Oct. 1, 1929. H. RAYMOND 1,730,092

VALVE LIFTER

Filed Aug. 9, 1928

Fig. 1.

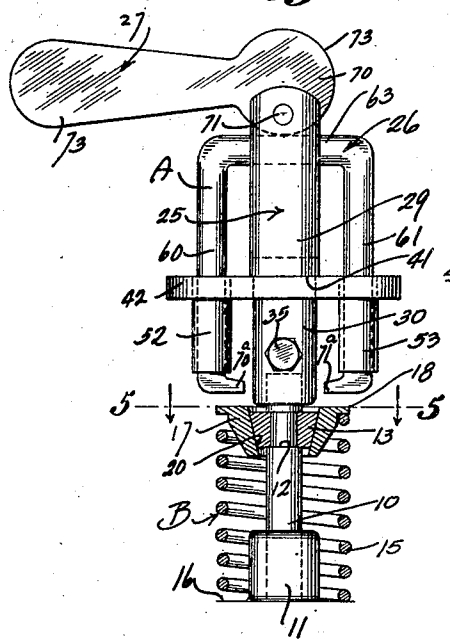


Fig. 2.

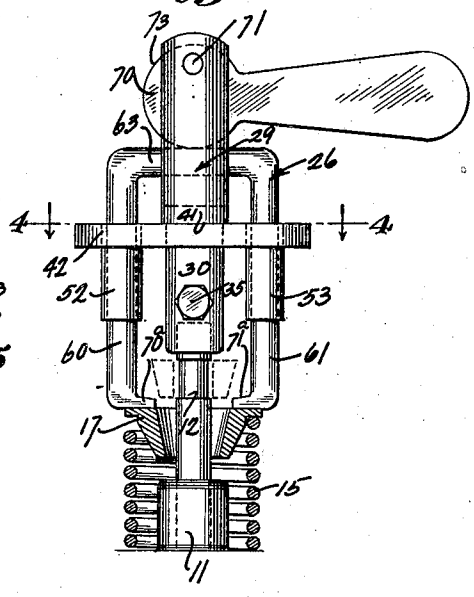


Fig. 3.

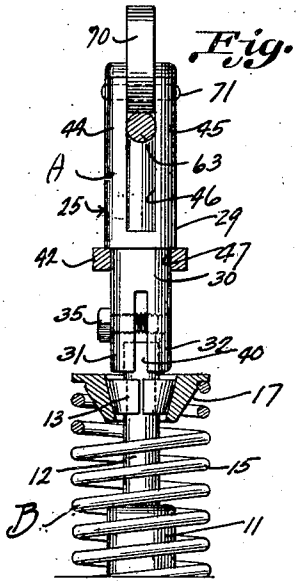


Fig. 4.

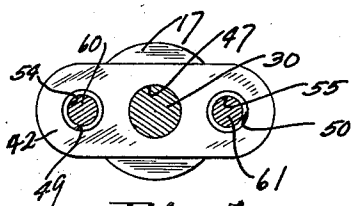
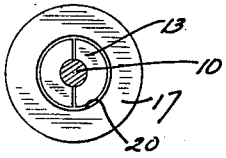


Fig. 5.



Inventor

Henry Raymond

By Lancaster and Allwine

Attorneys

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UNITED STATES PATENT OFFICE

HENRY RAYMOND, OF PRATT CITY, ALABAMA

VALVE LIFTER

Application filed August 9, 1928. Serial No. 298,546.

This invention relates to improvements in valve lifters.

The primary object of this invention is the provision of a relatively simple device, which may be attached with facility to the valve parts of internal combustion engines, especially those using the overhead valve, in order that the springs may be compressed to release the keys which hold the valve spring in place, and thereby facilitate detachment of the valve spring; the invention being attachable entirely above the spring cap at the top of the valve mechanism, and operable thereabove without attachment to the spring or beneath the spring.

A further object of this invention is the provision of an improved valve lifter having an improved arrangement for transmitting a balance force upon the spring with relation to the valve rod, so as to permit an efficient compression of the spring and removal of the key which detachably holds the same compressed.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views.

Figure 1 is a side elevation of the improved valve lifter, showing its relative attachment with respect to an internal combustion engine valve, in position prior to spring compression.

Figure 2 shows an arrangement of parts similar to Figure 1, but with the valve lifter in an operating spring compressing relation to facilitate detachment of the key which holds the same compressed.

Figure 3 is a view of the parts of Figure 1, taken at 90° with respect thereto.

Figures 4 and 5 are sectional views taken substantially on their respective lines in Figures 1 and 2 of the drawing.

In the drawing, wherein for the purpose of illustration is shown but a preferred embodiment of the invention, the letter A may generally designate the improved valve lifter, which is adapted to cooperate with a valve mechanism B of the internal combustion engine type.

The valve mechanism B may be of various types. In the embodiment shown, the same comprises a valve rod 10 slidably supported in a bushing 11, and at the upper end thereof having an annular groove 12, wherein a split ring-shaped key 13 is adapted to fit; said key being of frusto-conical formation and having an outer upwardly tapering periphery.

A spring 15 is under compression between a surface 16 of the engine housing, and at its upper end receives a cap or abutment 17, of ring-shaped formation, which has an annular flange 18 against which the top or outer end of the spring 15 abuts. The spring abutment or cap 17 is centrally provided with a tapered passageway 20, adapted to seat on the tapered periphery of the key 13, in a relation which is perfectly apparent, in order to hold the spring 15 compressed.

It is well understood that in order to remove the valve it is necessary to press downwardly upon the spring abutment 17, to move it away from its key 13, and the key 13 may then be detached, inasmuch as it is either of the split type, or the multiple type, and retains its seat in the groove 12 incident to spring compression. Of course, when the key 13 is removed, the spring 15 may be readily released, in a manner which is perfectly apparent.

Referring to the valve lifter A, the same comprises an attaching frame 25; runner 26; and means 27 carried by the frame 25 and operating on the runner 26 for causing spring compression.

Referring to the frame 25, the same preferably consists of a standard-like body 29, of cylindrical formation, including a lower reduced shank 30, which is split longitudinally inwardly from its lower end to provide jaws 31 and 32 which may be relatively contracted or extended by means of a bolt or screw 35 which is carried by the jaw 31 and threads into the jaw 32, as shown in Figure 3 of the drawing. These jaws 31 and 32 are concavely recessed at their facing sides at the lower ends thereof, for receiving the upper cylindrical end portion 40 of the valve rod 12, as shown

in Figure 3 of the drawing. This portion 40 ordinarily extends above the location at which the key 13 is assembled on the valve rod, as is well known. The upper portion of the standard 29 at its juncture with the reduced shank 30 has a shoulder 41, against which the flat body 42 of the frame 25 engages in a manner which will be subsequently described. The upper end of the body 29 is bifurcated to provide the upstanding segmental portions 44 and 45, defining a slot 46 open at the top of the frame standard 29, within which the runner 26 operates, below the cam means 27.

The frame 29 furthermore includes the disc-like body 42, of elongated formation, provided with a central opening between its ends, designated at 47 in Figure 4 of the drawing and also in Figure 3, in which the shank 30 of the frame 29 is preferably shrunk, to immovably position the body 42 upon the shank 30 at the shoulder 41. At opposite sides of the opening 47, the flat plate or body 42 is provided with openings 49 and 50, which respectively receive therein, in an immovable or preferably forced fitting relation, the upper ends of guide sleeves or bushings 52 and 53, which depend parallel with and at diametrically opposite sides of the shank 30. The bushings or bearing sleeves 52 and 53 are hollow and cylindrical, and provided with passageways 54 and 55 respectively, which slidably receive the arms 60 and 61 of the inverted U-shaped runner 26, in a snug sliding relation therein.

The runner 26 has the arms 60 and 61 connected at their upper ends by a right angled cross portion 63, which slides in the slot 46, as is shown in the drawing, in a rather snug sliding relation therein, so as not to permit too much loose play.

At their lower ends the arms 60 and 61 have inwardly extending fingers 70^a and 71^a respectively; the lower surfaces of which are flat and adapted to rest or engage upon the spring abutment or cap 17, at diametrically opposed sides of the valve rod.

The cam means 27 preferably comprises a circular disc-shaped cam head 70, operating in the upper end of the slot 46, and pivoted to the portions 44 and 45 of the frame by a pin 71 which is supported at the upper ends of the supporting portions 44 and 45; extending across the slot 46. The pin 71 of course eccentrically pivots the head 70, and head 70 is provided with a laterally extending handle 73 in the same plane as the head 70, and adapted to move the head 70 on its pivot pin 71, so that the outer periphery 73 acts with a cam action upon the top of the cross bar 63, to feed the runner 26 along the frame for the purposes of spring release or compression.

The operation of the invention from the foregoing will be apparent. An important feature of the invention is the fact that the standard 30 is longitudinally arranged axially with the valve rod 10, and with the legs 60 and 61 of the runner guided in a definite relation for engagement with the spring cap at diametrically opposed points. Upon movement of the cam the eccentrically positioned periphery thereof moves into engagement with the cross bar 63, and upon movement of the cam means 27 from the position illustrated in Figure 1, to the position illustrated in Figure 2, the runner 26 will be moved toward the spring 15, and force the cap of the spring away from the retaining washer 13, in order to permit release of the latter and detachment of the spring mechanism from the valve assembly.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a valve lifter the combination of a frame, means to attach the frame to the stem of a valve, a member movable on the frame in a position to engage the abutment of the valve spring, and cam means operatively connected with the frame for operating the movable member and compress said spring.

2. In a device to facilitate the removal of valves the combination of a frame, means on the frame to clamp upon the valve stem, a member slidable upon the frame for engagement with a valve abutment, and a manually operated cam eccentrically pivoted upon the frame for cooperative association with the member to move the latter against a spring abutment and compress the spring for valve removal purposes.

3. In a valve removing tool the combination of an elongated frame body, means on the end of the frame body for clamping the frame body in axial alignment upon a valve stem, a cam at the opposite end of said body operatively connected therewith, and a movable member on the body in cooperative association with said cam.

4. In a device of the class described the combination of an elongated body having valve stem clamping means at an end thereof to clamp the body in axial alignment with a valve stem, a plurality of relatively connected arms slidably carried by said body in parallelism with the body for engagement at similar ends with a valve spring abutment, and means associated with the body for moving said arms in spring compressing relation against a spring abutment.

5. In a device of the class described a frame, means on the frame to clamp upon an end of a valve stem, said frame having means thereon to engage a spring cap at a plurality of points equi-distant in degree about the valve stem, and means on the frame for mov-

ing the last mentioned means against a spring abutment.

6. In a valve removing tool the combination of an elongated frame standard, means at an end of the frame standard for clamping to the outer end of a valve stem, laterally extending guides on the frame, a pair of arms having a cross connection, the arms being slidably carried in the laterally extending guides for movement in parallelism with the standard of the frame, and the cross connection of said arms having a slidable guided connection upon the standard of the frame, and means carried by the standard of the frame for operating on the cross connection to move said arms longitudinally into spring compressing engagement with a spring abutment.

7. In a device of the class described an elongated standard-like body, means on an end of the body for clamping the body to an end of a valve stem in axially aligning relation with the valve stem, a runner operable along the standard-like body having diametrically opposed fingers on the same for engagement with a spring abutment, and means on the standard of the body for operating the runner in a spring compressing relation.

8. In a device of the class described an elongated standard-like body, means on an end of the body for clamping the body to an end of a valve stem in axially aligning relation with the valve stem, a runner operable along the standard-like body having diametrically opposed fingers on the same for engagement with a spring abutment, means on the standard of the body for operating the runnner in a spring compressing relation, said means comprising a cam eccentrically pivoted on the standard of the body for engagement with said runner.

9. In a device of the class described an elongated standard-like body, means on an end of the body for clamping the body to an end of a valve stem in axially aligning relation with the valve stem, a runner operable along the standard-like body having diametrically opposed fingers on the same for engagement with a spring abutment, means on the standard of the body for operating the runner in a spring compressing relation, said means comprising a cam eccentrically pivoted on the standard of the body for engagement with said runner, and a handle connected with the cam to facilitate operation thereof.

10. In a device of the class described a frame comprising a central standard of elongated formation and having guide passageways in parallelism with the elongated standard, means at one end of the standard for clamping the frame to a valve stem, a runner comprising arms sliding in the guide passageways and having their lower ends extended from said passageways for engagement with a spring abutment, means connecting said arms for synchronous operation, and means carried by the frame for operatively moving the arms of said runner along the frame.

11. In a device of the class described a frame comprising a central standard of elongated formation and having guide passageways in parallelism with the elongated standard, means at one end of the standard for clamping the frame to a valve stem, a runner comprising arms sliding in the guide passageways and having their lower ends extended from said passageways for engagement with a spring abutment, means connecting said arms for synchronous operation, and means carried by the frame for operatively moving the arms of said runner along the frame, said means comprising a cam eccentrically pivoted upon the end of the standard remote from the means to which it connects with a valve stem, said means which connects said arms of the runner extending in a guided connection upon the standard in position to be engaged by the cam.

12. In a device of the class described a frame including an elongated standard having lateral projections provided with guide sleeves in parallel relation with the standard, said bushing sleeves having passageways parallel with the standard, an inverted U-shaped runner comprising arms slidably operating in said guide sleeves and having similar ends provided with valve abutment engaging feet, the opposite ends of said arms being connected by a cross piece, the standard having a slot for slidably receiving the cross piece of said runner, means at the end of the standard adjacent the spring abutment engaging feet for connection with a valve stem, a cam head eccentrically pivoted on the standard for operating engagement at its eccentric periphery with the cross piece of said runner, and a handle for turning the cam head upon said standard.

HENRY RAYMOND.