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APPARATUS FOR DISASSEMBLING A HYDRAULIC VALVE LIFTER

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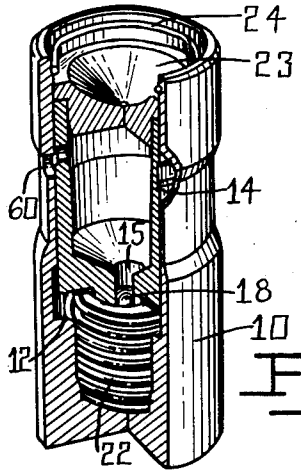


Fig. 6

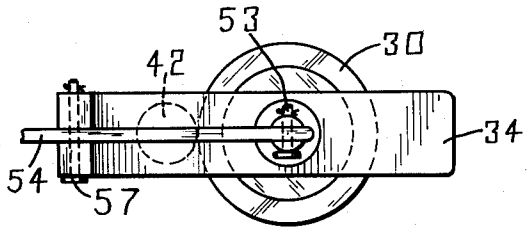


Fig. 1

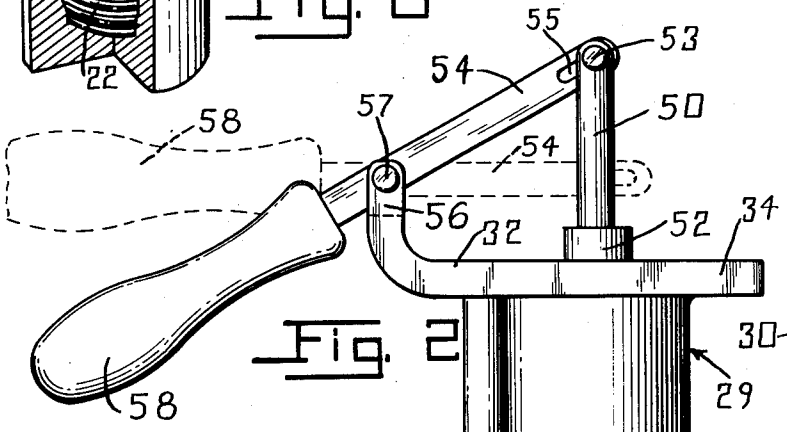


Fig. 2

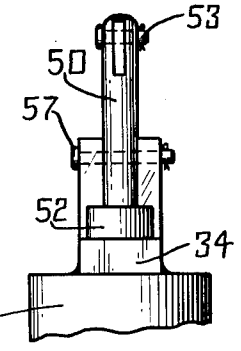


Fig. 3

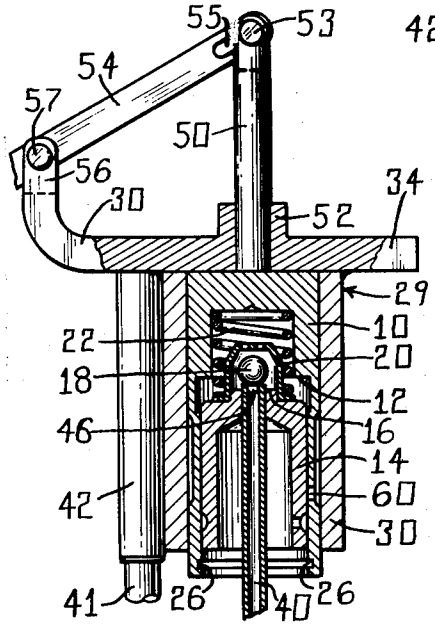
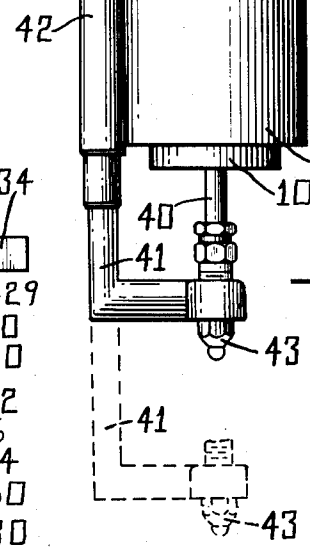


Fig. 5



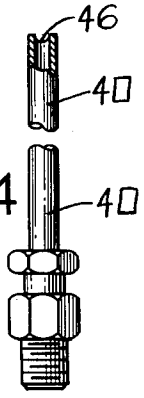


Fig. 4

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APPARATUS FOR DISASSEMBLING A HYDRAULIC VALVE LIFTER

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2 Claims. (Cl. 29—213)

This invention relates to an apparatus for and a method of disassembling a hydraulic valve lifter used in automobile engines.

Many types of automobile engines employ the use of a plurality of hydraulic valve lifters and associated mechanisms. Each lifter operates a rod which actuates movement of a valve. Frequently, one or more of these hydraulic valve lifters in an automobile engine fails to operate properly. In such instances, the plunger in the lifter has become tightly fixed to the inner wall of the lifter body. To function properly, the plunger must slide freely within the body.

When the parts of the engine are disassembled and the malfunctioning lifter is removed, the automobile mechanic usually learns that it is impossible to remove the plunger from within the body of the hydraulic lifter. The mechanic strikes the lifter body upon a hard material while he holds the body in an inverted position. Seldom is this process successful in removing the plunger from the body of the lifter. Due to the fact that the plunger is so fixed within the body of the valve lifter that it cannot be removed, the entire lifter must be rejected from further usage. Consequently, it is usually necessary to replace an inoperative lifter with a new lifter. This is an expensive procedure. This procedure, also, requires large amounts of steels and other metals which might be used in other products.

An object of this invention is to provide apparatus for and a method of easily removing a plunger which has become stuck within the body of a hydraulic valve lifter.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

Referring to the drawings, Figure 1 is an end view of a device used in the removal of a plunger from within the body of a valve lifter.

Figure 2 is a longitudinal view of the device.

Figure 3 is a fragmentary longitudinal side view of the device.

Figure 4 is a fragmentary view of the tubular portion of the device used in the dislodging process.

Figure 5 is a fragmentary longitudinal sectional view of the dislodging device showing a hydraulic lifter inserted in the dislodging device. The hydraulic lifter is shown in section.

Figure 6 is a perspective view with the parts shown in section.

Referring to the drawings in detail, a hydraulic lifter is composed of a body **10** which is substantially a hollow cylinder open at one end. Within the body **10** is a shoulder **12** which is formed by the reduction in diameter of the cavity within the body **10**.

A plunger **14** is adapted to fit snugly and slidably within the cylindrical cavity of the body **10**. The plunger **14** has a cylindrical cavity formed therein and the plunger **14** is open at one end. In the wall of the plunger **14** opposite the open end, an orifice **15** is formed. Encircling the orifice on the outer surface of the plunger **14** integral with the plunger **14** is a lip **16**.

A ball **18** acts as a valve closing the orifice of the plunger **14** as the ball abuts the lip **16**. A ball retainer **20**, cup-like in shape, is adapted to fit over the lip **16**. A helical spring **22**, positioned in the closed end of the body **10**, biases the ball retainer **20** and the plunger **14** outwardly.

The open end of the plunger **14** is closed by a push rod seat **23**. The push rod seat **23** fits snugly over the open end of the plunger **14**. The push rod seat **23** is retained within the body **10** by a locking ring **24** which fits into a groove **26** at the open end of the lifter body **10**. The spring **22** acts as a resilient means forcing the plunger **14**, having the push rod seat **23** as a cover, against the locking ring **24** in the groove **26**.

As previously stated, a frequent occurrence in an automobile service department is the discovery that a valve lifter in an engine does not operate properly. This is caused by lodging of the plunger in the bore of the lifter body. The sticking of the plunger to the bore of the lifter body may be a result of one of various causes. Formerly, it has been practically impossible to remove the plunger **14** from the body **10** if the plunger **14** became firmly fixed within the body **10**.

This invention utilizes a holder **29** for a hydraulic lifter during the process of dislodging the plunger **14**. The holder **29** has a cylindrical barrel **30** attached to a bracket **32**. A protruding end **34** of the bracket **32** is adapted to be clamped in any suitable tool, such as a vise. The bracket **32** is so positioned, when the end **34** is retained in a clamped position, that the barrel **30** is held in a horizontal position.

A hydraulic lifter having an improperly operative plunger is inserted into the cylindrical cavity of the barrel as shown in Figure 5. The locking ring **24** is first removed, allowing removal of the push rod seat **23**.

As disclosed in Figures 4 and 5, a small tube or pipe **40** is adjustably supported upon the barrel **30** and the bracket **32** by means of an arm **41** which telescopes into a sleeve **42**. The pipe **40** is inserted into the plunger **14** and through the orifice **15** in the end of the plunger **14**. The outer diameter of the pipe **40** is only slightly smaller than the diameter of the orifice **15**, thus providing a snug fit of the pipe **40** through the orifice **15**. The tip of the pipe **40** is caused to engage the surface of the ball **18**. The other end of the pipe **40** has a beveled adapter **43** providing means of attachment to a conventional high pressure grease gun which may consist of a small hand grease gun.

By longitudinal movement of the pipe **40**, the ball **18** is forced against the end of the ball retainer **20**. The pipe **40** is forced inwardly farther, causing movement of the ball retainer **20**. This inward movement requires further compression of the spring **22**. This inward movement of the ball retainer **20** provides an opening between the ball retainer **20** and the plunger **14**. While this opening is maintained, grease is activated from a grease gun through the adapter **43** and the pipe **40**. It will be noted that the tip of the pipe **40** which abuts the ball **18** is provided with two diametrically opposite notches **46** which provide openings between the ball **18** and the tip of the pipe **40**. These openings allow grease from the grease gun to flow along the surface of the ball **18** into the ball retainer **20** and thence through the opening which results from separation of the ball retainer **20** from the plunger **14**.

Grease flows into the cavity which exists between the lifter body **10** and the end of the plunger **14**. The spring **22** partially fills this cavity. Sufficient grease is forced into the cavity to fill the cavity and additional grease dislodges the plunger **14** and forces the plunger **14** to move out of the lifter body **10**. Such pressures can be

exerted upon the plunger **14** by grease pressure from the grease gun that a plunger **14** very firmly fixed within the body **10** must succumb to this force and become dislodged from the body **10**.

After the plunger **14** has been removed from the body **10**, the pipe **40** is withdrawn from within the barrel **30** by a longitudinal movement carried by the arm **41** which telescopes into the sleeve **42**. Then the body **10** is ejected from the barrel **30** by longitudinal movement of the rod **50** in a guide bearing **52**. The rod **50** is slidably attached to a lever **54** by means of a pin **53** carried in a slot **55** in the lever **54**. The lever **54** is pivotally attached to a portion **56** of the bracket **32** by a pintle **57**. A handle means **58** is provided on the lever **54**.

The barrel **30** of the holder **29** is provided with a bore of such diameter that an extremely small clearance exists between the lifter body **10** and the bore of the barrel **30**. The small clearance prevents leakage of grease from an oil hole **60** in the wall of the lifter body **10**. The rod **50** moves into the barrel **30**, providing means of ejection of the lifter body **10** from the barrel **30** following removal of the plunger **14**.

Many automobile engines use valve lifters of this type. Consequently, there are valve lifters having various body diameters. For this reason, cylindrical sleeves are provided for insertion into the barrel **30**. All of the sleeves have an external diameter equal to the diameter of the bore of the barrel **30**, but the sleeves have various internal diameters. A sleeve of each internal diameter is designed to provide a slide fit for a valve lifter body of a definite size. Thus, an apparatus and a method are provided to disassemble valve lifters of all conventional automobiles.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described our invention, we claim:

1. A device for retaining a hydraulic valve lifter during disassembly of the valve lifter, the valve lifter having a cylindrical body member provided with an internal cavity having an aperture in a side wall thereof, the body member having a bottom wall at one end thereof and being open at the other end thereof, said body member containing a plunger concentric with the body member and having a centrally disposed orifice, a ball intermediate the bottom wall and the plunger and in alignment with the orifice, a retainer partially encompassing the ball, the ball being slightly larger than the orifice, a spring member engaging the retainer and forcing engagement of the ball with the plunger to close the orifice, the combination comprising a barrel provided with a cylindrical bore open at one end thereof and having a wall at the other end thereof, the bore being of sufficient diameter to permit the cylindrical body member to snugly and slidably fit therein, the bore being of sufficient length to permit the barrel to cover the aperture in the cylindrical body member, a cylindrical tube supported by the barrel substantially concentric therewith and axially movable into the barrel, the outer diameter of the tube being slightly smaller than the orifice in the plunger of the valve lifter, the tube having an end adapted to slidably pass through the orifice and to engage the ball depressing the ball and the retainer, the tube having a plurality of slots therein in the end thereof which engages the ball to permit flow of fluid from the tube, the other end of the tube being provided with a grease gun fitting, a rod extending through said wall at the end of the barrel and reciprocally movable within the bore of the barrel, and means carried by the barrel for reciprocal movement of the rod, the tube being adapted to move the ball and the retainer from engagement with the plunger and to carry fluid into the internal cavity of the cylindrical body member intermediate the bottom wall and the plunger to force the plunger from the cylindrical body member, the rod being adapted to force the cylindrical body member from the barrel after removal of the plunger from the cylindrical body member.

2. An apparatus for use in disassembly of a valve lifter provided with a cylindrical body member open at one end and having a bottom wall at the other end, the cylindrical body member having a cylindrical plunger therein which has become lodged therewithin, the plunger having a centrally disposed orifice therein, there being a ball closing the orifice and a retainer engaging the ball, the combination including a bracket, a barrel attached to the bracket, the barrel having a cylindrical bore therein provided with an opening at one end thereof and an end wall at the other end thereof, the bore of the barrel being only slightly larger in diameter than the outer diameter of the cylindrical body member of the valve lifter, the body member being adapted to slidably fit within the bore, a tube carried by the barrel and axially movable therein, the tube having an end slidably movable through the orifice of the plunger, said end of the tube being adapted to engage the ball and to move the ball and the retainer in a direction from the plunger, the tube being adapted to conduct fluid into the cylindrical body member intermediate the bottom wall thereof and the plunger to dislodge the plunger, and rod means reciprocally movable through the end wall of the barrel for engaging a cylindrical body member disposed within the barrel for removal of the cylindrical body member from the barrel.

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