with a substantially cylindrical bore 33 which may be of sufficient size to receive the cylindrical tool holder 34 which is slidably mounted on the pilot 14 in Fig. 2. The tool holder 34 comprises a cylindrical member formed with a tapered surface 35 for receiving the valve seat cutter which was used in making the recess 22, and the tool holder 34 is slidably and rotatably mounted on the upper cylindrical end 36 of pilot 14, by means of the cylindrical bore 37 in the tool holder 34.

Referring to Fig. 4, it will be noted that if desired the driver 25 may be provided with a smaller aperture adapted to be slidably mounted on the cylindrical end 36 of the pilot 19, thereby eliminating the tool holder from the combination.

In either event, the driver 25 is slidably mounted upon the pilot 14 or 18, and is adapted to be guided in a vertical direction in the driving of the ring 23, and the driver and ring are thereby prevented from springing out of place during the driving operation. As the ring is driven from the position of Fig. 1 to that of Fig. 2 or Fig. 4, the driver and ring are guided by the pilot and the ring is quickly located and fixedly secured in the motor block in the position shown in Fig. 2. The valve seat ring may then be cut down by means of a reamer to form the valve seat, and the valve seat may be finished in the usual way.

It will thus be observed that I have invented an improved valve seat tool and assembly, which are capable of installing valve seat rings in the block of internal combustion engines in the most efficient and economical manner. The internal combustion engine block may thus be provided with valve seats which are better for that purpose than the material of which the block is constructed, and the valve seats may be refinished even after much of the motor block has been worn away.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States, is:

1. A valve seat ring driver comprising a metal member having an impact surface at one end and having a driving surface at the opposite end for engaging a valve seat ring, said member having an intermediate handle portion for engagement with the hand of the operator in driving the ring, said ring driver having a cylindrical bore extending into the same and a valve stem pilot having a complementary cylindrical surface for slidably supporting said ring driver during the driving of a valve seat ring.

2. A valve seat ring driver comprising a metal member having an impact surface at one end and having a driving surface at the opposite end for engaging a valve seat ring, said member having an intermediate handle portion for engagement with the hand of the operator in driving the ring, said ring driver having a cylindrical bore extending into the same and a valve stem pilot having a complementary cylindrical surface for slidably supporting said ring driver during the driving of a valve seat ring, and a spacer member having a similar bore for receiving said pilot stem, said spacer member having an upper driver engaging surface and a lower driving surface and being of circular shape and of greater diameter than said ring driver for engaging a valve seat ring of greater diameter than said ring driver.

3. A valve seat ring driver comprising driving means having an impact surface at one end and having a driving surface at the other end for engaging a valve seat ring, said driving means having an intermediate cylindrical surface for engaging a guide means, guide means adapted to be fixedly secured to the engine block and having a complementary cylindrical surface for slidably engaging the cylindrical surface on said driving means during the installation of a valve seat ring, said guiding means supporting said driving means for sliding movement substantially axially of the valve seat aperture.

In witness whereof, I hereunto subscribe my name this 4th day of December, 1931.

FRANS O. ALBERTSON.