Dec. 4, 1928. 1,693,732

C. L. STOKES

PRIMING APPARATUS

Filed Jan. 30, 1924

Fig. 1

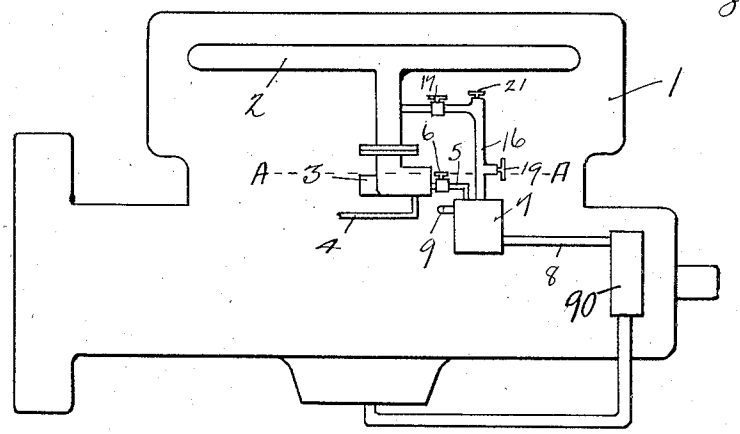
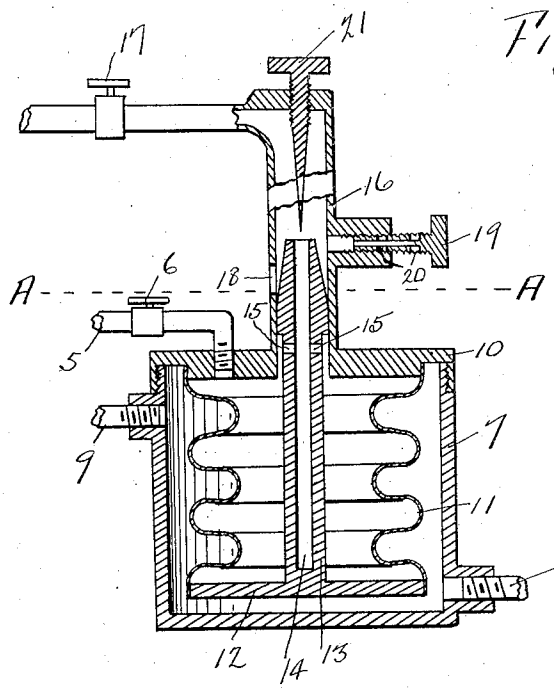


Fig. 2.



INVENTOR.

Charles L. Stokes

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CHARLES LAWRENCE STOKES, OF LOS ANGELES, CALIFORNIA.

PRIMING APPARATUS.

Application filed January 30, 1924. Serial No. 689,474.

My invention relates to improvements in priming apparatus whereby an internal combustion engine may be easily started and kept operating in cold weather.

The principal object of my invention is to utilize the positive pressure generated by the engine oil pump for first injecting a predetermined quantity of gasoline into the engine, depending on its temperature and thereafter controlling the supply of gasoline to the engine in accordance with the engine's demands at a particular temperature.

Referring to the drawings in which the same numbers indicate like parts:—

Fig. 1 is a diagrammatic view of an engine showing the way my apparatus is attached.

Fig. 2 is a sectional and part view of the construction of my apparatus.

An internal combustion engine 1 has an intake manifold 2 for drawing therein a mixture of air and liquid fuel from the carburetor 3 which is supplied with gasoline by any suitable means through a pipe 4. The carburetor 3 contains the usual float control reservoir for fuel (not shown) which maintains a certain liquid level therein and a pipe 5 is led from below said liquid level A—A to pass liquid fuel to the interior of my priming apparatus which comprises a casing 7.

The passage of fuel to 5 is controlled by a valve 6 and the lower end of 7 contains a connection for a pipe 8 leading from the oil pump 90 on its discharge side and the upper part of 7 contains a pipe 9 for discharging oil to any suitable portion of the interior of the crank case of engine 1.

The upper part of 7 is closed by a cover 10, screw-threaded therein and on the inner face of 10 is soldered a bellows, or expansible diaphragm 11 which is of the well-known sylphon type.

The lower part of 11 is closed fluid tight by a circular closure 12 having a central valve 13 thereon and 13 is drilled centrally to form a passage 14. The liquid fuel from 3 is passed through 5 and 10 to the interior of 11.

A pipe 16 leads from the central upper portion of 10 to the interior of the intake manifold 2 and 13 is adapted to slide easily in the interior of 16 for opening and closing an air port 18 in the wall of 16.

It will thus be noted that liquid fuel will always normally stand at the level A—A and in this manner the interior of 11 will be filled with liquid fuel and the passage of liquid fuel from 11 into the passage 14 is by way of a port 15 placed above the upper end of 11 for the purpose of preventing the same from becoming air-bound.

In the operation of internal combustion engines, particularly at low temperatures, the viscosity of the lubricating oil causes a considerable pressure to be built up immediately on starting the engine at idling speeds therefore, inasmuch as pump 90 is driven from the engine crank-shaft, the pressure developed thereby will be passed through 8 and cause a compression of 11. This compression immediately forces a stream of liquid fuel through 15 and 14 to the interior of 16 where, responsive to the engine induction vacuum being applied to 16 the liquid fuel in the required volume will be passed to the engine cylinders and prime the same. At the same time a certain amount of air will have passed through the port 18 to mix with the fuel and also a certain amount of air will have passed through the ports 20 in the adjusting valve 19 for also mixing with the fuel.

As soon as the engine will have started, the oil pressure being applied to 8 will have forced the valve 13 upwardly thereby closing the air port 18 to a predetermined degree so that the proportion of air to fuel will be sufficient to keep the engine running and the proportions of air and liquid fuel to be supplied to an engine under any given condition of temperature for starting may be controlled by the fuel valve 21 and the air valve 19. At the same time the suction to be applied to 16 may be regulated by the valve 17. Valve 21 is so placed that the upward movement of 13 will cause 21 to close the passage 14 after a predetermined upward movement and the amount of closure can be regulated at will.

After the engine has been running a predetermined period, the viscosity of the oil, due to increased temperature, will have decreased to permit the expansion of 11 and thereby the admission of further air through the port 18 and the volume of fuel to be supplied to the engine after the exhaustion of the priming charge in 11 may be governed by the valve 6, so that the cycle of operations includes first, the regulated priming charge by

11 and thereafter the diminishing of the fuel supply as the engine temperature increases.

It will be noted that on starting an engine which is warm, the viscosity of the oil will be such that 11 will be compressed a minimum amount and therefore the priming charge injected into the engine will be only sufficient to serve its purpose when the engine is hot.

Again, upon accelerating the engine the oil pressure will build up and therefore a further injection of fuel will take place with increasing speed, which is a very desirable feature.

The fuel supplied through 6 is generally of a minimum quantity required for idling conditions, the main fuel supply being supplied through the carburetor 3 and it should be noted that in place of the valves 6, 17, and 21 that certain sized orifices may be substituted therefor for any given engine in pipes 5, and 16.

It is of course understood that the pressure applied to the diaphragm 11 may be regulated by the size of the discharge orifice in 9.

I claim:—

1. In an internal combustion engine having a lubricating oil supply under pressure, means for supplying a priming charge to said engine comprising a movable member subjected to the oil supply pressure.

2. In an internal combustion engine having a lubricating oil supply under pressure, means for supplying a priming charge comprising a movable member subjected on one side to the oil supply pressure and on the other side to the engine vacuum.

3. In an internal combustion engine having a lubricating oil supply under pressure, means for supplying a priming charge comprising a movable member subjected to independent forces derived respectively from the oil supply pressure and from the engine induction vacuum.

4. In an internal combustion engine having a lubricating oil supply under pressure, means for supplying a priming charge comprising a movable member subjected to the oil supply pressure and means for varying the effective result of said pressure.

5. In an internal combustion engine having a lubricating oil supply under pressure, means for supplying a priming charge comprising a movable member subjected to the oil supply pressure and means for varying the effective result of said pressure in accordance with the engine induction vacuum.

6. In an internal combustion engine having a lubricating oil supply under pressure, the combination of a flexible diaphragm, means for subjecting the diaphragm to the oil supply pressure and means for applying the engine suction to the diaphragm for priming the engine.

7. In an internal combustion engine having an oil supply under pressure, the combination of a flexible diaphragm, means for subjecting the diaphragm on one side to the oil pressure and means for subjecting the other side of the diaphragm to the suction in the gas inlet for the engine.

8. In an internal combustion engine having an oil supply under pressure, the combination with a priming device of means for operating it comprising a movable member subjected to the oil pressure which varies with the speed and temperature of the engine.

9. A priming device for internal combustion engines having an oil supply under pressure comprising a flexible diaphragm adapted to be compressed and expanded by variations of the oil supply pressure responsive to the speed of the engine.

10. A priming device for internal combustion engines having an oil supply under pressure comprising a flexible diaphragm adapted to be governed by variations of the oil supply pressure responsive to the speed and temperature of the engine.

11. In an internal combustion engine, the combination of a carburetor, an intake manifold, a priming device, a pump for lubricating oil, means to supply liquid fuel from the carburetor to the priming device, means to supply oil under pressure from the oil pump to the priming device and means to feed liquid fuel from the priming device to the intake manifold.

12. In an internal combustion engine, the combination of a carburetor, an intake manifold, a priming device, a pump for lubricating oil, means to supply liquid fuel from the carburetor to the priming device, means to supply oil under pressure from the oil pump to the priming device and adjustable means to feed liquid fuel from the priming device to the intake manifold.

13. In an internal combustion engine, the combination of a carburetor, an intake manifold, a priming device, a pump for lubricating oil, means to supply liquid fuel from the carburetor to the priming device, means to supply oil under pressure from the pump to the priming device, a conduit connecting the priming device with the intake manifold, and means to pass a mixture of liquid fuel and air through said conduit.

14. In an internal combustion engine, the combination of a carburetor, an intake manifold, a priming device, a pump for lubricating oil, means to supply liquid fuel from the carburetor to the priming device, means to supply oil under pressure from the pump to the priming device, a conduit connecting the priming device with the intake manifold, and adjustable means to pass liquid fuel and air through said conduit.

15. In an internal combustion engine having a closed fluid circulating system under pressure, means for supplying a priming charge to said engine, and means operated by the fluid pressure in said system for con-

trolling the operation of said first-named means.

16. In an internal combustion engine having a closed fluid circulating system, means for supplying an explosive mixture to said engine, and means operated by the fluid pressure developed in said system for supplying an increased charge of explosive mixture to said engine upon suddenly accelerating the same.

Signed at Wilmington, in the county of Los Angeles and State of California, this 5th day of December A. D. 1923.

CHARLES LAWRENCE STOKES.