J. J. ROBSON.

VALVE LUBRICATION.

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1,291,157. Patented Jan. 14, 1919.

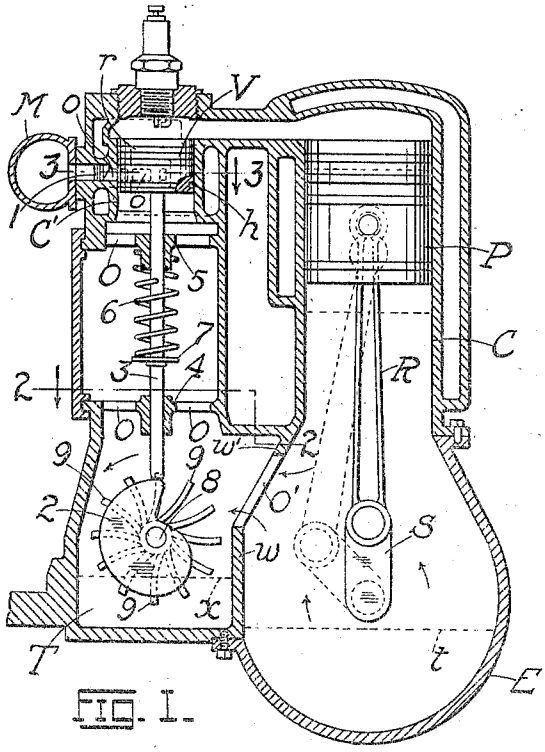


FIG. 1.

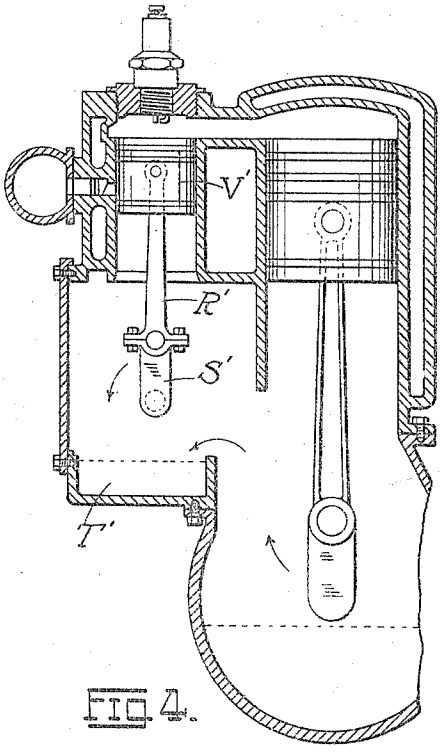


FIG. 4.

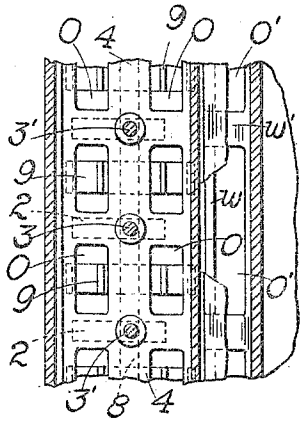


FIG. 2.

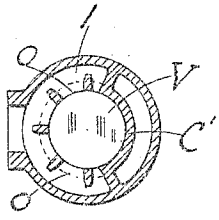


FIG. 3.

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VALVE LUBRICATION.

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To all whom it may concern:

Be it known that I, JOHN J. ROBSON, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Valve Lubrications, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

The present improvement is particularly directed to the lubrication of the intake and exhaust valves of internal combustion engines with a view not only of reducing friction, but of preventing excessive heating and consequent binding of the parts as a result of uneven expansion of the valve and the cylinder or casing therefor, and with a further view of maintaining uniform working conditions. It is well known that the valves of internal combustion engines are exposed to the high temperature of the burning gases; and unless kept well lubricated (and consequently cooled) will soon disintegrate and necessitate frequent renewals. It is therefore the object of the present invention to provide effective means for supplying the valves with the necessary lubricant, the means employed herein consisting of suitable devices operating to conduct the lubricant to the valves from the crank-case of the engine, the advantages of which arrangement will be apparent from the following detailed description in connection with the accompanying drawings in which—

Figure 1 represents a vertical cross-section of a conventional internal combustion engine showing my invention applied thereto; Fig. 2 is a horizontal section on the line 2—2 of Fig. 1; Fig. 3 is a horizontal section on the line 3—3 of Fig. 1; and Fig. 4 is a view similar to Fig. 1 showing a modification of my invention.

Referring to the drawings, and for the present to Figs. 1 to 3 inclusive, C represents the cylinder of a conventional form of internal combustion or explosive engine, P, the piston thereof, C, the cylinder, E, the crank case, S, the crank-shaft, and R, the connecting rod between the piston and crank-shaft, all as fully understood in the art. In the present instance I show the application of my invention to a valve V of the reciprocating piston type, operating in the cylinder C′ and controlling the ports *o* thereof, the valve illustrated being (by way of example) an intake valve, the intake ports *o* communicating with a chamber 1 into which the gas mixture flows from the manifold M as well understood in the art, the parts being shown herein more or less conventionally. In the present example the valve is closed or actuated in one direction by a cam 2 engaging the valve-stem 3 which reciprocates in the guide frames or plates 4 and 5, the valve being forced to open position (after the same is released from the action of the cam) by an expansion spring 6 interposed between the plate 5 and a disk 7 secured to the valve stem. The plates 4 and 5 are provided with series of openings O as shown. The cam-shaft 8 traverses an oil sump T which is separated from the crank-case E by a partition wall *w*, said wall having an upper inclined perforate or open extension *w′* through the openings O′ of which a considerable portion of the oil splashed by the crank-shaft in the crank-case finds its way into the sump T. Disposed on the cam-shaft 8 are a series of radial blades 9 the same dipping below the level *x* of the oil in the sump T, said blades being preferably immediately beneath the openings O of the plate 4, said openings being in vertical alinement with the corresponding openings O in the plate 5. The blades 9 will therefore operate to splash the oil from the sump T through the openings of the plates 4 and 5 against the walls of the valve cylinder C′, the oil being taken up by the oil groove *h* on the valve and thence distributed in the usual way to the packing rings *r* whereby the rubbing surfaces are kept well lubricated and the valve body prevented from becoming overheated.

In lieu of employing a valve with a valve-stem such as 3, I may substitute therefor a valve V′ with a connecting rod R′ coupled at its lower end to a crank-shaft S′ operating in the oil sump T′, as shown in the modification in Fig. 4, the engine otherwise being on the order of that shown in the form first described.

I do not wish of course to be restricted in the application of my invention to piston valves, as the same may be applied to other forms of reciprocating or oscillating valves, and to rotary valves. Neither do I wish to be limited to the oil agitators 9 and S′ previously described, it being within the spirit of my invention to employ any available equivalents thereof. Preferably (though not necessarily of course) the source of oil supply for the sump T is the crank

case of the engine, it being a simple matter to cause the splashing of the necessary quantity of the lubricant from the crank case into the sump through the openings O′, by the rapidly revolving crank of the crank-shaft in the crank case wherein the oil is maintained substantially at the level indicated by the line *t* in Fig. 1. The length of the oil sump T will depend of course on the number of cylinders comprising the engine. In Fig. 2 the parts illustrated take in three valves (intake and exhaust alternating), being broken away to indicate that a larger number of valves may be included depending on the number of cylinders comprising the engine. In this figure 3′ represent the stems of the exhaust valves (not shown) which alternate with the intake valves as well understood in the art.

It will be observed that the oil distributing groove *h* (Fig. 1) is permanently below the ports *o*. The reason for this is that the said groove *h* permanently houses a ring of oil which supplies the lubricant to the packing rings *r*, the oil flowing from said oil ring between the valve and the cylinder C′ thereof. To prevent flooding of the ports *o* with oil from said groove, the latter is maintained permanently below or to one side of the ports. It is apparent that if the groove *h* came opposite the ports the latter would be flooded and this would give rise to engine trouble resulting from the presence of too much oil in the combustion chamber.

Having described my invention what I claim is:

1. In an engine of the character described, a piston cylinder and crank-case therefor, a piston-valve for controlling the movements of the piston, an oil sump communicating with the crank-case, means coöperating with the piston for agitating the oil in the crank-case and causing a transfer of a portion of the oil into the oil sump, and an agitating device in the oil sump for transferring the lubricant to the valve.

2. In an engine of the character described, a crank-case, an oil sump separated therefrom by a partition wall and in free communication therewith above the wall, a piston valve, a cylinder therefor, a cam-shaft in the oil sump, a valve-stem actuated in one direction by the cam-shaft, an agitator on the cam shaft operating to splash the oil from the oil sump onto the walls of the cylinder of the piston valve, and a crank-shaft operating to splash a portion of the oil in the crank-case across the partition wall aforesaid into the oil sump.

3. In an internal combustion engine, a crank-case, an oil sump in free communication therewith and supplied with oil therefrom, a driving piston lubricated from the crank-case, a valve for controlling the movements of the piston, and means in the oil sump coöperating with the valve and supplying lubricant thereto from the oil in the oil sump.

4. In an internal combustion engine, a cylinder, a driving piston, a crank-case, a crank-shaft operating in the crank-case and coupled to the piston, an oil sump adjacent the crank-case and in free communication therewith at a point above the level of the oil in the crank-case, the crank of the crank-shaft operating to splash the oil from the crank-case into the oil sump, a cam-shaft, a piston valve and cylinder therefor, a stem leading from the valve and actuated by the cam on the cam-shaft, guides for the valve-stem provided with openings, and an agitator on the cam shaft opposite said openings for splashing the oil from the oil sump through said openings on to the walls of the piston-valve cylinder for lubricating the valve.

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

JOHN J. ROBSON.

Witnesses:
EMIL STAREK,
ELSE M. SIEGEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."