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J. M. LEAKE

2,415,213

ENGINE ROCKER ARM

Filed Sept. 11, 1944

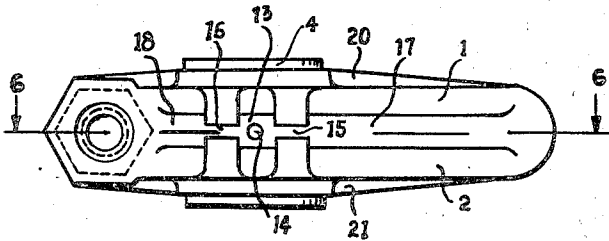


FIG. 1

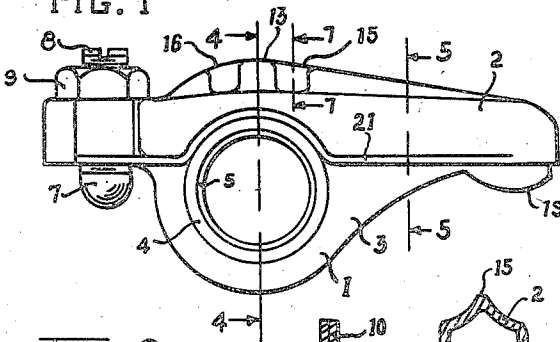


FIG. 2

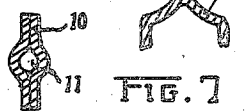


FIG. 7

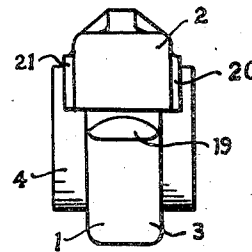


FIG. 3

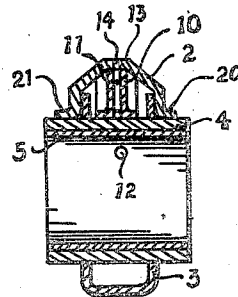


FIG. 4

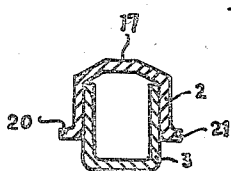


FIG. 5

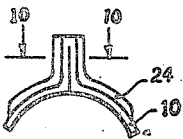


FIG. 9

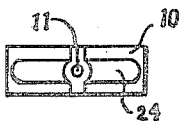


FIG. 11

FIG. 10

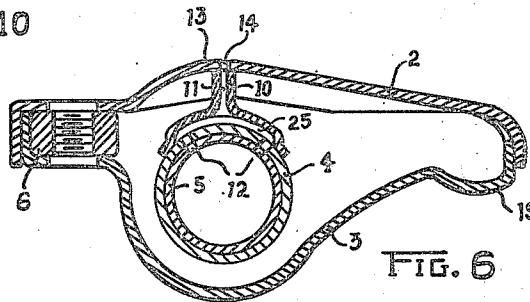


FIG. 6

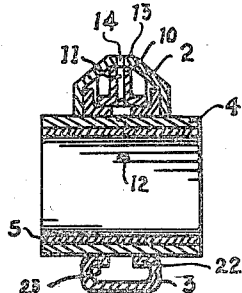


FIG. 8

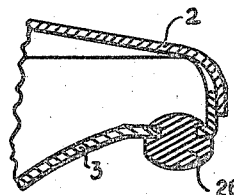


FIG. 12

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ENGINE ROCKER ARM

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2 Claims. (Cl. 74—519)

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My invention relates to engine rocker arms and more particularly to the type employed in the overhead valve type of internal combustion engine.

Heretofore the rocker arms used in combination with internal combustion engines have been of solid structure. Originally the rocker arms were either castings or forgings. My former rocker arm disclosed in Patent No. 2,176,083, gave much more strength per unit of weight than did the old type of rocker arms which were cast or forged. The increased strength was due to the fact that my former stamped rocker arm was constructed from sheet metal material which has greater strength than cast or forged metal. My rocker arm shown in Patents Nos. 2,345,822 and 2,338,726 provides a U-shaped engine rocker arm combined with suitable hub members. These rocker arms give more strength than did my original rocker arm provided with a laminated arm member.

My improved engine rocker arm combines the use of sheet metal with an arm member of substantially box-like construction. The arm member is made of two halves of U-shaped cross section. These two halves telescope when assembled and thereby provide a double wall at a point where the greatest strength is required.

My improved engine rocker arm provides more strength for the same weight of arm than do any of the present engine rocker arms. My engine rocker arm finds great utility when applied to the present day high speed internal combustion engine as it has the attributes of strength and rigidity coupled with comparatively little weight. Especially with the higher speed engines, it is very essential that the weight of the oscillating rocker arm be reduced to a minimum. In airplane engines the weight factor is doubly important because it directly effects the useful load. Since there are at least two engine rocker arms for each cylinder, the weight factor is quite an item in an airplane engine.

It is also important that this decrease in weight be accomplished with no or very little increase in cost. My engine rocker arm is adapted for quantity production and can be manufactured at a very reasonable cost.

One object of my invention is to provide an engine rocker arm that provides a cross section giving maximum strength for the material used.

Another object of my invention is to provide an engine rocker arm that requires little or no machining operations.

Another object of my invention is to provide

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an engine rocker arm made of material with great strength characteristics.

Another object of my invention is to provide an engine rocker arm that readily adapts itself to quantity production.

Another object of my invention is to provide an engine rocker arm that requires a minimum amount of skilled help to manufacture.

Another object of my invention is to provide an engine rocker arm that is especially adapted to the present day high speed engines.

Another object of my invention is to provide an engine rocker arm that controls or meters the lubricant to the contacting bearings.

Another object of my invention is to provide a rocker arm with a maximum of strength, rigidity and durability with a minimum of weight and cost.

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

In the drawing:

Fig. 1 is a top plan view of my improved engine rocker arm without the adjustable contacting bearing.

Fig. 2 is a front elevation of the engine rocker arm shown in Fig. 1 provided with an adjustable contacting bearing.

Fig. 3 is an end elevation of my novel engine rocker arm.

Fig. 4 is a sectional view taken along line 4—4 of Fig. 2.

Fig. 5 is a sectional view taken along line 5—5 of Fig. 2.

Fig. 6 is a sectional view taken along line 6—6 of Fig. 1.

Fig. 7 is a sectional view taken along line 7—7 of Fig. 2.

Fig. 8 is a sectional view showing a slightly modified form of my invention.

Fig. 9 is a front view of the oil transmitting member.

Fig. 10 is a sectional view taken along line 10—10 of Fig. 9.

Fig. 11 is a top plan view of the oil transmitting member shown in Fig. 9.

Fig. 12 is a fragmentary sectional view of an engine rocker arm showing a slightly modified form of my invention.

Referring to the drawing in more detail I have shown a stamped or pressed metal engine rocker arm 1. The arm member is composed of an

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upper half member 2 and a lower half member 3. The lower half 3 has a U-shaped cross section while the upper half 2 has an inverted U-shaped cross section. The upper half 2 telescopes over the lower half 3. In this way double side walls are provided which give greater strength at the desired places. The telescoping halves 2 and 3 form a box-like arm member. The arm member has a substantially rectangular cross section with a greater height near the mid-section than at the ends.

A tubular hub member 4 is secured transverse of the arm member 1 through openings in the side walls of the lower half member 3. A bushing 5 is secured in the hub member 4. The bushing is composed of a suitable bearing material adapted to journal on a rocker shaft bracket (not shown) when assembled in an internal combustion engine.

A nut 6 is secured within one end of the rocker arm member. An adjustable contacting bearing 7 provided with a threaded stem 8 is secured in the nut 6. A locknut 9 locks the adjustable contacting bearing 7 in a predetermined position.

A stamping 10 provides an oil passageway 11 from the bushing to the lower surface of the upper half member 2. An aperture 14 communicates the oil passageway 11 with the upper surface 13 of the engine rocker arm. The stamping 10 is formed from a sheet metal blank. It is formed and folded upon itself to form a member substantially as shown in Figs. 9, 10 and 11. A portion of the stamping has the same curvature as the hub member 4 and fits over the hub member 4 as shown in Fig. 6. The bead 24 formed in the stamped member 10 provided an oil passageway or duct 25 which communicates with the holes 12 in the bushing 4. Thus an oil passageway is formed extending from the inner surface of the bushing 5 to the top surface 13 of the rocker arm. The folded edges of the stamping 10 and the joint between the stamping 10 and the hub 4 may be brazed, welded or otherwise suitably sealed to provide a sealed oil passageway.

When assembled on an engine, oil under pressure from the rocker shaft (not shown) enters the holes 12 and flows through the oil passageways 25 and 11 to the upper surface 13 of the engine rocker arm. In order to reach the ends of the engine rocker arm the oil must flow over the narrow oil metering edges 15 and 16. Here the amount of oil flowing to the ends of the arm is controlled. The quantity of oil flow is controlled by varying the length width ratio of the metering edges 15 and 16. Oil then flows over the flat surfaces 17 and 18 to the ends of the engine rocker arm. It then spills over the ends of the rocker arm, flows down the sides of the arm member and onto the contacting bearings 7 and 19.

A fixed contacting bearing 19 is provided at one end of the rocker arm by a convex formed surface on the under side of the lower half member 3. The contacting bearing 19 may be hardened or otherwise heat treated to obtain a desirable fixed contacting bearing surface.

Flanged portions 20 and 21 extend outwardly from the upper half member 2 of the engine rocker arm providing additional strength and rigidity. The flanges 20 and 21 extend partially around the hub member 4.

The upper half member 2, the lower half member 3, the hub 4, the nut 6, and the stamping 10

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are preferably secured together by means of a silver brazing process. When the arm member is brazed, it is sealed. The double walls on the sides are fused into a solid wall thus increasing the strength and rigidity of the walls.

The upper half member 2, the lower half member 3, the hub 4, the nut 6, and the tube 10 may also be rigidly secured in place by means of spot welding, projection welding, copper hydrogen brazing or any other suitable process or even a combination of these processes.

Fig. 8 discloses a slight modification of my novel engine rocker arm. In this construction annular flanges 22 and 23 are extruded from the walls of the lower half member 3. This provides additional bearing surface for the tubular hub 4. It also provides a greater surface for brazing between the hub 4 and the lower half member 3.

Fig. 12 discloses another modification of my invention. In this form of my novel engine the fixed contacting bearing 26 is riveted to the lower half 3. This fixed contacting bearing 26 can also be rigidly secured in place by brazing or welding.

It will readily be noted that the cross sectional area of my improved engine rocker arm is substantially rectangular at any point. Thus it will be seen that in the construction of my novel engine rocker arm the metal is located away from the center line where greater strength is obtained. This type of construction provides the greatest possible strength for the material used. This is readily explained by the fact that a hollow tube is stronger than a solid rod or bar with the same cross sectional area. Likewise an I-beam is stronger than a round or square bar of the same cross sectional area. Furthermore my engine rocker arm is made from sheet metal which has more strength per unit area than does cast or forged metal. Since my improved engine rocker arm is made from metal that provides greater strength and the arm provides a shape that gives maximum strength, it will readily be seen that my improved engine rocker arm gives more strength for the same weight than do other types of rocker arms.

At the present time higher speeds are being used in tank, tractor, truck, automobile, airplane and many types of army, naval and industrial engines. Experiments have proven that when the present internal combustion engine is speeded up, stronger and heavier valve springs have to be used in order to operate the intake and exhaust valves properly. Heavier valve springs result in greater cost, heavier engines and increased wear, all of which are undesirable features. When my improved engine rocker arm was used, the engine operated very satisfactorily at a higher speed with the original or weaker valve springs. My improved engine rocker has proven to give less engine wear and consequently longer life to the engine. This is due to the fact that my novel engine rocker arm is lighter in weight and consequently the inertia of the oscillating arm is less. The weaker and lighter valve springs that can be used with my improved engine rocker arm further reduce the pressure which results in less wear of the power. Tests have proven that greater horse-power is obtained when my novel engine rocker arm is used.

While I have described the details of several forms of my invention, I do not wish to be limited to the particular forms shown and described as it will be apparent that many modifications therein may be made without departing from the

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scope of my invention as set forth in the appended claims.

Having thus described my invention what I claim is:

1. A sheet metal engine rocker arm, comprising an arm member; said arm member comprising a lower stamped metal member of U-shaped cross section, and an upper stamped member of inverted U-shaped cross section, said upper stamped member being larger in lateral dimensions than said lower stamped member, said upper and said lower stamped members telescoped whereby an arm member of substantial rectangular cross section with vertically laminated walls is provided, an enlarged depth portion in said lower stamped metal member intermediate its ends, a hub member extending transversely across said arm member in said enlarged depth portion and secured in apertures and located entirely in said lower stamped member, an internally threaded member secured between the side walls of said lower stamped member in engagement with said upper stamped member, and an aperture in said upper stamped member and an aperture in said lower stamped member in axial alignment with the bore of said internally threaded member.

2. A hollow sheet metal engine rocker arm comprising an arm member, said arm member comprising an upper inverted U-shaped stamping, a

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lower U-shaped stamping increasing in depth intermediate its ends, a hub member extending transverse to said arm member and secured entirely in said lower stamping, said upper stamping being larger in lateral dimensions than said lower stamping, said upper stamping telescoping said lower stamped member, an aperture in said hub communicating with the bore of said hub, an aperture in said upper stamping communicating with the upper surface thereof, a member provided with a passageway extending from said hub to the upper wall portion of said upper stamping, said passageway extending from said aperture in said hub to said aperture in said upper stamping.

JAMES M. LEAKE.

REFERENCES CITED

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

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