H. D. WATERHOUSE.

PRIMER FOR GASOLENE ENGINES.

APPLICATION FILED MAR. 16, 1917.

1,265,011.

Patented May 7, 1918.

Fig. 4.

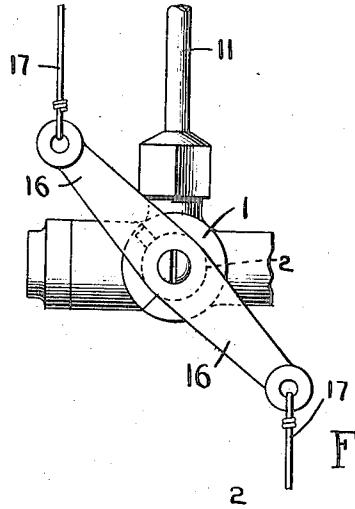


Fig. 1.

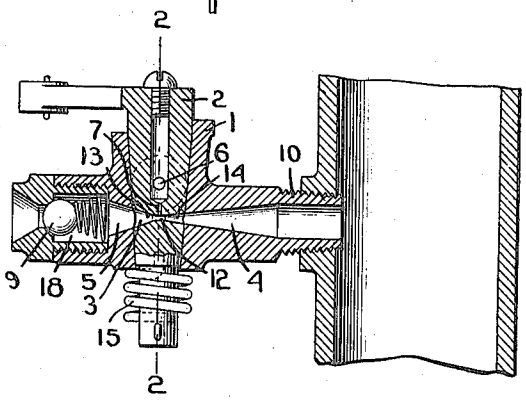


Fig. 2.

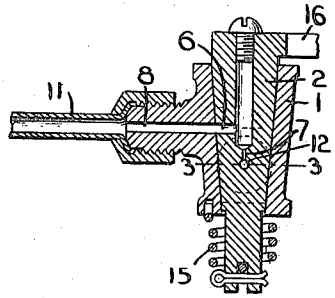
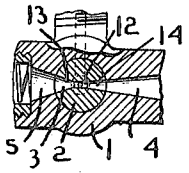


Fig. 3.



Inventor.
Harold D. Waterhouse
by Heard Smith & Tennant.
Attys.

UNITED STATES PATENT OFFICE.

HAROLD D. WATERHOUSE, OF WOLLASTON, MASSACHUSETTS, ASSIGNOR TO COPLEY MOTOR DEVICES COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PRIMER FOR GASOLENE-ENGINES.

1,265,011. Specification of Letters Patent. Patented May 7, 1918.

Application filed March 16, 1917. Serial No. 155,185.

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 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 has for its object to provide a novel primer for use in connection with gasolene engines by means of which a fine spray or mist of gasolene will be automatically delivered to the intake pipe when the engine is cranked.

There are in more or less common use so-called primers for internal combustion engines which have for their purpose to inject a spray of gasolene into the intake pipe or the cylinders of the engine in order to assist in starting the engine when the latter is cold. So far as I am aware, however, all these devices deliver the gasolene in the form of a rather coarse spray, the globules of gasolene forming the spray being of considerable size. It is not easy to ignite a spray of this sort because the gasolene is not sufficiently pulverized or vaporized. It is the object of my invention to provide an improved primer which is so constructed as to deliver into the intake pipe of the gasolene engine a mixture of air and gasolene in such minutely-divided particles as to constitute in effect a readily-ignitible vapor. I accomplish this by means of a device in which the priming charge of gasolene is acted upon by a current of air in such a way as to thoroughly pulverize the gasolene and produce the desired vapor.

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

In the drawings, Figure 1 is a sectional view through a device embodying my invention;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a section on the line 3—3, Fig. 2;

Fig. 4 is a plan view of the device shown in Fig. 1.

My invention comprehends a valve device having a passage which is contracted at some point in its length and through which air may be drawn into the intake manifold of an internal combustion engine, and also having a relatively small gasolene supply duct leading into the contracted portion of the passage at substantially right angles thereto, said duct communicating with a source of gasolene supply. In the particular construction shown in the drawings, the valve device is in the form of a plug valve and the contracted portion of the air passage and the gasolene duct leading thereinto is situated in the plug of the valve. The valve device herein illustrated comprises a valve casing 1 which is provided with the conical bore to receive a valve plug 2. The valve casing is provided with an air inlet port 5 and with an exhaust port 4 which leads through the nipple extension 10. The air inlet port 5 and the exhaust port 4 are situated opposite and in line with each other. The valve casing 1 is also provided with a gasolene inlet port 8 which is situated out of line with the ports 5 and 4, said gasolene port 8 communicating with a gasolene supply pipe 11 which leads to some suitable source of gasolene supply, such, for instance, as the gasolene tank of the automobile. The valve plug 2 is provided with a passage or port 3 which extends tranversely therethrough and which is adapted to form communication between the air inlet port 5 and the discharge port 4. When the passage 3 is in communication with air inlet port 5 and discharge port 4, a duct or passage is provided through which air may be drawn into the intake manifold. This passage has the characteristic that at some point in its length, it is contracted to form a portion of considerably-reduced cross-sectional area. In the illustrated embodiment of the invention, this contracted portion is formed in the portion 3 of the passage extending through the valve plug 2. The portion 3 of the air passage may have various shapes so long as it retains this characteristic. I have found from experiments that a Venturi-shaped passage gives good results and I have chosen to illustrate such construction herein. This Venturi-shaped passage 3 is provided with the central portion 12 of relatively-small diameter and with the inlet portion 13 having a converging shape toward the central portion 12 and the discharge portion 14 having a diverging shape from the central por-

tion 12. The inlet port 5 and the discharge port 4 will also preferably be tapering to correspond with the taper of the parts 13 and 14 of the passage so that when the valve is set as shown in Fig. 1, the passage through the valve constitutes a Venturi-shaped passage. The valve plug 2 is also provided with the port 6 adapted to communicate with the gasolene port 8 and with the relatively-small duct 7 which forms the communication between the port 6 and the passage 3, said port 7 leading into the portion 12 of smallest diameter of the passage and at right angles thereto. It is important that the duct 7 should be very small relative to the passage 3 and that it should lead into the contracted portion 12 of said passage. In fact I have found that best results are secured if the cross-sectional area of the duct 7 is about one quarter that of the passage 3 at its contracted portion though these proportions may be varied within certain limits without departing from the invention.

The valve plug 2 is acted upon by a spring 15 which normally tends to hold it closed. Said plug is also provided with one or more arms 16 by which the plug may be turned into the position shown in Figs. 1 and 2, that is, with the ports 6 communicating with the gasolene inlet port 8 and with the passage 3 forming communication between the ports 5 and 4.

The device is installed by connecting the nipple 10 either directly to the intake pipe of the engine or to a pipe leading into the intake pipe. One or both of the arms 16 will have suitable wires or connections 17 leading therefrom to a position where they may be operated when the engine is to be cranked. If the engine is to be cranked by hand, then one of the wire connections 17 may be led to the front of the radiator in convenient position to be operated by the person cranking the engine. If the engine has a self-starter attachment, then one of the wires or connections may be led to the instrument-board of the automobile where it may be manipulated by the person operating the self-starter.

The operation of the device is as follows: When the engine is to be cranked and it is desired to prime the same, the operator manipulates one of the wires or connections 17 thereby turning the plug 2 against the action of the spring 15 into its operative position shown in Figs. 1 and 2. The engine is then cranked either by hand or by the self-starter, and the suction produced in the intake pipe will draw a current of air through the ports 5, 3 and 4. The Venturi shape of these ports causes the air current to be drawn therethrough with a sort of hurricane effect, and owing to the principle of action of a Venturi tube or passage, considerable suction will be created at the lower end of the duct 7. This suction will result in gasolene being drawn through said duct, and owing to the hurricane action of the air in its movement through the Venturi passage, the gasolene which is delivered through the small duct 7 will be broken up or pulverized and, mixed with the air to produce a vapor which is easily ignitible. As soon as the engine is started, the connection 17 may be released when the spring will close the valve and terminate the priming action, thus allowing the engine to operate in usual manner.

With my improved device, the priming charge is automatically delivered during the suction stroke of the engine, and, what is more important, the gasolene constituent of the priming charge is so broken up and pulverized and mixed with the air that it is readily ignitible. The device is also very simple and inexpensive to manufacture and may be easily installed on any engine.

I have shown an inwardly-opening spring-pressed check valve 9 controlling a passage 18 leading to the inlet port 5. The purpose of this valve is to prevent the air from being blown out through the inlet port in case the pistons of the engine should have a backward movement during the cranking operation.

This priming device is applicable for use in connection with stationary internal combustion engines and engines for operating motor boats, or air ships, as well as automobile engines.

While I have illustrated herein a selected embodiment of my invention, I do not wish to be limited to the constructional features shown.

I claim:

1. In a primer for gasolene engines, the combination with a valve casing having an air inlet port and a discharge port situated in alinement with each other and also having a gasolene inlet port situated out of line with the first-named port, of a plug rotatably mounted in said valve casing and provided with a Venturi-shaped passage which forms a communication between the air inlet port and the discharge port when the plug is turned into one position, said plug also having a relatively-small duct leading transversely into the Venturi passage at its contracted portion and adapted to communicate with the gasolene inlet port when the Venturi passage forms a communication between the inlet and discharge port, movement of the plug to carry the Venturi-shaped passage out of communication with the air inlet and discharge ports also closing the gasolene inlet port.

2. In a primer for gasolene engines, the combination with a valve casing having an air inlet port, a discharge port, and a gasolene inlet port, of a plug rotatably mounted in said valve casing and provided with a

passage adapted in one position of said plug to form a communication between the air inlet port and the discharge port, some portion at least of said passage having a cross-sectional area considerably less than that of either the inlet port or the discharge port, and said plug also having a duct leading into said passage at its contracted portion and adapted to communicate with the gasolene inlet port, said duct being considerably smaller than said passage at its contracted portion, said ports, passage and duct having such a relative arrangement that movement of the plug to close the discharge port will also close the gasolene inlet port.

3. A primer for gasolene engines comprising a valve device having an air passage which is contracted considerably at some portion of its length and is adapted to be connected to the intake manifold of a gasolene engine, said valve device being provided with a gasolene supply duct which is considerably smaller in cross sectional area than the contracted portion of said passage and leads into said contracted portion, and also being provided with means to open or close said passage and duct simultaneously.

4. In a device of the class described, the combination with the intake pipe of a gasolene engine, of a valve device connected to said intake pipe and having an air passage which is contracted considerably at some portion thereof and communicates with said intake pipe, said valve device having a relatively-small gasolene supply duct leading into the contracted portion of said passage and connected to a source of gasolene supply, and also comprising a movable member adapted in one position to close both said passage and said duct and in another position to open both said passage and said duct.

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

HAROLD D. WATERHOUSE.