Jan. 26, 1937. L. J. CLOSSEY 2,069,133

VALVE AND GUIDE BUSHING EJECTOR

Filed March 31, 1936

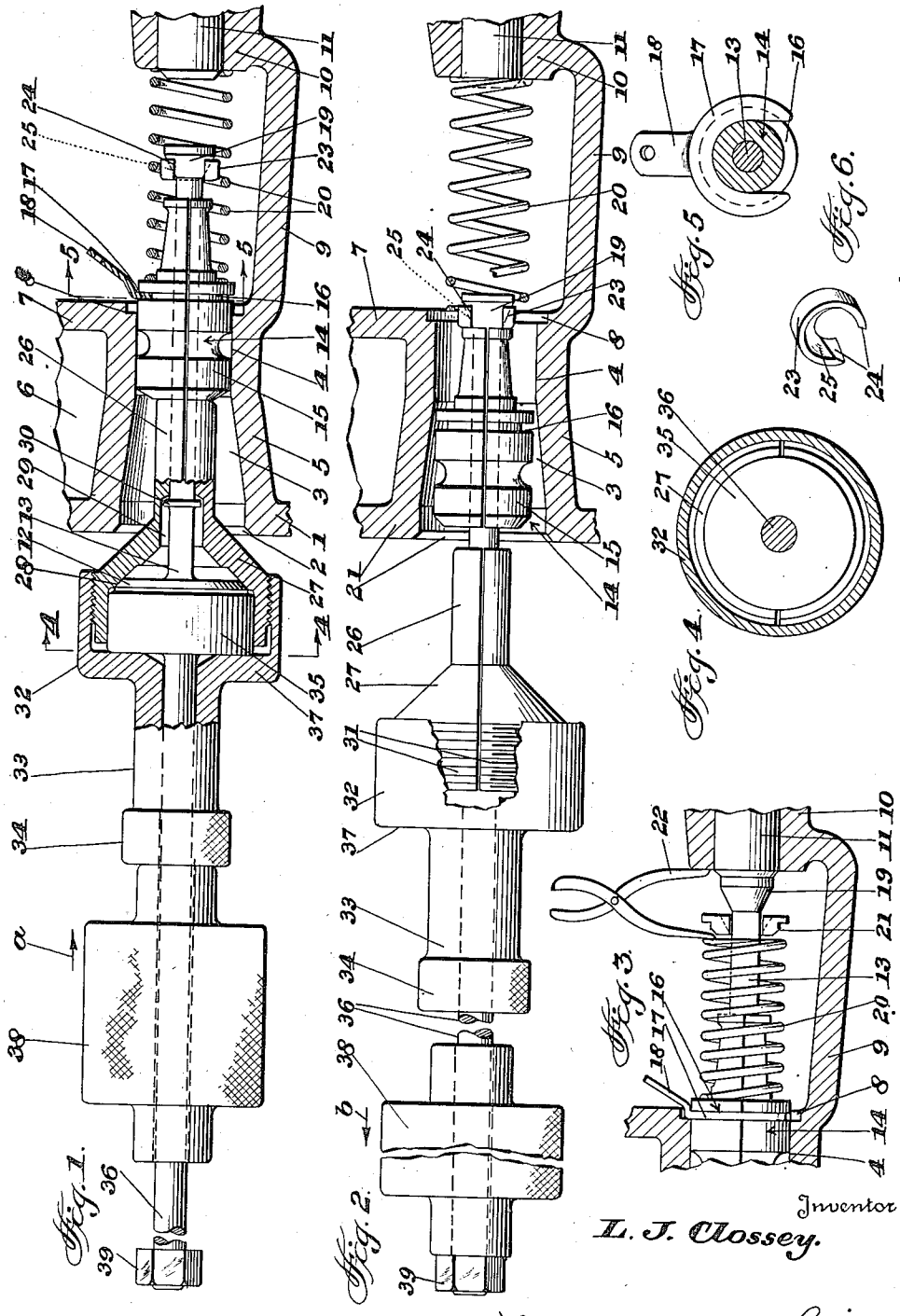


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5

Fig. 6.

Inventor

L. J. Clossey.

By Mecia, Anderson & Priddy

Attorneys

Patented Jan. 26, 1937 2,069,133

UNITED STATES PATENT OFFICE

2,069,133

VALVE AND GUIDE BUSHING EJECTOR

Leonard J. Clossey, Detroit, Mich.

Application March 31, 1936, Serial No. 71,918

4 Claims. (Cl. 29—88.2)

This invention relates to improvements in special tools with which to work upon internal combustion engines, and its principal object is as follows.

To provide an ejector to lock the valve (intake or exhaust) of a Ford V-8 motor in position so as to enable the removal of said valve and its stem guide bushing from the cylinder block without damage.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawing, in which:

Figure 1 is a combined sectional and elevation view showing the ejector in assemblage with the valve and guide bushing which it is designed to remove.

Figure 2 is a similar view showing the valve and guide bushing almost removed from the cylinder block.

Figure 3 is a detail sectional view illustrating the initial step of compressing the valve spring for the removal of the customary spring retainer.

Figure 4 is a cross section taken on the line 4—4 of Fig. 1.

Figure 5 is a cross section taken on the line 5—5 of Fig. 1.

Figure 6 is a detail perspective view of the ejector shoe which is fitted on the valve stem in substitution for the original spring retainer.

As previously indicated, the so called ejector comprises a special tool for removing the valves and their guide bushings from the cylinder block of the current Ford V-8 motor. As is known by those familiar with this type of motor, the two sets of cylinders stand off at angles of 45° from the central vertical plane. The intake and exhaust valves are at slightly greater angles, and are located intermediately of the two sets of cylinders so as to reach the cam shaft which runs above the crank shaft. The stems of these valves slide in guides, as is customary, but the valve guides of this particular motor are split, and are held by friction in openings in the cylinder block. This means that the valve guide, referring to only one from now on, must be driven out when it is desired to remove the valve and its spring preparatory to grinding or replacement.

In order to amplify the above statements, reference is made to the drawing. 1 designates the top surface of the cylinder block on the exhaust side of the motor. All that will be stated in connection with the invention will relate as well to the intake side of the motor. The part 1 is exposed to view when the cylinder head (not shown) is removed, and rather than appearing upright as in the drawing, the part 1 actually stands at an angle of 45°, sloping upwardly toward the right and toward the foregoing central plane of the motor.

The valve seat 2 is formed in the cylinder block 1, this seat merging into a tapering passageway 3 which terminates in a cylindrical end 4, the passageway and cylindrical end occurring in a portion 5 which is integral with the cylinder block, dividing off the external water jacket 6 from the internal exhaust opening (not shown). The portion 5 connects with a wall 7. The cylindrical end 4 has a counterbore 8 in this wall. The latter continues at 9 and ends in a bearing 10 in which a tappet 11 is slidable.

A valve 12 is adapted to coact with the seat 2. The stem 13 of this valve is slidably carried by the split bushing 14 which provides the guide. This bushing includes a large part 15 which is tightly and frictionally held in the cylindrical end 4. Said part has a groove 16 which contains a forked member 17, known as a thrust ring. This so called ring is adapted to seat in the counterbore 8 (Fig. 3) and it has a fingerpiece 18 standing off at an angle which enables its removal when the bushing 14 is displaced inwardly (Fig. 1).

The foregoing valve stem 13 terminates in an enlarged flared extremity 19 which is adapted to be engaged with the tappet 11 by the spring 20 and which also provides the anchorage for the customary valve spring retainer 21 (Fig. 3). The latter is of a horseshoe shape and it must be removed as one of the first acts of removing the valve and its guide bushing.

Thus far the description relates to structure that is common to the foregoing type of motor. The first step preparatory to the use of the invention consists of using a spring compressor 22 (Fig. 3) to compress the spring 20, so as to release the spring retainer 21. This retainer is removed, and presently the spring 20 is allowed to expand into contact with the bearing 10 which it will do when the compressor 22 is taken away.

The following description relates to the structure that comprises the invention. Before taking the spring compressor 22 away, an ejector shoe 23 is substituted for the retainer 21. This shoe is shown in detail in Fig. 6. It is of the same general horseshoe shape as the retainer 21, but it does not have the flange of the latter, and consequently can move inside of the convolutions of the spring 20. In other words, this shoe is of a substantially ring form but it is slotted at 24, giving it a horseshoe shape, and it is tapered at

25 to enable its resting upon the extremity 19. The latter, because of its flared form, tends to hold the shoe 23 securely so that it will not readily slip off.

A split bearing sleeve 26 is assembled around the valve stem 13 which is pulled up sufficiently far out of the cylinder block 1 to make it accessible (Fig. 1). This is possible because the spring 20 is disengaged. The sleeve 26 includes a cup 27 to contain the valve 12. The cup is provided with a seat 28 for the bevel of the valve to rest upon without injury. Said seat eventually communicates with a counterbore 29 which is provided to accommodate a circular flange 30 on the valve stem.

External threads 31 on the cup 27 provide for screwing on the cap 32 of what is now collectively known as the ejector head, said head consisting of the parts 26, 27, 32. The latter has a bushing 33 with a knurled prominence 34, the latter providing an anvil.

Preparatory to screwing the ejector head together the head 35 of a plunger rod 36 is put in place. This plunger rod head fills practically all of the internal space in the parts 27, 32 and when these are screwed together the head 35 is jammed tightly between the valve 12 and the opposite wall 37 of the cap 32. This locks the valve in tight engagement with the ejector.

A plunger 38 is slidable on the rod 36 which thus acts as a guide. This serves as a hammer and it is adapted to strike blows either against the anvil 34 or against a shoulder 39 on the free extremity of the plunger rod. This shoulder is shown in the form of a nut.

The operation is readily understood. The first act is to use the spring compressor 22 (Fig. 3) for the compression of the spring 20 to enable the removal of the valve spring retainer 21. The ejector shoe 23 is slipped on to the valve stem in its place while the spring is still held compressed. Thereafter the compressor 22 is taken away letting the spring 20 drop to the bearing 10.

The valve stem 13 is pulled up (Fig. 1) and the two halves of the sleeve 26 are assembled around the valve, as shown. The plunger head 35 is inserted in the cup 27 whereupon the cap 32 is screwed home, locking the valve and tool together as already brought out.

At first the plunger 38 is used to strike a number of blows in the direction of arrow *a* (Fig. 1). These bolts are transferred to the bushing 14 through the split bearing sleeve 26, which then contacts the large part of the bushing. The bushing is displaced sufficiently in the inward direction to remove the thrust ring 17 from the counterbore 8, whereupon the thrust ring is pulled out. This leaves everything clear for a driving action of the plunger 38 in the direction of arrow *b* (Fig. 2). The ejector shoe 23 then engages with the inner extremity of the bushing 14 and the hammer blows gradually dislodge the bushing together with the contained valve, so that all parts come loose without destroying or damaging either the valve or its guide bushing.

Practically the same procedure is followed on a reverse order in replacing the valve and its guide bushing. The bushing is first driven beyond its normal position (Fig. 3) to the position in Fig. 1 so that the thrust ring 17 can be replaced. The ejector shoe 23 is used in driving the bushing home. The spring 20 is finally compressed for the removal of the shoe 23 and the replacement of the spring retainer 21.

I claim:

1. Means to tightly lock a valve and a portion of its stem in an enclosing position, said stem being adapted to be carried by a bushing in the cylinder block of an internal combustion engine, a guide rigidly extending from said means, hammering means carried by the guide by which to impart hammer blows on the enclosing means for moving the bushing in one direction in the cylinder block, said guide having a shoulder against which hammer blows are imparted by said hammering means for moving the guide and enclosing means in the opposite direction, and means attached to the valve stem for imparting said blows to the bushing and moving it in said opposite direction.

2. A tool which includes a member to enclose a valve and a portion of its stem, said part engaging one end of the stem bushing tightly and frictionally seated in the cylinder block of an internal combustion engine, means embodied in the tool for delivering blows in one direction through said enclosing member to the bushing to drive the bushing in said direction out of the cylinder block, and further means included in the tool for delivering blows in the opposite direction to the bushing and driving said bushing in said direction from the cylinder block.

3. A tool comprising a plunger rod forming a guide, said plunger rod having a head on one end and a shoulder on the other, an ejector head including means to tightly clamp the plunger rod head onto a valve, said valve having a stem working in a guide bushing which is frictionally held in the cylindrical end of a passageway in an engine cylinder block, said end having a counterbore to contain a thrust ring on the bushing, a plunger movable on the rod to deliver hammer blows to the ejector head in one direction, said ejector head having a portion then engaging one end of the bushing to drive the bushing in said direction for the displacement of the thrust ring from its counterbore so that it can be removed, and means temporarily fitted on the valve stem to engage the other end of the bushing when moving the plunger to deliver hammer blows to the shoulder for driving the bushing in the opposite direction.

4. An ejector tool comprising a split bearing sleeve including a cup, a plunger rod having a head to be fitted in the cup, a bushing on the plunger rod having a cap, there being means to secure the cap and cup together to rigidly hold the head, said bushing having an anvil and said guide rod having a shoulder, a plunger slidable on the rod for delivering hammer blows to the anvil and shoulder, and an ejector shoe to coact with said ejector when the hammer blows are delivered in one direction.

LEONARD J. CLOSSEY.