June 7, 1960 J. G. OECHSNER 2,939,443

POPPET VALVE OPERATING MECHANISM

Filed Nov. 25, 1958 2 Sheets-Sheet 1

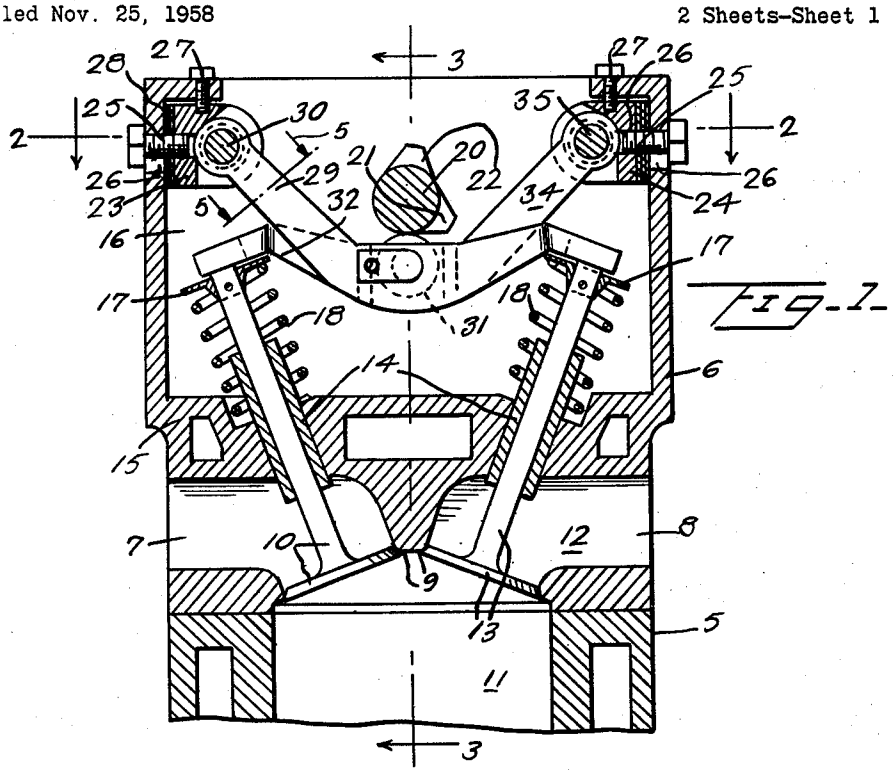


Fig. 1.

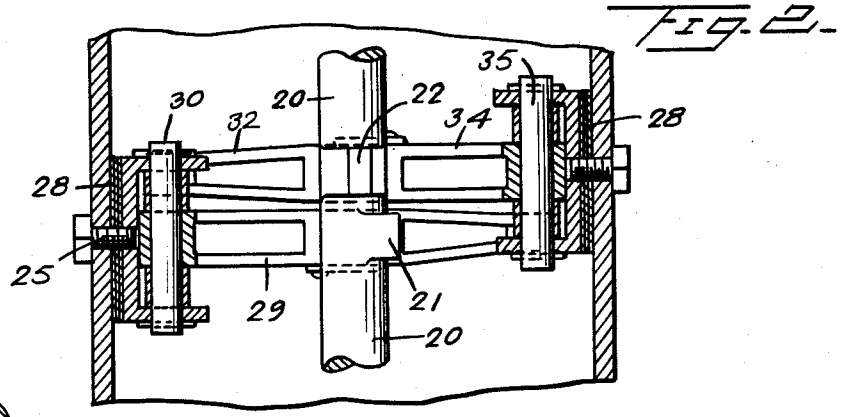


Fig. 2.

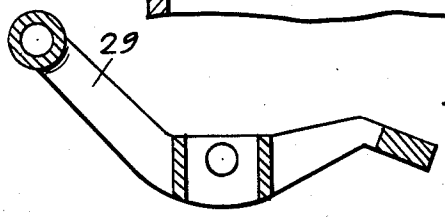


Fig. 5.

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POPPET VALVE OPERATING MECHANISM

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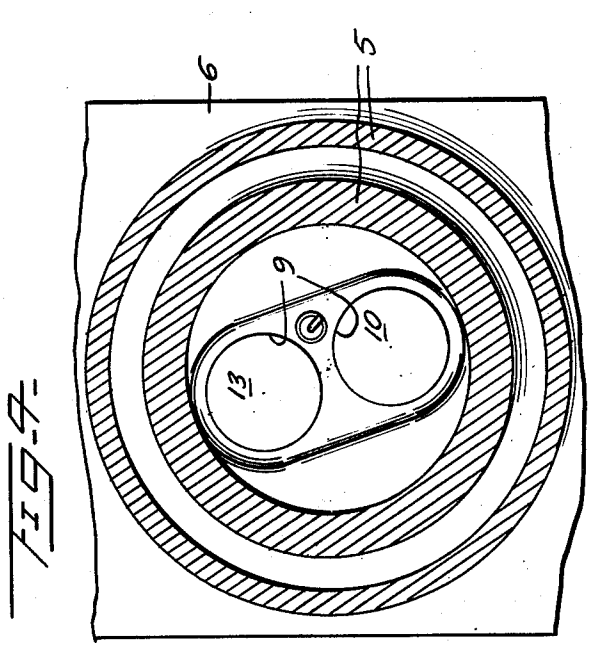


FIG. 4.

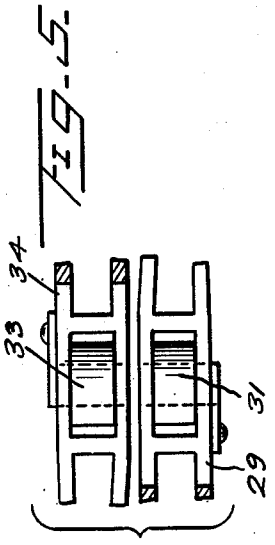


FIG. 5.

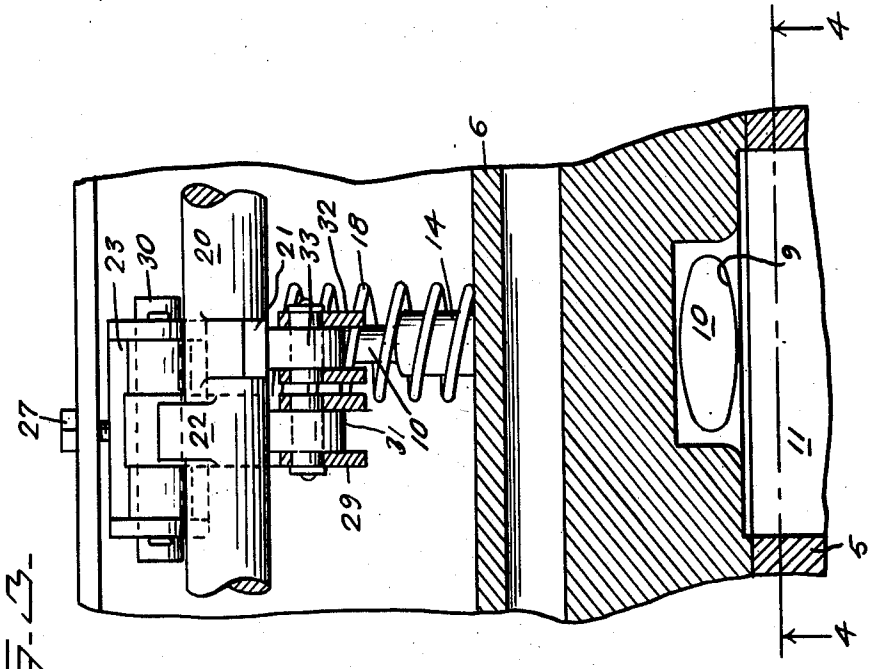


FIG. 3.

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POPPET VALVE OPERATING MECHANISM

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6 Claims. (Cl. 123—90)

This invention relates to internal combustion engine construction and more particularly to the valve operating mechanism for the overhead valve type of engines.

A primary object of the invention is to provide a poppet valve assembly wherein the rocker arms are journalled at one of their respective ends in such a way that lateral thrust on the valve stems is eliminated and at the same time reducing weight and friction to a minimum.

An important object of the invention is to provide a valve operating mechanism wherein due to the length of the rocker arms, the leverage is substantially increased permitting the use of relatively light valve springs.

Still another object of the invention is to provide a valve operating mechanism wherein a ratio between the valve lift and the cam lift is two to one, resulting in an exceptionally fast valve action with a low lift cam.

Another object of the invention is the provision of a valve mechanism wherein single cam shaft valves may be set at the desired angles, permitting the use of substantially large valves which may be staggered or set off center permitting straight line rocker arms which structure also produces a turbulence in the combustion chamber which will promote a better ram and breathing effect much desired in modern high compression motors, and also permits use of spark plug in the near center of combustion chamber.

Another object of the invention is the method of adjusting valve tappet clearance eliminating the customary heavy screw and nut over the valve or push rod, by the use of shims to adjust accurate valve timing.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts, hereinafter more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangements of parts without departing from the spirit of the invention as claimed.

Referring to the drawings:

Figure 1 is a vertical sectional view through the head of an engine block, illustrating the valve mechanism as mounted therein.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a sectional view taken substantially on line 3—3 of Figure 1.

Figure 4 is a sectional view taken on line 4—4 of Figure 3.

Figure 5 is a sectional view of rocker arms 29 and 34 showing detail of rollers 31 and 33 taken on line 5—5 of Figure 1.

Figure 6 is a longitudinal sectional view through one of the rocker arms.

Referring to the drawing in detail, an engine block is indicated generally by the reference character 5 and includes a cylinder head 6 which is of the usual "overhead valve type," formed with an inlet manifold connection 7 and an exhaust manifold connection 8.

At the inner end of the inlet manifold connection 7, is a valve seat 9 against which the poppet valve 10 seats, in controlling the passage of a fuel charge into the cylinder 11.

At the inner end of the exhaust manifold connection 8, is a valve seat 12 against which the exhaust valve 13 engages allowing the products of a fire charge to pass from the cylinder.

As clearly shown by Figure 1 of the drawings, the valves 10 and 13 are disposed at oblique angles with respect to the cylinder wall, and are mounted in bearings 14, mounted in the wall 15 that divides the cylinder head into an upper valve chamber 16 into which the valve stems of the valves 10 and 13 extend.

The ends of the valve stems of valves 10 and 13, that are disposed within the valve chamber 16, are provided with spring retainer disks 17 that are secured to said valve stems and against which the upper ends of the coiled spring 18 engages, the lower ends of said coiled spring resting in the cutout portions 19 of the partitioning wall 15 to normally urge the valves 10 and 13 to their seats.

The reference character 20 indicates a cam shaft that is disposed horizontally within the valve chamber, wherein it is provided with cams 21 and 22 which are so arranged on the shaft 20 to effect the proper timing of the valves.

Mounted for vertical adjustment within the upper valve chamber 16, and arranged diametrically opposite to each other, are bearing blocks 23 and 24, the bearing blocks being provided with adjusting screws 25 that extend through elongated openings 26 elongated vertically, so that the bearing blocks may be adjusted vertically, to compensate for wear and insure the proper timing of the valves.

Associated with each bearing block is a vertical lock bolt 27, that operates to secure the bearing blocks in their positions of vertical adjustment.

It might be here stated that shims 28 may be provided between the bearing blocks and wall of the valve chamber 16, to maintain proper position of the bearing blocks 23.

A rocker arm 29 has one of its ends journalled on the shaft 30, the rocker arm being curved, as better shown by Figure 1 of the drawings, so that the opposite end of the rocker arm rests on the end of the stem of the valve 13, the rocker arm 29 being provided with a roller 31 with which the cam 21 contacts, normally moving the rocker arm 29 downwardly, operating the valve 13.

The cam 22 engages the roller 33 that is mounted on the rocker arm 34 that has one of its ends journalled on the shaft 35 that in turn is mounted on the bearing block 24. The opposite end of the rocker arm 34 contacts the upper end of the valve stem forming a part of the valve 10.

From the foregoing it will be seen that the rocker arms 29 and 34 are journalled at one of their respective ends, while the opposite end thereof contacts the end of the poppet valve associated therewith to the end that the leverage is substantially increased permitting the use of relatively light valve springs for accomplishing the desired purpose.

It will also be seen that because of the rocker arm construction, lateral thrust on the valve stems is eliminated, and the additional weight incident to mounting the rocker arms at points intermediate their ends, is also reduced to a minimum.

I claim:

1. In an internal combustion engine, a cylinder head including an upper valve chamber, poppet valves hav-

ing upwardly projecting stems mounted within said valve chamber, valve springs mounted on said valve stems normally closing said valves, bearing blocks mounted within said valve chamber, rocker arms having one of their respective ends pivotally secured to a bearing block, the opposite ends of said rocker arms resting on a valve stem, each of said rocker arms embodying a pair of elongated side members, having openings in one end and in the center thereof, said side members having a center portion horizontally disposed on the top and convex on the bottom, said side members having one of their ends rectangular in side plan form and upwardly inclined from one end of said center portion, said rectangular portions being parallel to each other, and the other end of said side members being upwardly inclined from said center portions at a lesser degree than the other end of said side members, the upper and lower edges of said last-mentioned ends of said side members inclined towards each other and terminating in an angularly disposed solid end, said second end of said side members converging towards said solid end when viewed in plan form, said rocker arms terminating in a tubular end on the outer end of said rectangular portion, a cam shaft extending into said valve chamber, and cams on said shaft contacting said center portion of said rocker arms intermediate the ends thereof, opening said valves against the force of said spring.

2. In an internal combustion engine, a cylinder head including an upper valve chamber, poppet valves having upwardly projecting stems mounted within said valve chamber, valve springs mounted on said valve stems normally closing said valves, bearing blocks mounted within said valve chamber, rocker arms having one of their respective ends pivotally secured to a bearing block, the opposite ends of said rocker arms resting on a valve stem, said rocker arms embodying a pair of elongated side members, having openings in one end and in the center thereof, said side members having center portions horizontally disposed on the top and convex on the bottom, said side members having one of their respective ends rectangular in plan form and upwardly inclined from one end of said center portion, said rectangular portions being parallel to each other, and the other ends of said side members being upwardly inclined from said center portion at a lesser degree than the opposite other ends of said side members, the upper and lower edges of said last-mentioned ends of said side members being inclined upwardly towards each other and terminating in angularly disposed solid ends, said second ends of said side members converging towards said solid ends when viewed in plan form, the other end of each rocker arm terminating in a tubular bearing, vertical webs in longitudinal spaced relation to each other, said webs separating said side members, a cam shaft extending into said valve chamber, and cams on said shaft contacting said rocker arms intermediate the ends thereof, opening said valves against the force of said springs.

3. In an internal combustion engine, a cylinder head including a valve chamber with separate intake and exhaust poppet valves having valve stems projecting outward from said cylinder head at oblique angles on opposite sides right and left from the longitudinal axis of a cam shaft, said valves being staggered fore and aft to

permit longitudinally curved rocker arms to operate side by side in a straight line, springs mounted on said valves for returning said valves to their closed positions, rollers operating in vertical planes mounted intermediate the ends of said rocker arms, and a cam shaft operating within said valve chamber having cams contacting said rollers, operating said rocker arms and valves.

4. In an internal combustion engine, a cylinder head including a valve chamber with a cam shaft operating separate intake and exhaust poppet valves having valve stems projecting outward from said cylinder head at oblique angles on opposite sides right and left from longitudinal axis of said cam shaft, said valves being staggered fore and aft to permit longitudinally curved rocker arms to operate side by side in a straight line, springs mounted on said valves for returning said valves to their closed positions, and rollers operating in vertical planes, mounted intermediate the ends of said rocker arms, said cam shaft operating on centerline within said valve chamber, the cam lobes operating the valves on right and left side of said cylinder head by the connecting rocker arms.

5. In an internal combustion engine, a cylinder head including a valve chamber with a cam shaft operating separate intake and exhaust poppet valves having valve stems projecting outward from said cylinder head at oblique angles on opposite sides right and left from longitudinal axis of said cam shaft, said valves being staggered fore and aft to permit longitudinally curved rocker arms to operate side by side in a straight line, the opposite ends of said rocker arms engaging a valve stem on the opposite side of the cylinder head from the pivoted side, and springs mounted on said valves for returning said valves to their closed positions, and rollers operating in vertical planes, mounted intermediate the ends of said rocker arms, said cam shaft operating on centerline within said valve chamber, the cam lobes operating the valves on right and left side of said cylinder head by the connecting rocker arms.

6. In an internal combustion engine a cylinder head including a valve chamber with a single cam shaft operating separate intake and exhaust poppet valves having valve stems projecting outward from said cylinder head at oblique angles on opposite sides right and left from longitudinal axis of said cam shaft, said valves being staggered fore and aft from center line of cylinder longitudinally, to permit longitudinally curved rocker arms to operate side by side in a straight line, said rocker arms pivoted on manually adjusted pivot blocks secured on each side of the vertical walls of the cylinder head, said rocker arms extending in their longitudinal curved length to operate the valve on opposite right and left sides of the assembly, which eliminates the use of a separate cam shaft for the intake valves and exhaust valves.

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