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VALVE GEAR WITH ROCKER ARM GUIDE MEANS

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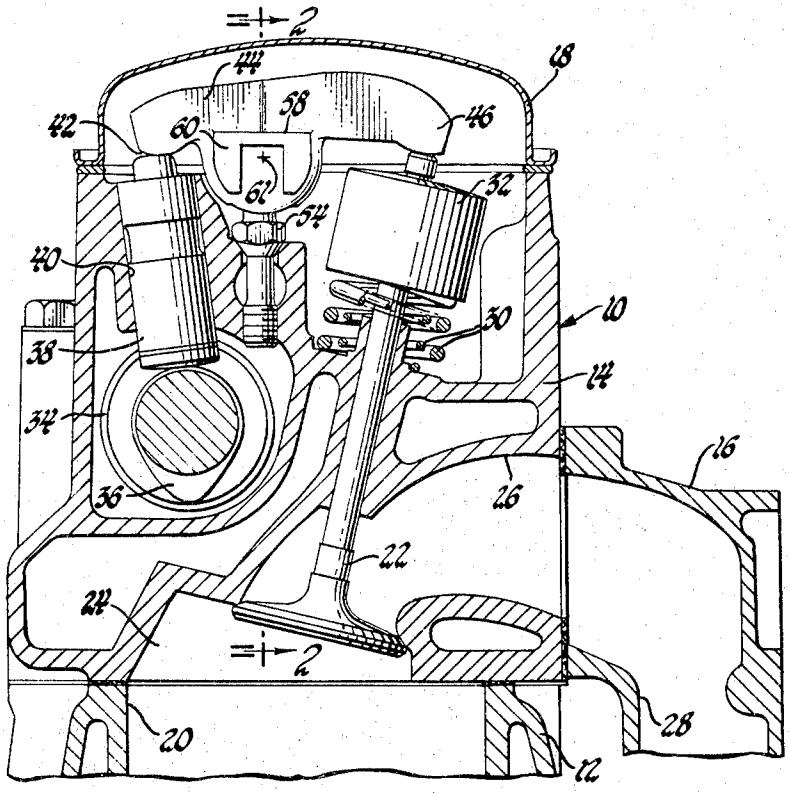


Fig. 1

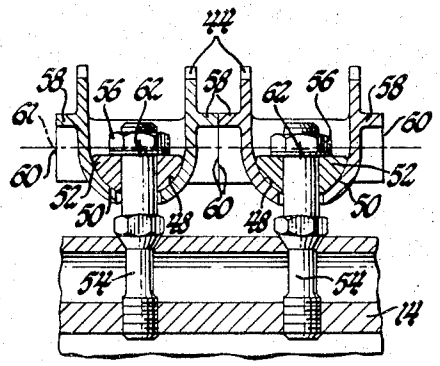


Fig. 2

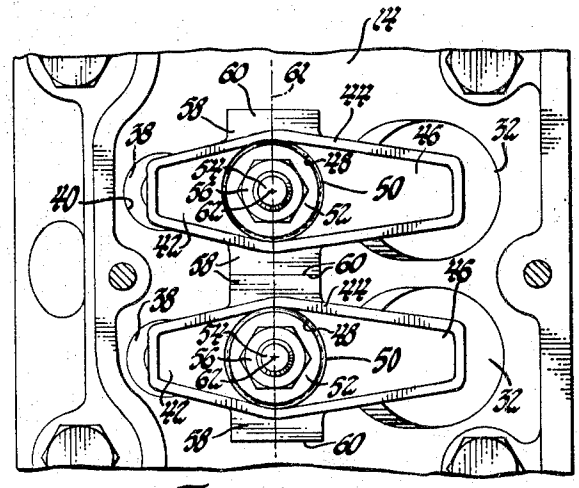


Fig. 3

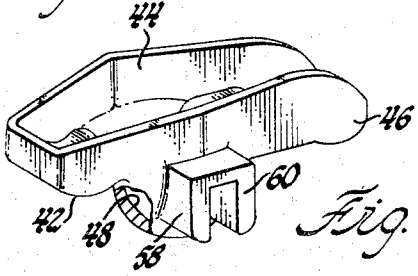


Fig. 4

INVENTOR.
Robert M. Buchwald
BY
Robert J. Outland
ATTORNEY

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VALVE GEAR WITH ROCKER ARM GUIDE MEANS

Robert M. Buchwald, Birmingham, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

The primary embodiment discloses an overhead valve engine having pairs of adjacent rocker arms mounted on ball stud supports for pivotal motion in parallel planes around a common axis. The rocker arms are positively guided by abutment means extending from the rocker arms into engagement with one another around the axis of rocking motion so as to prevent any rotating or tipping of the rocker arms out of their planes of intended movement.

Field of the invention

This invention relates to engine valve gear and more particularly to valve gear having means for guiding adjacent stud-mounted rocker arms of an overhead valve engine.

Description of the prior art

A relatively large number of automotive engines in current use today utilize valve gear having simple stamped or cast metal rocker arms mounted on ball stud pivots which are carried in the cylinder head of the engine. These arrangements commonly include mating spherical surfaces on the ball stud and rocker arm which permit universal movement of the rocker arm on the stud and make necessary the use of some manner of preventing the rocker arm from rotating or tilting out of its desired plane of pivotal action.

Many arrangements for guiding rocker arms mounted in the foregoing manner are shown in the prior art. One commonly used arrangement provides a spherical seat in the rocker arm in which the push rod or valve lifter end is received and guides the rocker arm indirectly by limiting side movement of the push rod or valve lifter.

Summary of the invention

The present invention provides direct means for guiding the rocker arms of engines, such as the overhead valve type, where ball stud mounted rocker arms are arranged in pairs for pivotal movement around a common axis. The arrangement proposed is to provide abutting guiding surfaces on the adjacent rocker arms which engage one another so as to positively limit movements of the two rocker arms to pivotal movement around the axis extending through the centers of the adjacent ball stud spherical bearing surfaces. The rocker arms may be made with guiding surfaces on either side so that the same rocker arm may be used interchangeably as either one of an abutting pair.

The present invention thus provides means for directly guiding the movement of stud mounted rocker arms in an appropriate manner as well as other advantages which will be more clearly seen from the following description of a preferred embodiment chosen for purposes of illustration.

Brief description of the drawings

In the drawings:

FIGURE 1 is a cross-sectional view of an overhead valve internal combustion engine having valve gear including stud mounted rocker arms with guide means according to the invention,

FIGURE 2 is a cross-sectional view taken generally in the plane indicated by the line 2—2 of FIGURE 1 and showing the manner of mounting a pair of abutting rocker arms,

FIGURE 3 is a plan view of the engine of FIGURE 1 with the valve cover removed to show the arrangement of the rocker arms, and

FIGURE 4 is a pictorial view of a rocker arm having abutment means according to the invention.

Description of the preferred embodiment

Referring to the drawings with more particularity, numeral **10** generally indicates an internal combustion engine having a cylinder block **12** on which is mounted a cylinder head **14** carrying an exhaust manifold **16** and a valve cover **18**.

Cylinder head **14** closes the upper end of the cylinders **20** of cylinder block **12** and mounts a plurality of valves **22**. The valves control the flow of gases from intake means (not shown) to the combustion chamber **24** and from the combustion chamber to exhaust passages **26** and **28** formed in the cylinder head and exhaust manifold respectively.

Valves **22** are normally held closed by springs **30** acting against a retainer and oil shield **32** secured adjacent the end of the valve stem. Periodic opening of the valves is provided through valve gear which includes a camshaft **34** rotatably carried in the cylinder head and having cams **36**, each of which engages a valve tappet or lifter **38** reciprocably mounted in a bore **40** of the cylinder head.

Each tappet **38** engages one end **42** of a rocker arm **44**, the other end **46** of which engages the stem of one of the valves **22**. Each rocker arm **44** includes intermediate its ends a spherical seat portion **48** which engages the spherical bearing surface **50** of a retainer member **52**. The retainers **52** are locked in place on the ends of studs **54** as by nuts **56** and the studs **54** are in turn secured in suitable openings in the cylinder head **14**.

Each cylinder **20** has associated with it both an intake and an exhaust valve which are arranged in pairs for reciprocation on parallel axes. The tappets for operating these valves are likewise arranged in pairs for reciprocation on parallel axes, spaced apart equal to the distance of the spacing of the valve pairs. As a consequence, the pairs of rocker arms **44** connecting the pairs of valves with the pairs of actuating tappets are arranged on their respective ball studs for pivotal movement in parallel planes defined by the axes of their associated valves and tappets.

In order to guide the movement of the rocker arms so as to prevent their rotation or tilting out of the desired planes of pivotal movement, the rocker arms **44** are provided with U-shaped abutments **58** which extend laterally adjacent the location of spherical seats **48** and terminate in guiding surfaces **60**. Those surfaces **60** that are located on the sides of each rocker arm toward the adjacent rocker arm of each pair are arranged to engage one another so as to positively position the rocker arms for pivotal movement in their desired planes. This requires that the guiding surfaces **60** lie perpendicular to the axis of rotation **61** extending between the centers **62** of the spherical surfaces **50** of the retainer members **52** and that the guiding surfaces **60** include contacting elements which lie on both sides of every line in the plane of engagement which is perpendicular to the rotational axis **61**. Since the U-shaped abutments have elements on either side of axis **61** and these elements extend both above and below the axis, the abutting surfaces **60** meet this requirement and provide for the positive guidance desired.

In order to provide a minimum parts inventory, a single rocker arm configuration may be utilized for both

members of the pair, this requiring that each rocker arm have abutments extending laterally from both sides of its spherical seat location. In this way abutting surfaces are in position to engage the adjacent rocker arm no matter in which position the rocker arm is used.

The particular rocker arm design disclosed is designed to be formed as a casting utilizing simple cores with a parting line extending along the upper edge of the U-shaped abutments **58**, hence the open design of the upper portion of the rocker arm and the lower sides of the abutments. It should be obvious that a stamped rocker arm construction could be designed with suitable abutting surfaces to accomplish the same purposes. Other suitable rocker arm designs could also be utilized.

From the foregoing description, it should be apparent that this invention comprises means for directly guiding the pivotal movement of pairs of stud mounted rocker arms arranged for rocking motion in parallel planes around a common axis. Since numerous changes in the manner of applying the invention could be made by those skilled in the art, it is intended that the invention not be limited except by the language of the following claims.

I claim:

1. Valve gear for an internal combustion engine comprising

support means having a pair of spherical bearing surfaces arranged on spaced centers defining an axis,

a pair of rocker arms retained on said support means, each engaging one of said spherical surfaces for pivotal movement thereon, and

abutment means on said rocker arms and in lateral engagement with one another at points lying in a plane intermediate said spherical surfaces and perpendicular to said axis so as to confine movement of said rocker arms to rocking motion centered on and perpendicular to said axis.

2. Valve gear as defined in claim **1** wherein said rocker arms each comprise

a central seat portion engageable with one of said spherical surfaces and

a pair of oppositely extending ends each engageable with reciprocable members,

said abutment means being disposed laterally of said seat portion.

3. Valve gear as defined in claim **2** wherein said rocker arms each include a pair of said abutment means disposed laterally opposite one another, said rocker arms being identical and interchangeably mountable on either of said spherical surfaces.

4. Valve gear for use with an overhead valve engine having a cylinder head, said valve gear comprising

a pair of spaced ball studs mounted on one side of said cylinder head and having spherical surfaces generally facing said side,

a pair of rocker arms each having a central seat portion engaging the spherical surface of one of said ball studs for pivotal movement thereon, said rocker arms each further including a pair of oppositely extending ends, each engaging reciprocable members of the valve train, and

abutment means, extending laterally from each of said rocker arms into engagement with one another at points in a plane perpendicular to an axis passing through the centers of said spherical surfaces, said abutment means being engageable with one another in said plane on both sides of all perpendiculars to said axis lying in said plane,

whereby pivotal movement of said rocker arms is confined substantially to movement in parallel planes perpendicular to said axis.

5. The valve gear of claim **4** wherein the abutment means of said rocker arms extend laterally from both sides thereof, said rocker arms being identical and interchangeably mountable on either of said ball studs.

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AL LAWRENCE SMITH, *Primary Examiner.*