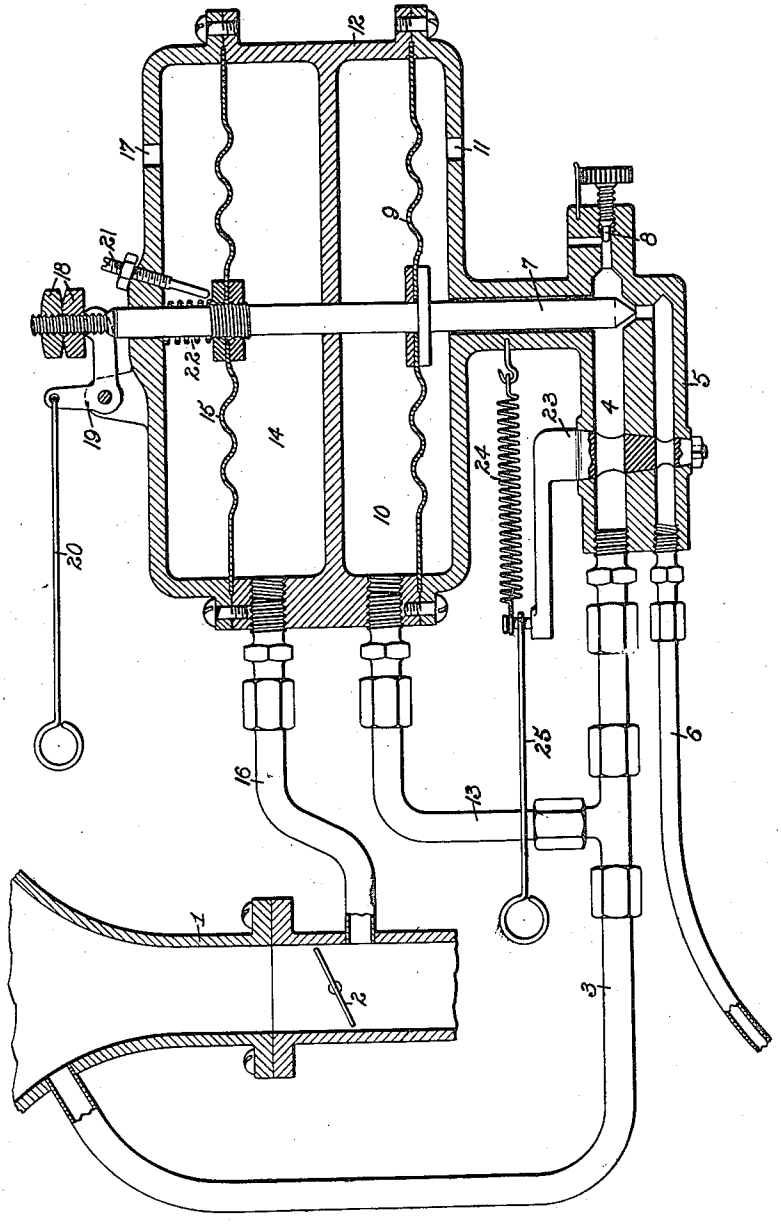
H. BROOKS.

PRIMING DEVICE.

APPLICATION FILED FEB. 24, 1917.

1,272,204.

Patented July 9, 1918.



WITNESSES

Alice W. Holmes

B. J. Offe

INVENTOR

H. Brooks

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

HOWARD BROOKS, OF EL PASO, TEXAS.

PRIMING DEVICE.

1,272,204. Specification of Letters Patent. Patented July 9, 1918.

Application filed February 24, 1917. Serial No. 150,737.

To all whom it may concern:

Be it known that I, HOWARD BROOKS, a citizen of the United States, and a resident of El Paso, in the county of El Paso and State of Texas, have invented a new and Improved Priming Device, of which the following is a full, clear, and exact description.

My invention relates to means for priming internal combustion engines, and has reference more particularly to means for continuous priming of the engine until the engine is hot enough or has reached the required speed to operate with the normal supply of fuel.

An object of the invention is to provide a simple and efficient device which is automatic in its action.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

The accompanying drawing illustrates an embodiment of my invention, in which the device is shown in section.

In starting an engine by priming it is very desirable to automatically reduce the priming fuel as the throttle valve is opened, and to reduce the supply of priming fuel in a degree proportional with the opening of the throttle to the extent that when the throttle is wide open the priming fuel supply will be entirely cut off. But if the engine refuses to pick up speed on its normal fuel it is equally desirable that the priming fuel supply be restored automatically upon the return or closing of the throttle valve.

In addition to the desirable conditions pertaining to continuous priming of engines it is necessary to reduce the supply of priming fuel when the throttle valve is opened, for the reason that if an engine picks up its normal supply of fuel the supply of priming fuel will produce too rich a mixture and cause the engine to slow down or stop.

Referring to the drawings, 1 is the intake manifold of an internal-combustion engine, and 2 is the throttle. The manifold above the throttle is connected by a conduit 3 to the mixing chamber 4 of a fuel mixing valve 5. A fuel supply conduit 6 is connected to the valve 5, the flow of fuel to the mixing chamber being controlled by a valve 7. The flow of air to the mixing chamber is controlled by an independent valve 8 which is adjusted to supply a predetermined quantity of air for any displacement of the valve 7 which controls the supply of fuel to the mixing chamber.

The stem of the valve 7 is secured to a diaphragm 9 which is housed in a chamber 10. One surface of the diaphragm is subjected to the atmospheric pressure, a suitable opening 11 being provided in the bottom of the casing 12 which houses the diaphragm. The opposite surface of the diaphragm is subjected to the pressure in conduit 3 through the medium of a conduit 13 extending from the conduit 3 to the casing 12 above the diaphragm 9. Therefore, the upper surface of the diaphragm is subjected to pressure in the upper part of the manifold.

The casing 12 has another chamber 14 through which the valve stem passes and wherein the stem is secured to a second diaphragm 15. The under side of the diaphragm 15 is in communication through a conduit 16 with the manifold 1 below the throttle 2, whereby this side of the diaphragm is subjected to the pressure in the manifold below the throttle. The upper surface of the diaphragm 15 is subjected to atmospheric pressure, a suitable opening 17 being provided in the casing 12 for that purpose. The projecting end of the valve stem carries threaded members 18 which may be adjusted on the stem. A bell-crank member 19 is mounted on the casing, one arm of which bears against one of the threaded members 18. The other arm of the bell crank is connected to a pull rod 20 whereby the valve 7 may be raised from its seat manually. The movement of the valve 7 is limited by a set screw 21 provided in the housing 12. The valve 7 is normally seated by a coil spring 22.

The mixing valve 5 is provided with a stopcock 23 passing through the mixing chamber 4 and the fuel supply passage, this stopcock, therefore, being interposed between the valve 7, the air valve 8, and the conduits 3 and 6. A coil spring 24 is so mounted as to move the stopcock 23 to the closing position. A pull rod 25 is provided for bringing the stopcock to the open position, in which the stopcock is shown in the drawing.

When the engine is to be primed, a pull

is exerted on the rod or wire 25, opening the stopcock 23, and the engine is cranked, the throttle 2 being slightly open. In consequence a reduction in pressure will take place in chamber 10 above the diaphragm 9 through the conduits 13 and 3. Substantially no reduction takes place below the diaphragm 15. In consequence the valve 7 will be lifted from its seat against the resistance of spring 22, fuel and air will flow into the mixing chamber 4 and through conduit 3 into the manifold and into the cylinders. As the throttle valve 2 is opened the engine will begin to operate on its normal fuel supply.

Due to the opening of the throttle there will be a reduction in pressure below the valve and, consequently, in the conduit 16 which influences the diaphragm 15. As the pressure above the diaphragm 9 and below the diaphragm 15 equalizes, the spring 22 will force the valve 7 on its seat, thereby cutting off the supply of priming fuel and preventing too rich a mixture, which would choke the engine. If the engine fails to pick up on its normal fuel supply, the closing of the throttle 2 will at once reëstablish the condition at the starting, causing the valve 7 to rise from its seat, and allowing the priming fuel to flow to the cylinders in the manner previously described. As soon as the engine runs on its normal supply of fuel, the stopcock 23 may be closed by releasing the rod 25.

While I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made as are within the scope of the appended claims.

I claim:

1. In combination with the intake manifold of an internal-combustion engine having a throttle valve, a priming device comprising a feed valve, means for supplying fuel and air to said valve, a delivery conduit from said valve to the manifold above the throttle, a spring for closing the feed valve, a diaphragm associated with the feed valve, a conduit from the delivery conduit to one side of the diaphragm whereby said valve may be moved against the resistance of the spring, a second diaphragm associated with the feed valve, and a conduit connecting the manifold below the throttle to the said second diaphragm whereby said second diaphragm may be caused to balance the first diaphragm and thereby render the spring effective.

2. In combination with the intake manifold of an internal-combustion engine having a throttle valve, a priming device comprising a needle valve, a spring for seating the valve, means for supplying fuel to the needle valve, a delivery conduit from the needle valve to the manifold above the throttle, a valve for supplying air to said delivery conduit, a casing associated with said needle valve, diaphragms in said casing connected to the valve and forming adjacent chambers in said casing, a conduit from one of the chambers to the delivery conduit, a conduit from the other chamber to the manifold below the throttle, and means for manually unseating the needle valve.

3. In combination with the intake manifold of an internal-combustion engine having a throttle valve, a priming device comprising a valve, a spring for closing the valve, means for supplying fuel and air to said valve, a delivery conduit from the valve to the manifold above the throttle, a casing associated with the valve having chambers the capacities of which may be varied, means establishing communication between one of the chambers and the manifold below the throttle, and similar means establishing communication between the other chamber and the manifold above the throttle, said valve having means adapted to be influenced by the change in the capacities of the chambers whereby the effect of the spring on the valve may be varied substantially as and for the purpose set forth.

4. In combination with the intake manifold of an internal-combustion engine having a throttle valve, a priming device comprising a spring-actuated valve, means for supplying fuel to said valve, a delivery conduit from the valve to the manifold above the throttle, means for supplying air to the delivery conduit, a diaphragm mechanism for influencing the spring-actuated valve subjected to the air pressure of the manifold above and below the throttle, and a stopcock for controlling the flow of fuel to the valve and the fuel mixture from the valve to the delivery conduit.

5. In combination with the intake manifold of an internal-combustion engine having a throttle valve, a priming device comprising a fuel feed, a valve controlling the feed, a discharge conduit from the valve to the manifold above the throttle, pneumatically-operable means controlling said valve, and means for subjecting said pneumatically-operable means to the pressure of the manifold above the throttle valve when priming the engine, and to the pressure above and below the throttle when running on the regular mixture.

6. In combination with the intake manifold of an internal-combustion engine having a throttle valve, a fuel feed, a valve controlling the feed, a discharge conduit from the valve to the manifold above the throttle, a diaphragm mechanism associated with said valve, and means for subjecting the diaphragm mechanism to the pressure of the

manifold above the throttle when priming the engine, and to that above and below when running on the regular mixture.

7. In combination with the intake manifold of an internal combustion engine having a throttle valve, a feed controlling valve, a discharge conduit from the said valve to the manifold above the throttle, a spring for maintaining said valve closed, a diaphragm mechanism associated with the feed valve, and means for subjecting the diaphragm mechanism to the pressure of the manifold above the throttle to move the valve against the resistance of the spring or to the pressure above and below the throttle of the manifold to subject the valve to the action of the spring whereby the flow of priming fuel is inversely proportional to the flow of regular fuel mixture.

HOWARD BROOKS.