

United States Patent

McFarland et al.

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[54] CLAMPING TOOL

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[51] Int. Cl. **B25b 27/14, A47b 13/06**

[58] Field of Search 29/272, 278, 280, 282; 294/19, 294/29, 31, 93-95; 269/47, 48.1, 233, 157; 81/72

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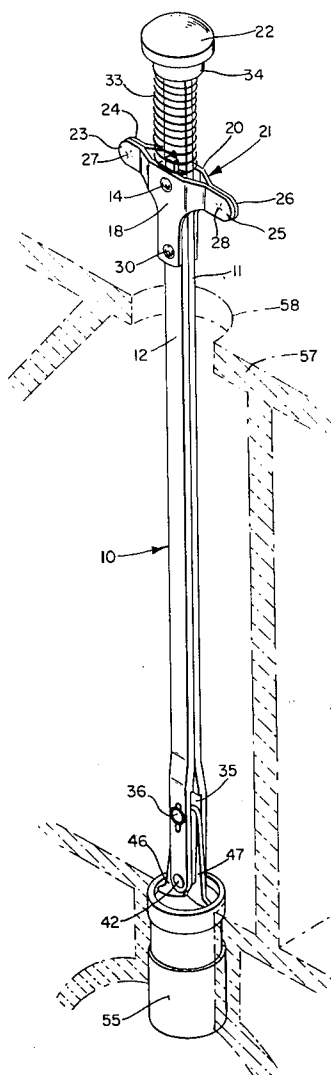
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[57] ABSTRACT

A tool is provided, that is adapted to be engaged in the hand of the user, and which has a depressable portion, which actuates jaws adapted for internal engagement of a member. The tool is particularly useful for reaching into automobile engines and the like, and working loose and removing valve tappets, and then lifting the tappets up through the engine, with the jaws or grips of the tool in engagement internally of the tappets.

4 Claims, 4 Drawing Figures



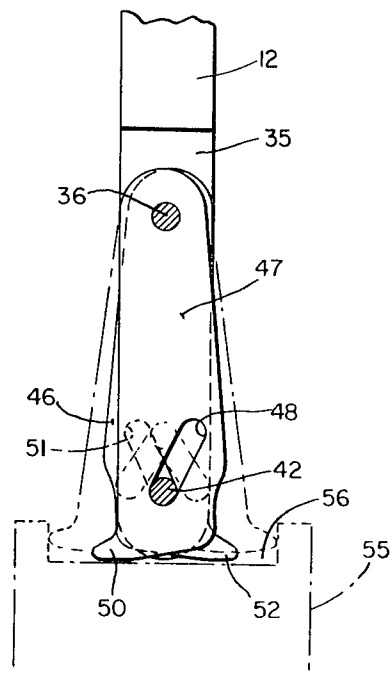
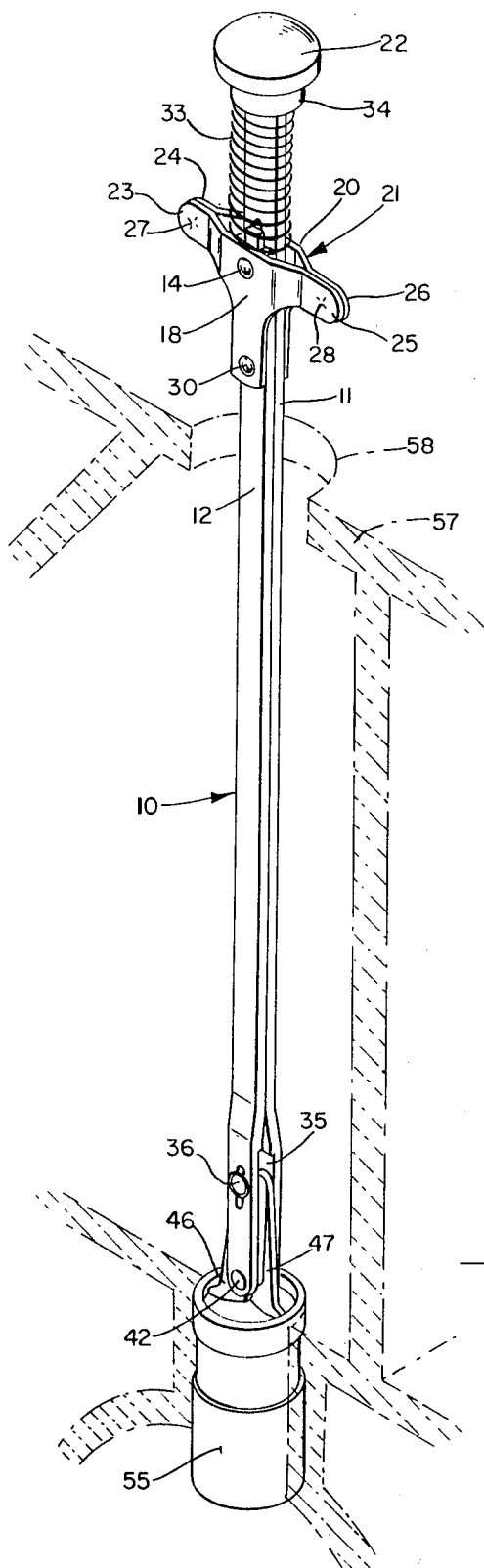


Fig. 4

Fig. 1

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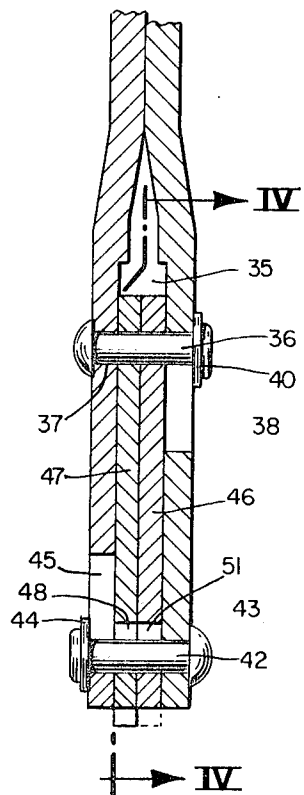
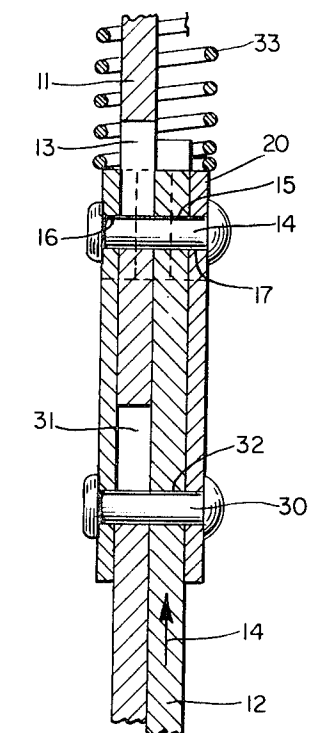


Fig. 3

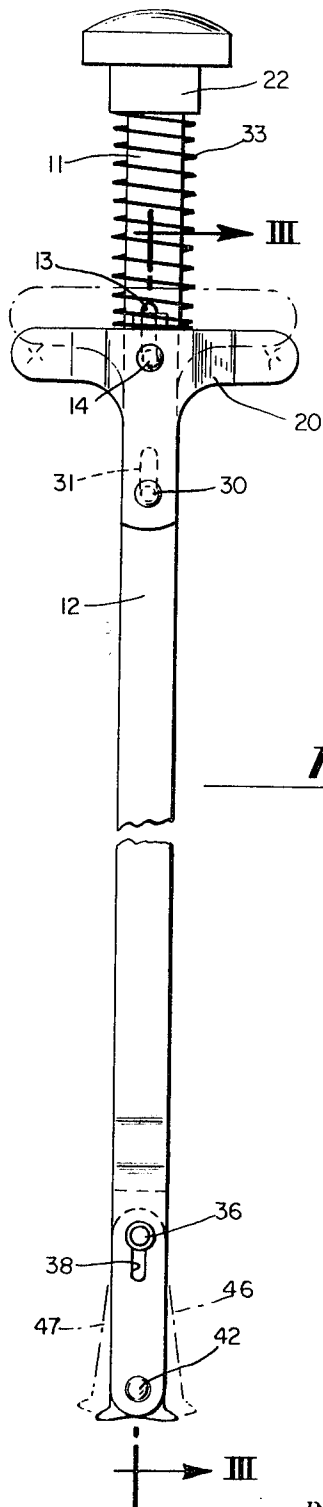


Fig. 2

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BACKGROUND OF THE INVENTION

In many industries, particularly in the automotive industry, it periodically becomes necessary to disassemble engines. In the course of such disassembly, it is often desirable to remove hydraulic valve lifters, or hydraulic tappets, in that such often become covered with varnish or foreign material and tend to stick or become secured within their receiving bores, and in such a manner that the cams that are adapted to lift the valves cannot do so in the intended manner. Thus, if the tappet is prevented by means of varnish or other foreign material from moving throughout its full stroke, the valve rods that are driven by the tappets also fail to traverse their full stroke, and accordingly the valve opening and closing does not function in the intended manner. The result is generally engine malfunction.

Because of the location of valve lifters and tappets, their removal has in the past been an expensive and time consuming job. With increased labor costs, in many instances removal for cleaning and replacement purposes of lifters and tappets has been economically prohibitive.

Some tools have been developed that have been effective to a very limited degree in assisting the removal of valve lifters and tappets, but for the most part, such tools have not functioned in such a manner as to provide sufficient gripping capabilities when operated from an area remote with respect to the engine, in that it has been necessary to insert such tools into the engine for gripping of the tappets at a location substantially removed from the point at which force is applied to the tool. Also, besides the generally limited overall tool design of prior art devices, generally they require both hands for actuation, thereby limiting the freedom and working conditions of the mechanic.

SUMMARY OF THE INVENTION

The present invention is directed toward providing a tool that may be used by a mechanic, for the purpose of loosening and removing valve lifters and tappets from an engine, with the tool being adapted for insertion into the engine with or without removal of the manifold, and with the tool further being adapted for use and operation by one hand of the mechanic, but yet being adapted to exert sufficient forces on the components being removed for loosening of the same. Also, the tool is generally elongated for access to the components being removed.

Accordingly, it is a primary object of this invention to provide an elongated tool that is adapted to exert sufficient pressures for removal of machine components by gripping the same internally and exerting sufficient pressure thereon for ease of removal.

It is a further object of this invention to provide a tool of the type described immediately above, which may be applied for removal of valve lifters and tappets, and which may be utilized by a single hand of a mechanic or the like.

It is a further object of this invention to provide a tool utilizing a spring-biased camming mechanism for exertion of sufficient forces to firmly grip components desired to be loosened and/or removed.

Other objects and advantages of the present invention will be readily apparent to one skilled in the art from a reading of the following brief description of the drawing figures, the detailed description of the preferred embodiment, and the appended claims. While the removal of valve lifters and tappets is demonstrated throughout this application as being a preferred use of the invention described herein, it will be recognized that this invention will have utility in other environments also, wherein similar types of removal difficulties are presented, to which the tool of this invention is readily adapted.

FIG. 1 is a top perspective view of the tool of this invention, being illustrated in a manner in which the same is used to reach into an engine, to engage and remove a tappet therefrom, with portions of an engine being illustrated broken away in phantom, for presentation of the manner of use of the tool of this invention.

FIG. 2 is a side elevational view of the tool of this invention, with the grip and clamping portions thereof being illustrated in both full lines and phantom positions, for illustrations of both relaxed and clamping positions of the tool, respectively.

FIG. 3 is an enlarged fragmentary longitudinal sectional view of the tool of this invention, taken generally along the line III—III of FIG. 2, and wherein the sliding arrangements of the various components are more clearly illustrated.

FIG. 4 is an enlarged fragmentary sectional view of a portion of the tool of this invention, taken generally along the line IV—IV of FIG. 3, and wherein the clamping engagement of the clamping elements of the tool of this invention is clearly illustrated, in the released and clamping positions of the elements illustrated respectively in full line and phantom positions, and wherein a portion of a valve tappet is illustrated in phantom, for the purpose of setting the environment of the tool of this invention.

Referring now to the drawings in detail, reference is first made to FIG. 1, wherein there is illustrated the tool of this invention, generally designated by the numeral 10. The tool 10 includes a first longitudinal arm or member 11 and a second longitudinal arm or member 12, disposed against one another, and slidable relative to each other in accordance with the operation of the tool 10. The member 11 includes a slotted hole 13 at an upper-most end thereof, as viewed in FIG. 3, with the rivet 14 also passing through a hole 15 in the upper-most end of the member 12, in connecting relation, with the rivet 14 also passing through appropriate holes 16 and 17, respectively, in opposite sides 18 and 20, respectively, of a finger grip 21.

A palm-engaging knob 22 is provided, in press-fit relation, or otherwise suitably adhered or secured to the upper-most end of the member 11.

The opposite sides 18 and 20 of the grip 21 have laterally offset portions 23, 24, 25 and 26, which are brought together as illustrated in FIG. 1, and are welded or otherwise secured together, as at 27 and 28, by means of spot welds or the like, with adjacent pairs 23, 24, and 25, 26 of the laterally off-set portions forming finger-gripping ears on opposite sides of the tool 10 for manual engagement by the hand of a user.

Another rivet 30 is secured at the lower-most ends of the grip members 18 and 20, also passing through a slotted hole 31 in the member 11, and through a generally circular hole 32 in the member 12, in a manner generally similar to the arrangement described above for the rivet 14, such that, the grip 21 is securely held for sliding engagement relative to the member 11, and for, upon engagement by the fingers of a user, facilitating the sliding engagement of the arm or member 12, relative to the member 11, an amount determined by the length of the slotted holes 13 and 31.

A helical wound spring 33 is provided, with its lower end as viewed in FIG. 1, bottomed on the upper edges of the grip sides 18 and 20, and with its upper end in engagement against a shoulder 34 of the knob 22.

The lower-most ends of the members 11 and 12, are off-set from each other, to define a recess 35 therebetween, as viewed in FIGS. 1 and 3. A rivet 36, or like connecting member extends through a hole 37 in the member 11, passes across the recess 35, and extends through a slotted hole 38 in the off-set portion of the member 12, being secured in a suitable manner in such disposition by a washer 40, or the like, for sliding engagement of the member 12 relative to the rivet 36, when the member 12 is moved longitudinally in the direction of the arrow 41, relative to the member 11.

Another rivet or like connecting member 42, is provided at the lower-most end of the arm or member 12, passing through a circular hole or the like 43 therein, across the recess 35, and being connected with a suitable washer 44, through a slotted hole 45 in the member 11, for secure connection of the rivet 42 to the lower-most end of the member 12, and for sliding engagement of the rivet 42 within the slotted hole 45 of the member 11.

Thus, the rivet 37 is fixed relative to the first longitudinal member 11, but the rivet 42 is slidable relative to the longitudinal member 11.

A pair of clamping elements 46 and 47 are disposed within the recess 35, these elements 46 and 47 being substantially identical in construction. Both members 46 and 47 are pivotally mounted at their upper-most ends, as viewed in the drawings, to be pivotally rotatable about the rivet 36.

The clamping element 47, is best illustrated in FIG. 4, as including a slotted hole 48, obliquely disposed relative to the longitudinal disposition of the members 11 and 12, and relative to a plane transverse to a general longitudinal disposition of such members 11 and 12, such slotted hole 48 thereby extending at an upwardly directed angle as viewed in FIG. 4, also extending somewhat rightward, as viewed in FIG. 4. The element 47 is also provided with a leftwardly directed lip 50, as viewed in FIG. 4. The rivet 42 passes through the slotted hole 48, in the manner illustrated in FIG. 4.

The element 46 contains a slotted hole 51, through which the rivet 42 also passes. A lip 52 protrudes in a rightward direction at the lower-most end of the element 46, as viewed in FIG. 4.

Upon engagement of the grip 21, and movement of the same upwardly, against the downward biasing action of the resilient spring 33, and upon upward movement of the longitudinal member 12, relative to the member 11, the rivet is also moved upwardly, and becomes a drive member which engages within the slotted holes 48 and 51 of the respective elements 47 and 46 at a location closer to the lips 50 and 52 than to the rivet 36, as illustrated in FIG. 4, and "cams" the elements 46 and 47 between the full line position illustrated in FIGS. 2 and 4, to the phantom line positions illustrated in FIGS. 2 and 4, such that the lips 52 and 50 of the elements 46 and 47 respectively, are driven laterally outwardly, away from each other, as the elements 46 and 47 are caused by the cam-like action of the rivet 42 within the camming slots 47 and 51 to pivot the elements 46 and 47 about the rivet 36.

As the elements 46 and 47 are pivoted outwardly, the lips 52 and 50, respectively thereof, are adapted to internally engage a member, such as the valve tappet 55, by clampingly engaging at opposite side portions of a blind bore or the like 56 thereof, as viewed in FIGS. 1 and 4 and thus accomplish the force-applying objective set forth in the objects above.

The tool 10 of this invention may thus be inserted into an engine 57 or the like, through a valve rod opening 58, for removal of valve tappets 55, with or without removal of the engine manifold as desired. In this manner, by spreading the elements 46 and 47 of the tool, under pressure applied by the hand of a mechanic or the like with his fingers engaging the grip 21 and with his palm over the knob 22, the desired pressure may be applied through the element lips 52 and 50, for twisting the tappets 55 backwardly and forwardly, with a rotary motion, or by pulling the same upwardly and downwardly to loosen the tappets 55 for removal of the same.

It will be apparent from the foregoing, that various modifications may be made in the details of construction, as well as in the areas of use of the tool 10 of this invention, all within the spirit and scope of the invention as recited in the appended claims.

We claim:

1. A tool for internally engaging machine elements and the like in clamping relation from a location remote from the location of tool actuation, comprising a first longitudinal elongated member, a second longitudinal elongated member disposed for longitudinal movement relative to said first member, manual gripping means on said second member for manual engagement for facilitating its longitudinal movement, connecting means carried by said first member, two clamping elements, each mounted for pivotally sliding on said connecting means, lips on said each of said clamping elements, and cam means on each of said elements, cam drive means carried by said second member at a location remote from said manual gripping means and located closer to said lips than to said connecting means to provide means for maximizing forces applied through said clamping element lips for engaging said cam means and driving said elements pivotally relative to each other, with their respective lips laterally away from each other, wherein said first and second members are spaced apart relative to each other at their ends closest to said clamping elements, with said clamping elements being disposed in sandwiched relation therebetween.

2. The tool of claim 1, wherein said cam means comprise slotted holes disposed obliquely relative to the longitudinal disposition of said members and relative to the lateral direction of movement of said lips, and wherein said drive means comprises a pin means carried by said second member and disposed through each of said slotted holes.

3. The tool of claim 1, wherein said gripping means is spring-biased toward said elements by a spring and is movable in opposition to said spring for relative lateral outward movement of said clamping means to article-engaging position.

4. The tool of claim 1, wherein a palm-engaging knob is disposed on an end of said first member remote from from said clamping means.

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