

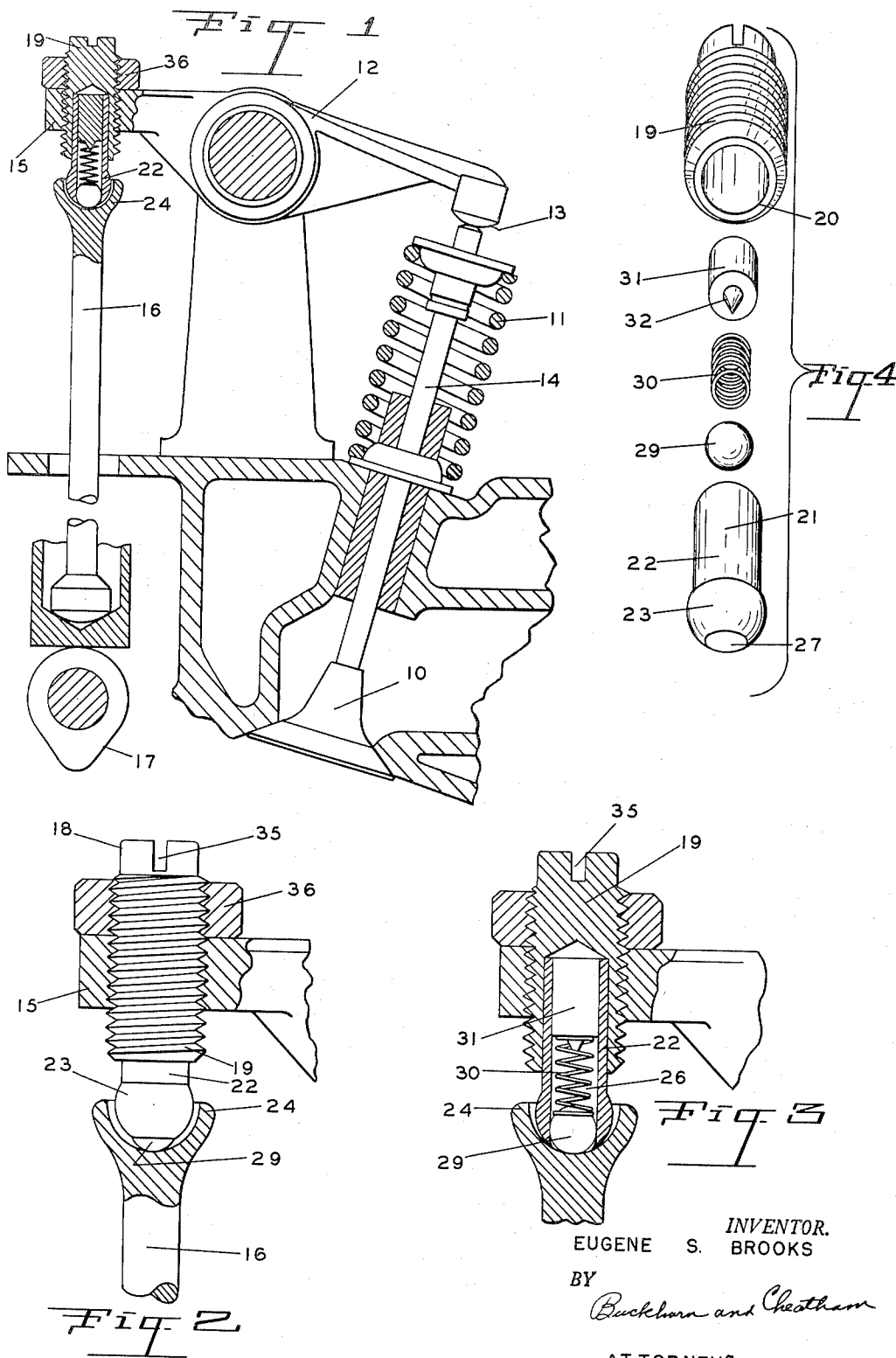
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VALVE SCREW

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VALVE SCREW

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1 Claim. (Cl. 123—90)

The present invention relates to internal combustion engines of the overhead valve type, and more particularly to a new and improved valve tappet screw for silencing the tappet action.

Valve tappet screws have been provided heretofore for silencing the valve actuating mechanism having a spring biased ball member provided in the end thereof for taking up the clearance play between the end of the rocker arm and the push rod. While the principle of such tappet screws is well known, difficulties are encountered in the manufacture thereof and particularly with regard to the mounting of the ball in place while providing a wearing surface of reasonably long life.

In prior art tappet screws of the type herein considered, the outwardly biased ball is retained within its cooperating recess by an inwardly swaged lip. To permit such swaging of the lip, the end portion of the screw must of necessity be relatively soft and which, of course, cannot be subsequently hardened. As a result, the soft metal at the end of the screw rapidly wears away during usage and with the wearing away of the swaged lip, the ball is free to move out of the recess.

It is a general object of the present invention, therefore, to provide a new and improved valve tappet screw of the type described having a long-wearing, hardened end working surface.

A further object of the present invention is to provide a new and improved valve tappet screw having a ball retaining end portion which is hardened prior to the assembly of the unit thereby providing a durable wearing surface of relatively long life.

Other objects and advantages will become apparent hereinafter.

In accordance with the illustrated embodiment of the invention, there is provided a valve tappet screw which includes a body member adapted to be threaded into the push rod engaging end of a valve actuating rocker arm. A ball retainer of hardened metal is mounted in the body member, having an axial bore therethrough in which is disposed a ball protruding from the end thereof. The outer end of the bore converges inwardly to define an opening of lesser diameter than the ball whereby the latter is restrained from ejection therefrom, the ball being urged outwardly of the opening by a suitable spring disposed within the bore.

For a more detailed description of the invention, reference is made to the following specification taken in conjunction with the accompanying drawings, wherein:

Fig. 1 shows a fragmentary view of a portion of an automobile engine with the valve tappet screw of the invention mounted therein;

Fig. 2 is an enlarged fragmentary view of a rocker arm and push rod, partially in section, with the valve tappet screw of the invention in the normal inactive position;

Fig. 3 is a further enlarged fragmentary view of a rocker arm with the valve tappet screw of the invention and a push rod in section illustrating the ball depressed within the valve screw; and

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Fig. 4 is a perspective exploded view of the parts making up the valve tappet screw of the invention.

A typical operating arrangement for an overhead valve is shown in Fig. 1 wherein the numeral 10 indicates a valve held in a normally closed position by a valve spring 11. The valve 10 is operated through a pivotally mounted rocker arm 12, the tappet end 13 of which engages the end of the valve stem 14, the other end 15 of which is adapted to be actuated by a push rod 16 which is operated in a conventional manner by a cam 17.

The valve tappet screw of the invention is indicated generally at 18 and comprises an externally threaded body member 19 adapted to be threadedly engaged in the cooperatively threaded end 15 of the rocker arm 12 actuated by the push rod 16. The body member 19 is provided with a cylindrical axial cavity 20 extending from one end thereof, within which is shrink-fitted the shank portion 21 of a generally tubular ball retaining member 22. The ball retaining member 22 includes a hardened tip or globular end portion 23 extending outwardly of the body member 19, which end portion is adapted to engage cooperatively the socket 24 formed on the end of the push rod 16. The ball retaining member 22 has an axial bore 26 therethrough, the wall of which converges inwardly adjacent the surface of the globular end portion 23 to define an opening 27 of slightly lesser diameter than the diameter of the remainder of the bore. Disposed within the bore 26 is a hardened steel ball 29 of greater diameter than the opening 27, which ball is urged outwardly through the opening 27 by resilient means such as the helical compression spring 30, one end of which abuts against the ball and the other end of which bears against a stop means comprising a spring-engaging plug 31 press-fitted within the opposite end of the bore 26. To assist in centering the spring 30 during the assembly of the ball retaining member, the plug 31 is preferably provided with an axially centered, conical projection 32 which protrudes within the helical spring 30 and holds it relatively centered on the plug 31. As is evident, ejection of the ball 29 is prevented by the bead formed by the converging side walls of the bore. As will be seen, the ball 29 should protrude from the end portion 23 by a distance at least as great as the normal clearance required between the rocker arm tappet end 13 and the valve stem 14. Mention should be made of the fact that the plug 31 is not essential to the invention but need be utilized only when the spring 30 is so short that it will not extend when expanded between the ball 29 and the inner end of the cavity 20.

The body member 19 of the valve screw 18 may be provided with a slot 35 or other suitable means for turning the same, and a lock nut 36 may be provided to hold the valve screw at a set position.

In installing the valve tappet screw of the invention, it is threaded in the end 15 of the rocker arm 12 as shown in Fig. 1. A feeler gauge is then inserted between the tappet end 13 of the rocker arm 12 and the valve stem 14, and the valve screw 18 is pushed firmly down against the socket 24 of the push rod 16, in the manner seen in Fig. 3, and turned until the feeler gauge indicates the required clearance between the rocker arm tappet end 13 and the valve stem 14. When the feeler gauge is removed, the spring 30 will urge the ball 29 to the position shown in Fig. 2 where the globular end 23 of the valve tappet screw is free of contact with the socket 24 of the push rod 26 and the ball 29 is in contact therewith, and the tappet end 13 of the rocker arm 12 will be urged into contact with the valve stem 14, as shown in Fig. 1.

The valve tappet screw 18 effectively eliminates the usual tappet pounding inasmuch as the rocker arm tappet 13 is constantly held in contact with the valve stem 14 so that no occasion of hammering between those parts can

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arise. On the other hand, the force of the push rod 15 is cushioned by the spring 30 so that little noise will arise from the making of contact between the push rod 15 and the end 23 of the valve tappet screw 18. The valve stem 14 is free to expand during operation of the engine, of course, inasmuch as the spring 30 will be correspondingly depressed as the valve stem lengthens.

In prior art types of tappet screws, and as mentioned in the fore part of the instant specification, the body member 19 and the ball-retaining member 22 are formed as a single piece, and after the hardened ball 29 is inserted into the cylindrical bore 26 the outer end portion of the unit is swaged inwardly to form the ball-retaining lip. As will be observed with reference to Fig. 3, the inwardly swaged lip is inherently relatively thin. Due to the presence of the hardened ball 29, the thin lip cannot be subsequently heat treated and hardened so that it must be left soft and consequently is subject to rapid wear. In accordance with my present invention, the entire member 22, or at least the globular end portion 23, may be heat treated and hardened in substantially the form shown. The inwardly swaged, thin lip portion retaining the ball 29 in place thus presents a long-wearing, long-life working surface and thus represents a very substantial improvement over the prior art devices of similar nature.

It will be understood, of course, that it is intended that each intake valve and each exhaust valve in an engine be provided with the described valve tappet screws 18 in the respective rocker arms thereof, but that the arrangement of each will be substantially the same as that illustrated herein.

Having illustrated and described a preferred embodiment of my invention, it should be apparent to those skilled

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in the art that the invention permits of modification in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the appended claim.

I claim:

A valve screw comprising a body member adapted to be adjustable mounted on the rocker arm of a valve operating mechanism, said body member having a smooth surfaced cylindrical axial cavity extending from one end thereof, a ball retaining member including a smooth surfaced, cylindrical shank portion tightly fitted within said cavity and retained therein by frictional engagement between said members, said ball retaining member having a hardened, wear resistant, substantially spherical end portion extending outwardly from said body member, said ball retaining member having an axial bore therethrough the wall of which converges inwardly adjacent the surface of said end portion to define an opening of lesser diameter than the diameter of the remainder of the bore, a ball of greater diameter than said opening and lesser diameter than said bore disposed within said bore and protruding from said opening, and resilient means within said bore operatively arranged between said ball retaining member and said ball for urging said ball outwardly of said opening.

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