H. D. WATERHOUSE.

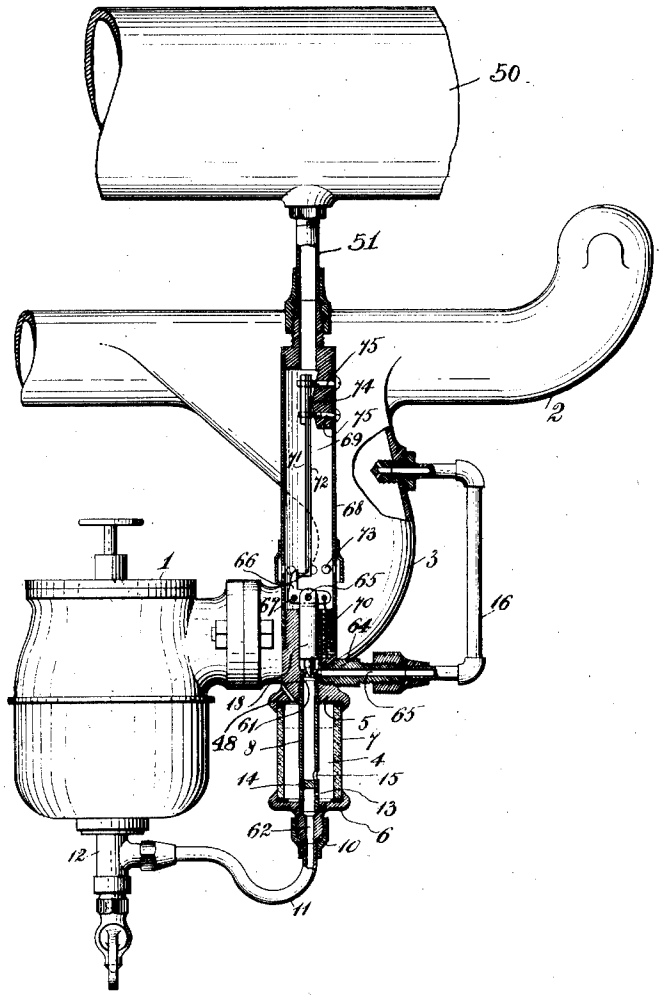
AUTOMATIC PRIMER FOR GASOLENE ENGINES.

APPLICATION FILED MAR 8, 1917.

1,365,755. Patented Jan. 18, 1921.

2 SHEETS—SHEET 1.

Fig. 1.



INVENTOR:

Harold D. Waterhouse

By Howard Smith & Tennant.

HIS ATTORNEYS.

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2 SHEETS—SHEET 2.

Fig. 2.

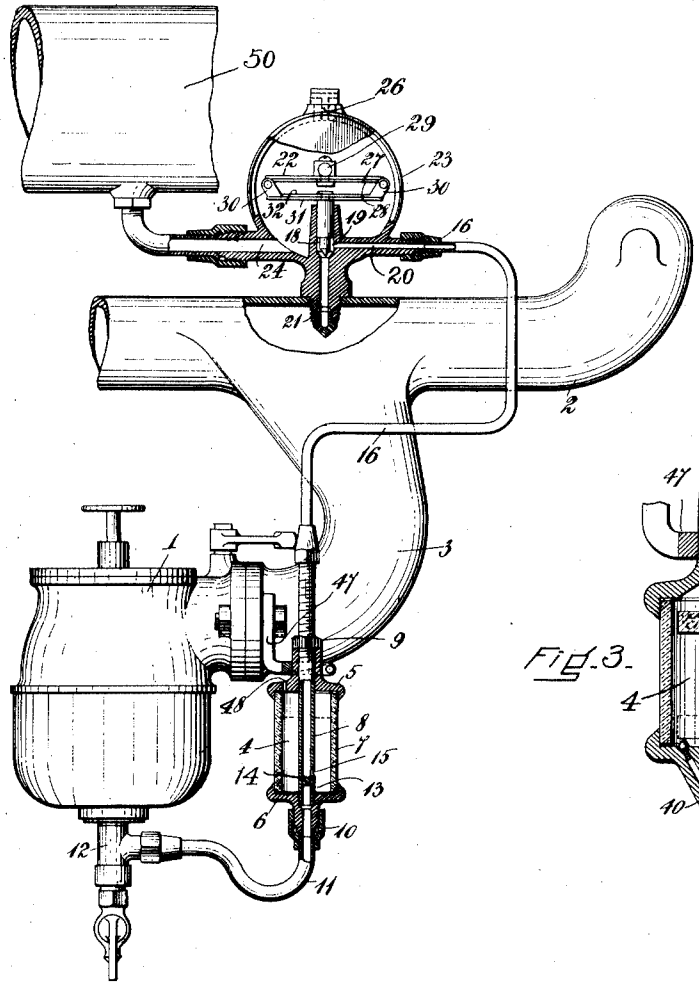
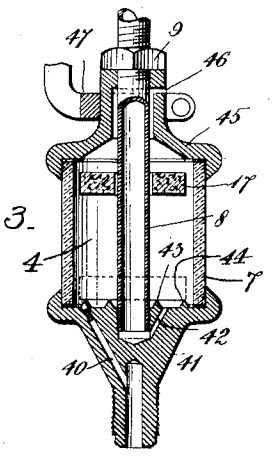


Fig. 3.



INVENTOR:

Harold D. Waterhouse

By Heard Smith & Tennant.

HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

HAROLD D. WATERHOUSE, OF WOLLASTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WALTER S. CRANE, JOSHUA CRANE, AND FRANK V. STONE, TRUSTEES.

AUTOMATIC PRIMER FOR GASOLENE-ENGINES.

1,365,755. Specification of Letters Patent. Patented Jan. 18, 1921.

Application filed March 8, 1917. Serial No. 153,308.

To all whom it may concern:

Be it known that I, HAROLD D. WATERHOUSE, a citizen of the United States, residing at Wollaston, county of Norfolk, State of Massachusetts, have invented an Improvement in Automatic Primers for Gasolene-Engines, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to primers for internal combustion engines and has for its object to provide an automatic primer which is operative to prime the cylinders automatically when the engine is started, provided the engine is cold, but which will be inoperative to perform any priming operation so long as the engine is warm.

Other objects of my invention are to provide an improved automatic priming device for internal combustion engines having various advantages hereinafter pointed out.

In order to give an understanding of the invention, I have illustrated in the drawings some selected embodiments thereof which will now be described, after which the novel features will be pointed out in the appended claims.

Figure 1 of the drawings shows the carbureter and intake pipe of an internal combustion engine and also illustrates one embodiment of my improved primer associated therewith;

Figs. 2 and 3 show different embodiments of the invention.

I have indicated at 1 the carbureter of an internal combustion engine and at 2 the intake manifold which is connected to the carbureter through the usual intake pipe 3. My improved primer comprises a priming chamber having a relatively small inlet which is connected to a suitable source of gasolene supply, such as the float chamber of the carbureter, and which is preferably situated at about the normal gasolene level in the carbureter or other source of supply, so that when the engine is not running, the gasolene will flow from the carbureter or other source of supply into the priming chamber and will rise to the same level therein as it has in the carbureter or other source of supply. The priming chamber is of such a size as to hold the requisite amount of gasolene for properly priming the engine. This priming chamber is also provided with an outlet connected to the intake manifold, so that when the engine is started, the suction produced in the intake manifold will draw thereinto the priming charge of gasolene in the priming chamber.

The necessity of priming an internal combustion engine arises only when it is desired to start the engine when it is cold, and in order to prevent the priming device from operating when the engine is hot, I have provided means for automatically closing the communication between the priming chamber and the intake pipe as soon as the engine starts and becomes heated, which means will operate to maintain said communication closed so long as the engine is hot. This prevents the engine from being automatically primed when it is started while it is still warm.

The priming chamber is indicated at 4 and it will preferably be constructed with the upper and lower heads 5 and 6 and with the cylindrical body 7 which is clamped between the heads. This body 7 can conveniently be made of glass so that the operation of the primer can be readily observed. The lower head 6 is shown as having a pipe 8 screwed thereinto, the lower end of which communicates through a duct 62 with a pipe 11 which leads to any suitable source of gasolene supply. This source of gasolene supply may be the gasolene tank of the automobile or may be the carbureter 1, the latter being the construction herein illustrated. The pipe 8 is provided with a plug or barrier 14 near its lower end and below said barrier it is provided with a small inlet port 13 leading into the chamber 4. Directly above said barrier, said pipe is provided with a relatively-large outlet port 15.

The head 5 is provided with a laterally-extending nipple 64 which is connected by a pipe 16 with the intake pipe 3 or intake manifold 2. This nipple is provided with a bore or duct 65 which communicates with the upper end of the pipe 8 through a valved port 61.

When the engine is idle, the gasolene will flow from the source of supply through the pipe 11 and the inlet port 13 into the priming chamber 4. Said priming chamber is supported by some suitable means at such an elevation relative to the normal gasolene

level in the source of supply that when the gasolene flows into the priming chamber and fills the latter to the gasolene level in the source of supply, the priming chamber will be full or partially full of gasolene. Where the priming chamber is connected to the carbureter as herein illustrated, it will preferably be supported adjacent the carbureter and at about the level indicated in the drawings. When the engine is started, the suction produced in the intake manifold will suck the gasolene in the priming chamber 4 through the outlet port 15, pipe 8 and pipe 16, into said intake manifold, thus priming the engine. The amount of gasolene which the priming chamber 4 holds will preferably be sufficient to properly prime the engine when it is started.

The upper head 5 is shown as provided with a vent port 48 to admit air into the priming chamber when the priming charge is sucked therefrom. It is only necessary to prime an internal combustion engine when it is to be started while it is cold, and my invention comprehends means for automatically closing the communication between the priming chamber and intake manifold after the engine has started, and to maintain said communication closed so long as the engine is warm. Said means is constructed so that when the engine becomes cold again the communication between the priming chamber and intake manifold will be automatically opened again so that the device will be ready for its automatic operation when the engine is started. While any suitable means for thus automatically controlling the communication between the priming chamber and the intake manifold may be employed, I will preferably use a thermostatically-controlled valve, the thermostat of which is influenced or operated by the heat developed in the internal combustion engine when it is running. I have shown in the drawings two different forms of such a thermostatically-controlled valve. In Fig. 1 of the drawings the valve is indicated at 18 and is arranged to open and close the duct or port 61. This valve is pivotally connected at 65 to an elbow-lever 66 which in turn is pivoted at 67 to a casing 68 that is secured to the head 5 and forms within it a thermostat-receiving chamber 69. The lever 66 is acted upon by a spring 70 which tends normally to close the valve 18. The valve is held open by a thermostat comprising two plates of metal 71 and 72 which have different co-efficients of expansion, such, for instance, as zinc and iron. These two plates are secured together as usual in thermostat devices and the lower end of the plates bears against the upright arm of the elbow-lever 66. The chamber 69 in which the thermostat is received is so connected to or supported on the engine that it will become heated when the engine starts and will remain heated so long as the engine is warm. This may be accomplished in various ways. The chamber might be so connected to the radiator that the water therein would circulate through the chamber, or it may be connected to the exhaust pipe 50 so that some of the exhaust gases will be delivered into the chamber, thus heating the thermostat, or the chamber might be fastened directly to the engine so that it will be heated by contact therewith. I have illustrated herein a construction wherein the chamber 69 is connected to the exhaust pipe 50 by means of a suitable pipe 51, this pipe 51 leading into the upper end of the chamber 69. The lower end of the chamber 69 is provided with the exhaust ports 73 through which the exhaust gases entering the chamber 69 may escape.

As stated above, the thermostat is so arranged that when the engine is cold it will hold the valve 18 open against the action of the spring 70. As soon as the engine is started, some of the exhaust gases pass into the chamber 69, thus heating the thermostat and causing it to expand. This action will move the lower end thereof to the right, Fig. 1, allowing the spring 70 to close the valve 18 and thus cut off communication between the priming chamber and the intake pipe. The valve will remain closed until the engine becomes cool when the thermostat will automatically open the valve.

My improved device, therefore, will operate automatically to prime the engine when it is started while it is cold and will be inoperative to prime the engine as soon as it becomes warm and so long as it remains warm.

The thermostat shown in Fig. 1 is so constructed that it can be adjusted to cause the valve to remain closed until the temperature in the casing 69 falls to a predetermined point, at which time the thermostat will operate to open the valve. The advantage of this is that if the engine with which the device is used will start readily without priming at ordinary summer temperature, but will need to be primed when the temperature reaches 40 or 30, for instance, the device can be adjusted so that the valve 18 will remain closed until the lower temperature is reached. I accomplish this herein by fulcruming the upper end of the thermostat on a fulcrum point 74 and by providing the two adjusting screws 75 situated either side of the fulcrum and which screw into the upper end of the thermostat. By backing off one screw and tightening up the other, the normal position of the thermostat may be varied and thus it may be so adjusted that it will open the valve at any predetermined temperature.

In Fig. 1 the thermostatically-controlled valve is situated adjacent the primer and

forms with the primer a unitary structure. In Fig. 2 I have shown a slightly different embodiment of the invention wherein the thermostatically-controlled valve is placed adjacent the intake pipe. In this embodiment the pipe 8 extends up through the head 5 and has screw-threaded thereon a nut 9 which serves to clamp the two heads against the ends of the glass body 7. This pipe 8 is connected to the pipe 16 which leads to the thermostatic device.

The upper head 5 is provided with the vent port 48 and the priming chamber is supported in proper position by means of the bracket 47. The thermostatic device illustrated in Fig. 2 comprises a valve 18 operating in a valve casing 19 having the inlet duct 20 to which the pipe 16 is secured and the outlet duct extending through a nipple 21 that is screwed into the intake manifold 2. The valve 18 is shown as a needle valve and it is connected to a thermostatic device 22 that is inclosed within a chamber 23 which is provided with an inlet 24 connected by a pipe to the exhaust manifold 50. The chamber is also provided with small outlet openings 26. The thermostatic device 22 may be of any usual type which is capable of closing the valve 18 when the temperature rises and of opening the valve when the temperature falls. The construction herein shown comprises two plates 27, 28 of metals having different co-efficient of expansion, such, for instance, as zinc and iron, which are secured centrally to a support 29 carried by the casing 23. The outer ends of these plates 27 and 28 are pivotally connected to ears 30 carried by the end of two other plates 31 and 32 which have different co-efficient of expansion. The plates 31, 32 are connected to the stem 33 of the valve 18. The construction is such that at normal atmospheric temperature, the valve 18 will be held open, but if the temperature in the casing 23 rises, then the unequal expansion of the plates 27, 28 and 31, 32 causes the valve 18 to be closed. Since the casing 23 is connected to the exhaust pipe, some of the exhaust gases will be delivered into the casing 23 as soon as the engine is started and the thermostatic device will, therefore, immediately respond to close the valve 18.

So long as the engine is running, a portion of the hot gases from the exhaust pipe will be delivered into the casing and will be discharged through the casing and the outlet ports 26, thus subjecting the thermostatic device to relatively high temperature. The valve 18 is thus maintained in closed position while the engine is running and until the engine becomes cool. This thermostatic valve device thus automatically closes the communication between the priming chamber and the manifold as soon as the engine has started and holds it closed until the engine becomes cool. There is, therefore, no possibility that the valve will be open except when the engine is cold.

In Fig. 3 I have shown a different form of priming chamber in which the lower head 41 has the inlet port 40 therein which communicates with the pipe 11 and also an outlet port 42 which leads to the bottom of the pipe 8. The head 41 is provided with two annular valve seats 43 and 44 against which the float 17 rests when the priming chamber is empty. The outlet port 42 is situated between the annular valve seats 43 and 44 while the inlet port 40 is situated on the exterior of the valve seats. As a result, when the engine is started and the priming charge is sucked out of the priming chamber, the float 17 will be seated against the valve seats 43 and 44 and will thus close communication between the priming chamber and the supply pipe 11. The upper head 45 is provided with the air duct 46.

From the above it will be seen that I have provided a priming device which automatically becomes operative when the engine is cold and which automatically becomes inoperative and remains inoperative so long as the engine is warm, and while I have illustrated some selected embodiments of my invention, yet I do not wish to be limited to the constructional features shown.

I claim:

1. In a priming system for internal combustion engines, a conduit for conducting fuel from a supply source to the intake passage of the engine, valve means in said conduit for closing said conduit when the engine is firing, and engine suction-operated means for closing said conduit independently of said valve when a predetermined charge of fuel has been introduced to the intake passage.

2. In a priming system for internal combustion engines, a conduit for conducting fuel from a supply source to the intake passage of the engine, a thermally-controlled valve in said conduit and auxiliary automatic charge-determining means other than said valve operatively interposed in said conduit.

3. In a priming system for internal combustion engines, a conduit for conducting fuel from a supply source to the intake passage of the engine, a charge-determining chamber operatively interposed in said conduit, said chamber provided with a float, and inlet and outlet ducts adjacent the bottom of the chamber, whereby, when said chamber is empty pursuant to starting of the engine, said float will be held in its lowermost position by engine suction through its outlet duct, thereby operatively closing the inlet duct and automatically preventing automatic refilling of said chamber so long as the engine continues in operation, while per-

mitting automatic refilling of said chamber on stoppage of the engine.

4. In a priming system for internal combustion engines, a conduit for conducting fuel from a supply source to the intake passage of the engine, a valve in said conduit, a thermostatic device for operating said valve, a chamber inclosing said thermostatic device, means to admit exhaust gases into said chamber and automatic charge-determining means independent of the thermostatic device, said determining means limiting the priming charge delivered to the engine at each starting operation thereof.

5. In a priming system for internal combustion engines, a conduit for conducting fuel from a supply source to the intake passage of the engine, and a chamber operatively interposed in said passage having a connection with the supply end of said conduit for automatic refilling thereof, and with the discharge end of said conduit for automatic emptying thereof, said chamber determining the maximum amount of fuel utilized in the initial priming charge.

In testimony whereof, I have signed my name to this specification.

HAROLD D. WATERHOUSE.