

March 22, 1938.

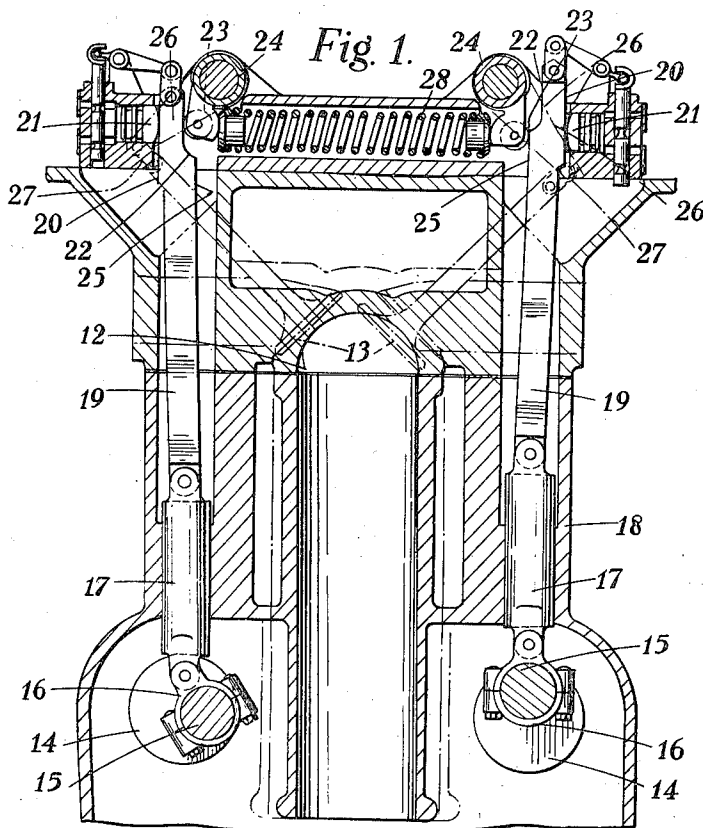
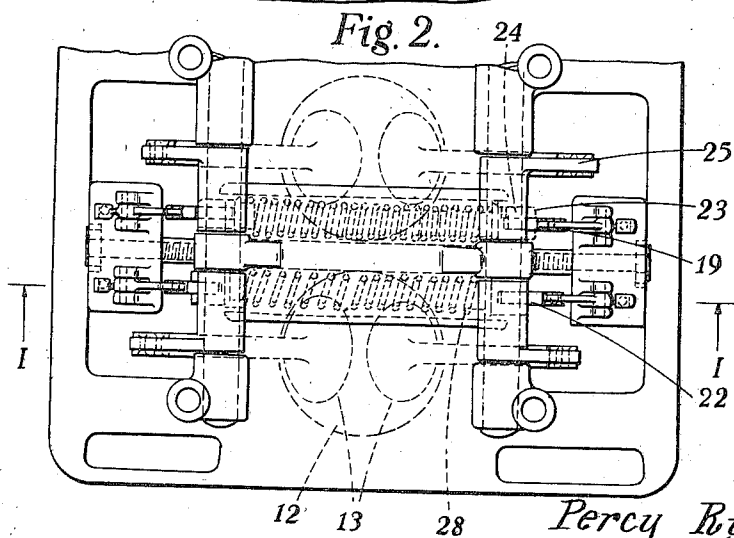
P. RILEY

2,111,735

VALVE OPERATING MECHANISM FOR INTERNAL COMBUSTION ENGINES

Filed Jan. 14, 1937

2 Sheets-Sheet 1



INVENTOR

Percy Riley

BY
Mawhinney & Mawhinney
ATTORNEYS.

March 22, 1938.

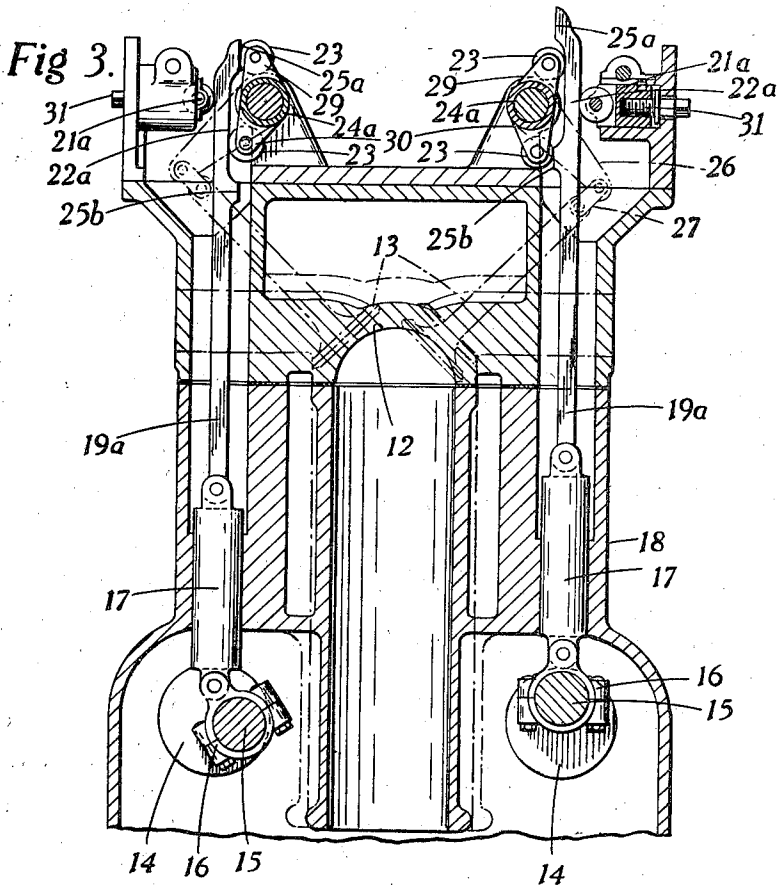
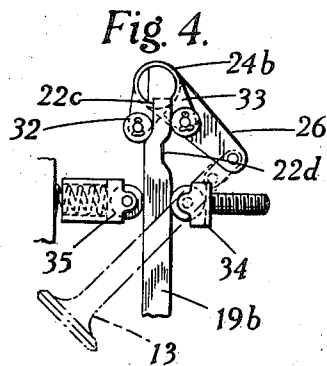
P. RILEY

2,111,735

VALVE OPERATING MECHANISM FOR INTERNAL COMBUSTION ENGINES

Filed Jan. 14, 1937

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,111,735

VALVE-OPERATING MECHANISM FOR INTERNAL COMBUSTION ENGINES

Percy Riley, Coventry, England

Application January 14, 1937, Serial No. 120,639
In Great Britain January 17, 1936

6 Claims. (Cl. 123—90)

This invention relates to valve-operating mechanism for internal-combustion engines such as include overhead valves.

The main object is to provide an improved operating mechanism with which very satisfactory cam control can be obtained, whilst difficulties arising from the use of new cylinder gaskets, for example, will be largely obviated, and expansion as working temperatures are reached will be less prone to interfere with the valve clearances. Many of the advantages obtainable with an overhead camshaft can be obtained, by means of the present invention, without the expense and difficulties of operation of overhead camshafts being encountered.

Valve gear for an internal-combustion engine with an overhead valve, according to the invention, includes a rotatable crank, eccentric, cam or other member, a cam bar slidable thereby, and a rocker for the valve adapted to be engaged by the profile of the cam bar so as to open the valve on movement of the cam bar in one direction.

In the accompanying diagrammatic drawings:—

Figure 1 is a sectional elevation, taken on the line I—I of Figure 2, mainly of the cylinder block of an internal-combustion engine fitted with valve gear according to the invention;

Figure 2 is a fragmentary plan thereof;

Figure 3 is a view similar to Figure 1 of a modified arrangement; and

Figure 4 is a detail view of a further modification.

Like numerals indicate like parts throughout the drawings.

In the construction of Figures 1 and 2 there is illustrated a hemi-spherical combustion chamber 12 with a pair of overhead poppet valves 13, 13 set at approximately ninety degrees to one another and across the engine. Obviously, however, by the use of different actuating rockers the valves may be set at any desired angle. The drawings show two operating shafts 14, 14 arranged on opposite sides of the engine, and conveniently one of these is disposed where the camshaft would be of an ordinary engine with side-by-side valves or with push-rod-operated overhead valves. Each operating shaft has fast on it a crank-pin or other eccentric 15 for each valve disposed on that side of the engine. The eccentric straps 16 are in each case hinged to links 17 guided in the cylinder block 18 and in turn hinged, respectively, to slidable cam bars 19. Each cam bar is formed on its non-operative face 55 with a smooth portion 20 in engagement with an

abutment 21. Its operative face has a recessed portion 22 disposed in proximity to the roller 23 on the shorter arm of the associated rocker 24 and joined by a smooth curve to the non-recessed or raised portion 25. The rocker has the longer arm 26 linked at 27 to actuate the adjacent valve, the shorter arm being arranged to engage one end of a common spring means 28 acting on the rocker to urge the valve to the closed position.

At the left-hand side of Figure 1 the valve is shown in the closed position, the cam bar being near the bottom of its travel and the recessed portion 22 of the cam bar being engaged by the short arm of the rocker. At the right-hand side of Figure 1 the cam bar is in its raised position and the non-recessed portion is in engagement with the short arm of the rocker, the latter having been caused to rotate clockwise and thus open the valve.

The abutment 21 in this case is assumed to be a hydraulic one of the kind described and claimed in the specification of my co-pending patent application Serial No. 120,638, filed January 14, 1937. It may obviously, however, take other forms—for example, as shown in Figure 3.

It will be evident too that use may be made of only a single operating shaft 14, this having one eccentric per valve and each eccentric being associated with its own cam bar and each cam bar with its own rocker. Half the rockers act directly on the adjacent valves, as described in connection with Figures 1 and 2, the remaining ones being linked to corresponding rockers through which the valves on the remote side of the engine can be actuated.

Whereas the valves in the construction of Figures 1 and 2 are spring-returned, in the construction of Figure 3 they are positively moved in both directions. Here, each of the rockers 24a has two short arms 29, 30 carrying rollers which co-act with the operative face of the cam bar 19a. This includes a recessed portion 22a between two prominent portions 25a, 25b joining the recessed portion with smooth curves. When the cam bar is in a lowered position, as shown on the left-hand side of Figure 3, the upper arm 29 of the associated rocker is engaged with the upper flat 25a and the lower arm 30 with the recessed portion 22a, the rocker having been turned in a clockwise direction to the fullest extent to effect closure of the valve. The profiled end of the cam bar may be sufficiently springy to ensure that the valve is closed on to its seat at an appropriate pressure in these conditions. When the cam bar is fully raised, as shown at the right-hand

side of Figure 3, the associated rocker has been rotated in a clockwise direction to the fullest extent to effect opening of the adjacent valve, the upper arm 29 engaging the recessed portion 22a and the lower arm 30 the lower flat 25b.

In this construction the abutments 21a carrying rollers are adapted to be positioned as necessary by means of the bolts 31.

It will be evident that, as in the construction above described in connection with Figures 1 and 2, use may be made, if desired, of only a single operating shaft 14, all the rockers being on that side of the engine on which the operating shaft is arranged and half of them being linked to rockers associated with the valves on the remote side of the engine.

The detail view of Figure 4 shows an alternative arrangement whereby a slidable cam bar 19b can positively actuate an associated valve 13 in both directions. The cam bar in this case has a recess 22c on one face, to engage one short arm 32 of a rocker 24b, and a lower recess 22d on the other face to co-act with another short arm 33 of the rocker 24b. 34 represents a fixed but adjustable abutment, and 35 a spring-pressed abutment. In the lower position of the cam bar, as shown, the rocker has rotated in an anti-clockwise direction to the fullest extent possible to close the valve. As the cam bar rises the rocker is rotated clockwise, as will be easily understood, to effect opening of the valve. During closing, however, the sideways thrust of the cam bar is taken by the spring-pressed abutment 35, which thus ensures closing the valve on to its seat at an appropriate pressure.

By means of the invention I provide overhead valves for an internal-combustion engine without the size of the engine being materially increased, whilst very satisfactory valve operation can be obtained. Furthermore, in the case of a V-type engine the one operating shaft can be used for actuating the valves of both the cylinder banks, which results in further economy.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In an internal-combustion engine, an overhead valve, a three-armed rocker having one arm connected to actuate said valve, a rotatable eccentric member, a reciprocable cam bar, and means interconnecting said cam bar and rotatable member whereby said cam bar will be reciprocated on the rotation of said rotatable member, said cam bar having a profile portion, different parts of which are continuously engaged, respectively, by the other arms of said rocker, such as to effect opening of the valve on movement of the cam bar in one direction and closing thereof on movement of the cam bar in the other direction.

2. In an internal-combustion engine, a valve, a three-armed rocker having one arm connected to actuate said valve, a movable cam bar having two high points spaced apart to alternately engage the two remaining arms of said rocker, said cam bar having between said high points an intermediate low point to receive the two remaining arms of the rocker when the same are not engaged by said high points, and an abutment engaging said cam bar on the face thereof opposite to said high and low points for maintaining the cam bar up against said rocker arms.

3. In an internal combustion engine, a valve, and mechanism for operating said valve, said mechanism comprising, a reciprocating cam bar having a resilient floating upper end portion provided with high and low points on one face thereof, valve actuating means engaged by said high and low points, and an abutment positioned to engage the face of said resilient portion of the cam bar opposite to said high and low points whereby to maintain the floating resilient upper portion of said cam bar with the high and low points against said actuating means.

4. In an internal combustion engine, a valve, and mechanism for operating said valve, said mechanism comprising, a movable cam bar having high and low points, valve actuating means engaged alternately by said high and low points, an abutment engaged by the face of said cam bar opposite to said high and low points, said abutment including a support, a block slidably mounted in said support toward and from said cam bar, and means for adjusting said block toward and from the cam bar.

5. In an internal combustion engine, a valve, and mechanism for operating said valve, said mechanism comprising, a movable cam bar having high and low points, valve actuating means acted on by said high and low points, a support, a movable block in said support having a movement toward and from said cam bar, means for adjusting said block in said support toward and from said cam bar, and anti-friction means carried by said block and engaging said cam bar on the face thereof opposite to said high and low points.

6. In an internal combustion engine, a valve, and mechanism for operating said valve, said mechanism comprising, a movable cam bar, valve actuating means moved by the cam portion of said bar, abutments disposed on opposite sides of said cam bar, means for adjusting one of said abutments toward and from the cam bar, and means for yieldably urging the other abutment toward the cam bar.

PERCY RILEY.