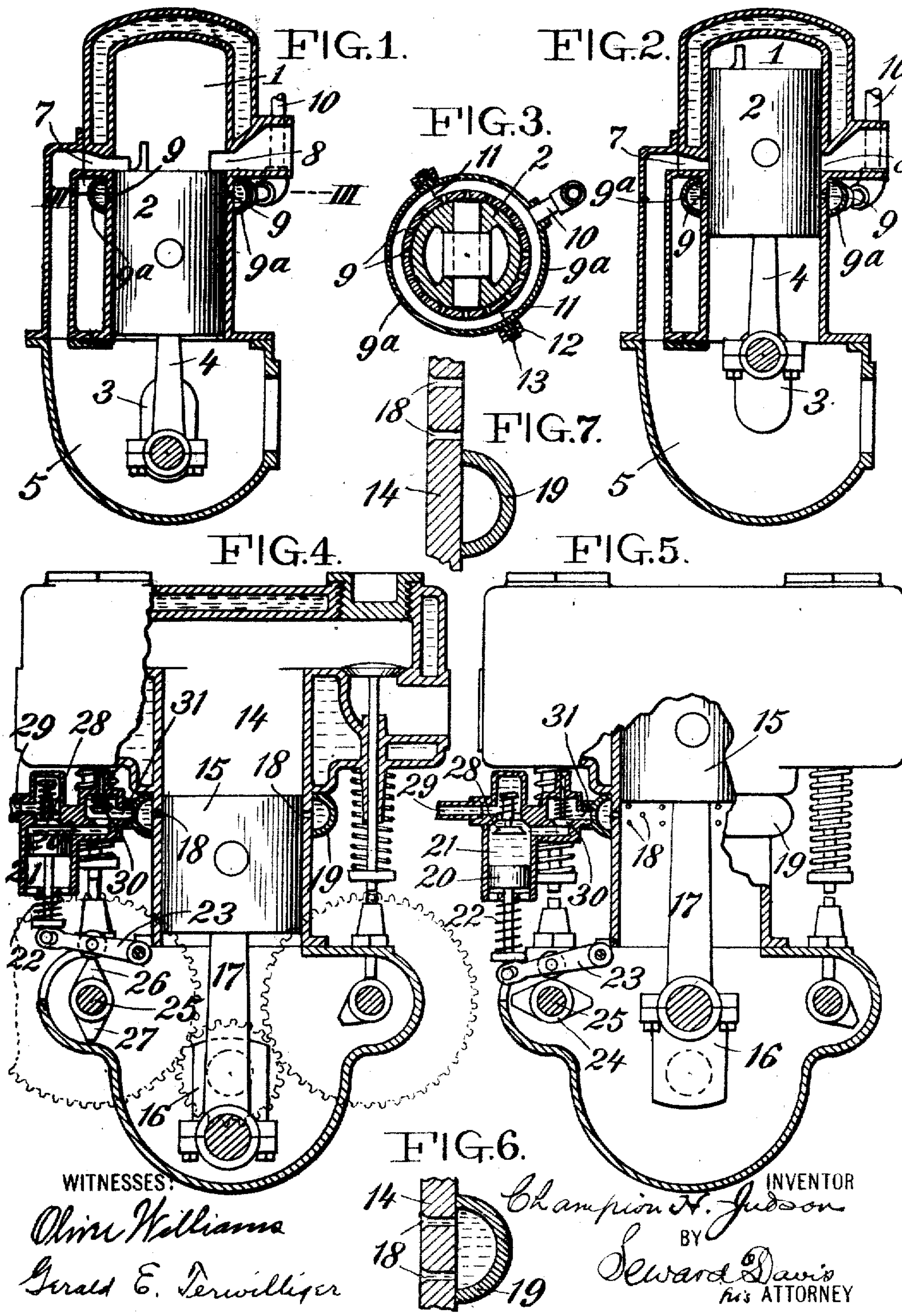
C. H. JUDSON.

LUBRICATING SYSTEM.

APPLICATION FILED AUG. 19, 1910.

1,011,626. Patented Dec. 12, 1911.



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LUBRICATING SYSTEM.

1,011,626. Specification of Letters Patent. Patented Dec. 12, 1911.

Application filed August 19, 1910. Serial No. 578,014.

To all whom it may concern:

Be it known that I, CHAMPION H. JUDSON, a citizen of the United States, residing at Dobbs Ferry, in the county of Westchester, in the State of New York, have invented certain new and useful Improvements in Lubricating Systems, of which the following is a specification.

My invention relates to lubricating systems for engines and more particularly to lubricating systems for internal combustion engines having a reciprocating piston, and is especially adapted for use with automobile or motor boat engines, being applicable to motors of either the two-cycle or four-cycle class.

My invention provides means for injecting oil into the combustion chamber in such a manner that the piston reciprocating therein is at all times uniformly and adequately lubricated, at the same time preventing the use of such a superfluity of oil as will cause the engine to emit visible fumes from its exhaust.

The most common method of cylinder lubrication in use in engines of the type above specified is that commonly known as the splash feed system, in which the crank case is kept filled with oil to such a depth that the crank at each revolution will be partially immersed therein and the oil will be splashed up, not only into the bearings of the connecting rod, but also into the cylinder sufficiently to lubricate the piston in its travel therein. The splash feed system of lubrication, however, is objectionable in many ways. The extent of the lubrication is uncertain, depending on several factors, among which are the depth of the oil in the crank case and the speed of the engine, the cylinder not receiving an equal amount of oil at each revolution, as it should for most efficient operation. As a result of this state of affairs, the engine at times receives an excess of oil, causing a smoky exhaust, and also the formation of carbon in the cylinder which interferes greatly with the economical and satisfactory operation of the motor. By my improved system an equal amount of oil is injected into the cylinder at each revolution, irrespective of the speed of the motor, and this positive supply, when once adjusted, will continue to deliver oil at the same rate until the reservoir becomes empty. A minimum of oil may, therefore, be used with my system with the assurance that the engine will constantly receive the proper amount, while in prior devices an excess supply is required to provide for possible failure to lubricate for a short period of time during the operation of the engine.

In the accompanying drawings which form a part of this specification, Figure 1 represents a sectional view of one form of my improved lubrication system as applied to an internal combustion motor of the two-cycle type; Fig. 2 is a similar view in which the engine is shown at another stage in its operation; Fig. 3 is a transverse sectional view on line III—III of Fig. 1; Fig. 4 is a view similar to Fig. 1 of a four-cycle engine equipped with my device; Fig. 5 is a view similar to Fig. 4 showing another stage in the operation of the engine; Fig. 6 is a fragmentary sectional view on an enlarged scale of a portion of the cylinder wall and the oil manifold in operative position; Fig. 7 is a view similar to Fig. 6 with the manifold displaced in order to permit access to the oil inlet passages.

Referring in detail to the drawings, the numeral 1 designates the cylinder of a two-cycle internal combustion engine in which reciprocates the piston 2 actuating the crank shaft 3 through the agency of the connecting rod 4. The engine is provided with the crank case 5 and the by-pass 6 leading to the inlet passage 7.

The numeral 8 designates the exhaust passage.

To admit oil to the cylinder, I pierce the walls of the same with one or more oil inlet passages 9, surrounding which is an oil inlet manifold 9^a of semi-circular section completely encircling the cylinder. The supply pipe 10 is provided for admitting oil to the oil inlet manifold either by gravity from a supply tank, not shown, situated above the level of the inlet passages, or under pressure, as may be desired. The oil manifold is split diametrically on the line 11, and means for joining the two sections, comprising bolts 12, passing through the flanges 13, are provided. The oil inlet passages are so placed that the piston in its travel will never uncover them. Owing to this fact, the oil need not be injected under high pressure, and a gravity system may, if desired, be employed, as neither the compressed gases in the crank chamber, nor the gases in the combustion chamber, can ever bring any direct pressure to bear upon the oil. Fig. 1

shows the piston at the end of its downward stroke, while Fig. 2 shows the piston at the extremity of its upward travel, the oil inlet passages in neither case being uncovered, but a substantial length of the piston receiving oil at each stroke and distributing the same within the cylinder. This construction necessitates the use of a piston slightly longer than the stroke. I preferably taper the inlet oil passages, as shown in Fig. 6, in order to provide a slightly larger oiling internal surface. Since oil is constantly feeding during the operation of the engine, there is little danger of the inlet passages becoming clogged. However, should this occur, it is only necessary to loosen the nuts 12 slightly and to slide the oil inlet manifold longitudinally along the cylinder until the oil inlet passages are exposed, when they may be readily freed from any foreign substance.

In Figs. 4 and 5 I have illustrated a modification in which my device is applied to a four-cycle motor, and means for feeding the oil under pressure, actuated directly by the engine, are provided. Referring to these figures, the numeral 14 designates the cylinder, within which reciprocates the piston 15 operating the crank shaft 16 by the connecting rod 17. The cylinder wall in this case is pierced by a plurality of oil inlet passages 18 similar to those in the engine above described. Surrounding the inlet passages is the oil manifold 19. For supplying oil under pressure to this manifold, I provide a force feed system comprising a piston 20 reciprocating in a cylinder 21. This piston may be reciprocated through the agency of a spring 22 and a rocker arm 23, which is actuated by the cam 24 keyed to one of the valve or "half-time" shafts 25. This cam has the two operating faces 26 and 27, 180 degrees apart. The use of a double cam is preferred, in that the valve shaft revolves only once for every two revolutions of the crank shaft. The cylinder 21 is provided with an inlet valve 28 admitting oil on the down stroke of the piston from the supply pipe 29. The valve is adapted to seat on the up stroke of the piston, at which time the outlet valve 30 will open and the oil will be forced out through the outlet pipe 31 into the oil inlet manifold. Oil will thus be continuously forced against the piston in its travel from the beginning of its downward stroke until it reaches the end of its travel. The cam 24 may be so disposed on the shaft 25 that oil under pressure will be supplied an instant before the piston covers the valve inlet passages on its downward stroke, thus permitting a slight amount of oil to be sprayed into the cylinder. It is essential, however, that the oil inlet passages be so disposed in the walls of the cylinder that the upper end of the piston shall never uncover them in its travel, otherwise the oil will be subjected to the full pressure of the gases at the end of the power stroke in the explosion chamber. In the case of a four-cycle motor illustrated in Figs. 4 and 5, the length of the piston may be such as to keep the oil inlet passages closed throughout its travel, as illustrated in the modification first described, or may be shortened so as to uncover all the passages, or some of them, when the piston is at the top of its stroke, as illustrated in Fig. 5. The construction of the oil inlet manifold in either case is identical, so that the manifold may be slipped longitudinally along the cylinder in order to permit of the cleaning of the inlet passages in case they should become clogged from any cause.

While I have illustrated my invention as applied to internal combustion engines, I do not wish to be limited thereto, as it is evident that my invention is capable of broader application, not only to various machines other than a gas engine, having a reciprocating piston, such as air compressors and the like, but is also capable of being applied to other structures where positive and uniform lubrication is desired.

Having thus described my invention, I claim:

1. In a lubricating system, a reciprocating member, a structure surrounding said member having oil inlet passages through the walls thereof, an oil manifold surrounding said passages adjustable in the direction of reciprocation, and means for supplying oil to said manifold.

2. In a lubricating system, a cylinder, a reciprocating member therein, oil inlet passages through the walls of said cylinder so disposed that they shall never be uncovered by said reciprocating member, an oil manifold encircling said cylinder and surrounding said passages, said manifold being adjustable in the direction of reciprocation, and means for supplying oil to said manifold.

3. In a lubricating system, a cylinder, a reciprocating member therein, oil inlet passages through the walls of said cylinder, an oil manifold encircling said cylinder and surrounding said passages, and means for positively forcing oil into said manifold only at the times when said passages are covered by said reciprocating member.

4. In a lubricating system, a cylinder, a reciprocating member therein, oil inlet passages through the walls of said cylinder, an oil manifold of semi-circular section encircling said cylinder and surrounding said passages, said manifold being split transversely, means for uniting the ends thereof and thereby tensioning said manifold against the walls of said cylinder, and means for supplying oil to said manifold.

5. In a lubricating system, a cylinder, a reciprocating member therein, oil inlet passages through the walls of said cylinder, an oil manifold of semi-circular section encircling said cylinder and surrounding said passages, said manifold being split transversely, means for uniting the ends thereof and thereby tensioning said manifold against the walls of said cylinder, and means for supplying oil to said manifold at the times when the oil inlet passages are covered by said reciprocating member.

6. In a lubricating system, a cylinder, a reciprocating member therein, oil inlet passages through the walls of said cylinder, means included within said cylinder for preventing compressed gases therein from having access to said oil inlet passages, and means for positively forcing oil against said reciprocating member when the oil inlet passages are covered thereby.

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