T. F. BOURNE.

PRIMING MEANS FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED NOV. 9, 1918.

1,343,547. Patented June 15, 1920.

Fig. 4.

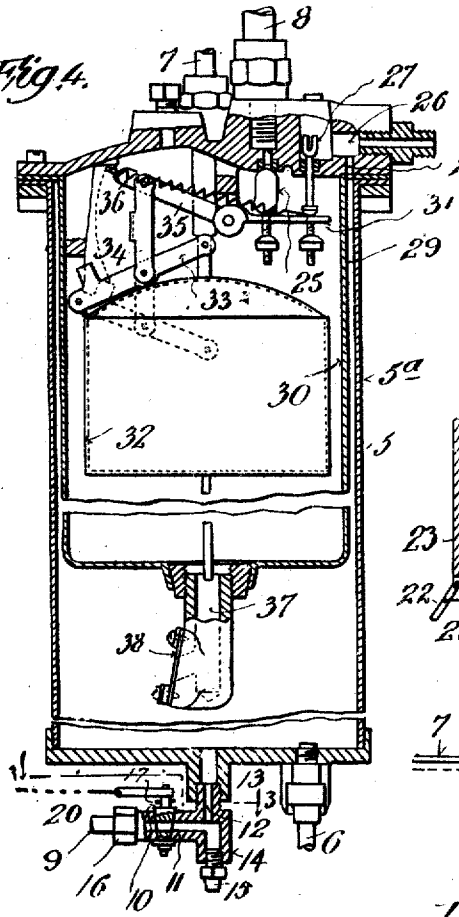


Fig. 3.

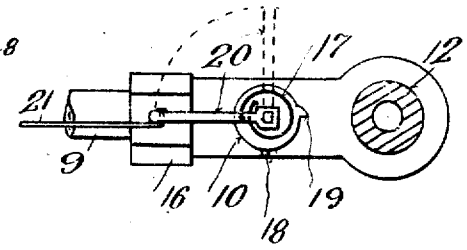


Fig. 2

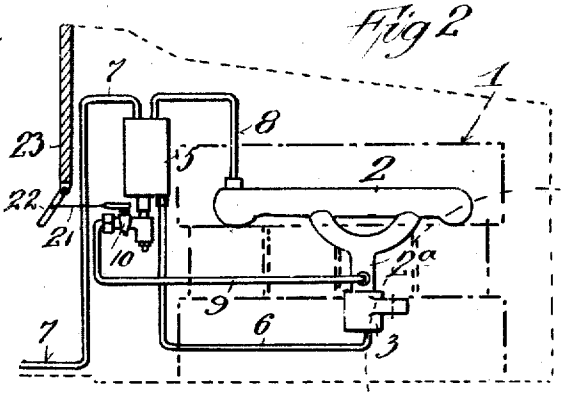
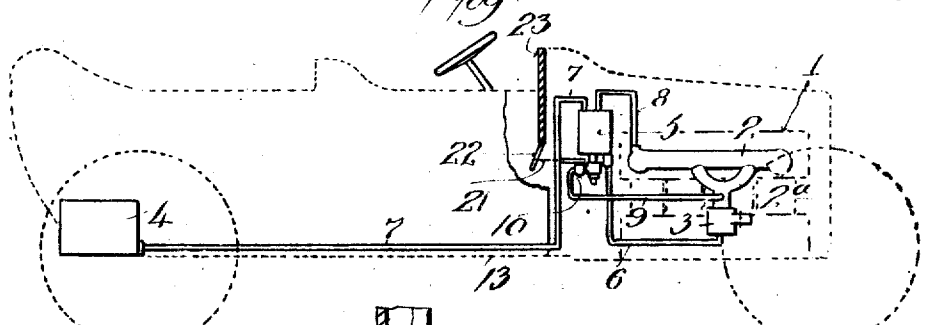


Fig. 1.



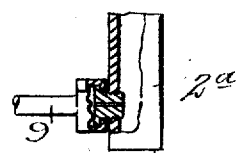


Fig. 5.

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PRIMING MEANS FOR INTERNAL-COMBUSTION ENGINES.

1,343,547. Specification of Letters Patent. Patented June 15, 1920.

Application filed November 9, 1918. Serial No. 261,760.

To all whom it may concern:

Be it known that I, THEODORE F. BOURNE, a citizen of the United States, and resident of Upper Montclair, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Priming Means for Internal-Combustion Engines, of which the following is a specification.

An object of my invention is to provide means for supplying priming charges to internal combustion engines from a supply of liquid fuel, such as liquid hydrocarbon, which will be ready for use without requiring the priming charges to be supplied manually. A further object of the invention is to utilize, for priming the engine, liquid fuel flowing by gravity from the same receptacle that supplies such fuel to the carbureter of the engine.

In the accompanying drawings I have illustrated a receptacle for liquid fuel in communication with the carbureter of the engine to supply the carbureter with said fuel by gravity, and manually controlled means providing communication between said receptacle and the engine mixture manifold or intake conduit for supplying the latter with said fuel by gravity for priming the engine. Means also provide communication between said receptacle and the engine cylinders, such as through a connection with said manifold, for producing a partial vacuum in said receptacle for charging said receptacle with such fuel from a main supply tank. Liquid fuel for priming the engine thus will automatically be maintained in position to flow by gravity to said intake conduit or manifold when said manually controlled means is operated.

My invention also comprises novel details of improvement and combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part hereof, wherein—

Figure 1 is a side elevation illustrating an automobile equipped with my improvements; Fig. 2 is an enlarged detail of parts shown in Fig. 1; Fig. 3 is a detail plan view of part of Fig. 2; Fig. 4 is an enlarged sectional view through the receptacle for the liquid fuel for supplying the carbureter and the priming charges for the engine; and Fig. 5 is a sectional detail.

In the accompanying drawings the reference numeral 1 indicates an internal combustion engine, 2 indicates an intake conduit or manifold for the engine, and 3 indicates a carbureter communicating with said conduit, which parts may be arranged and connected in any well known manner. At 4 is a main supply tank for liquid hydrocarbon fuel, such as gasolene, kerosene or the like, and at 5 is an auxiliary receptacle or tank in communication with tank 4 to receive the fuel therefrom and in communication with the carbureter through a conduit or piping 6. The receptacle 5 is on a level higher than the carbureter and tank 4 to deliver liquid fuel to the carbureter by gravity. The conduit or piping 6 extends from the lower part of said receptacle below the normal liquid level therein. The upper portion of the receptacle 5 is connected with tank 4 by means of a conduit or piping 7. Liquid may be caused to flow from tank 4 into receptacle 5 by means of exhaust or partial vacuum produced in said receptacle in any well known manner. In the example illustrated the upper portion of receptacle 5 above the liquid fuel therein, is in communication with intake conduit or manifold 2 through a conduit or piping 8, whereby the exhaust produced by the engine cylinders in conduits 2 and 8 will cause the exhaust or partial vacuum in receptacle 5 for charging of the latter from tank 4. The parts above described are well known constructions for maintaining a supply of liquid hydrocarbon for the carbureter of internal combustion engines.

In the example illustrated I utilize receptacle 5 as a means to supply liquid hydrocarbon for priming the engine, whereby so long as there is a supply of liquid fuel for the carbureter in receptacle 5 there will be the same supply for priming the engine. From a point below the liquid level in receptacle 5 I provide a conduit or piping 9 to afford communication from said receptacle to the engine cylinders, and as shown said conduit 9 is connected with the intake conduit or manifold. By preference conduit 9 is connected to the intake leg 2^a of the manifold at a point above the carbureter for mixing the priming charge with the mixture from the carbureter. The conduit 9 may, of course, be connected to any other conduit or passage leading from the carbureter to the engine cylinders, according to well known practice, as where an external manifold is not interposed between the en-

gine and the carbureter but where the carbureter is connected directly to the intake passage in the engine. I provide a valve indicated at 10 to control the flow of liquid fuel from receptacle 5 through conduit 9 and by preference said valve will automatically close to shut off the flow of priming fuel. Said valve may be of any suitable construction, yet I have shown the same in the form of an ordinary apertured tapering plug valve journaled in a casing 11 having a threaded branch 12 for connection with hub 13 at the bottom of receptacle 5, said casing having a branch 14 which may be closed by a plug or valve indicated at 15, whereby the receptacle may be drained. A union 16 may connect the casing 11 with the conduit or pipe 9. For automatically closing valve 10 it may be connected to a suitable spring 17 the opposite end of which spring is connected to the valve casing, a stop 18 on said casing coöperating with a projection 19 connected with the valve stem serving to retain the latter in closed position. At 20 the valve stem is shown provided with a projection or arm whereby the valve may be operated. Said projection 20 may be manually operated by any suitable means, such as by means of a wire or flexible connection 21 extending to an operating member, such as a lever 22, pivotally supported in any suitable manner upon a suitable part of the automobile, boat or other apparatus to which the described appliances are applied, such as to the dash-board 23 of the automobile, in a convenient position for operation. By preference valve 10 is located adjacent to receptacle 5 so that the length of conduit or pipe 9 from such valve to the conduit or manifold 2 will contain a limited supply of liquid fuel to be drawn to the engine after valve 10 is closed, for continuing the priming charge until the supply of fuel has been sucked out of conduit 9, to enable the operator quickly to close valve 10 without oversupplying the priming charge, and yet permitting the engine pistons to continue to draw the priming charge for a limited period.

In Fig. 4 I have illustrated a so-called vacuum receptacle, for containing the supply of liquid fuel in connection with which my improvements are applied. Said receptacle is similar to that disclosed in Letters Patent to Webb Jay, No. 1,125,549, issued Jan. 19, 1915, and is illustrated for the purpose of disclosing means to automatically maintain such a supply of liquid hydrocarbon for the carbureter and for priming, although my invention is not limited to the particular construction of such receptacle set forth. In Fig. 4 the conduit 8 is controlled by a valve 25 and air intake passage 26 is controlled by a valve 27, the passage 26 having communication through passage 28 with the space 29 between the outer wall 5^a and the inner vessel 30 of receptacle 5. Said valves are so connected to the lever 31 that they can open and close alternately, as described in the aforesaid patent. When valve 25 is open the valve 27 is closed, and the engine suction is permitted to effect the reduction of pressure within vessel 30 to cause the flow of fuel from tank 4 through pipe 7 into vessel 30 to cause the rise of float 32. Said float is connected by a lever 33 and link 34 to an arm 35 fulcrumed coaxially with lever 31, serving to support one end of tension spring 36 whose opposite end is connected to the lever 31, whereby the spring tends to fold the members 31 and 35 toward each other, either above or below their fulcrum, to resist the rise of the float, and whereby the float may rise suddenly to its upper limit of movement to cause the unseating of air valve 27 and the seating of valve 25, to cut off the engine suction and restore atmospheric pressure within vessel 30. When the level of the fuel in said vessel is sufficiently lowered the float will descend to cause the operation of lever 31 and arm 35 for opening valve 25 and closing valve 27 to permit the engine suction to cause the charging of the receptacle, and so on in well known manner. The passage 37 controlled by valve 38 permits the flow of the liquid fuel from vessel 30 into the shell 5^a. From the construction described it will be understood that the level of the liquid fuel in receptacle 5 is automatically maintained at such a height as to simultaneously supply by gravity said liquid fuel to the carbureter for the production of mixture for the engine and to the conduit or manifold leading from the carbureter to the engine cylinders for the priming charge.

When it is desired to start the engine it is merely necessary to open valve 10 for a relatively short period and to rotate the engine crank shaft, either with a self-starter or by hand operation, whereby the engine cylinders will not only be supplied with fuel for the mixture in the usual way, but with priming fuel from the same source to enrich said mixture for ready starting of the engine. The valve 10 may be closed when required, and may be maintained open temporarily, as desired, to supply fuel additional to that supplied to the carbureter while the engine is being warmed.

My invention for priming internal combustion engines utilized in connection with the usual supply of liquid fuel for the carbureter provides a simple and yet most convenient means for priming the engine without requiring the engine suction to elevate the liquid from a low level tank for priming, and without requiring the operator to do any more than operate valve 10 for

starting the priming charge. I thereby dispense with devices heretofore proposed for priming engines, such as pumps, priming cups requiring manual charging with priming fuel, and other known auxiliary devices additional to the usual supply receptacle or tank for fuel for the carbureter. My improvements also obviate drawing upon the fuel supply in the carbureter for priming with the consequent lowering of the liquid level therein.

My invention is not limited to the particular details of construction set forth since the same may be varied, within the scope of the appended claims, without departing from the spirit of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. The combination of an internal combustion engine having an intake conduit, a carbureter communicating with said conduit, a receptacle for liquid fuel communicating with said carbureter to supply it by gravity, means providing, except for the valve hereinafter named, unobstructed communication between said receptacle and said intake conduit below the normal liquid level in the receptacle to supply priming charges by gravity for the engine from said receptacle independent of the carbureter and a valve to control said first named means.

2. The combination of an internal combustion engine having an intake conduit, a carbureter communicating with said conduit, a receptacle for liquid fuel communicating with said carbureter to supply it by gravity for running the engine, means providing communication between said receptacle and said intake conduit to supply priming charges by gravity for the engine from said receptacle, means to control said first named means, a main fuel supply tank, a conduit providing communication between said tank and said receptacle, and means providing communication between said receptacle and the engine cylinders for causing partial vacuum in said receptacle for charging the latter from said tank.

3. The combination of an internal combustion engine having an intake conduit, a carbureter communicating with said conduit, a receptacle for liquid fuel located on a level higher than the carbureter, means to feed liquid fuel from said receptacle to the carbureter by gravity for running the engine, a conduit connected to said receptacle below the normal liquid level therein and in communication with the engine intake conduit to feed the latter by gravity and means to control the flow from said receptacle to the second named conduit for priming the engine, the last named conduit being arranged to provide direct and uninterrupted flow of such priming fuel to said intake conduit while said control-means is in an unobstructive position.

4. The combination of an internal combustion engine having an intake conduit, a carbureter communicating with said conduit, a receptacle for liquid fuel, three separate means of communication between said receptacle and said intake conduit, two of said means communicating with the receptacle below the normal level of liquid therein, and the other of said means communicating with the receptacle above the said level, one of said two means communicating with said conduit through the carbureter, and means to control the flow of priming charges through the other of said two means.

5. The combination of an internal combustion engine having an intake conduit, a carbureter communicating with said conduit, a receptacle for liquid fuel communicating with said carbureter, a conduit providing communication between said receptacle and conduit above the carbureter and below the normal liquid level in the receptacle, means to control the flow through said conduit, a conduit providing communication between said first mentioned conduit and said receptacle above the liquid level therein, a valve to control said conduit, said receptacle having an air inlet, a valve to control said air inlet, a float operatively connected with said valves to open and close them alternately according to the rise and fall of the float, a main fuel supply tank at a lower level than the receptacle, and a conduit providing communication between said tank and receptacle.

6. The combination of an internal combustion engine having an intake conduit, a carbureter communicating with said conduit, a receptacle for liquid fuel communicating with said carbureter to supply it by gravity, a conduit providing, except for the valve hereinafter named, direct and uninterrupted flow of priming fuel from below the normal level of liquid in said receptacle to said first named conduit separate from the supply of said fuel to the carbureter for running the engine, and a valve to control the flow through the second named conduit.

Signed at New York, county and State of New York, this 7th day of November, 1918.

THEODORE F. BOURNE.