Oct. 26, 1971 G. A. SCHLEY 3,614,943

ENGINE ROCKER ARM SUPPORT MEANS

Filed June 1, 1970 2 Sheets-Sheet 1

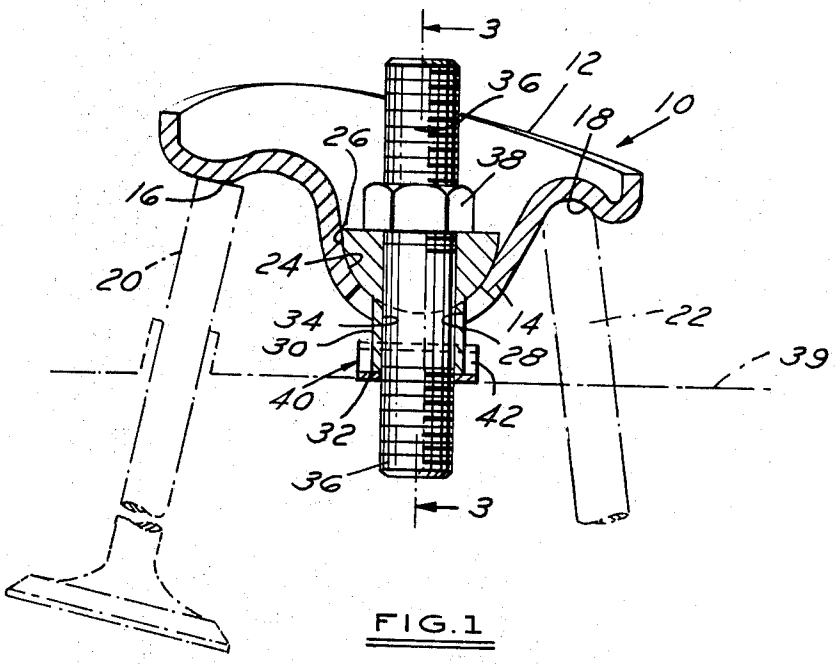


FIG. 1

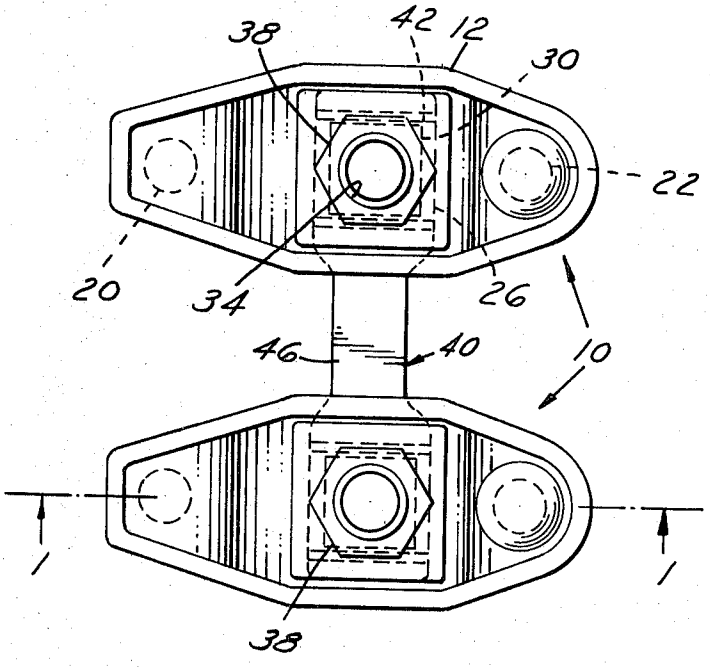


FIG. 2

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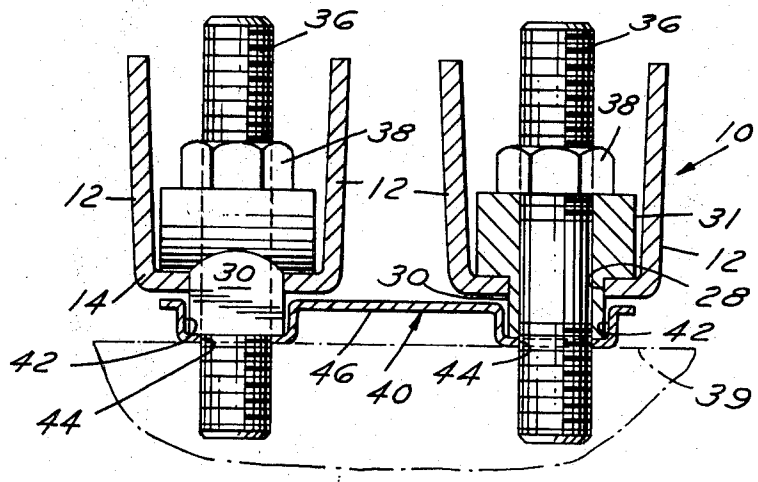


FIG. 3

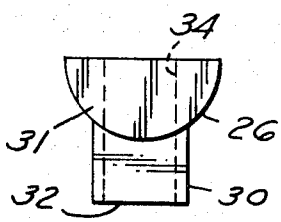


FIG. 4

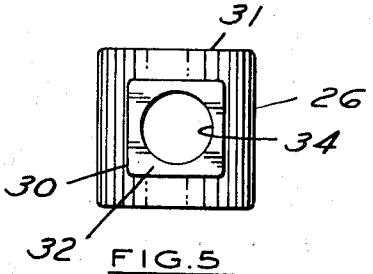


FIG. 5

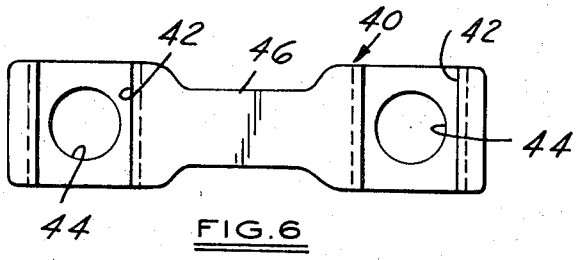


FIG. 6

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ENGINE ROCKER ARM SUPPORT MEANS

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U.S. Cl. 123—90.42 4 Claims

ABSTRACT OF THE DISCLOSURE

A pair of rocker arms are each mounted to the cylinder head on its own stud, each containing a semi-cylindrical fulcrum having a flat sided shank depending integrally therefrom and nested in a trough in a plate connecting the fulcrum, the plate preventing relative rotation between the fulcrums and cylinder head, the fulcrum shape preventing relative rotation laterally between the fulcrums and rocker arms.

This invention relates, in general, to an internal combustion engine valve train. More particularly, it relates to a means for supporting an individually mounted rocker arm in a manner to prevent lateral pivotal movement of the rocker arm out of its plane of reciprocable movement.

One of the problems connected with a pedestal mounted type rocker arm is that it must be prevented from lateral pivotal movement at right angles to its plane of reciprocation to minimize wear of the push rod and valve ends against the rocker arm surfaces, as well as the fulcrum against its support, which would decrease efficiency by lowering the "float" speed and response time.

In the past, many solutions have been offered, such as, for example, providing plates that interconnect the push rods of adjacent rocker arm assemblies such as is shown in U.S. Pat. 3,086,507 to R. A. Mooney, Jr.; providing multimember bridging structures interacting with the fulcrum members, such as is shown in U.S. Pat. 3,198,-183 to S. W. Ball; providing a unitary fulcrum for a plurality of rocker arms and plate means interconnecting a greater plurality of rocker arm assemblies, such as is shown, for example, in U.S. 3,270,727 to R. L. Nance; or, providing flat sides on the rocker arm mounting stud cooperating with flat sides on the fulcrum, such as is shown, for example, in U.S. 3,313,279 Burweger and 3,112,740 Sampietro.

However, as will be evidence by reference to the Ball and Nance constructions, for example, the prior art devices tended to be complex and cumbersome to assemble and costly to manufacture. Likewise, the Burweger and Sampietro constructions, for example, located only a single rocker arm, and accordingly provided large torque moments on the rocker arm supporting stud.

This invention provides an improved rocker arm support and locating means that is not only simpler in construction and assembly, but is readily adaptable to existing pedestal mounted individually supported rocker arm assemblies to positively locate the rocker arm in its plane of reciprocation.

More specifically, the invention provides a rocker arm locating means consisting of a one piece fulcrum with a depending shank portion that cooperates with a channeled means in the support. The locating means positively prevents lateral pivotal movement of the rocker arm out of its plane of reciprocation. It also vertically locates the rocker arm so as to provide an easy and automatic method of

setting the hydraulic tappet gap without having to run a nut down to a predetermined height on the mounting stud, as is conventional on prior art constructions.

In brief, the invention includes an inexpensive sheet metal stamping that can be dropped over a pair or more of rocker arm mounting studs or bolts in the cylinder head and be located by the studs by a close fit of the holes in the stamping. The stamping has a trough at each rocker arm location in which fits a square or rectangular-base fulcrum. The latter is accurately located by contact of the flat sides of the base of the fulcrum and the sides of the trough. This produces a fulcrm that is properly positioned and restrained in relationship to the tip of the engine valve.

It is a primary object of the invention, therefore, to provide a rocker arm positioning and support means that is relatively inexpensive to manufacture and simple in construction and assembly, and yet positively locates the rocker arm attitude with respect to the engine valve tip and push rod.

Another object of the invention is to provide a sheet metal stamping with spaced channel-like portions cooperating with the depending flat sided shank portion of a rocker arm fulcrum integrally depending from a semi-cylindrical fulcrum body portion, the latter matingly pivoting on a lower bearing surface of the rocker arm; and, the ends of the shank portion cooperating with the channel portion sides and bottom not only to pivotally locate the rocker arm laterally but also act as a positive stop for the vertical positioning of the rocker arm.

Other objects, features and advantages of the invention will become more apparent upon reference to the succeeding detailed description thereof, and to the drawings illustrating a preferred embodiment thereof; wherein,

FIG. 1 is a cross-sectional view of a portion of a rocker arm assembly embodying the invention, taken on a plane indicated by and viewed in the direction of the arrows 1—1 of FIG. 2;

FIG. 2 is a plan view of the FIG. 1 construction;

FIG. 3 is a cross-sectional view taken on a plane indicated by and viewed in the direction of the arrows 3—3 of FIG. 1; and,

FIGS. 4, 5 and 6 are elevational and plan views of individual components of the rocker arm assembly of FIG. 1.

As indicated above, the invention is directed primarily to a means for supporting a rocker arm so that it does not rotate laterally out of its plane of reciprocation, and also is located vertically so as to automatically and positively determine the valve tappet gap. The invention has particular use in connection with pedestal mounted type rocker arms in which each rocker arm is individually supported for rotation or pivotal movement upon its own stud or bolt secured to the cylinder head of an internal combustion engine.

In such an installation, it will be clear that without some means of preventing lateral pivotal movement of the rocker arm, actuating forces that are axially misaligned will cause severe binding forces on movement of the rocker arm. This is especially so in the case of a part spherical fulcrum. One of the ways to minimize this pivotal lateral movement, of course, is to provide a semi-cylindrical fulcrum with essentially flat ends cooperating with essentially straight side walls of the rocker arm.

Turning to the invention, FIG. 1 shows a rocker arm assembly including a one-piece stamped or cast rocker arm

10. It has essentially straight or vertical side walls 12 (FIG. 3) integral with a bottom wall portion 14 that extends laterally essentially at right angles to the side walls. As seen in FIG. 1, bottom wall 14 has a number of essentially concave actuating portions 16 and 18 at opposite ends adapted to actuate and be actuated by the conventional engine valve 20 and push rod 22 indicated in phantom lines.

Rocker arm 10 includes a central, generally concave, bottom bearing surface 24 that is essentially semi-cylindrical for mating with the semi-cylindrical surface of fulcrum portion 26, to be described. The rocker arm bottom portion has a flat sided aperture 28 for receiving therethrough the fulcrum and support means for the rocker arm assembly.

The fulcrum in this case consists of a semi-cylindrical body portion 26 having a flat sided shank portion 30 depending integrally from body portion 26 and having essentially a flat end portion 32. The flat sided shank portion 30 cooperates with the straight sided walls of aperture 28 in the rocker arm. The flat end portions 31 of fulcrum body portion 26 cooperate with the straight side walls 12 of the rocker arm to essentially prevent lateral relative movement between the two.

Both the body and shank portions 26 and 30 of each fulcrum are provided with an aperture 34 for closely and slidably receiving therethrough a stud 36. In this case, the stud has a nut 38 adapted to bear against the top surface of the fulcrum body portion 26, as shown. It will be clear that a headed bolt could be used. The bottom portion of stud 36 is threadedly received in a suitable manner in the top surface of the engine cylinder head 39, or in a specific boss projecting vertically from the cylinder head, as the case may be.

As stated above, relatively lateral pivotal movement between the fulcrum and rocker arm is prevented by the making cylindrical surfaces of the fulcrum and rocker arm. However, this does not restrain the assembly from pivotal movement relative to the cylinder head 39 or push rod 22 or valve portion 20. The latter is accomplished by the use of a stamped metal plate 40 illustrated more clearly in FIGS. 3 and 6.

More specifically, plate 40 is a sheet metal stamping in which opposite end portions are bent at right angles in a number of successive steps to provide two channel-like portions or troughs 42. Each of the troughs is provided with an aperture 44 of a diameter slightly larger than that of the stud 36 but a smaller diameter than the widest part of the fulcrum shank portion 30. Each of the troughs 42 has essentially a flat bottom to lie flat against the cylinder head 39, or cylinder head extension, as the case may be, and also to permit the flat ends 32 of each of the fulcrum shank portions 30 to lie flat against the bottom of the sheet metal stamping.

It will be seen, therefore, that the flat sides and bottom of each trough 42, when the fulcrum is assembled on the stud 39, lie closely adjacent the flat sides and bottom of the fulcrum shank portion 30 so as to positively prevent lateral pivotal movement of each fulcrum and, therefore, rocker arm assembly, relative to the sheet metal plate 40. It will also be seen, therefore, that because the sheet metal plate interconnects at least two of the rocker arm fulcrum members, that lateral movement of any rocker arm out of its plane of reciprocation is positively prevented. It will further be seen, therefore, that because of the engagement of the flat bottom of the fulcrum shank portion with the trough of the sheet metal stamping, that the rocker arm is positively located vertically by engagement of the nut 38 against the top surface of the fulcrum body portion 26 so as to automatically set the hydraulic tappet gap.

It will be clear, of course, that more than just the two rocker arm assemblies shown can be interconnected by a single sheet metal stamped plate 40 without departing from the scope of the invention. Also, it will be seen that, while the invention shows the rocker arm assemblies as being in lateral alignment, the invention would equally be applicable to rocker arm assemblies that are laterally misaligned, such as the canted valve, pedestal mounted type rocker arms, merely by providing a twist or bend in the intreconnecting web portion 46 of the appropriate angle, or other suitable bend so the assemblies are positively interconnected to prevent lateral rotation of each assembly relative to the cylinder head.

The assembly of the rocker arm is believed to be clear from the above description and from a consideration of the drawings. In brief, the sheet metal stamping 40 would be dropped over a pair, in this case, of upstanding stud members 36. The one-piece fulcrum would then be dropped over the studs with the flat end portions 32 resting against the bottom and a side portion nesting in the troughs or channels 42 of the sheet metal stamping 40. The nut 38 would then be threadedly mounted on the stud and tightened until engaged with the top surface of the fulcrum shank portion 26. The assembly is now accurately positioned for pivotal movement, and is positively located vertcially by the nut 38 and the flat bottom portions 32 of the fulcrum.

It will be seen, therefore, that the invention provides an engine rocker arm that is positioned and restrained in the correct relationship to the engine valve tip by a semi-cylindrically shaped fulcrum which itself is positioned and restrained by a simple and inexpensive stamping that orients itself on the support studs or bolts.

What is claimed is:

1. Rocker arm support means for an individual pedestal mounted type rocker arm supported from a part of an engine for a pivotal movement in one plane comprising, in combination, a rocker arm having an essentially U-shape in cross-section and a bottom concave semi-cylindrical fulcrum bearing surface with a flat sided opening therein for the passage therethrough of a fulcrum and support means for said rocker arm, said fulcrum comprising a semi-cylindrical bearing body portion having a lower bearing surface adapted to slidably mate with said rocker arm surface and a flat sided depending shank portion projecting integrally downwardly from said lower bearing surface through the aperture in said rocker arm when assembled therein, said fulcrum body portion having portions engageable with mating surface portions of said rocker arm preventing relative pivotal movement therebetween, said fulcrum body and depending shank portion having aligned apertures therethrough for receiving therethrough said support means, and means preventing lateral pivotal movement of said fulcrum relative to said support means including trough means associated with the support means and having side walls thereof frictionally engaging the bottom and flat sides of said fulcrum depending shank portion preventing relative pivotal movement between said support means and fulcrum.

2. Rocker arm supporting means for a plurality of individual pedestal mounted type rocker arms each individually separately supported from a part of an engine for a pivotal movement in one plane comprising, in combination, a plurality of rocker arms each having a bottom concave semi-cylindrical fulcrum bearing surface with a flat sided opening therein for the passage therethrough of a fulcrum and support means for each of said rocker arms, each of said fulcrums comprising a semi-cylindrical bearing body portion having a lower bearing surface adapted to slidably mate with said rocker arm surface, and a flat sided depending shank portion projecting integrally downwardly from said lower bearing surface through the aperture in said rocker arm when assembled therein, said fulcrum body portion having essentially flat end portions engageable with essentially flat wall portions of said rocker arm preventing relative pivotal movement therebetween, said fulcrum body and depending shank portions having aligned apertures therethrough for receiving therethrough said support means individual to each of said fulcrums, and one piece plate means con-

necting a plurality of said fulcrums preventing pivotal movement of said connected fulcrums relative to each other, said plate means having spaced channel like portions with the side walls thereof frictionally engaging the bottom and flat sides of each of said fulcrum depending shank portions preventing relative pivotal movement between fulcrums.

3. A supporting means as in claim 2, said plate means having individual apertures for passage of the individual support means therethrough, said individual apertures being of smaller diameter than the external diameter of said fulcrum depending shank portions whereby the abutment of the bottom of said depending portions against the plate means vertically locates said fulcrums.

4. A supporting means as in claim 2, said plate means comprising a flat stamping having portions at opposite

ends formed with a number of right angle bends to define said channel like portions.

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