Sept. 7, 1948. J. M. LEAKE 2,448,989

ENGINE ROCKER ARM

Filed Feb. 18, 1946

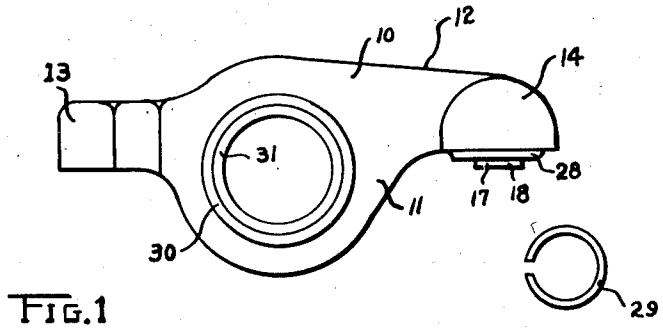

FIG. 1

FIG. 8

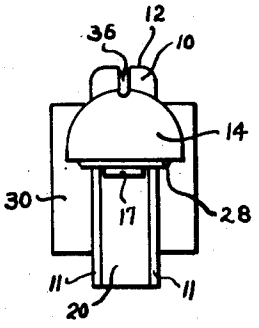

FIG. 3

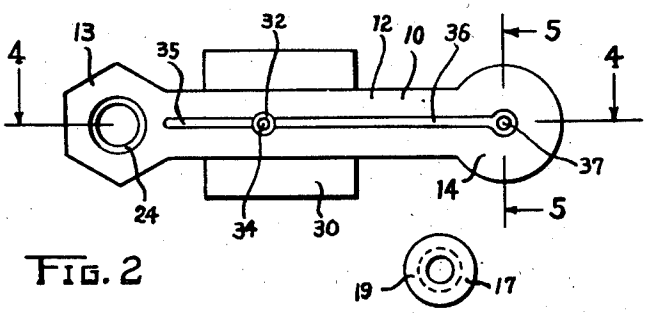

FIG. 2

FIG. 10

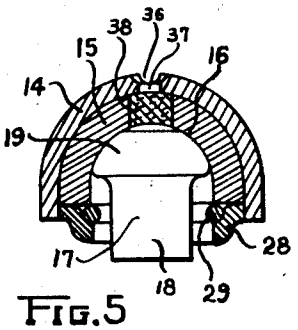

FIG. 5

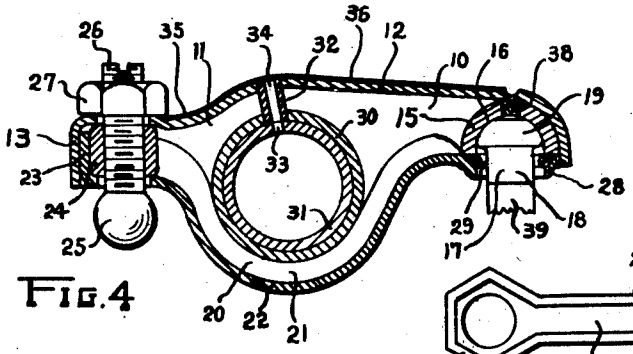

FIG. 4

FIG. 9

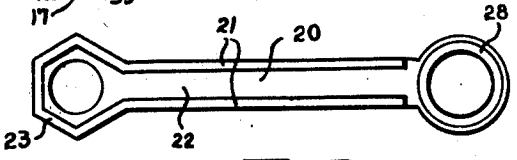

FIG. 7

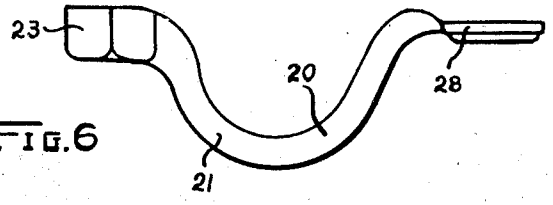

FIG. 6

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ENGINE ROCKER ARM

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7 Claims. (Cl. 74—519)

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My invention relates to rocker arms and more particularly to the type of rocker arm used to operate the valves of an overhead valve type of internal combustion engine.

The present types of engine rocker arms are made from forgings, castings and stampings. The stamped engine rocker arms are lighter in weight than the forged or cast engine rocker arms. These stamped engine rocker arms are provided with a fixed contacting bearing. Considerable difficulty is encountered in obtaining proper alignment of the fixed contacting bearing. My novel arrangement combines a light weight stamped arm member with a self-aligning contacting bearing.

In the present day high speed engine weight is a very important factor. The engine rocker arm oscillates when the engine operates. Therefore the heavier the engine rocker arm the greater the inertia and hence the more power required to operate the engine rocker arms. In airplane engines weight is a very vital factor and a very appreciable saving in weight is accomplished with the use of my improved-engine rocker arm, since two or more arms are required for each cylinder.

My improved engine rocker arm also provides a self-aligning feature which saves time, expense and scrap in the manufacturing process and at the same time provides greater accuracy in the valve operating mechanism of the internal combustion engine.

One object of my invention is to provide an engine rocker arm that is light in weight.

Another object of my invention is to provide an engine rocker arm provided with an arm member of a hollow cross sectional construction formed from sheet metal.

Another object of my invention is to provide an engine which provides an improved lubrication system.

Another object of my invention is to provide an engine rocker arm with a self-aligning contacting bearing.

Another object of my invention is to provide an engine rocker arm that is strong, durable and inexpensive.

With these and other objects in view, my invention consists in the construction, combination and arrangements of the various parts of my improved device as described in the specification, claimed in the claims and illustrated in the accompanying drawing.

In the drawing:

Figure 1 is a front elevation of my improved engine rocker arm.

Figure 2 is a top plan view of my improved engine rocker arm.

Figure 3 is an end view of my improved engine rocker arm.

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Figure 4 is a sectional view taken along line 4—4 of Figure 2 with an adjustable contacting bearing.

Figure 5 is an enlarged sectional view taken along line 5—5 of Figure 2.

Figure 6 is a front elevation of the lower member of my improved engine rocker arm.

Figure 7 is a top plan view of the lower member shown in Figure 6.

Figure 8 is a top plan view of the retaining spring used in my improved engine rocker arm.

Figure 9 is a front elevation of the self-aligning contacting bearing used in my improved engine rocker arm.

Figure 10 is a top plan view of the self-aligning contacting bearing shown in Figure 9.

Referring to the drawing in more detail, in Figure 1, I have shown a stamped or pressed arm member 10. The arm member 10 is pressed from a flat sheet metal blank which has been cut to a predetermined size and shape. The arm member 10 comprises substantially parallel side walls 11—11 spaced a substantial distance apart, and an upper wall 12 integral with the side walls 11—11, thus producing an inverted U-shaped cross section. The side wall portions 11—11 are joined by end wall portions which are integral with the side walls 11—11 and the upper wall 12, thus a continuous wall is provided around the sides and ends of the arm member 10.

The sides of one end of the arm member 10 are formed into a partial prism portion 13. The opposite end is formed into a concavo-convex portion 14 that is substantially hemispherical. A concavo-convex member 15 is secured in the concavo-convex portion 14 of the arm member 10. The inner or concave surface 16 of the concavo-convex member 15 is a smooth bearing surface hemispherical in shape. A self-aligning contacting bearing 17 is provided with a head portion 19 and a stem portion 18. The head portion 19 engages the hemispherical concave bearing surface 16. A lower stamping 20 is secured between the side walls 11 of the arm member 10. The lower stamping 20 is U-shaped in cross section through most of its length. The sides 21—21 of the member 20 are secured to the sides 11—11. At one end of the lower stamping the sides provide a partial prismatical socket 23 integral with the lower wall 22. The partial prismatical socket 23 is secured in the partial prism wall portion 13. A nut or internally threaded member 24 is secured in the partial prismatical socket 23.

An adjustable contacting bearing 25 provided with a threaded stem 26 is adjustably secured in the internally threaded member 24, and is locked in a predetermined position by the lock nut 27.

A ring portion 28 is provided at the end of the lower stamping 20. The ring portion 28 is secured in the concavo-convex portion 14, adjacent the

lower edge of the concavo-convex bearing member 15. The ring portion 28 is preferably recessed to hold the self-aligning contacting bearing retainer member 29.

A hub member 30 extends transversely through apertures in the side walls 11—11 and from both sides of the arm member 10. A bushing or bearing 31 is secured in the hub 30. The bearing 31 is adapted to be journaled on a rocker shaft (not shown). A tubular member 32 extends from the hub to the upper wall 12 and communicates with an aperture 33 in the bushing 31 thus providing an oil passageway 34 from the bearing 31 to the upper surface of the wall 12. The oil passageway 34 communicates with the oil channels 35 and 36 to provide oil at both ends of the engine rocker arms.

From the channel 35 oil flows over the partial prism portion 13 down the sides thereof and onto the lower stamping 20 and finally onto the adjustable contacting bearing 25. The adjustable contacting bearing 25 which usually engages a push rod (not shown) is thus lubricated. Oil flowing down the channel 36, passes through the aperture 37 to the felt oil control member 38. From the felt oil control member 38 oil is provided to the surface 16 and the head 19 of the self-aligning contacting bearing 17.

The arm member 10, the lower stamping 20, the internally threaded member 24, the concavo-convex member 15, the hub 30 and the tube 32 are preferably brazed or welded into a substantially one piece member. In operation pressure is exerted upwardly on the contacting bearings 17 and 25, while the bushing or bearing 31 bears against the engine rocker arm shaft (not shown). The upward force applied to the adjustable contacting bearing 25 is transmitted to the nut or threaded member 24, which is brazed in the socket 23 and also bears against the upper wall 12. Hence the upward force exerted on the nut 24 is adequately and proportionally distributed to the arm member 10 and to the lower stamping 20. The upward force exerted on the self-aligning contacting bearing 17 by the valve stem 39 is transmitted to the concavo-convex member 15 and then to the concavo-convex portion 14 of the arm member 10. The upward force tends to push both the threaded member 24 and the concavo-convex member 15 against the upper surface of the arm member 10. Hence it is not necessary for the brazed joint to take the entire stress. In case the brazed joint fails the engine rocker will continue to operate.

In assembling the engine rocker arm the head portion 19 of the self-aligning contacting bearing 17 is placed in the concavo-convex member 15. The spring member 29 is then snapped into place so that the self-aligning contacting bearing 17 cannot drop out of the concavo-convex member 15. Whenever the self-aligning contacting bearing 17 has to be replaced the spring member 29 must be removed in order to remove the worn out part and insert a new self-aligning contacting bearing. The spring member 29 is then replaced.

If the valve stem 39 is not in proper alignment with the self-aligning contacting bearing 17 the head 19 will turn in the concavo-convex bearing 15 so that the stem 18 will seat flatly on the valve stem 39. In this way variations in angularity, alignment and tolerances due to slight variations in production are compensated for by my improved engine rocker arm.

From the above description it will be apparent

that my improved type of engine rocker arm is strong and yet light in weight. It provides adequate and controlled lubrication. The arm is made of a plurality of parts that are formed into a substantially one piece member by a brazing process. The self-aligning contacting bearing is self-aligning and is also replaceable. The contacting bearings are secured so that the force acting on them tends to keep them in proper location.

While I have described the details of one form of my invention, I do not wish to be limited to the particular forms shown and described as it will be apparent that modifications therein may be made without departing from the scope of my invention as set forth in the appended claims.

Having thus described my invention what I claim is:

1. An engine rocker arm comprising a central bearing support, an arm member extending in substantially opposite directions therefrom, said arm member comprising an upper inverted U-shaped stamping and a lower U-shaped stamping said upper and lower stampings being telescoped and fused together to form a box section construction, an internally threaded member secured between the side walls of said lower U-shaped stamping at one end thereof, a contacting bearing adjustably secured in said internally threaded member, a concave portion provided in the under side at one end of said upper inverted U-shaped member, a concavo-convex bearing member secured in said concave portion, and a self-aligning contacting bearing swivelably secured in said concavo-convex bearing member.

2. An engine rocker arm comprising a central bearing support, an arm member extending in substantially opposite directions therefrom, said arm member comprising an upper inverted U-shaped stamping and a lower U-shaped stamping said upper and lower stampings being telescoped and fused together to form a box section construction, an internally threaded member secured between the side walls of said lower U-shaped stamping at one end thereof, a contacting bearing adjustably secured in said internally threaded member, a concave portion provided in the under side at one end of said upper inverted U-shaped member, a concavo-convex bearing member secured in said concave portion, and a self-aligning contacting bearing provided with a partial spherical head portion adapted to swivel in said concavo-convex bearing member and a means for retaining said partial spherical head portion in said concavo-convex bearing member.

3. An engine rocker arm comprising a central bearing support, an arm member extending in substantially opposite directions therefrom, said arm member comprising an upper inverted U-shaped stamping and a lower U-shaped stamping said upper and lower stampings being telescoped and fused together to form a box section construction, an internally threaded member secured between the side walls of said lower U-shaped stamping at one end thereof, a contacting bearing adjustably secured in said internally threaded member, a concave portion provided in the under side at one end of said upper inverted U-shaped member, a concavo-convex bearing member secured in said concave portion, a self-aligning contacting bearing provided with a partial spherical head portion adapted to swivel in said concavo-convex bearing member, a ring portion integral with lower U-shaped stamping ex-

tending adjacent the lower edges of said concavo-convex bearing member and retaining a resilient member, said resilient member adapted to retain said self-aligning contacting bearing.

4. An engine rocker arm of box construction, comprising an upper stamping of inverted U-shaped cross section, a lower stamping of U-shaped cross section telescoped within said upper stamping and fused thereto, a hub secured transverse to said upper stamping, intermediate its ends, an internally threaded member secured between the side walls of said lower stamping, a contacting bearing adjustably secured in said internally threaded member, a concave portion at one end of said upper stamping, a concavo-convex bearing member secured in said concave portion, and a self-aligning contacting bearing swivelably secured in the concave portion of said concavo-convex member.

5. An engine rocker arm of box construction, comprising an upper stamping of inverted U-shaped cross section, a lower stamping of U-shaped across section telescoped within said upper stamping and fused thereto, a hub secured transverse to said upper stamping, intermediate its ends, an internally threaded member secured between the side walls of said lower stamping, a contacting bearing adjustably secured in said internally threaded member, a concave portion at one end of said upper stamping, a convavo-convex bearing member secured in said concave portion, and a self-aligning contacting bearing provided with a partial spherical head portion swivelably secured in the concave portion of said concavo-convex member, a ring portion integral with said lower stamping adjacent the lower edge of said concavo-convex member adapted to retain a spring member whereby said self-aligning contacting bearing is removably secured in said concave portion of said concavo-convex member.

6. An engine rocker arm comprising a hollow arm member, said arm member comprising an upper stamping of inverted U-shaped cross section and a lower stamping of U-shaped cross section telescoped within said upper stamping, an internally threaded member secured within said arm member at one end thereof, a bearing member provided with a substantially hemispherical concave portion secured at the other end of said arm member, a self-aligning contacting bearing swivelably secured in said hemispherical concave portion, a hub secured transverse to said arm member intermediate its ends and a bearing member secured in said hub.

7. An engine rocker arm comprising a hollow arm member, said arm member comprising an upper stamping of inverted U-shaped cross section and a lower stamping of U-shaped cross-section telescoped within said upper stamping, an internally threaded member secured within said arm member at one end thereof, a bearing member provided with a substantially hemispherical concave portion secured at the other end of said arm member, a self-aligning contacting bearing swivelably secured in said hemispherical concave portion, a hub secured transverse to said arm member intermediate its ends and a bearing member adapted to be journaled on a shaft secured in said hub, a tubular member extending from said hub to the upper surface of said arm member and a plurality of oil channels in said upper stamping extending from said tubular member to the proximity of the ends of said arm member.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,132,411	Watts	Mar. 16, 1915
1,904,770	Skillman	Apr. 18, 1933
2,230,520	Wemp	Feb. 4, 1941
2,251,143	Loeffler	July 29, 1941

FOREIGN PATENTS

Number	Country	Date
349,508	Great Britain	May 26, 1931