Nov. 26, 1957 C. L. KESSELL 2,814,098

HYDRAULIC VALVE LIFTER PLUNGER PULLER

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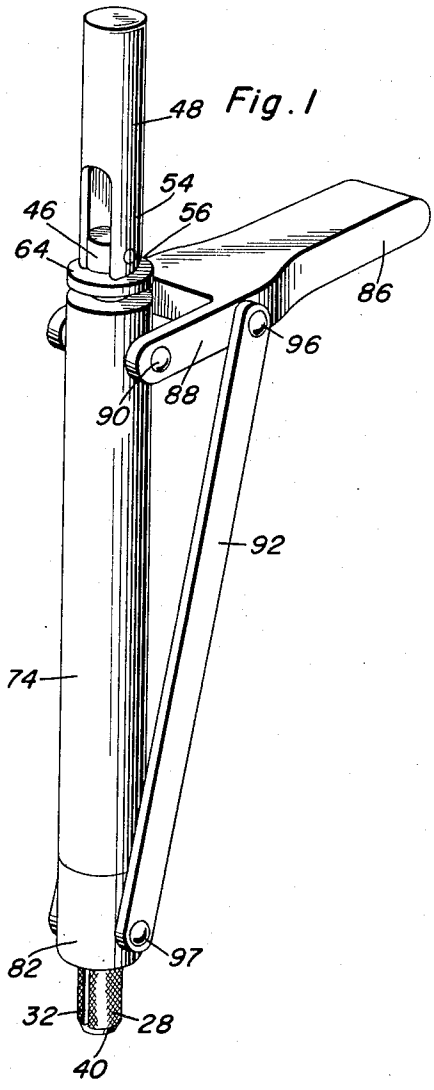


Fig. 1

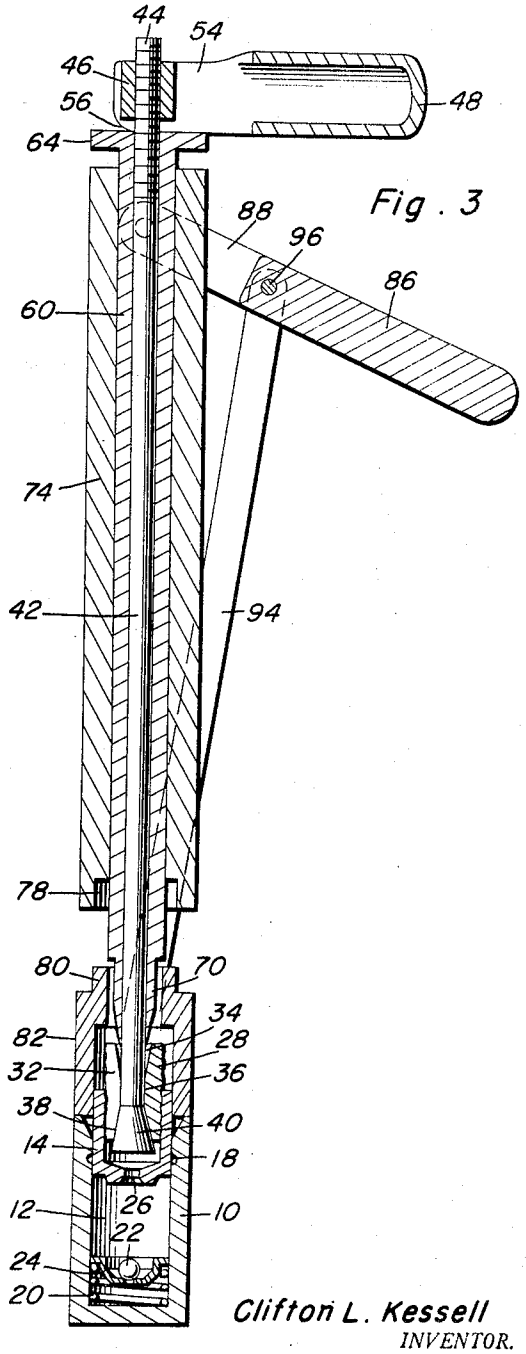


Fig. 3

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Fig. 2

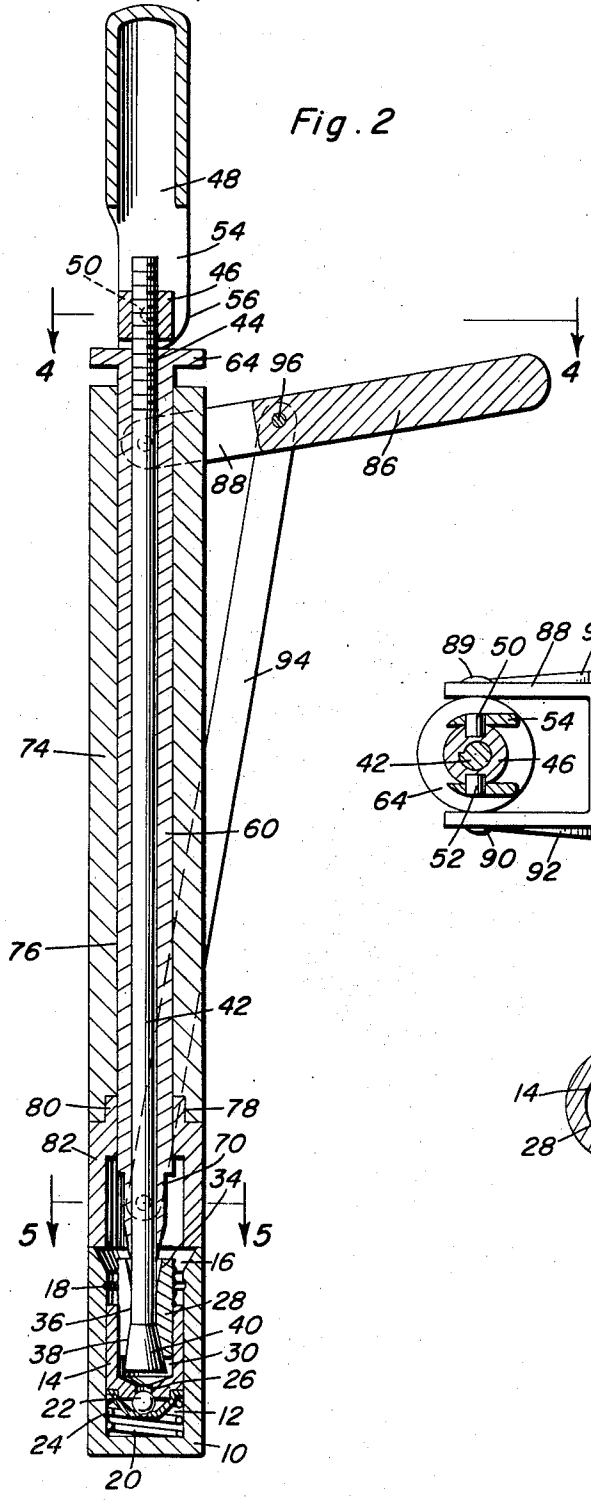


Fig. 6

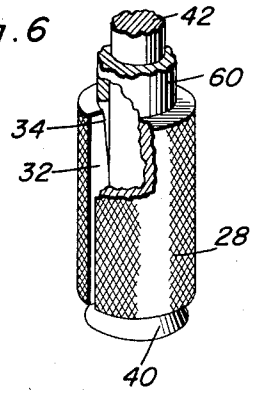


Fig. 4

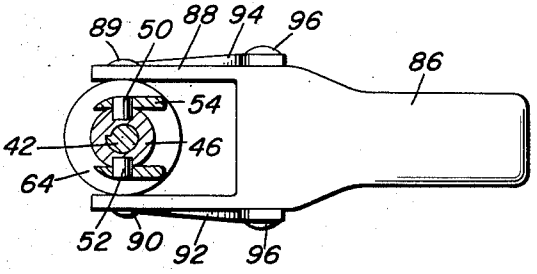
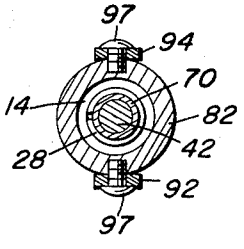


Fig. 5



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HYDRAULIC VALVE LIFTER PLUNGER PULLER

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3 Claims. (Cl. 29—267)

This invention relates to tools for extracting the plunger from hydraulic valve lifter bodies.

An object of the present invention is to provide an improved tool for extracting the plunger from a valve lifter body with a minimum of effort and without causing material injury to the plunger so that it may be reused.

When a hydraulic valve lifter of the type presently used in automotive vehicle engines requires servicing or repair, it is necessary to remove the plunger therefrom. Inasmuch as the plunger is mounted in the body of the valve lifter with a very close tolerance, it is difficult to remove the plunger. Moreover the valve lifters are not readily accessible to the mechanic in some types of engines. It is a primary object of the present invention to provide a valve lifter plunger extraction tool which functions to remove the plunger without injuring it and which accomplishes the job with a minimum of effort all of the controls for the tool being at the upper, outer end thereof.

A further object of the invention is to provide a practical device for removing valve lifter plungers, this device being constructed in such a way that it does the job effectively and safely.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of the tool which embodies the principles of the invention;

Figure 2 is a longitudinal sectional view of the tool of Figure 1, showing the same after it has been inserted in the plunger of a valve lifter;

Figure 3 is a longitudinal sectional view of the valve lifter plunger extractor while it is being used to extract the plunger from the valve lifter body;

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 2;

Figure 5 is a transverse sectional view taken on the line 5—5 of Figure 2; and

Figure 6 is a fragmentary perspective view of the extractor.

One of the very common types of valve lifters presently found in automotive, internal combustion engines is seen in Figures 3 and 4. It includes a cylindrical valve lifter body 10 in the bore 12 of which there is a cylindrical plunger 14. The plunger outer surface fits the bore walls with a close tolerance. The upper end of the body 10 is tapered as at 16 and has a groove 18 near the taper to accommodate the locking ring that holds the cap in place. In Figures 2 and 3 the valve lifter is shown without the locking ring and cap, these two parts of the valve lifter having been removed. However, the other parts are present, including the valve lifter spring 20, ball check 22 and retainer 24 for the ball. This ball check coacts with the orifice 26 in the lower wall of the plunger 14 for valving the same in the functioning of the valve lifter.

An extractor 28 is insertable in the bore 30 of plunger 14. This extractor consists of a sleeve having a knurled or scored outer surface which is adapted to engage the inner surface of the plunger 14. A longitudinal slot 32 is formed in the wall of the sleeve 28 so that the extractor is capable of being spread. After spreading, the extractor returns due to the inherent resiliency of the metal from which the extractor is made. There is an upper taper 34 in the bore 36 of extractor 28, together with a lower taper 38 at the lower end of the extractor. These tapers are generally in the shape of a frustum of a cone in order that the similarly shaped head 40 on extractor rod 42 may seat on the wall of the taper 38.

Extractor 42 consists of a rod having the enlargement at one end which constitutes head 40 and having threads 44 at the opposite end. A nut 46 is threaded on threads 44 and has an operating handle 48 connected therewith. The connection is made by trunnions 50 and 52 carried in aligned passages formed in the nut 46. Handle 48 has a yoke 54 at one end, the sides of which accommodate trunnions 50 and 52. One edge 56 of each of the sides 54 is curved and functions as a cam.

A sleeve 60 is placed over the extractor rod 42, the latter having a seat 64 at its upper end on which the cams 56 are movable. The lower end of the sleeve 60 is reduced as at 70 in order to provide ample clearance in the operation thereof. The extreme end of sleeve 60 is adapted to come to rest upon the upper surface of extractor 28 (Figure 6) in order to prevent the sleeve 60 from moving with respect to the spreader 28.

A housing 74 has sleeve 60 inserted in the cylindrical bore 76 thereof. The lower end of bore 76 is counterbored as at 78 to accommodate the reduced extension 80 of collar 82. The lower edge of collar 82 is adapted to seat upon the upper surface of the hydraulic valve lifter body 10 while housing 74 is elevated. This is accomplished by having a lever 86 pivoted at one end to the housing 74. The pivotal connection is made by utilizing a yoke 88, to the sides of which there are trunnions 89 and 90, the latter being pivoted in aligned openings formed in the housing 74. Links 92 and 94 are pivoted to the lever 86 between the ends thereof and to the collar 82. Upper pivots 96 are used to connect the links to the lever 86, while lower pivot pins 97 are used to connect the lower ends of the links to the collar 82.

In operation the extractor 28 is inserted in the bore 30 of the plunger 14. This extractor has a bore 36 which is tapered at both ends so that when the extractor is spread it will spread evenly and will not distort so as to apply undue stresses to the plunger 14. This is accomplished by the weakening of the top part of the spreader through the removal of the metal thereof in order to form the upper bevel 34. Then handle 48 is rotated thereby rotating nut 46 on the threaded end of extractor rod 42. This pulls the head 40 into the taper 38 of the spreader 28 and forces its knurled surface 28 against the bore 30 of plunger 14. Final spreading takes place by rotating handle 48 about the axes of trunnions 50 and 52 thereby bringing the cam surfaces 56 upon the top surfaces of the seat 64 and pulling extractor rod 42 axially with respect to its supporting sleeve 60. This further spreads the spreader by pulling head 40 into the tapered bore thereof.

With collar 82 seated upon the upper end of the hydraulic valve lifter body 10, application of a force to lever 86 will cause links 92 and 94 to exert a downward force to be applied to the collar 82. At the same time the reaction of this force is applied to housing 74, but the reaction is in the opposite direction. This reaction force lifts housing 74 and with it, the sleeve 60 whose seat 64 contacts the upper end of housing 74. The lifting of the sleeve 60 causes the extraction rod 42 to be lifted inas-

much as the handle **48** prevents relative axial movement of the extraction rod **42** and its sleeve **60**. Therefore, the valve lifter plunger is removed from the valve lifter body in this way.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. For use with a valve lifter body provided with a plunger having a bore, a tool for extracting the plunger, said tool comprising a housing, a collar, a linkage pivotally connected to said collar, a lever to which said linkage is connected, said lever being pivoted to said housing so that upon manipulation of said lever said collar is moved with respect to said housing, a sleeve in said housing, an extractor rod slidable in said sleeve, said rod having a head, a spreader on said head, means for axially moving said extractor rod to move said head into said spreader to expand the spreader, said spreader having an outer surface adapted to fit against the bore of said plunger and said collar adapted to rest on the body of the valve lifter so that when said lever is manipulated, said housing and collar are spread with respect to each other to thereby pull said sleeve, rod and extractor outwardly of the body whereby the plunger is removed.

2. For use with a valve lifter body provided with a plunger having a bore, a tool for extracting the plunger, said tool comprising a housing, a collar, a linkage pivotally connected to said collar, a lever to which said linkage is connected, said lever being pivoted to said housing so that upon manipulation of said lever said collar is moved with respect to said housing, a sleeve in said housing, an extractor rod slidable in said sleeve, said rod having a head, a spreader on said head and adapted to be expanded by said head, said spreader having an outer surface adapted to fit against the bore of said plunger and

said collar adapted to rest on the body of the valve lifter so that when said lever is manipulated, said housing and collar are spread with respect to each other to thereby pull said sleeve, rod and extractor outwardly of the body whereby the plunger is removed, a nut on said rod, means to axially move said rod including a handle connected to said nut for rotating said nut, and a seat connected to said sleeve on which said handle bears so that said rod may be adjusted with respect to said sleeve.

3. For use with a valve lifter body provided with a plunger having a bore, a tool for extracting the plunger, said tool comprising a housing, a collar, a linkage pivotally connected to said collar, a lever to which said linkage is connected, said lever being pivoted to said housing so that upon manipulation of said lever said collar is moved with respect to said housing, a sleeve in said housing, an extractor rod slidable in said sleeve, said rod having a head, a spreader on said head and adapted to be expanded by said head, said spreader having an outer surface adapted to fit against the bore of said plunger and said collar adapted to rest on the body of the valve lifter so that when said lever is manipulated, said housing and collar are spread with respect to each other to thereby pull said sleeve, rod and extractor outwardly of the body whereby the plunger is removed, a nut on said rod, means to axially move said rod including a handle connected to said nut for rotating said nut, a seat connected to said sleeve on which said handle bears so that said rod may be adjusted with respect to said sleeve, the lower end of said sleeve contacting said extractor so that upon adjustment of said rod the head thereof is displaced with respect to the bore of said extractor.

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