G. W. FARNSWORTH.

EXPLOSIVE ENGINE.

APPLICATION FILED FEB. 2, 1914.

1,133,845.

Patented Mar. 30, 1915.

2 SHEETS—SHEET 1.

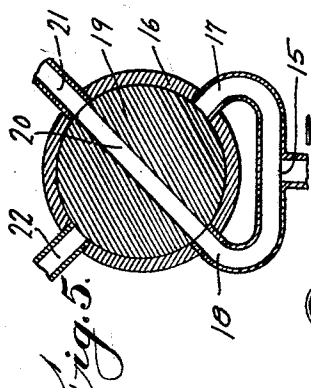


Fig. 5.

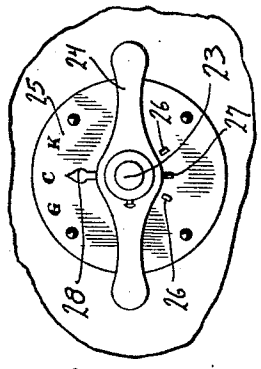


Fig. 4.

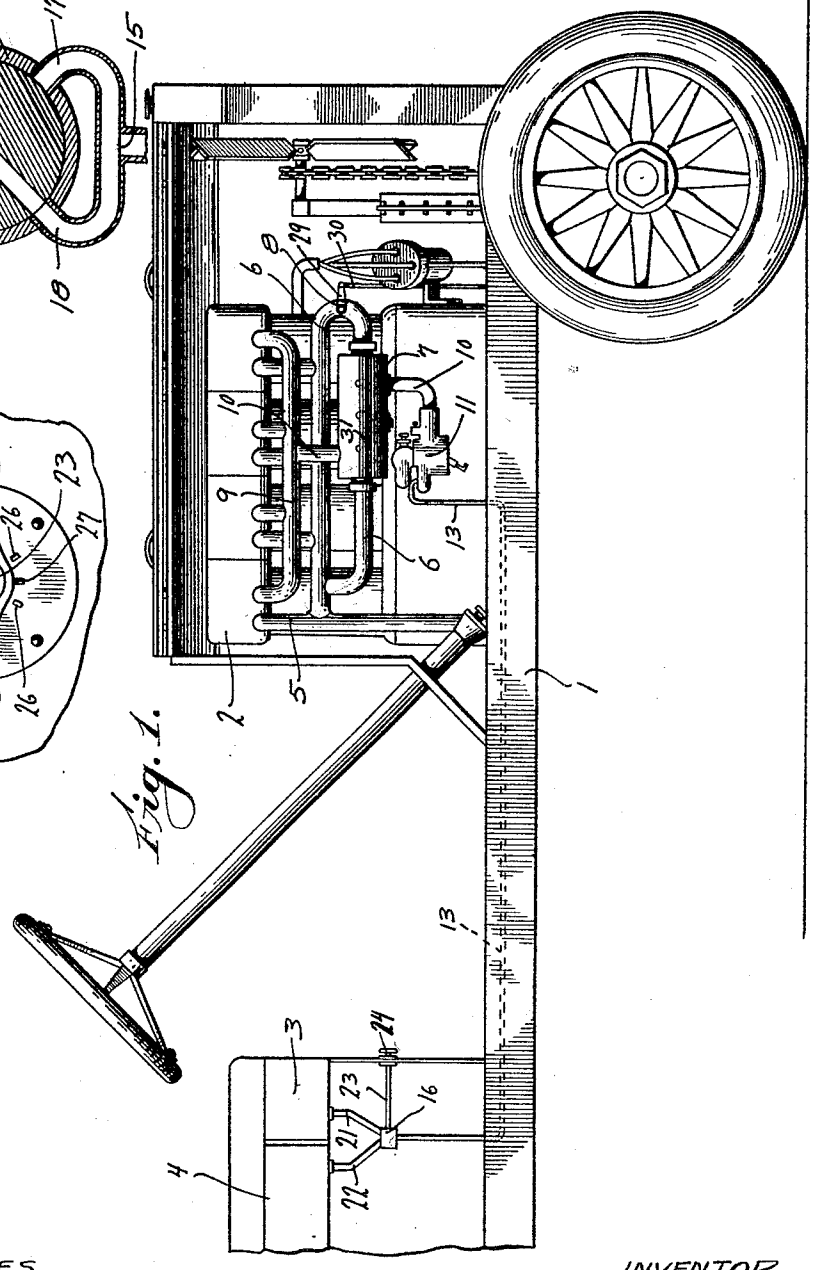


Fig. 1.

WITNESSES.

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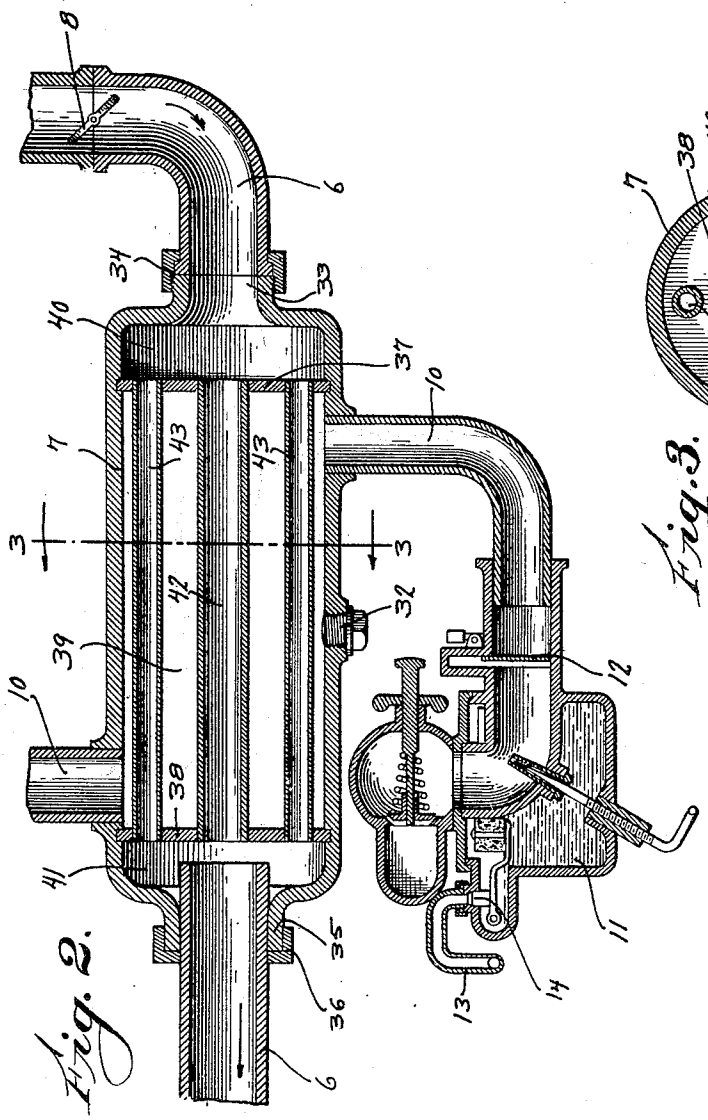


Fig. 2.

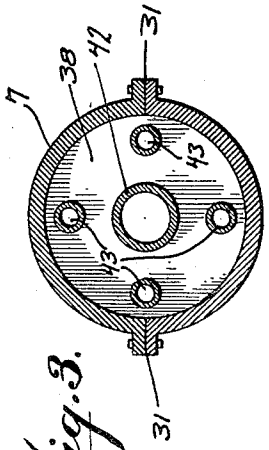


Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE W. FARNSWORTH, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO FRED WALLACE THURSTON, OF SAN FRANCISCO, CALIFORNIA.

EXPLOSIVE-ENGINE.

1,133,845. Specification of Letters Patent. Patented Mar. 30, 1915.

Application filed February 2, 1914. Serial No. 816,041.

To all whom it may concern:

Be it known that I, GEORGE W. FARNSWORTH, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Explosive-Engines, of which the following is a specification.

My invention relates to a system for utilizing topped oil for explosive engines and has as its principal object the provision of convenient and effective means whereby explosive engines may be driven by kerosene or other oils heavier than gasolene.

A second object of my invention is to provide simple and effective means whereby an explosive engine which has been started on gasolene may have heavy oil substituted for the gasolene in running the engine.

A final object of my invention resides in the particular arrangement and combination of parts hereinafter described.

With the above and other objects in view my invention comprises a plurality of tanks, one at least for gasolene and one at least for heavier oil, a carbureter, valve controlled means for connecting said tanks to said carbureter one at a time, and manually controlled means for gasifying the output of the carbureter.

In the accompanying drawings:—Figure 1 is an elevational view showing my system as applied to an automobile engine. Fig. 2 is a vertical sectional view through the carbureter and heater shown in Fig. 1. Fig. 3 is a cross sectional view of the heater taken on the line 3—3 of Fig. 2. Fig. 4 is a detail view of the two-way valve used for controlling the output of the fuel tank. Fig. 5 is a cross sectional view of the valve shown in Fig. 4, showing the manner of arranging the connections.

Throughout the separate views the same part is designated by the same reference character.

Referring more particularly to the drawings, 1 is an automobile chassis on which is mounted an engine 2 and fuel tanks 3 and 4 for kerosene and gasolene respectively. The engine 2 has an exhaust manifold 5 which is provided with a bypass 6. I provide a heater 7 in the bypass and a hand control valve 8 for regulating the amount of the exhaust gases passing through the heater. The inlet manifold of the engine is designated as 9 and it has a connection 10 which leads to the heater 7 so that the vapor given by the carbureter 11 shall be thoroughly gasified.

It will be seen that the carbureter 11 may be of any standard type and I prefer to mount the throttle valve 12 intermediate and carbureter and the heater 7. A single pipe such as 13 is provided for maintaining the liquid level within the carbureter, a float controlled valve 14 being shown to prevent the flooding of the same.

I contemplate supplying both kerosene and gasolene to the carbureter 11 through the pipe 13 and said pipe leads to a pipe 15 close to a valve 16 whereupon the pipe is branched forming two arms 17 and 18 both of which connect with ports in the valve casing. Within the valve casing is a plug 19 having a passage 20 therein and I provide pipes 21 and 22 which connect with suitable ports in the valve casing diametrically opposite the ports of the pipes 18 and 17, respectively, so that when the plug 19 is in the position shown in Fig. 5 the passage 20 connects the pipe 21 with the pipe 18. When, however, the plug 19 is turned to 90 degrees the passage 20 will connect pipe 22 with pipe 17. Pipe 21 connects with the kerosene tank 3 while pipe 22 connects with the gasolene tank 4 and consequently the supply of fuel liquid to the carbureter is either gasolene or kerosene depending on the position of the valve 16.

In order to promote the convenient operation of the system I provide a long stem 23 which is connected to the plug 19 and which extends to a point within convenient reach of the operator or chauffeur where the same is provided with a handle 24, which handle is bent to turn in front of a plate 25. I provide stops such as 26—26 on the plate 25 and the handle may be provided with a lug such as 27 which lies between the stops 26 and which is so situated that when it is in contact with one of the stops the passage 20 will register with one of the pipes connecting with the valve casing 16. In order to further promote the convenience of the user, I provide a pointer such as 28 and place letters such as "G"—"C"—"K" on the plate 25 so that when the handle is in one extreme position it will indicate that the carbureter is

connected with the gasolene tank, when in the other extreme position that it is connected with the kerosene tank, and in the central position that the fuel is disconnected. It will be seen, moreover, from Fig. 1, that the valve 8 which controls the amount of heating gases passing through the heater 7 is of the multiplied type as shown in Fig. 2 and may be controlled by any suitable lever such as 29 and link 30.

The ordinary fan and ignition apparatus is illustrated in Fig. 1 but having no connection with my invention, it will not be described in detail.

Referring more particularly to Fig. 2, it will be seen that the heater 7 comprises an outer casing and by referring again to Fig. 1 it will be seen that I design the casing so as to split along a horizontal line such as 31. It will be seen, moreover, that the pipe 10 leading from the carbureter to the inlet manifold enters the heater 7 at the bottom near one end thereof and leaves at the top in the other end thereof. Also the heater is provided with a drain 32 in the bottom. At one end the casing of the heater is reduced and provided with a hollow projection 33 which is exteriorly threaded so as to afford means for attaching the same to the pipe 6 by means of a coupling 34. At the opposite end of the casing from the projection 33 is a second projection 35 which is sufficiently large to receive the corresponding end of the pipe 6 thus affording a slip joint providing for expansion, said joint being closed by a gland 36.

Within the heater 7 are two plates 37 and 38, respectively, which inclose a central chamber 39, the plate 37 forming a chamber 40 at one end and the plate 38 forming a chamber 41 at the other end. A central tube 42 and a plurality of small tubes such as 43 connect the chamber 40 with the chamber 41 passing through both the plates 37 and 38 so that gases coming from the exhaust manifold to the bypass 6 in the direction of the arrow have an interrupted passage through the heater 7, the percentage of the exhaust gases passing through the heater being regulated by means of the valve 8 as desired.

From the foregoing it will be understood that in using my system the engine is started on gasolene and then changed so as to run on kerosene or other heavy oil. When the machine is to be started, the handle 33 is turned until the pointer 28 indicates that the passage 20 connects 22 and 17. This will admit gasolene to the pipe 13 and then to the carbureter 11. When the engine is cranked the gasolene will be vaporized through the valve of the carbureter and pass through the pipe 10 into chamber 39 of the heater, the continuation of the pipe 10 through the manifold 9 and then into the cylinder. After the engine has once started the exhaust is passed through the bypass 6 and the tubes 42 and 43 and thoroughly heat the chamber 39. The handle 24 will then be turned until the pointer 28 indicates that the passage 20 connects 21 with 18. Kerosene or other heavy oil will then be admitted to the pipe 13 and the carbureter 11 where it will be sufficiently strained or vaporized so as to be carried into the chamber 39. In this chamber the heat will act on the kerosene vapor into a thorough gas which will pass through the pipe 10 and the manifold to the cylinder as before described, and being in this gaseous state it will be easily exploded and take the place of more expensive gasolene. It will be seen, moreover, that in the present system I require only one carbureter, while by varying the amounts of exhaust through the medium of the valve 8 I can successfully use distilled kerosene or toppings.

The tubes 42 and 43 are preferably made of copper in order to give the maximum amount of heat to the fuel.

It will be understood that while I have shown and described the preferred form of my invention, I do not wish to be limited to the exact form shown and described and that parts of my invention may be used without using the whole.

Having thus described my invention, what I claim is:—

1. In an explosive engine, a plurality of cylinders, a main exhaust pipe leading from one of said cylinders, a by-pass loop structure comprising main and heater leg portions with the terminal of the main leg connected with the main exhaust above the outlet of the latter and the heater terminal being connected with the main leg adjacent to the point of connection of the latter with said main exhaust pipe, exhaust pipes connecting the remaining cylinders with said main leg portion in advance of the point of connection of the heater leg with the main leg with respect to the direction of flow through the main leg, a gas heater interposed in said heater leg portion to be heated by the exhaust gases passing through the latter, a carbureter delivering to said heater, connections delivering the heated charge from said heater to said cylinders, and means interposed between said heater and said exhaust pipes for controlling the volume of gas delivered to said heater, substantially as described.

2. In an explosive engine, a plurality of cylinders, a main exhaust pipe leading from one of said cylinders, a by-pass loop structure comprising a main leg and a heater leg with the terminal of the main leg connected with the main exhaust and the terminal of the heater leg being connected with the main leg adjacent to the point of connection of the latter with the main exhaust pipe, ex-

haust pipes connecting the remaining cylinders with the main leg in advance of the point of connection of the heater leg with the main leg with respect to the direction of flow through the main leg, a gas heater interposed in said heater leg to be heated by the exhaust gases passing through the latter, a carbureter delivering to said heater, and connections delivering the heated charge from said heater to said cylinders, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

GEORGE W. FARNSWORTH.

Witnesses:
H. SHANNON,
EVALIN MILLER.