Nov. 3, 1925. 1,560,486

J. RUMMINS

DEVICE FOR SEATING VALVES

Filed Oct. 8, 1923

Fig. 1

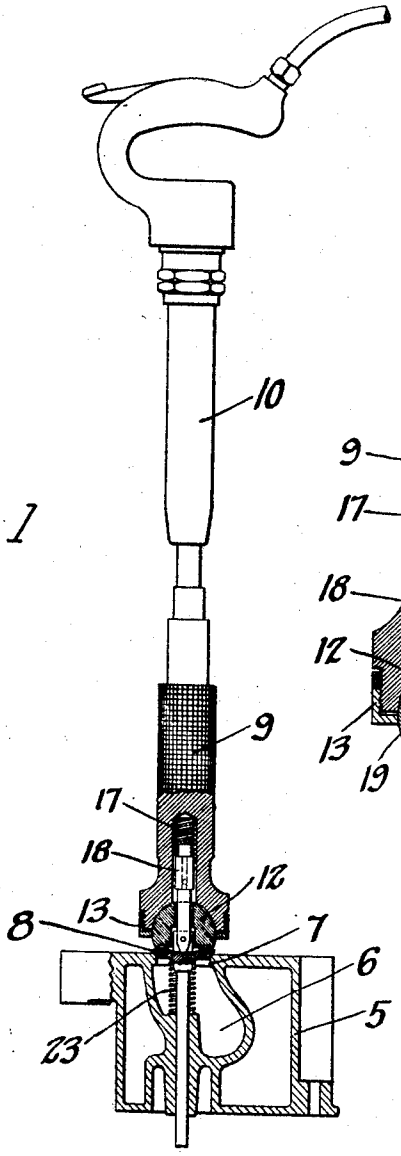
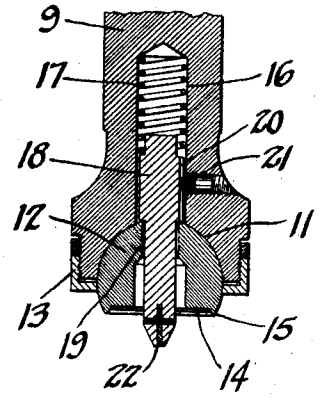


Fig. 2



Inventor

John Rummins

By his Attorneys

Blackmore, Spencer & Gleich.

Patented Nov. 3, 1925. 1,560,486

UNITED STATES PATENT OFFICE.

JOHN RUMMINS, OF LANSING, MICHIGAN, ASSIGNOR TO GENERAL MOTORS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE.

DEVICE FOR SEATING VALVES.

Application filed October 8, 1923. Serial No. 667,432.

To all whom it may concern:

Be it known that I, JOHN RUMMINS, a citizen of the United States, and a resident of Lansing, county of Ingham, and State of Michigan, have invented certain new and useful Improvements in Devices for Seating Valves, of which the following is a full, clear, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

My invention relates to the seating of poppet valves, particularly in internal combustion engines; and the object thereof is to provide a plan or scheme whereby such valves may be more readily and expeditiously seated than has heretofore commonly been the case; and whereby a more perfect seating of the valve, with consequent tightness, and a seat surface having better wearing qualities than has ordinarily been produced in the usual "grinding in" operation heretofore in vogue, will be secured.

My invention is regarded as including a new device for seating valves. The tool being illustrated in the drawing accompanying and forming a part of this specification. The distinguishing features wherein my invention consists are particularly pointed out in the claims at the end of this specification; although it will be appreciated that my invention includes such variations and modifications of the particular tool and process disclosed and claimed herein as will be obvious to those skilled in the art to which my invention relates, so long as such variations come within the scope of the claims in question.

Referring now to the drawing:

Figure 1 is a view showing the tool which constitutes a part of my invention partly in side elevation, and partly in section.

Figure 2 is a fragmentary view showing the tool aforesaid in section upon a longitudinally extending axial plane, and upon a larger scale than the same is shown in Figure 1.

In the drawing, the numeral 5 designates the head or upper end of the cylinder of an internal combustion engine or equivalent structure, in a conventional manner, my invention as a matter of course being applicable to the seating of poppet valves in any type of engine, pump, or similar device in which valves of that kind are used; and 6 is an inlet, exhaust or other passage through which a fluid flows when the engine is in operation. This passage extends past a valve seat at 7; and the numeral 8 designates a poppet valve comprising a head the periphery of which cooperates with the seat 7, and a stem cooperating with a suitable guide to insure rectilinear movement of the valve; all as is usual in valves of the type contemplated herein.

In seating valves in accordance with my invention the valve seat 7 is given its usual bevelled form during the manufacture of the cylinder, or head therefor if the head is formed separately from the cylinder, as is the more common practice; the seat being in fact in substantially its final form prior to the seating operation involved in my invention, although the surface thereof undergoes a further finishing operation during the seating operation.

In seating a valve in accordance with my invention the valve is placed upon its seat; and is then subjected to a plurality of blows delivered to its upper side, so as to drive the valve against the seat. Angular movement about its axis or stem is preferably imparted to the valve during the seating operation to thereby insure proper contact between the valve and its seat in all angular positions of the valve; and the valve thus seated is intended to operate in conjunction with the particular seat upon which it is seated throughout the life of the parts or until the valve needs to be re-seated, the same as in the usual practice of grinding a valve into proper engagement with its seat.

The driving, as it were, of the valve onto its seat which occurs in performing my process compacts the seat, and produces a harder seating surface than has heretofore been the case. The seating surface produced is therefore one which will resist the cutting and grooving action of the gases flowing past the same better than has heretofore been the case, in the usual grinding in method of seating; and my invention also provides cooperating surfaces which are in more intimate contact than heretofore, and in which leakage past the valve is materially reduced.

The seating operation above described may be performed by implements or tools of vari-

ous forms, so long as they are suitable for delivering blows to the valve in the manner and with the results enumerated. I have, however, invented a particular tool which I have found well adapted for performing the process; the distinguishing features thereof being as follows:

The numeral 9 designates an elongated body member preferably knurled upon its periphery so that the tool may be the better and more firmly held by the hand of the operator, and the upper end of which body member is adapted to receive blows; said upper end being shown as so shaped as to enter and be held in the chuck of an ordinary pneumatic riveting or chipping hammer 10 operated by compressed air, which is a device in common use and purchasable in the open market. Blows may, however, be delivered to the upper end of the body 9 in any way, and by any device; as, for example, by a hand operated hammer which is perhaps the simplest conception of a blow delivering device or scheme.

The lower end of the body portion 9 is provided with a spherical seat at 11 within which a spherical anvil 12 is held in any suitable way, as by a locking ring arrangement 13; the anvil being free to rock in the seat so that blows will be transmitted to the valve along the axis thereof, notwithstanding such nutation of the upper end of the tool, and of the hammer striking the same, as may be due to unsteadiness of the hands of the operator; or to lack of uniformity as regards the holding of the tool relative to the valve being seated in successive seating operations. The lower outer and exposed portion of the anvil is so shaped as to rest upon and throughout a considerable area of the upper side of the head of the valve operated upon as by providing a substantially flat surface upon said anvil, as indicated by the numeral 14. A peripheral ridge 15 is present in the tool illustrated to more certainly prevent the tool from slipping sidewise off the valve head. These features distribute the force of the blows imparted to the valve and concentrate the effect thereof along a line extending circumferentially of the seat, and disposed directly above the same; and insure that the force of the blows will be exerted always in a direction along the axis of the valve when the tool is in use, as will be understood.

The body member 9 is shown as provided with a longitudinally extending passage 16 containing a comparatively weak spring 17 acting upon the upper end of a plunger 18 housed in said passage, and extending through an opening 19 in the spherical anvil 12 and the lower end of which engages the upper end of the valve operated upon. This plunger, although it serves a useful purpose merely in pressing downward upon the valve with a yielding pressure, is provided principally for the purpose of enabling the operator to impart angular movement to the valve during the seating operation, as hereinbefore explained; and to that end the plunger is provided with a longitudinally extending groove 20 into which the end of a set screw 21 extends, to thereby cause the plunger to rotate with the body member. The lower end of the plunger is provided with a plate 22 adapted to fit within the slot commonly present in valve heads so that they may be rotated by a suitable device in the usual grinding operation; from which it follows that the valve while being seated by blows communicated thereto through the body member 9, may be rotated at the will of the operator by rotating said body member.

It is preferable that the valve be lifted off or at least eased from its seat between the blows delivered thereto, and more especially so when the operator rotates the tool to impart angular movement to the valve; and in order to accomplish that end a spring 23 of proper length and stiffness may be interposed between the under side of the valve and the usual guide for the stem thereof. This spring is comparatively weak so as not to interfere with the pressing of the valve against its seat by the operator, nor to materially lessen the effect of the blows communicated thereto during the seating operation; but is stiff enough to raise the valve from its seat when the operator reduces the force with which he presses the valve against its seat, as when the valve is to be rotated as hereinbefore explained.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. A valve seating tool comprising an elongated body member adapted to receive blows at its upper end, and having a spherical seat at its lower end; and a spherical anvil held in place within said seat and having an exposed surface adapted to engage the upper end of a valve to be seated.

2. A valve seating tool comprising an elongated body member adapted to receive blows at its upper end, and having a longitudinally extending passage and a spherical seat at its lower end; a spherical anvil held in place within said seat and having an opening extending therethrough, and an exposed surface adapted to engage the upper end of a valve to be seated; and a spring pressed plunger arranged within the passage aforesaid and extending through the opening in said anvil and adapted to engage the valve being seated.

3. A valve seating tool comprising an elongated body member adapted to receive blows at its upper end, and having a spherical seat at its lower end; a spherical anvil held in place within said seat and having

an exposed surface adapted to engage the upper end of a valve to be seated; and means for imparting angular movement about its axis to the valve during the seating operation.

4. A valve seating tool comprising an elongated body member adapted to receive blows at its upper end, and having a longitudinally extending passage and a spherical seat at its lower end; a spherical anvil held in place within said seat and having an opening extending therethrough, and an exposed surface adapted to engage the upper end of a valve to be seated; a spring pressed plunger arranged within the passage aforesaid and extending through the opening in said anvil and adapted to engage the valve being seated; means for preventing rotation of said plunger within the passage aforesaid; and means at the lower end of said plunger through which the valve may be rotated during the seating operation.

5. A valve seating tool comprising an elongated body member adapted to receive blows at its upper end, and having a spherical seat at its lower end; a spherical anvil held in place within said seat and having an exposed surface adapted to engage the upper end of a valve to be seated; and a spring located beneath the valve and tending to force it away from the seat aforesaid.

6. A valve seating tool comprising an elongated body member adapted to receive blows at its upper end, and having a longitudinally extending passage and a spherical seat at its lower end; a spherical anvil held in place within said seat and having an opening extending therethrough, and an exposed surface adapted to engage the upper end of a valve to be seated; a spring pressed plunger arranged within the passage aforesaid and extending through the opening in said anvil and adapted to engage the valve being seated; means for preventing rotation of said plunger within the passage aforesaid; means at the lower end of said plunger through which the valve may be rotated during the seating operation; and a spring located beneath the valve and tending to force it away from the seat aforesaid.

In testimony whereof I affix my signature.

JOHN RUMMINS.