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VALVE CONTROLLING MECHANISM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JAN. 31, 1913.

1,155,044. Patented Sept. 28, 1915.

Fig. 1.

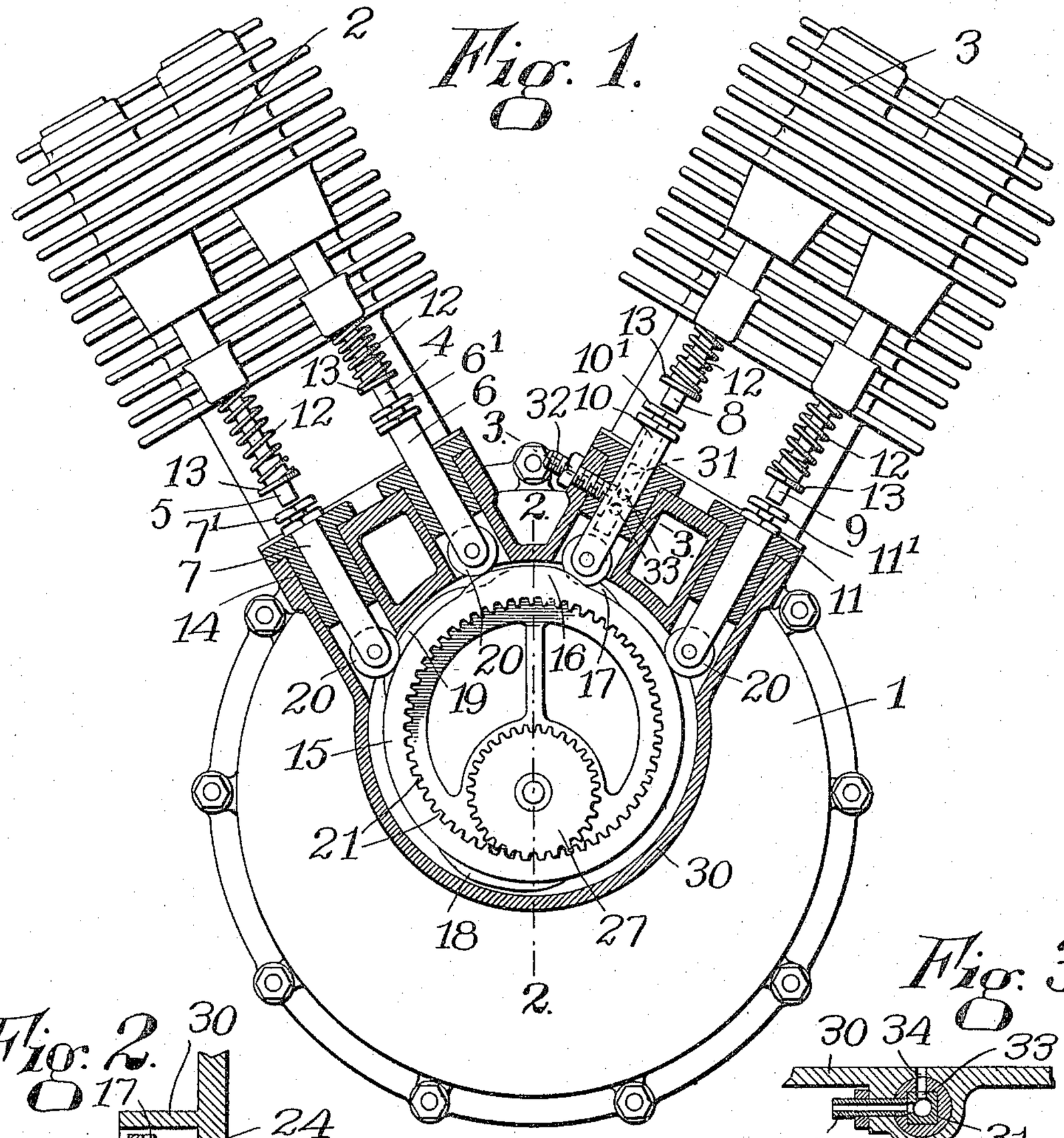

Fig. 2.

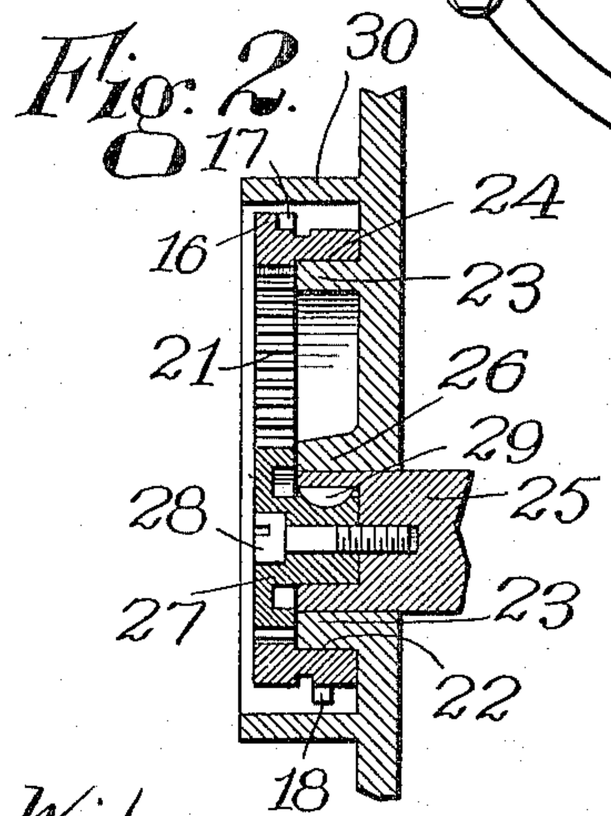

Fig. 3.

Witnesses

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VALVE-CONTROLLING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,155,044. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed January 31, 1913. Serial No. 745,325.

To all whom it may concern:

Be it known that I, LYMAN H. COBB, a citizen of the United States, residing at Fitchburg, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Valve-Controlling Mechanism for Internal-Combustion Engines, of which the following, together with the accompanying drawing, is a specification.

My invention relates to valve controlling mechanism and more particularly to mechanism for controlling the operation of the intake and exhaust valves of internal combustion engines, the invention being particularly applicable to engines designed for motorcycles.

One object of the invention is to provide a valve controlling mechanism which shall be extremely simple so as to be of light weight and, further, so as not to get out of order easily. It is obvious that these features are particularly desirable in connection with motorcycles.

One form of the invention will be described in connection with the accompanying drawing, in which—

Figure 1 is a side elevation of the crank case and cylinders of a motorcycle engine, a portion of the crank case being removed to show the valve controlling mechanism as constructed in accordance with my invention; Fig. 2 is a sectional view on the line 2—2 of Fig. 1; and Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

Like reference characters refer to similar parts in the different figures.

The crank case 1 and the cylinders 2 and 3 are rigidly joined in any suitable manner, the cylinders being set 60° apart about the crank shaft. An intake valve stem 4 and an exhaust valve stem 5 for the cylinder 2 are operated by tappets 6 and 7 respectively. An intake valve stem 8 and an exhaust valve stem 9 of the cylinder 3 are similarly operated by tappets 10 and 11 respectively. The valve stems are provided with spiral springs 12 confined between shoulders 13 on the valve stems and the surfaces of the cylinders and tending to maintain their respective valves in closed position.

The tappet 7 reciprocates in a bushing 14 mounted in the crank case, the tappet being held by the bushing in alinement with the valve stem 5 operated thereby. Each of the other three tappets 6, 10 and 11 are similarly mounted in bushings carried by the crank case.

The upper ends of the tappets 6, 7, 10 and 11 are provided with threaded openings into which are screwed adjusting screws 6′, 7′, 10′ and 11′, these adjusting screws being retained in any desired adjustment by lock nuts carried thereby and screwed down against the ends of the tappets. The adjusting screws serve to adjust the effective lengths of the tappets so as to move their respective valves through the proper distances.

The lower end of each of the tappets engages the external face or periphery of a ring shaped member 15, the periphery of this ring shaped member being provided with cams 16 and 17 for operating the tappets 6 and 7 respectively and with cams 18 and 19 for operating the tappets 10 and 11 respectively. The cams are, of course, located at slightly different distances from the edge of the ring-shaped member 15 so that their paths will not coincide, the lower ends of the tappets being similarly positioned so that each may lie normally within the path of the proper cam. In order to reduce friction, the cam engaging ends of the tappets are provided with antifriction rollers 20.

One edge of the internal face of the ring-shaped member 15 is provided with gear teeth 21 and the other edge is finished to form a cylindrical bearing surface 22. The crank case 1 carries a cylindrical flange 23, the flange being preferably integral with the crank case. The external cylindrical face of this flange is finished to provide a bearing surface 24 to fit within the bearing surface 22, the flange 23 thus forming a bearing for the ring-shaped member 15 to rotate upon. The driving shaft 25, mounted in a suitable bearing 26 formed in the crank case, drives a pinion 27 which engages the teeth 21 of the ring-shaped member 15. It will be seen that the ring-shaped member 15 is really an internal gear wheel carrying the cams 16, 17, 18 and 19 on its periphery and driven by the pinion 27. The pinion 27 is secured to the shaft 25 by a screw 28 and a key 29. The internal gear wheel 15 and the pinion 27 are surrounded by a protecting flange 30 and any suitable cover may be provided to exclude dust and other foreign matter.

In order that objectionable differences in pressure within the crank case, caused by the movements of the pistons and other parts of the engine, may be prevented, the tappet 10 is hollow, the space 31 within the tappet having communication through one side of the tappet with a pipe 32 leading to a point outside the crank case, so that the space 31 within the tappet is always in communication with the outside air. Two other openings 33 are provided through another side of the tappet so as to move into and out of register with two openings 34 leading from the inner surface of the bushing carrying the tappet 10 to the interior of the crank case 1. One opening 33 and one opening 34 would be sufficient if large enough in cross section, but the number of openings shown is preferable in order that air and other gases may pass to and from the interior of the crank case with as little resistance as possible. Each time that the tappet 10 is raised by its cam 18, the openings 33 will come into register with the openings 34, thus establishing communication between the interior of the crank case and the outside air by way of these openings, the space 31 and the pipe 32. The tappet 10 with its cam 18 thus acts to prevent objectionable changes in pressure within the crank case, or, as it is sometimes said in the art, it acts as a breather. The space 31 may be a continuation of the threaded opening provided for the adjusting screw 10′, this adjusting screw serving to close the upper end of the space 31.

The shaft 25 is driven directly by the connecting rods of the engine and so the pinion 27 rotates once for each complete up and down stroke of one of the pistons. In the engine shown, each piston makes two such complete strokes during each cycle and, therefore, each valve must operate once while its piston is making two complete strokes. For this reason the number of teeth on the internal gear wheel 15 is twice as great as the number of teeth on the pinion 27, so that the gear wheel will rotate once while the pinion driving it is rotating twice.

While I have illustrated the principles of my invention by showing and describing the details of one form thereof, I do not wish to be limited to such details as it is obvious that certain changes may be made within the scope of the appended claims without departing from the spirit of the invention; but

What I claim as new and desire to secure by Letters Patent is:

1. In an internal combustion engine, a crank casing, a crank shaft journaled in said crank casing, an annular rotatably mounted valve operating member surrounding said crank shaft and eccentric thereto, and having an internal gear thereon, and a pinion carried by said crank shaft and meshing with said internal gear.

2. In an internal combustion engine, a pair of cylinders disposed at an acute angle, a common crank casing therefor, a crank shaft journaled in said casing, a bearing formed on said crank casing surrounding said crank shaft and eccentric thereto, an annular member journaled on said bearing, and having an internal gear, a pinion on said crank shaft meshing with said internal gear, and cams on the periphery of said annular member for actuating the valves of said cylinders.

3. An internal combustion engine including a ring-shaped member with one edge of its internal face provided with gear teeth and the other edge of said face finished to form a cylindrical bearing surface, the external face of said member being provided with a cam, a pinion engaging the gear teeth to drive said member and cam, a bearing engaging the bearing surface of the ring-shaped member to support it, and valve-operating means projecting normally into the path of the cam to be moved thereby.

4. An internal combustion engine including a crank case, a cylindrical flange carried by the crank case and having its outer surface finished to form a bearing, a ring-shaped member having an internal bearing surface and rotatably mounted upon said cylindrical flange, the external face of the ring-shaped member being provided with a cam, valve-operating means projecting normally into the path of the cam, and means for driving the ring-shaped member.

5. An internal combustion engine including a crank case, a cylindrical flange carried by the crank case and having its outer surface finished to form a bearing, an internal gear wheel with its gear teeth located at one edge of its internal face, the other edge of said face being finished to form a bearing surface to fit over the flange on the crank case, the external face of the gear wheel being provided with a cam, valve-operating means driven by the cam, and a pinion to drive the gear wheel.

Dated this 24th day of January, 1913.

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Witnesses:
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