Nov. 30, 1926. 1,608,883

LE ROY E. JUSTUS

VALVE TOOL

Filed June 8, 1926

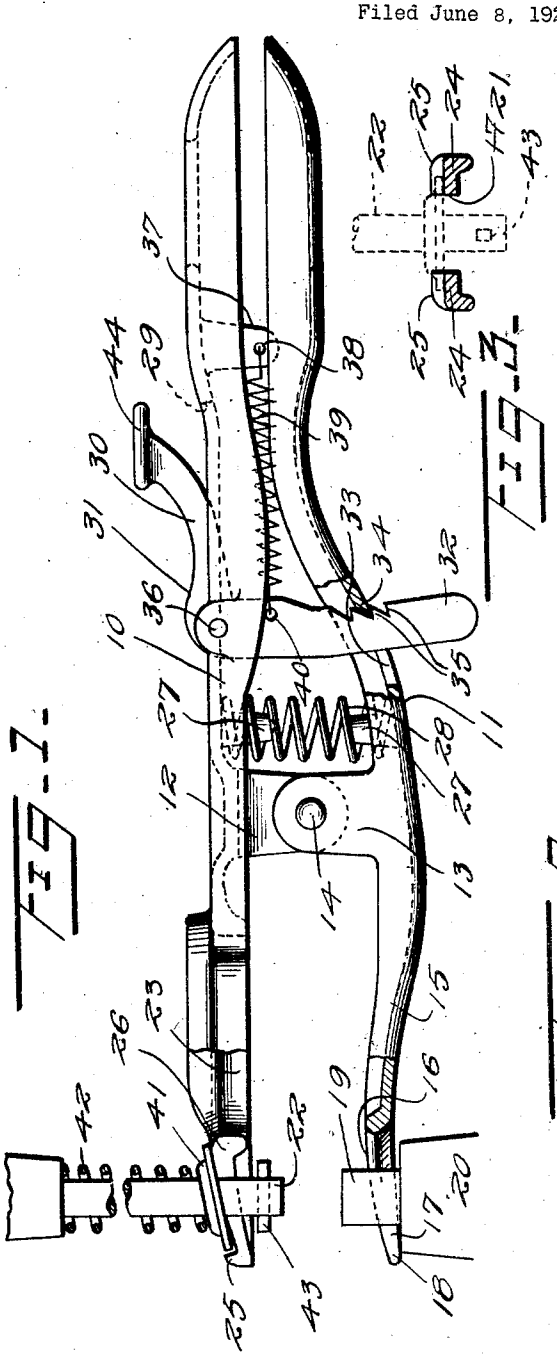


FIG. 1.

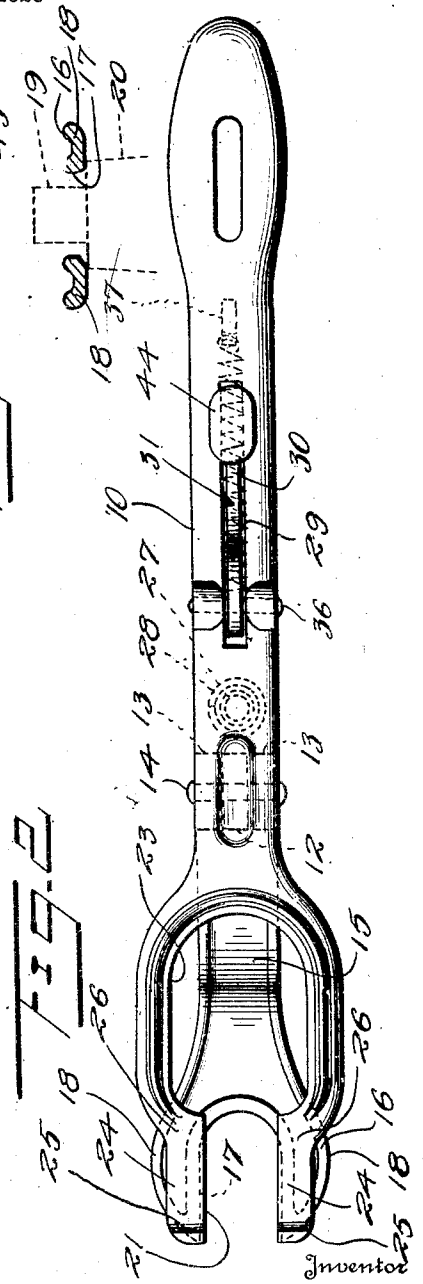


FIG. 2.

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VALVE TOOL.

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This invention relates to valve tools, and more particularly to a device for compressing and holding compressed the springs of the poppet valves of internal combustion engines while removing the retaining device, so that the valve proper may be removed.

An important object of the invention is to provide a device so constructed that accidental slipping of the spring is effectually prevented and at the same time means are provided whereby the spring may be removed when desired.

A further object of the invention is to provide a device of this character so constructed that while holding the spring, it affords ready access to and a clear view of the retaining device, whereby the spring seat is maintained in proper position upon the stem of the valve.

A still further object of the invention is to provide a device of this character so constructed that it provides ample clearance to enable access to the retaining device.

These and other objects I attain by the construction shown in the accompanying drawing, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Fig. 1 is a side elevation of a tool constructed in accordance with my invention showing the same in the spring compressing position;

Fig. 2 is a plan view of the tool; and

Fig. 3 is a vertical sectional view taken through the jaw ends of the tool.

Referring now more particularly to the drawing, the numerals 10 and 11 designate upper and lower levers respectively, the upper lever being formed intermediate its ends with a downwardly projecting lug 12 and the lower lever with upwardly projecting transversely spaced ears 13 between which the lower end of the lug 12 may be arranged for the reception of a pivot 14 for connecting the levers. From the ears 13, the lower lever curves upwardly at 15 toward one end thereof and in the outer end of this curved portion the upper surface of the lever inclines downwardly, as at 16. At its terminal, this end of the lever is forked at 17 to provide arms 18 receiving therebetween the push rod 19 of the poppet valve mechanism of an internal combustion engine, while the arms 18 rest upon the push rod guide 20. The corresponding end of the upper jaw is slotted at its extremity, as indicated at 21, to provide a space for the passage of the stem 22 of the push rod. Inwardly of the slot 21, this end of the upper lever is formed with a longitudinally elongated opening 23 of greater width than the slot and with which the inner end of the slot communicates. The upper surfaces of the extremity of the arms 24 formed by slotting the end of the lever are provided with lugs 25. From these lugs toward the pivot of the lever, the arms are gradually thickened at 26, for a purpose presently to appear.

Beyond the pivotal connection of the levers from the jaw ends thereof, adjacent faces of the levers are provided with opposing lugs 27 extending into the opposite ends of a spring 28, the function of which is to urge the jaw ends of the levers into engagement with one another. The opposite ends of the levers are formed as handles, and the upper lever is provided with a longitudinally extending slot 29 for the reception of one arm 30 of a bell-crank lever 31. This bell-crank lever is pivoted to the upper lever and has its second arm 32 directed through a slot 33 formed in the lower lever and having its rear edge formed as a tooth 34 for selective engagement in any one of a series of notches 35 formed in the rear face of the arm 32. Rearwardly of the pivot 36 of the bell-crank, the under surface of the upper arm has formed thereon a lug 37 provided with an opening 38 in which is engaged one end of a spring 39, the opposite end of which is engaged through an opening 40 formed in the arm 32 of the bell-crank lever immediately below the under surface of the upper lever.

The spring 28, as hereinbefore stated, normally maintains the jaw ends of the tool in engaging relation, so that these jaw ends provide a taper or wedge formation for insertion between the spring seat 41 of the valve spring 42. When the tool is properly positioned and the lugs 25 are arranged at the rear face of this spring seat, the handle ends of the lever are forced together, compressing the spring 42 and elevating the spring seat 41 from the retaining element 43 (usually a pin). The large opening 23 permits this retaining element to be readily viewed and engaged for removal thereof and after the pin is removed, the valve, of course, may be bodily removed. At this time, the upper surface of the jaw end of

the spring tool will be arranged at an inclination to the axis of the spring, so that the spring and spring seat have a tendency to move toward the free end of the jaw of the upper lever. This movement is limited by the lugs 25, so that any accidental disengagement of the spring is avoided. When, however, it is desired to remove the spring, all that is necessary is that the outer end of the tool be bodily depressed, so that the spring may be drawn toward the opposite side from that in which it normally tends to move when it may be very readily removed. The latch provided by the bell-crank lever 31 and its engagement with the lower lever will, of course, maintain the jaws in adjusted position and at the same time may be very readily released by placing the thumb upon the thumb seat 44 formed upon the rear end of the arm 30 and depressing the same against the action of the spring 39. The arcuate curvature of the lower jaw provides between the upper and lower jaws sufficient space to permit ready access to the pin from beneath the upper jaw, if this is found necessary or desirable.

In the construction of the tool, any suitable material may be employed and this material reinforced by thickening at points where great strain is liable to occur.

Since the construction hereinbefore set forth is obviously capable of a certain range of change and modification without materially departing from the spirit of the invention, I do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

1. A tool for use in removing the spring seat retainers of the springs of poppet valves of internal combustion engines, comprising a pair of levers pivoted to one another at points intermediate the ends thereof, one end of one of said levers being slotted for the passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the spring of the valve, the outer ends of said arms being provided with lugs for engagement with the spring seat, the upper surfaces of said arms inclining downwardly toward said lugs.

2. A tool for use in removing the spring seat retainers of the springs of poppet valves of internal combustion engines, comprising a pair of levers pivoted to one another at points intermediate the ends thereof, one end of one of said levers being slotted for the passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the spring of the valve, the outer ends of said arms being provided with lugs for engagement with the spring seat, the upper surfaces of said arms inclining downwardly toward said lugs, said lever inwardly of said end and between said end and the pivot having a relatively large opening with which the inner end of the slot communicates.

3. A tool for use in removing the spring seat retainers of the springs of poppet valves of internal combustion engines, comprising a pair of levers pivoted to one another at points intermediate the ends thereof, one end of one of said levers being slotted for the passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the spring of the valve, the outer ends of said arms being provided with lugs for engagement with the spring seat, the upper surfaces of said arms inclining downwardly toward said lugs, a spring normally urging said end of the lever into engagement with the corresponding end of the other lever, and means for retaining said ends of the levers in spaced relation against the action of the spring.

4. A tool for use in removing the spring seat retainers of the springs of poppet valves of internal combustion engines, comprising a pair of levers pivoted to one another at points intermediate the ends thereof, one end of one of said levers being slotted for the passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the spring of the valve, the outer ends of said arms being provided with lugs for engagement with the spring seat, the upper surfaces of said arms inclining downwardly toward said lugs, a spring normally urging said end of the lever into engagement with the corresponding end of the other lever, and means for retaining said ends of the levers in spaced relation against the action of the spring including a bell-crank lever pivoted to the opposite end of the first-named lever, one arm of the bell-crank lever extending adjacent the second lever of the pair and having notches for coaction with a tooth carried by the second lever of the pair.

5. A tool for use in removing the spring seat retainers of the springs of poppet valves of internal combustion engines, comprising a pair of levers pivoted to one another at points intermediate the ends thereof, one end of one of said levers being slotted for the passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the spring of the valve, the outer ends of said arms being provided with lugs for engagement with the spring seat, the upper surfaces of said arms inclining downwardly toward said lugs, a spring normally urging said end of the lever into engagement with the corresponding end of the other lever, means for retaining said ends of the levers in spaced relation against the action of the spring including a bell-crank lever pivoted to the opposite end of the first-named lever, one arm of the bell-crank lever extending adjacent the

second lever of the pair and having notches for coaction with a tooth carried by the second lever of the pair, and a spring connecting the first lever of the pair and said arm of the bell-crank lever and constantly urging said arm in a direction for engagement with said tooth.

6. In a tool of the character described, a pair of levers one having intermediate its ends a lug and the other having intermediate its ends a pair of ears between which the end of the lug may be extended, a pivot extending through the lug and ears, one end of the first-named lever being slotted to permit passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the poppet valve, the corresponding end of the other lever being slotted for the passage of a tappet and to provide arms to rest upon the tappet guide, means normally urging said ends of the levers into engagement with one another, means for locking the levers with said ends in separated relation, the arms of the first-named lever being provided upon their extremities with upwardly facing lugs for engagement with the rim of the valve seat.

7. In a tool of the character described, a pair of levers one having intermediate its ends a lug and the other having intermediate its ends a pair of ears between which the end of the lug may be extended, a pivot extending through the lug and ears, one end of the first-named lever being slotted to permit passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the poppet valve, the corresponding end of the other lever being slotted for the passage of a tappet and to provide arms to rest upon the tappet guide, means normally urging said ends of the levers into engagement with one another, means for locking the levers with said ends in separated relation, the arms of the first-named lever being provided upon their extremities with upwardly facing lugs for engagement with the rim of the valve seat, the upper faces of said arms when the levers are locked in the last-named position inclining downwardly toward said lugs.

8. In a tool of the character described, a pair of levers one having intermediate its ends a lug and the other having intermediate its ends a pair of ears between which the end of the lug may be extended, a pivot extending through the lug and ears, one end of the first-named lever being slotted to permit passage of the valve stem of a poppet valve and to provide arms for engagement beneath the spring seat of the poppet valve, the corresponding end of the other lever being slotted for the passage of a tappet and to provide arms to rest upon the tappet guide, means normally urging said ends of the levers into engagement with one another, means for locking the levers with said ends in separated relation, the arms of the first-named lever being provided upon their extremities with upwardly facing lugs for engagement with the rim of the valve seat, the upper faces of said arms when the levers are locked in the last-named position inclining downwardly toward said lugs, the first-named lever inwardly of the ends thereof having formed therein an opening for the passage of the fingers, the inner end of said slot communicating with said opening.

In testimony whereof I hereunto affix my signature.

LE ROY E. JUSTUS.