April 18, 1933. C. L. STOKES 1,904,936

COMBINED PRIMER AND CYLINDER LUBRICATOR FOR INTERNAL COMBUSTION ENGINES

Original Filed Nov. 11, 1925

Fig. 1

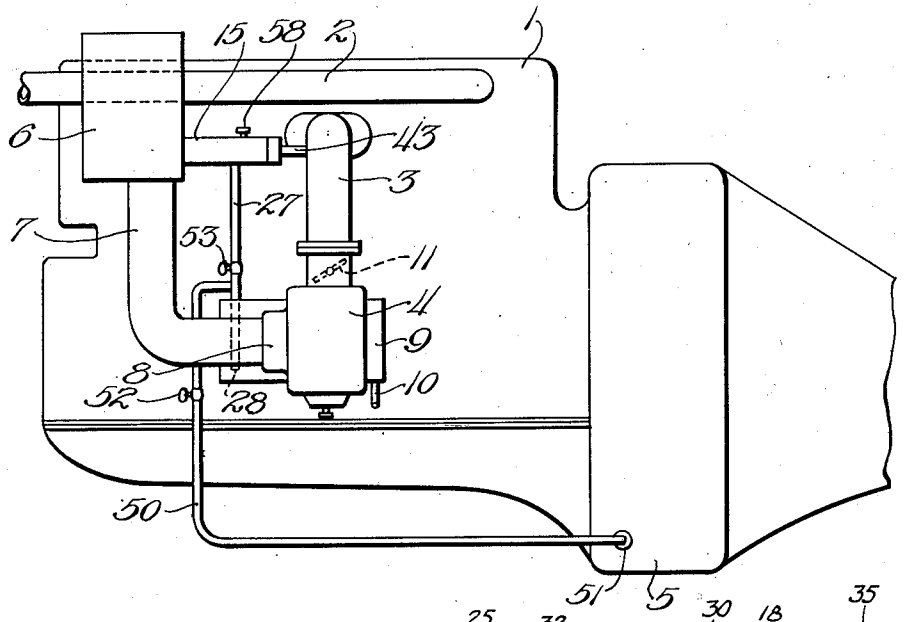


Fig. 2

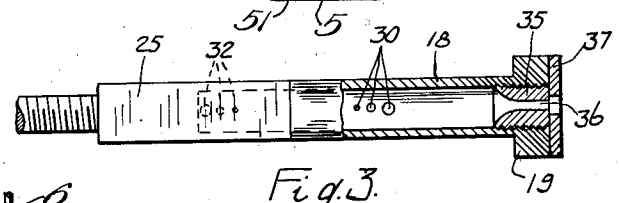
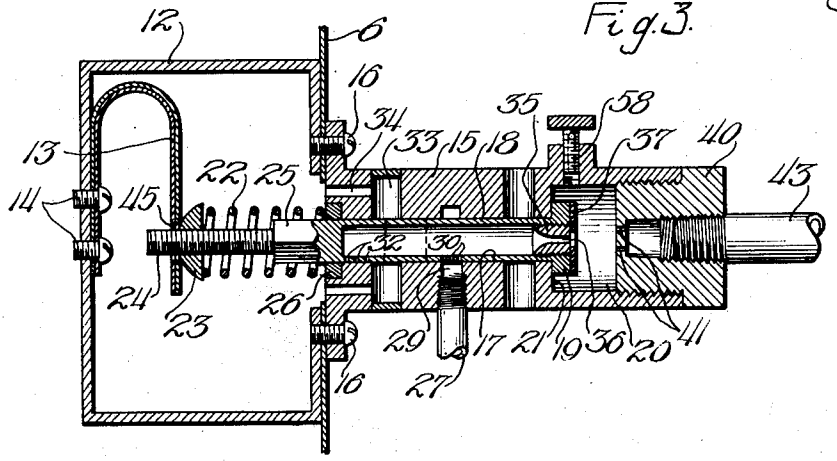


Fig. 3.



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UNITED STATES PATENT OFFICE

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COMBINED PRIMER AND CYLINDER LUBRICATOR FOR INTERNAL COMBUSTION ENGINES

Original application filed November 11, 1925, Serial No. 67,864, now Patent No. 1,764,659, dated June 17, 1930. Divided and this application filed November 2, 1928. Serial No. 316,658.

My invention relates to improvement in a combined primer and cylinder lubricator for internal combustion engines.

Various attempts have been made in the past to provide lubrication to the cylinders of internal combustion engines above the pistons so as to assure an efficient seal between the pistons and cylinder walls, which is of particular importance during the priming of the engine, to prevent crank case dilution, and of course which is important during the entire operating period of the engine to assist in maintaining high compression. These devices, however, were operated continuously or by manual control by the driver, with the result that either too much or too little lubricant was admitted to the engine cylinders and that a sufficient quantity of lubricant was not available at the time when most needed, viz: during the admission of a rich priming charge to the cylinders often comprised largely of raw fuel.

An object of my invention is to provide an improved primer and lubricator which functions simultaneously to prime the engine cylinders and lubricate the cylinders as the engine is started.

Another object is to provide a primer and lubricator for internal combustion engines in which the amount of priming charge and lubricant admitted to the engine cylinders is dependent upon the speed of the engine.

Another object is to provide a primer and lubricator for internal combustion engines wherein a relatively heavy priming charge and lubricating charge is introduced to the engine cylinders during low speed as at cranking, and wherein the priming charge and lubricant admitted to the cylinders is decreased as the speed of the engine increases upon its own power.

A further object is to provide a primer and lubricator for internal combustion engines for which the time during which the apparatus is operative as a primer and lubricator is dependent upon the temperature of the engine and wherein the apparatus is rendered inoperative upon the attainment of normal running engine temperature.

Other advantages and objects will hereinafter appear.

This application is a divisional part of my co-pending application, Serial No. 67,864 now Pat. No. 1,764,659, granted June 17, 1930, for automatic fuel regulators, filed November 11, 1925.

My improved primer and lubricator is illustrated in the accompanying drawing, in which

Fig. 1 is a side elevation illustrating an internal combustion engine equipped with the combined primer and lubricator, and

Fig. 2 is a vertical sectional view through a part of the apparatus illustrated in Fig. 1.

Fig. 3 is a plan view partly in section of the valvular member.

The primer and lubricator selected for illustration herein is shown associated with an internal combustion engine having an exhaust manifold 2, an intake manifold 3, a carburetor 4, and an oil sump 5.

A hot air stove 6 surrounds the exhaust pipe 2 and hot air therefrom is conducted through a hot air pipe 7 to the air inlet 8 of the carburetor 4.

The carburetor 4 may be of any well known make having a float chamber 9 to which liquid fuel is fed through a fuel pipe 10 by any well known means. A carburetor throttle valve 11 is provided to control the flow of fuel mixture from the carburetor 4 to the engine cylinders through the intake manifold 3.

With reference to Fig. 2 it may be seen that an open bracket 12 is supported within one side wall of the stove 6. A bi-metal thermostatic element 13 is fixed at one end to the opposed side of the bracket 12 by screws 14. The element is thus exposed to the heated air within stove 6 and will move with the rise and fall of engine temperature communicated thereto by the exhaust pipe 2 and the moving air stream as it is drawn toward the air inlet 8 of the carburetor.

A valve body 15 is fastened externally of and to the stove by screws 16 which also form the interconnecting means between bracket 12 and the stove. This valve body has a bore 17 extending axially thereof within which a hollow stem valve 18 is free to

slide. One end of valve 17 has an enlarged head 19 lying within a chamber 20. The head 19 normally bears against the adjacent wall 21 of chamber 20 by virtue of a compression spring 22 surrounding that end of the valve near the thermostatic element 13, which spring is placed between the end wall of casing 15 and an adjustable button 23 threaded upon an externally threaded portion 24 of the valve.

That part 25 of valve 18 which extends from the valve body into the stove 6, is quadrangular in cross-section and passes through a similarly formed guide plate 26 so as to prevent the rotation of the valve with respect to the body 15.

A liquid fuel pipe 27 communicates at one end 28 with the float chamber 9 and at its opposite end with a fuel port 29 in the body 15, with which port a plurality of fuel feed passages 30 in the side wall of the hollow valve 18 normally register. As valve 18 moves against the force of spring 22, certain or all of the passages 30 will be moved out of registration with the fuel feed port 29.

Concurrent with the shutting off of communication between the passages 30 and the port 29, other passages 32 through the side wall of valve 18 will be caused to register with an air inlet 33 communicating through passages 34 with the interior of stove 6.

The head 19 of valve 18 has a plug 35 therein through which a centrally disposed discharge port 36 is drilled. A packing disc 37 is fixed to the outer face of head 19 and encompasses the delivery orifice of discharge port 36.

Chamber 20 is closed at that end facing the valve head 19 by a plug 40 which has a plurality of small passages 41 therethrough, each communicating with a pipe 43 connected directly with the intake manifold 3 of the engine above the carburetor 4. Communication between the passages 41 and chamber 20 is shut off by the packing disc 37 when valve 18 is moved to the extreme right. (See Fig. 2.)

The free end of the thermostatic element 13 has an opening 45 through which the threaded portion 24 of valve 18 extends so that the element may bear against button 23 to move valve 18 upon a predetermined increase in the engine temperature and in proportion to the increase in temperature, until the valve is in a position to completely shut off fuel port 29 and close passages 41.

A lubricant supply pipe 50 is connected with the liquid fuel pipe 27 at a point between the float valve 9 of carburetor 4 and the fuel inlet port 29 of valve 18. The opposite end of the pipe 50 is connected to the interior of the oil sump 5 as shown at 51. The valve 52 in lubricator pipe 50 serves to control or shut off entirely the flow of lubricant to the liquid fuel pipe 27.

I have thus provided a means for introducing a predetermined amount of lubricant with the liquid fuel admitted to valve 18 for the purpose of priming, so that each priming charge may have any desired proportion of lubricant mixed therewith. A valve 53 in the liquid fuel pipe 27 is employed to shut off or control the supply of liquid fuel or both liquid fuel and lubricant when desired.

In operation, my improved primer and lubricator functions as follows: Prior to starting engine 1, which is cool and at rest, the valve 18 will lie in the position shown in Fig. 2 whereby all of the orifices 30 are in communication with the liquid fuel in float chamber 9 through fuel pipe 27 and fuel port 29. These openings 30, while shown as of uniform diameter, may be of varying diameters if desired, in which case that opening nearest to the valve head 19 would be the largest.

The orifices 30 being completely open, the air orifices 32 will be of course shrouded. Upon cranking engine 1 with the throttle valve 11 substantially closed, the engine suction will be applied through passages 41, port 36 and orifices 30 to draw a large supply of liquid fuel from float chamber 9 together with a lubricating charge of oil through pipe 27, which fuel and oil is continuously fed through pipe 43 and manifold 3 to the engine cylinder until firing commences. A small amount of air is also admitted at this time to chamber 20 through an adjustable valve 58, which air assists in the partial atomizing of the liquid fuel as it passes through the passages 41.

Immediately upon firing of the engine, the depression in manifold 3 and hence chamber 20 will suddenly increase, whereupon a predetermined movement in the valve 18 against the force of spring 22 will take place, resulting in the closing of certain of the openings 30 and the registration of certain of the passages 32 with the air inlet 33—34.

This action has two functions, the first to positively reduce the volume of fuel and lubricant in the priming charge by shrouding one or more of the fuel openings 30; the second, is to reduce the suction applied to the remaining fuel openings 30 by admitting air through the openings 32 to relieve the depression within chamber 20.

This opening movement of valve 18 responsive to sudden increase in the engine suction, will draw button 23 away from the thermostatic element 13 and while engine 1 continued to run at the same speed, no further change in the position of valve 18 by engine suction will take place.

Regardless of the movement of valve 18 by engine suction, warm air within stove 6 circulating past element 13 as it is drawn

into the air inlet 8 of the carburetor and, the direction radiation of heat from manifold 2 to element 13, will cause the element to expand as the temperature of the engine increases until finally it will engage with button 23 to advance valve 18 toward closed position. When proper running temperature of the engine has been attained, the element 13 will have moved sufficiently to seat the packing disc 37 over passages 41, resulting in the complete shutting off of the priming and lubricating charge.

During the initial period of priming, the movement of valve 18, due to the sudden increase in engine suction as the engine fires and increases to its idling speed, causes certain of the fuel openings 30 to be closed and certain of the air openings 32 to be open, as described. If now the throttle 11 is opened for the purpose of accelerating the engine, the suction in manifold 3 communicated to chamber 20 will decrease, permitting the valve to fall back and thereby increase the fuel charge by reopening certain of the openings 30 and closing certain of the openings 32. The amount to which the valve 18 will fall back upon the sudden drop in engine suction during acceleration may be limited if desired by maintaining a predetermined distance between button 23 and thermostatic element 13 for a given temperature. Of course, as the engine warms up it is not necessary that the increase in the richness of the priming and lubricating charge be as pronounced, which condition is provided for in the natural advance toward button 23 of thermostatic element 13 upon the increase in engine temperature, as described.

It is thus apparent that I have provided a primer and lubricator for an engine which is automatically governed by both engine suction and temperature, both coordinately and separately, according to the requisite conditions, to provide excess fuel and a lubricant to the engine only during the period required to bring the engine to a good running temperature whereupon the functions of the combined primer and lubricator are entirely suspended.

As the primer and lubricator operates in carrying out one of its functions to supply a lubricant to the engine cylinders at each time the engine is started, an effective seal is obtained between the piston and the cylinder walls during that time when excess fuel is fed thereto. After the engine has reached its normal running temperature and the feeding of fuel and lubricant through the apparatus has ceased, the lubricant will of course remain in the engine cylinders and become slowly dissipated during operation of the engine.

When the engine is again started, an additional charge of lubricant will be supplied. An excess quantity of lubricant will not be fed to the engine cylinders as through continuous starting and stopping of the engine during normal use, because the quantity of lubricant as in the case of the quantity of liquid fuel in the priming charge depends upon engine temperature. Therefore, if the engine, after running, is started several times between short intervals, only a relatively small quantity of lubricant will be fed into the engine cylinders, because of the operation of valve 18 by the thermostatic element 13.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A primer and lubricator for internal combustion engine, comprising a valve body having a port for communicating with the intake manifold of an internal combustion engine, means for feeding liquid fuel priming charge to said port during the starting of the engine and other means for feeding a lubricant to the liquid fuel charge.

2. In combination with an internal combustion engine, a valve body having a port adapted to communicate with the intake manifold thereof, a valve responsive to engine temperature adapted to close said port as the engine warms up and means for feeding a lubricant to said port.

3. In combination with an internal combustion engine, a body having a port adapted to communicate with the intake manifold thereof, a movable valve responsive to engine temperature adapted to close said port as the engine warms up and means for feeding liquid fuel and lubricant to the port.

4. In combination with an internal combustion engine, a valve body having a port adapted to communicate with the intake manifold of the engine, a sliding valve responsive to engine manifold suction and engine temperature for controlling communication between said port and said engine manifold and means for supplying a lubricant to said port.

5. A primer and lubricator for internal combustion engine comprising a valve body having a port for communicating with the intake manifold of an internal combustion engine, means for feeding liquid fuel priming charge to said port during the starting of the engine, and other means for feeding a lubricant to the liquid fuel charge, said last named means being operable to vary the proportion of fuel and lubricant fed to said port.

6. A primer and lubricator for internal combustion engines comprising a body having a port for communicating with the intake manifold of an internal combustion engine, automatic means for supplying a fuel priming and lubricating charge to said port during the starting period of said engine, said means being operable to shut off

the supply of fuel and lubricant to the port when the engine attains a predetermined temperature.

7. A primer and lubricator for internal combustion engines comprising a valve body having a port for communicating with the intake manifold of an internal combustion engine, a fuel inlet, said fuel inlet normally communicating with said port, a source of lubricant also communicating with said fuel inlet, means responsive to the differential in pressure between intake manifold depression and atmospheric pressure for decreasing the supply of fuel and lubricant to said port upon an increase in engine speed as from cranking to starting, and other means cooperating with said first named means for closing said port as the temperature of the engine increases to normal running temperature.

8. A primer and lubricator for internal combustion engines comprising a valve body having a port for communicating with the intake manifold of an internal combustion engine, a fuel inlet, said fuel inlet normally communicating with said port, a source of lubricant also communicating with said fuel inlet, and means responsive to the differential in pressure between intake manifold depression and atmospheric pressure for decreasing the supply of fuel and lubricant to said port upon an increase in engine speed as from cranking to starting.

In witness whereof, I hereunto subscribe my name this 26 day of October, 1928.

CHARLES LAWRENCE STOKES.