C. S. MURDOCK.

VALVE OPERATING MECHANISM FOR ENGINES.

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1,305,397.

Patented June 3, 1919.

Fig. 1.

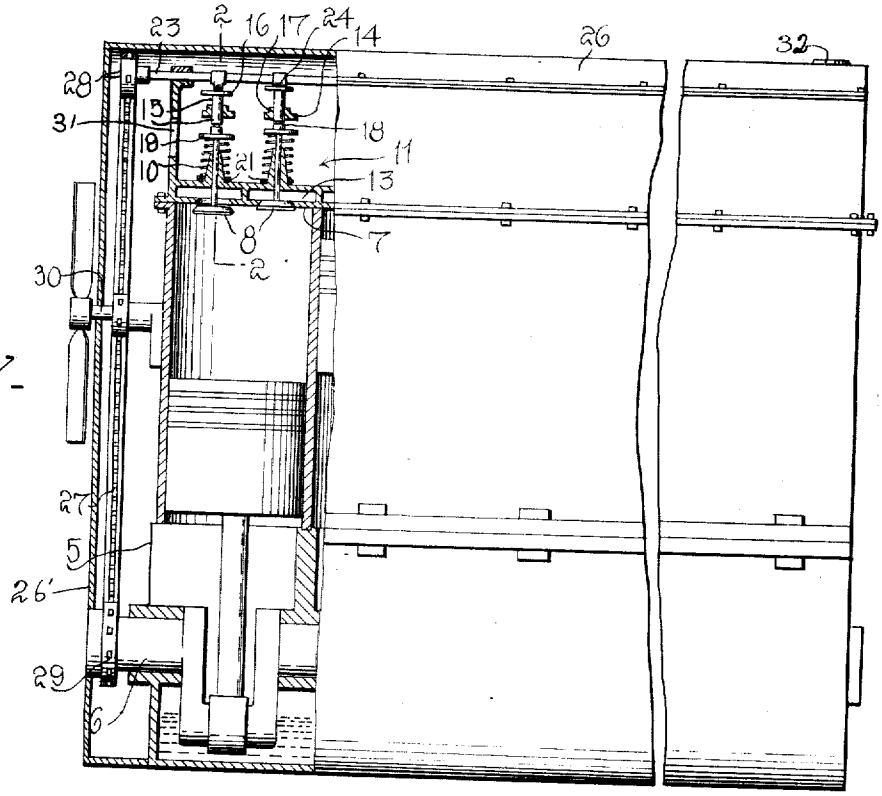


Fig. 2.

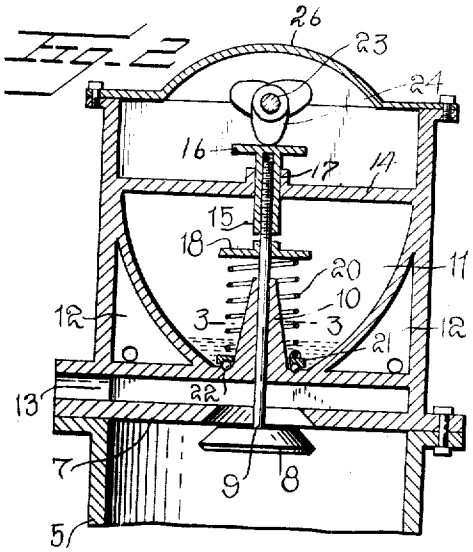


Fig. 3.

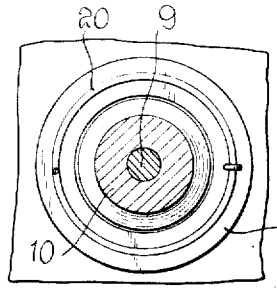
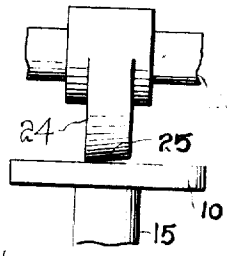


Fig. 4.



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VALVE-OPERATING MECHANISM FOR ENGINES.

1,305,397. Specification of Letters Patent. Patented June 3, 1919.

Application filed June 8, 1918. Serial No. 239,071.

To all whom it may concern:

Be it known that I, CHESTER S. MURDOCK, a citizen of the United States, residing at Booneville, in the county of Logan and State of Arkansas, have invented certain new and useful Improvements in Valve-Operating Mechanisms for Engines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improved valve operating mechanisms for engines, and has for its primary object to provide means for actuating the valves of an internal combustion engine which is relatively simple in its construction, practically silent in operation, and which may be utilized in conjunction with various types of multi-cylindered motor vehicle engines now in common use.

It is also another important object of the invention to provide a valve operating means which will impart an initial rotary movement to the valve before it is opened and thereby turn or grind the valve upon its seat so that the necessity of separately regrinding the individual valves will be obviated.

It is another and more particular object of the invention to provide, in combination with the valve mounted in the cylinder head, a spring yieldingly urging the valve to its seat, an overhead cam shaft and an adjustable bearing element connected to the valve stem and with which the cam portion on the shaft is adapted to coact to first rotate the valve and then force the same to its open position.

With the above and other objects in view, the invention consists in the improved construction, combination and relative arrangement of the several parts as will be hereinafter more fully described, subsequently claimed and illustrated in the accompanying drawing, in which similar reference characters designate corresponding parts throughout the several views, and wherein:—

Figure 1 is a fragmentary side elevation, partly in section, of a multi-cylindered internal combustion engine equipped with my improved valve operating mechanism;

Fig. 2 is an enlarged vertical section taken on the line 2—2 of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 2; and

Fig. 4 is an enlarged detail elevation of the cam shaft and the adjustable tappet member with which the cam engages.

Referring in detail to the drawing, 5 designates the engine cylinders in which the usual pistons are mounted to reciprocate, said pistons being actuated from the crank shaft 6. It will, of course, be understood that the engine may be provided with any desired number of cylinders. These cylinders are provided with heads 7 cast *en bloc* and secured upon the upper ends of the cylinders in any approved manner. In the heads 7, an intake and exhaust valve 8 for each of the engine cylinders are mounted. Each of these valves is fixed upon the lower end of a stem or rod 9 which extends upwardly through a guide 10 centrally formed upon the base wall of the chamber 11 of the cylinder head. Exteriorly of this chamber 11 at each side thereof, the cylinder head is provided with longitudinally extending water chambers 12 in communication with each other at one of their ends and having inlet and outlet connections respectively at their opposite ends. In Fig. 2 of the drawing, I have shown a manifold 13 leading to the port which is normally closed by the valve 8. It will be understood that the cylinder head is equipped with an intake and exhaust manifold for the engine cylinders.

Spaced bars 14 extend transversely across the top of the chamber 11, each of said bars being centrally provided with an opening to receive the interiorly threaded shank 15 of a tappet member 16, which is in the form of a metal disk integral with one end of said shank. The shanks 15 are adjustably engaged upon the threaded upper ends of the respective valve stems 9. Each bar 14 is preferably formed with a guide bearing 17 for the shank 15.

To each valve rod or stem 9, below the bar 14, a metal disk or collar 18 is secured. A coil spring 20 surrounds the valve rod guide 10 and bears at its upper end against

the collar 18. The lower end of this spring has an annulus 21 fixed thereto, which is provided with a raceway to receive the anti friction bearing balls 22, which are also engaged in a similar raceway at the base of the guide 10.

Above the transverse bars 14, a longitudinally extending shaft 23 is journaled at its ends in suitable bearings on the cylinder head 7. This shaft is provided at spaced points with the cams 24 corresponding in number to the number of valves 8. These cams may be either in the form of off-set cranks or separate arms fixed upon the shaft 23. The ends of the cams are adapted for engagement upon the respective tappet disks 16, and the end edge of each cam is obliquely inclined as indicated at 25, or in other words, the cam at one side is lower than at its opposite side so that the lower side of the cam will first contact with the surface of the disk 16 at one side of its axis. The beveled portion 25 extends only a slight distance along the periphery of the cam 24 and the remaining portion of the cam is flat. It is to be further noted that the transverse center of the cam occupies the same plane as the axial center of the disk 16 and the coacting stem 9. By this construction and arrangement it will be noted that the beveled portion 5 will first contact with the disk 16 at a point to one side of its axial center and which will result in a slight rotation of said disk. When the flat portion of the cam contacts with the axial portion of the disk, a direct downward thrust of the rod will result without any rotary action. It will therefore be apparent that in the rotation of the shaft 23 there will first be a rotative movement of the rod 9 and valve 8 before the cam exerts sufficient bearing pressure on the disk 16 to overcome the action of the spring 20 and move the rod 9 longitudinally, whereby the valve is displaced from its seat. In this manner, each valve 8 will be ground upon its seat when it is opened in the operation of the engine, and it is not necessary to regrind the individual valves at frequent intervals as is now the universal custom. By subjecting the disk 8 only to a slight relative movement, the wear upon the valve 8 and its coacting seat will be materially reduced so that the life of the same will be greatly prolonged.

A removable cover or housing 26 incloses the cam shaft 23 and the tappet members, and to one end of this housing the upper end of a vertically disposed housing 26′ is suitably secured, the lower end of said latter housing being fixed to the crank case. This housing 26′ inclosed an endless chain 27 engaged upon a sprocket 28 fixed on one end of the cam shaft 23, said chain also extending around a sprocket 29 on one end of the crank shaft 6. One stretch of said chain is operatively engaged with a sprocket pinion on the fan shaft 30. Any suitable means may be provided for tightening or taking up the slack in the chain 27.

The end of the cylinder head, to which the housing 26′ is secured, is provided immediately below the cam shaft 23 with one or more openings indicated at 31. The corresponding end of the crank case above the shaft 6 opens into said housing. Thus, as the oil contained in the bottom of the crank case is violently agitated by the cranks on the shaft 6 in the operation of the engine, the oil vapor will rise through the housing 26′ and pass through the openings 31 into the housing 26. At the opposite end of the housing 26, and at the top thereof, a breather opening 32 is provided, through which the vapor is exhausted to the atmosphere. In its passage through the housing 26, the oil vapor collects upon the shaft 23, so that the bearings for said shaft are lubricated and the shanks 15 of the vertically movable tappet members are likewise lubricated by the oil vapor so that they will move freely and without friction through the bearings 17.

From the foregoing description, taken in connection with the accompanying drawing, the construction, manner of operation and several advantages of the invention will be clearly and fully understood. By providing the overhead cam shaft for the operation of the valves, the mechanism is greatly simplified, as the use of numerous rocker arms and push rods is thereby avoided. By providing a valve operating means which automatically grinds the valves and the valve seats, considerable trouble and expense incident to the separate regrinding of the valves is avoided. The device as a whole consists of relatively few simply constructed parts and can be readily incorporated in various types of internal combustion engines now commonly used for the propulsion of motor vehicles at relatively small cost. The mechanism is also durable in its construction, positive and reliable in operation, and not liable to get out of order.

While I have herein shown and described the preferred construction and arrangement of the various elements, it is to be understood that the device is susceptible of considerable modification therein, and I therefore reserve the privilege of adopting all such legitimate changes as may be fairly embodied within the spirit and scope of the invention as claimed.

I claim:—

In combination with a valve and its stem, and means for constantly urging the valve to its seat, a disk secured to the outer end of the stem, and a rotatable cam coacting with the disk, a portion of the periphery of the cam being transversely beveled, the remain-

ing portions thereof being flat, the beveled portion of the cam engaging the disk at one side of its axial center to impart slight rotary movement to the disk and to the valve, the flat periphery of the cam contacting with the axial center of the disk for imposing a direct thrust upon the stem.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

C. S. MURDOCK.

Witnesses:
BOLIN CRINER,
J. W. H. MARTIN.