

[54] MECHANICAL VALVE LIFTER

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[73] Assignee: **General Motors Corporation**, Detroit, Mich.

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Attorney—J. L. Carpenter et al.

[52] U.S. CL..... 123/90.52, 74/569, 74/586

[51] Int. Cl..... F011 1/20, F16h 53/06

[58] Field of Search..... 123/90.27, 90.52;
74/55, 569, 586

[56] References Cited

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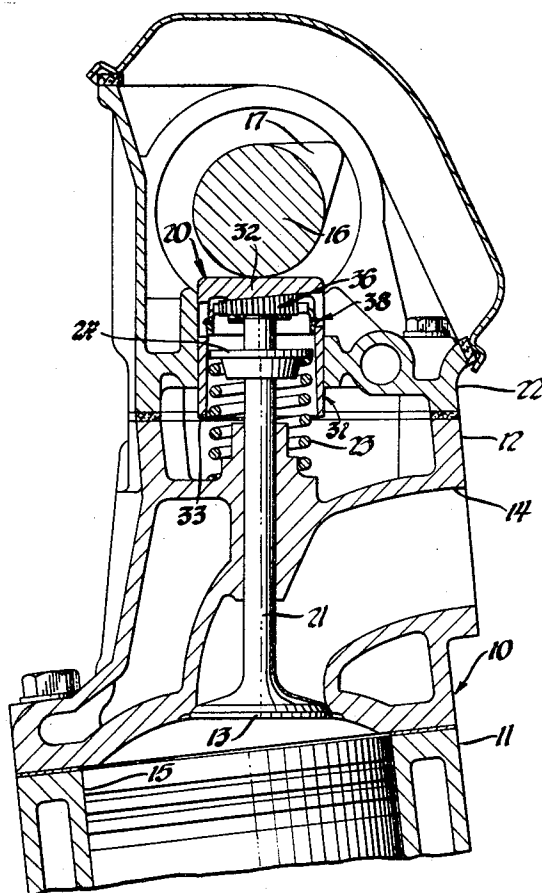
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[57]

ABSTRACT

A mechanical valve lifter having a sliding tapered wedge to effect valve adjustment, the wedge being retained in the desired position within the lifter by means of a retainer secured within the lifter and having spring arms thereon positioned to engage serrations in the wedge.

3 Claims, 5 Drawing Figures



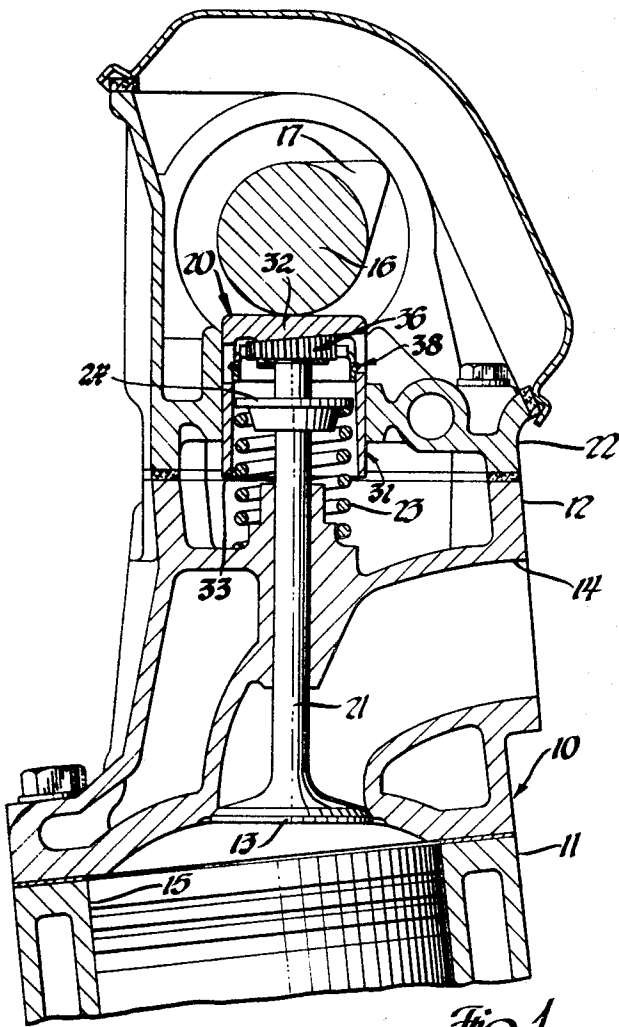


Fig. 1

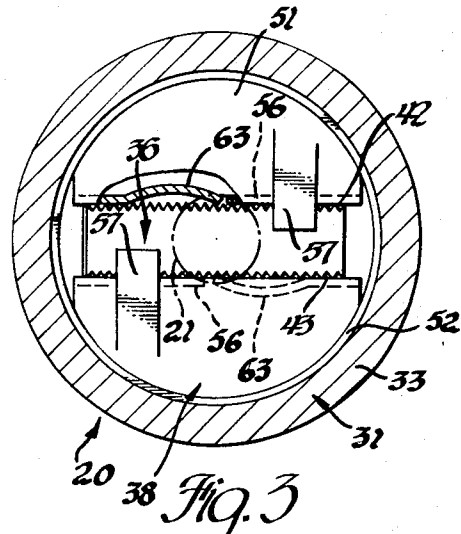


Fig. 3

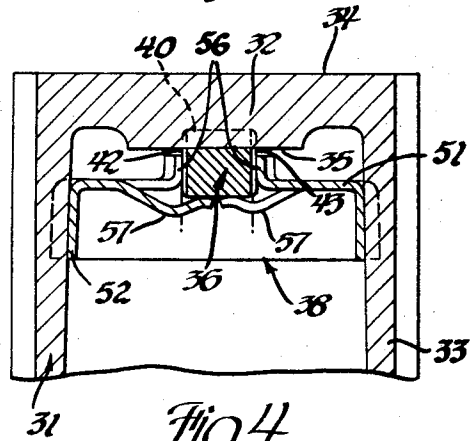


Fig. 4

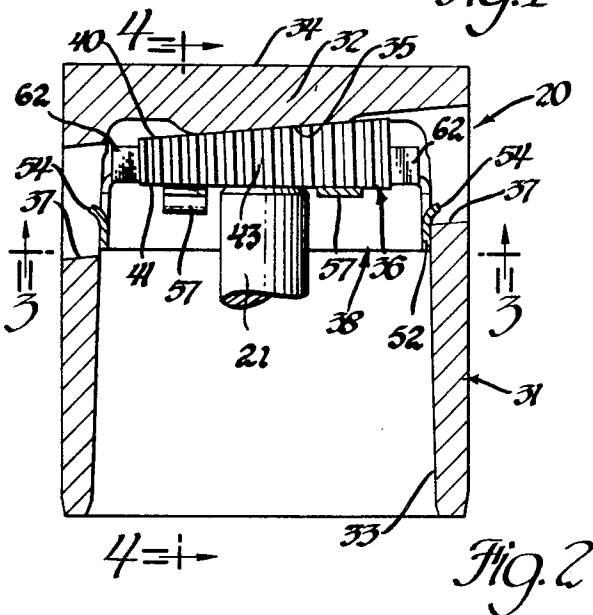


Fig. 2

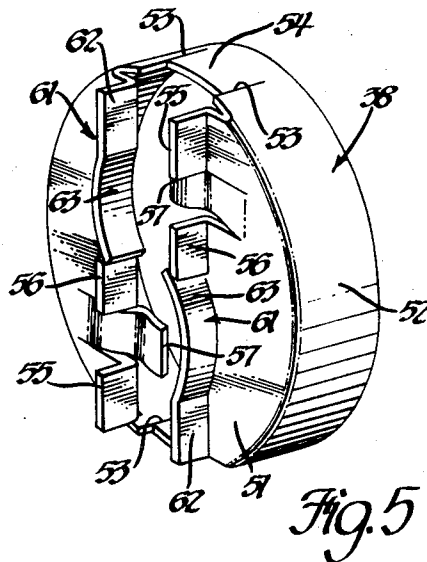


Fig. 5

MECHANICAL VALVE LIFTER

This invention relates to valve lifters or tappets for transmitting movement from a cam or the like to the stem of a poppet valve, such as is used in internal combustion engines and, in particular, to a mechanical valve lifter.

Various mechanical tappets or valve lifters, hereinafter referred to as valve lifters, have been used in the prior art which were provided with adjusting means, such as adjustable bolts or shims, so that the opening and closing of each individual valve of an engine could be separately adjusted. Such mechanical valve lifters are interposed between the valve actuating cam and the end of the valve stem.

One such mechanical valve lifter, presently in use, is of the type disclosed in U.S. Pat. No. 3,270,726 issued Sept. 6, 1966 to John Lee Cotton and comprises a cup-shaped member which is adapted to fit over the end of the valve stem and which has a transverse threaded bore containing an adjustable screw plug having a tapered flat surface for contacting the end of the valve stem. Although a valve lifter of this type provides satisfactory performance, it is relatively expensive to manufacture.

It is therefore the primary object of this invention to provide an improved mechanical valve lifter which is simple in construction and adapted to be readily fabricated at low cost and, which can be readily adjusted without the need of special tools.

Another object of this invention is to provide an improved valve lifter having a sliding wedge for ready adjustment of the opening and closing of the valve on an engine with which the valve lifter is associated.

These and other objects of the invention are attained by means of a cup-shaped lifter having a spring clip secured therein for adjustably retaining a serrated adjuster wedge therein.

For a better understanding of the invention, as well as other objects and further features thereof, reference is had to the following detailed description of the invention to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a vertical cross section of the upper part of a cylinder of an internal combustion engine provided with a mechanical valve lifter in accordance with the invention;

FIG. 2 is an enlarged vertical sectional view of the mechanical valve lifter of FIG. 1;

FIG. 3 is a sectional view of the mechanical valve lifter taken along line 3—3 of FIG. 2;

FIG. 4 is a partial sectional view taken along line 4—4 of FIG. 2; and,

FIG. 5 is a perspective view of the spring clip retainer of the lifter prior to its assembly in the lifter body.

Referring now to FIG. 1, there is shown parts of an internal combustion engine 10, including a cylinder block 11, on which is mounted a cylinder head 12, fitted with a conventional poppet valve 13, for controlling a port 14, connecting the engine cylinder 15 with the engine manifold (not shown).

A rotatable camshaft 16 has a cam lobe 17 which bears against a valve lifter 20, constructed in accordance with the invention, fitted over the end of the valve stem 21 of valve 13 and reciprocally mounted in camshaft block 22 to effect opening of valve 13 against the biasing force of a coil return spring 23 bearing upwardly from the cylinder head 12 against a spring re-

tainer 24 locked to the valve stem 21. The camshaft 16 is driven from the engine crankshaft in the conventional manner.

The valve lifter 20 of the invention includes a lifter body 31 formed as a cup-shaped member having a base 32 with an integral depending annular wall 33. Base 32 has an outer or upper surface 34, with reference to the drawings, adapted to be contacted by the cam lobe 17 and a depending axially extending boss 35, concentric with depending circular wall 33, bearing against an adjuster wedge 36 which in turn bears against the upper free end of valve stem 21. The annular wall 33 of the lifter body is provided with diametrically opposite opening bore windows 37 therethrough to permit insertion and positioning of the adjuster wedge 36 therein against boss 35, with the adjuster wedge being adjustably retained within the lifter body by a retainer 38. As can best be seen in FIG. 2, the surface of boss 35 against which the adjuster wedge 36 abuts is flat but inclined at a slight angle with respect to the outer surface 34 of the lifter body and in line with the windows 37 for a purpose which will become apparent. The inclined surface of boss 35 is aligned with the windows 37 to form with these windows a transverse passage through the lifter body.

To permit axial adjustment of the tappet clearance, adjuster wedge 36, as its name implies, has tapered flat top and bottom surfaces 40 and 41, respectively, and parallel serrated or notched tooth side surfaces 42 and 43. The adjuster wedge 36 can be inserted through a window 37 into lifter body 31 and set in any radial position therein in abutment against the surface of boss 35 to vary the effective length of the valve lifter by varying the axial height between the bottom surface 41 of the adjuster wedge and the upper surface 34 of the lifter body, as desired, the height being measured in a line extending from the axis of valve stem 21, and it is then releasably retained in this position by the spring clip type retainer 38. The taper of the surfaces 40 and 41 of the adjuster wedge and the inclination of the boss 35 is such that with the adjuster positioned in the lifter body in engagement with boss 35, the bottom surface 41 of the adjuster wedge is parallel to the upper surface 34 of the lifter body. In addition, the length of the adjuster wedge is substantially less than the outside diameter of the lifter body to permit radial movement of the adjuster wedge within the lifter body.

As best seen in FIG. 5, the retainer 38 is formed as a spring-sheet metal cup-shaped member having a circular base 51 and an integral depending annular wall 52 of a diameter so as to be slidably received within the annular wall 33 of the lifter body 31. Annular wall 52 is pierced as at 53 on diametrically opposite sides thereof whereby, after insertion of the retainer into the lifter body 31, the portions of the annular wall between closely spaced pierced sections thereof can be bent outwardly to form tabs 54 extending into windows 37 with the sides of the tabs engaging the side walls of the windows to lock retainer 38 in the lifter body against both axial and rotative movement relative to the lifter body.

The base 51 of the retainer is pierced with portions thereof bent upward relative to the depending annular wall 52 to provide upstanding pairs of guide portions 55 and 56 in spaced apart parallel relationship to each other at diametrically opposite sides of base 51, with a downward bent support spring finger 57 therebetween

positioned to slidably receive the adjuster wedge between the guide portions and to support the adjuster wedge 36 by engagement of the spring fingers against the bottom surface 41 of the adjuster wedge 36 so that lifter body 31, adjuster wedge 36 and retainer 38 can be handled as a unit assembly.

In addition, portions of base 51 are bent upward to provide a pair of oppositely positioned complementary, upturned, spring retainer fingers or arms 61, each having a base portion 62 rigid with respect to base 51 and a flexible spring finger portion 63 integral at one end with the base portion 62 and having its free end movable to sweep across the plane of base 51. The flexible spring finger portions 63 are curved with their free ends bent, in the as-formed condition, towards each other but spaced apart from each other a distance slightly less than the width between the bottom of the notched teeth on notched tooth side surfaces 42 and 43 of the adjuster wedge. With this arrangement, as best seen in FIG. 3, when the adjuster wedge 36 is inserted between the spring finger portions 63, they can be flexed apart relative to each other to permit movement of the adjuster wedge therebetween to establish stepwise axial adjustment of the tappet clearance, with the fingers then engaging matched notches in the sides of the adjuster wedge to retain it in the desired position. As can be seen best in FIG. 5, the base 51 is thus provided with an opening in the center thereof to adjustably receive adjuster wedge 36 therethrough when the retainer 38 is in its assembled position in the lifter body 31, as seen in FIG. 4.

What is claimed is:

1. A valve lifter comprising a cup member with a boss extending axially therein, said cup member being adapted to fit over the end of a valve stem and having a transverse opening therethrough in alignment with said boss, an adjuster wedge positioned in said cup member and having opposed tapered flat surfaces, one of which is positioned in abutment against said boss and the other flat surface being adapted to be contacted by the end of the valve stem, said adjuster wedge having parallel serrated side surfaces, and a retainer secured within said cup member and having a pair of spring fingers biased against said other flat surface of said ad-

juster wedge and a pair of opposed spring retainer fingers positioned to releasably engage the serrated side surfaces of said adjuster wedge whereby said adjuster wedge can be positioned to vary the effective length of said valve lifter.

2. A valve lifter according to claim 1 wherein said retainer is cup-shaped and includes a pierced base and a depending annular wall of a diameter slidably received in said cup member, tab means extending radially outward from said annular wall to extend into said windows, said base having a central transverse opening therein with pairs of upturned guide portions on opposite sides thereof with one of said spring fingers between each of said pairs of upturned guide portions extending downward relative to said guide portions and positioned in spaced apart relation to each other to yieldably engage said other flat surface of said adjuster wedge, and said spring retainer fingers being upturned from said base on opposite sides of said transverse opening therein and being positioned complementary to each other to yieldingly engage said serrated side surfaces of said adjuster wedge therebetween.

3. A valve lifter including a cup-shaped lifter body having a base and an integral depending annular wall, said base having an exterior flat cam engaging surface on one side thereof and a boss on the other side thereof extending axially within said annular wall, the surface of said boss being inclined at an angle relative to said flat cam engaging surface, a pair of window openings in said annular wall positioned diametrically opposite each other in alignment with the inclined surface of said boss, a cup-shaped retainer fixed in said lifter body and having a pair of spring fingers positioned in spaced axial relation to said boss, and an adjuster wedge having opposite tapered flat surfaces slidably engaged in said lifter body between said boss and said spring fingers, one of said flat surfaces engaging said inclined surface of said boss, said adjuster wedge having parallel serrated side surfaces, and said retainer having a pair of complementary-shaped spring retainer fingers positioned to releasably engage the serrated side surfaces of said adjuster wedge.

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