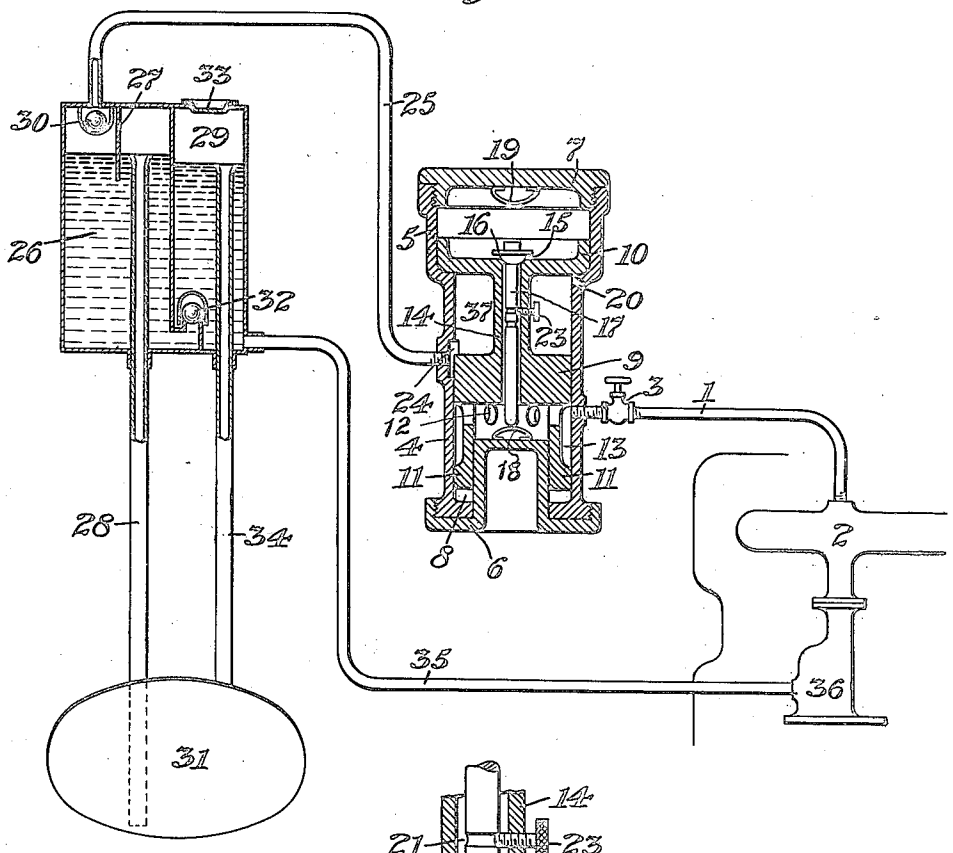
Feb. 6, 1923. 1,444,219.

C. L. STOKES.

APPARATUS FOR FEEDING OIL TO INTERNAL COMBUSTION ENGINES.

ORIGINAL FILED APR. 16, 1917.

Fig. 1



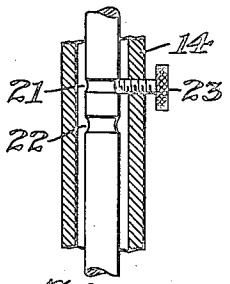


Fig. 2

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UNITED STATES PATENT OFFICE.

CHARLES LAWRENCE STOKES, OF LOS ANGELES, CALIFORNIA.

APPARATUS FOR FEEDING OIL TO INTERNAL-COMBUSTION ENGINES.

Application filed April 16, 1917, Serial No. 162,489. Renewed June 19, 1922. Serial No. 569,323.

To all whom it may concern:

Be it known that I, CHARLES LAWRENCE STOKES, a citizen of the United States, and resident of Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Apparatus for Feeding Oil to Internal-Combustion Engines, of which the following is a specification.

This invention relates to apparatus depending for its action on partial vacuum of induction in an internal combustion engine for raising fuel oil or lubricating oil from a low level tank to a high level feed reservoir.

In my apparatus the oil is raised intermittently through an ascension pipe from a low level tank to a high level reservoir having a lock chamber; this lock chamber is maintained under subatmospheric pressure by engine suction whilst the oil is being so raised, and in the intervals is opened to the atmosphere. When the lock chamber is so opened to atmosphere oil flows from it through a check valve into a feed chamber or service reservoir which is permanently open to atmosphere. From this feed chamber the oil flows by gravity to the carbureter or to the engine lubricating system as required. An overflow from the high level feed chamber reservoir permits return to the low level reservoir of any excess quantity of oil delivered into said chamber from the lock chamber. In practice the quantity of oil raised is in excess of engine demand, so that there is always an overflow through said return pipe. The pressure in the lock chamber is controlled by a pulsator which establishes a connection between said lock chamber and the engine cylinder and atmosphere alternately.

The detail construction of the pulsator is subject to any desirable variation. The essence of the invention is in the utilization of intermittent vacuum as contra-distinguished from constant vacuum with valve and float controls in a high level reservoir. But by way of example one type of apparatus in which the invention may be carried out successfully is illustrated in the accompanying drawings. In Fig. 1 of this drawing the parts other than the pulsator are shown in semi-diagrammatic form whilst the pulsator is shown in vertical section. Fig. 2 illustrates a fragment detail of the pulsator.

The pipe 1 connects the induction manifold 2 of the engine to the pulsator, a control valve 3 being fitted to enable regulation of the rate at which air or gas will flow through the pipe 1. The pulsator comprises a cylindrical chamber, the lower part of which 4 is of lesser diameter than its upper part 5. 6 and 7 are lower and upper heads respectively of the cylindrical barrel. The head 6 forms with the barrel 4 an annular dash pot chamber 8 in the bottom of the pulsator. 9 is the main piston, 10 the control piston, and 11 the annular dash pot piston. 12 are holes through the upper part of the annular piston 11, for establishing a free connection between the hollow interior of said annular piston and the annular groove 13 surrounding it. The pipe 1 is led into the barrel 4 at a point where it will always be below the piston 9. The piston is, in Fig. 1 of the drawings, shown at the lower end of its stroke. The pistons 9 and 10 are connected by a tubular stem 14 having a valve seat 15 formed at its upper end. A poppet valve 16 carried on a stem rod 17 is fitted to the seat 15, the stem 17 being a loose fit in the central hole in the piston stem 14. 18 and 19 are spring contacts which act on the valve 16 to move it off or on to its seat at the end of its downward and upward strokes respectively. 20 is an air snift hole through the pulsator barrel 4 located therein so as always to occupy a position between the pistons 9 and 10 irrespective of their position in the casing. The valve stem 17 has two small grooves 21 and 22 turned in it to lightly engage the rounded point of a screw 23 which operates to hold the valve lightly in either upper or lower position and to permit it to be moved readily from either of these positions to the other one. A port 24 in the pulsator barrel 4 located therein so as to be crossed by the piston 9, is connected by a pipe 25 into the top of the lock chamber 26. The upper part of this lock chamber is partitioned by a depending baffle 27, and the pipe 25 is connected into it on one side of said baffle whilst on the other side of said baffle the ascension pipe 28 is brought up to a point at which a sufficient head of oil will be maintained in the lock chamber 26 to ensure flow of oil by gravity from said chamber into the feed chamber 29. 30 is a float valve at the mouth of the pipe 25 where it enters the lock chamber 26. This valve is normally inoperative, but if the chamber 26 should flood, this valve

serves to close the pipe 25 and prevent oil passing directly therethrough into the pulsator. 31 is the low level oil tank open to the atmosphere. 32 is a check valve connecting the lock chamber 26 with the feed chamber 29 which operates to permit oil to pass from the lock chamber into the feed chamber but to prevent reverse flow from the feed chamber into the lock chamber. 33 is a cap having an air vent in it for closing the top of the feed chamber 29. 34 is a return flow pipe for oil from the feed chamber 29 to the low level tank 31.

35 is the flow pipe from the feed chamber 29 to the carburetter 36, or, in the case of a lubricating oil service, to the engine lubricator system.

The operation is as follows:—

The engine being rotated to start it in the usual way, suction is created in the manifold 2, and the chamber below the piston 9 is thus partially exhausted of air. When the piston 9 is brought down by the superplus of atmospheric pressure acting above, atmosphere entering freely through the hole 20, the valve stem 17 strikes on the spring 18 and the valve 16 is thus forced off its seat 15. The stem of the valve has sufficient clearance in the central hole in the stem 14 to allow it to spring a little, thereby permitting the enlarged portion between the groove 21 and the groove 22 to pass the point of the set pin 23 and bring said groove 22 engaged with said pin 23 thereby to hold the valve 16 off its seat 15. Communication being thus established through the hole in the stem 14, the chamber above the piston 10 is exhausted into the chamber below the piston, 9, but the piston 10 being of greater diameter than the piston 9 the atmospheric pressure acting between the pistons operates to lift the pistons as a whole. Before this lifting motion occurs the lock chamber 26 is in communication with atmosphere through the pipe 25, the chamber 37 between the pistons, and the snift hole 20. When the upward motion of the pistons occurs, the lower piston 9 passes over the port 24, momentarily covering it and finally opening it to the chamber below said piston 9. Thereupon suction is established in the lock chamber 26 through the pipe 25 and this suction operates to suck oil up from the tank 31 through the ascension pipe 28 into the lock chamber 26. Upon the pistons reaching the top of the stroke, the head of the valve 16 strikes the spring 19 and the valve is thereby closed. Thereafter air slowly leaks past the piston 10 and the pistons move downwardly, the dash pot annular piston 11 prohibiting a too rapid movement. When the pistons are nearing the bottom end of the stroke, the port 24 is closed off from its communication from the induction manifold 2 and is again opened to atmosphere through the snift hole 20, the partial vacuum in the lock chamber 26 being thus broken; upward flow of oil through the ascension pipe 28 thereupon ceases. As, however, the oil in the lock chamber 26 is now at a high level, it flows by gravity through the non-return valve 32 into the feed chamber 29, any excess passing from said feed chamber back to the tank 31 through the overflow pipe 34. The carburetter 36 may now take its feed of oil through the pipe 35 by gravity, and as the feed chamber 29 is always open to atmosphere through the vent in its cap 33, oil may flow to the carburetter from the feed chamber continuously notwithstanding that the lock chamber 26 is under partial vacuum.

This operation is repeated automatically, the pulsator alternately establishing and dis-establishing vacuum in the lock chamber 26 and the oil raised into said lock chamber flowing intermittently through the valve 32 into the feed chamber 29 and thence passing by the service pipe 35 either to the carburetter or to the lubricating system as required. The rate of reciprocation of the pulsator pistons depends upon the freedom of the fitting of the pistons and the regulation of the control valve 3, as well also upon the degree of vacuum existing for the time being in the manifold 2. If, accidentally, a greater volume of oil should be raised into the lock chamber 26 than is required to maintain the service, so that the level of the oil therein rises to an excess height, said oil floats the valve 30 and closes the mouth of the pipe 25, thus cutting off suction and prohibiting further upflow of oil through the pipe 28.

It will be observed that the lock chamber and the feed chamber are not fitted with any mechanical valve actuating means but only the two self-acting check valves, and that the action of the apparatus depends upon the alternating establishment of vacuum and normal atmospheric pressure in the lock chamber.

It will be understood, therefore, that it is not essential that the pulsator should be operated automatically by vacuum; the same result may be obtained by operating the pulsator mechanically by a connection to the engine shaft, so that the piston or other member therein by which the connection is established alternately from the lock chamber to atmosphere and to the induction system respectively is moved with the required frequency to ensure the raising of the necessary volume of oil.

Having now fully described said invention, I declare that what I claim is:—

1. Apparatus for raising oil for an internal combustion engine, from a low level tank to a high level service reservoir, comprising a lock chamber, suction and delivery check valves for said lock chamber, a high level service reservoir in communica-

tion with said lock chamber through said delivery check valve, pulsator, a pipe connection from the top of the lock chamber to said pulsator, an internal combustion engine having an induction system, a pipe connection from the pulsator to said induction system and means within the pulsator operating to place the pipe connection thereto from the lock chamber, alternately in communication with said induction pipe and with atmosphere respectively.

2. In a liquid feed system, a low level tank, a high level reservoir, a communication between the tank and reservoir, means for applying suction to the reservoir, said means comprising a valve actuated in one direction by suction to cut off the suction which actuates it, and by gravity in the other direction to restore said suction and means for discharging said reservoir by gravity pressure.

3. In apparatus of the class described, a high level reservoir, a low level tank, a pipe leading from the latter to the former, means for applying suction to the high level reservoir to draw liquid to said pipe from the low level tank, said means comprising a piston actuated in one direction by suction to cut off the suction which actuates it and by gravity in the other direction to restore said suction, a valve slidably engaged with said piston, means for regulating the pressure applied to said piston, and means permitting discharge of said reservoir by gravity.

4. In a liquid feed system for internal combustion engines, the combination of a low level tank, a high level reservoir, a communication between the tank and reservoir, means for applying suction to the reservoir said means comprising a reciprocating valve actuated in one direction by suction to cut off the suction which actuates it, and by gravity in the other direction to restore said suction and means for discharging said reservoir by gravity pressure.

5. In a liquid feed system for an internal combustion engine, the combination of a low level liquid tank, a high level liquid reservoir, a communication between the tank and the reservoir, a carbureter, means for applying suction to the reservoir, said means comprising an encased piston having an enlarged portion, a valve seating on the enlarged portion of said piston, means for breaking said valve from its seating on said piston and means for feeding said carbureter from said reservoir.

Signed at Flint in the county of Genesee and State of Michigan, this 14th day of April, A. D. 1917.

CHARLES LAWRENCE STOKES.