A. E. RANNEY.

AUXILIARY LIQUID HYDROCARBON TANK FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JAN. 9, 1909.

**973,880.** Patented Oct. 25, 1910.

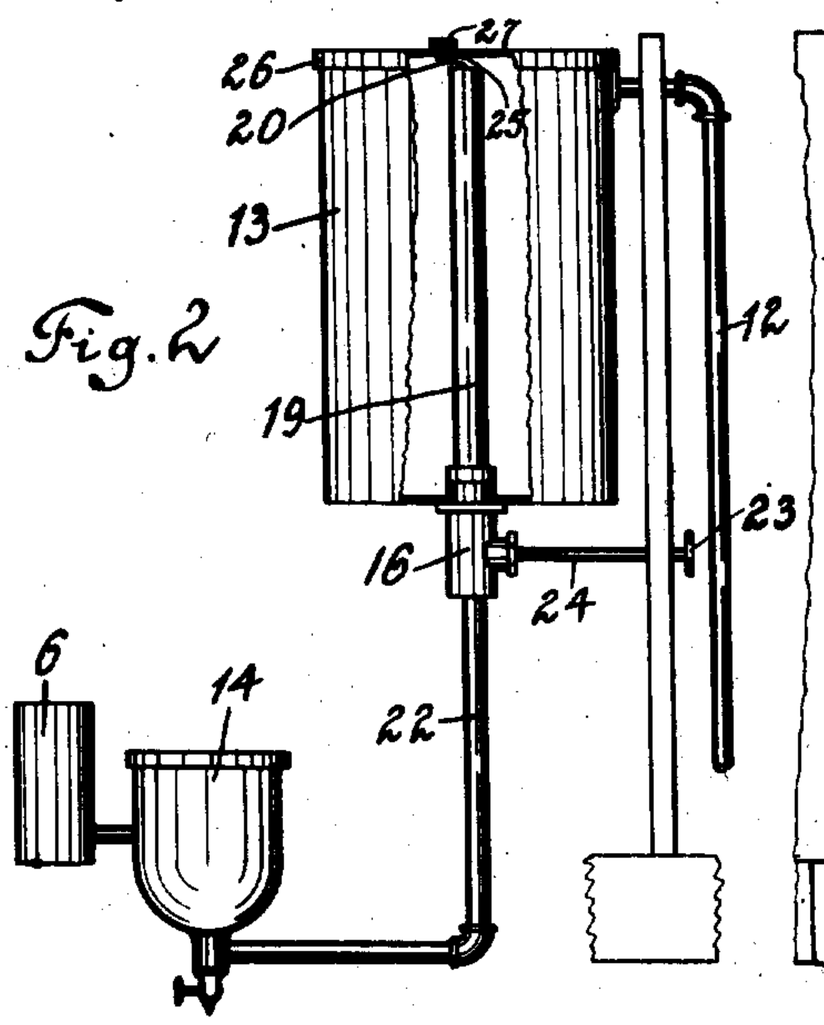


Fig. 2

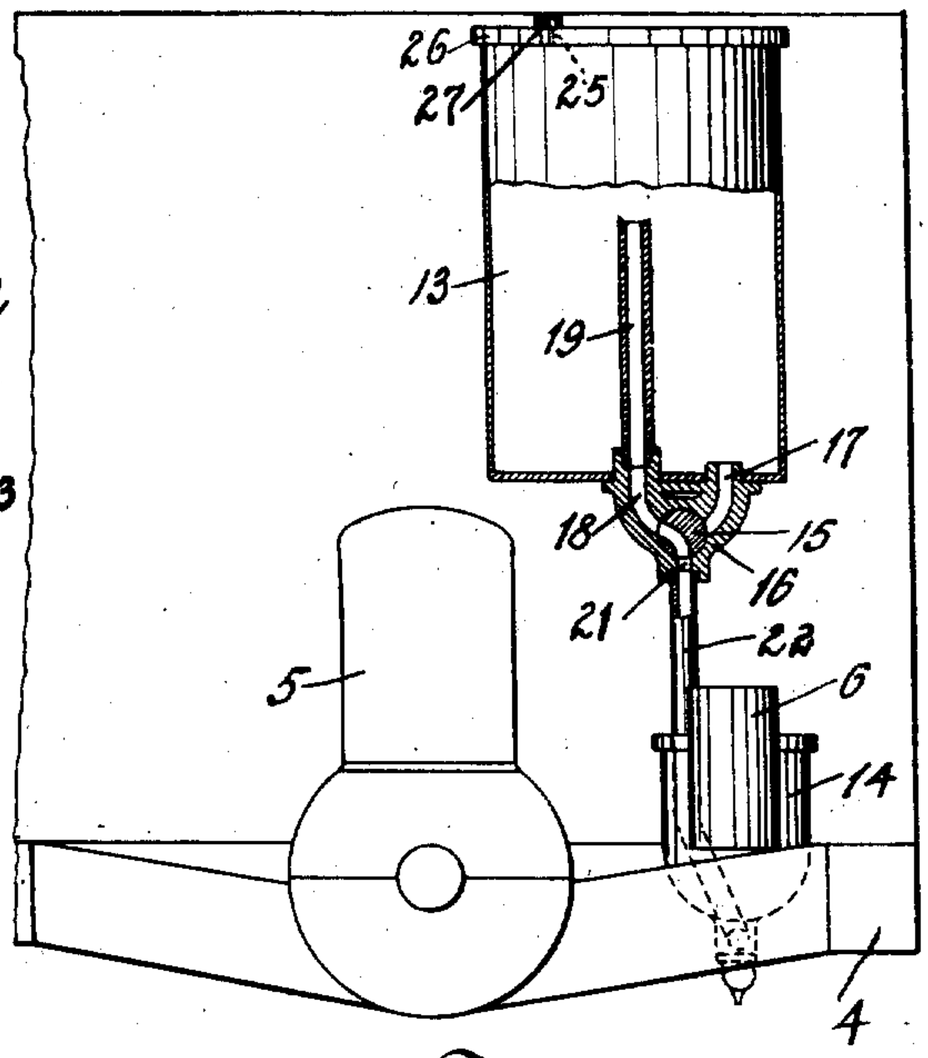


Fig. 3

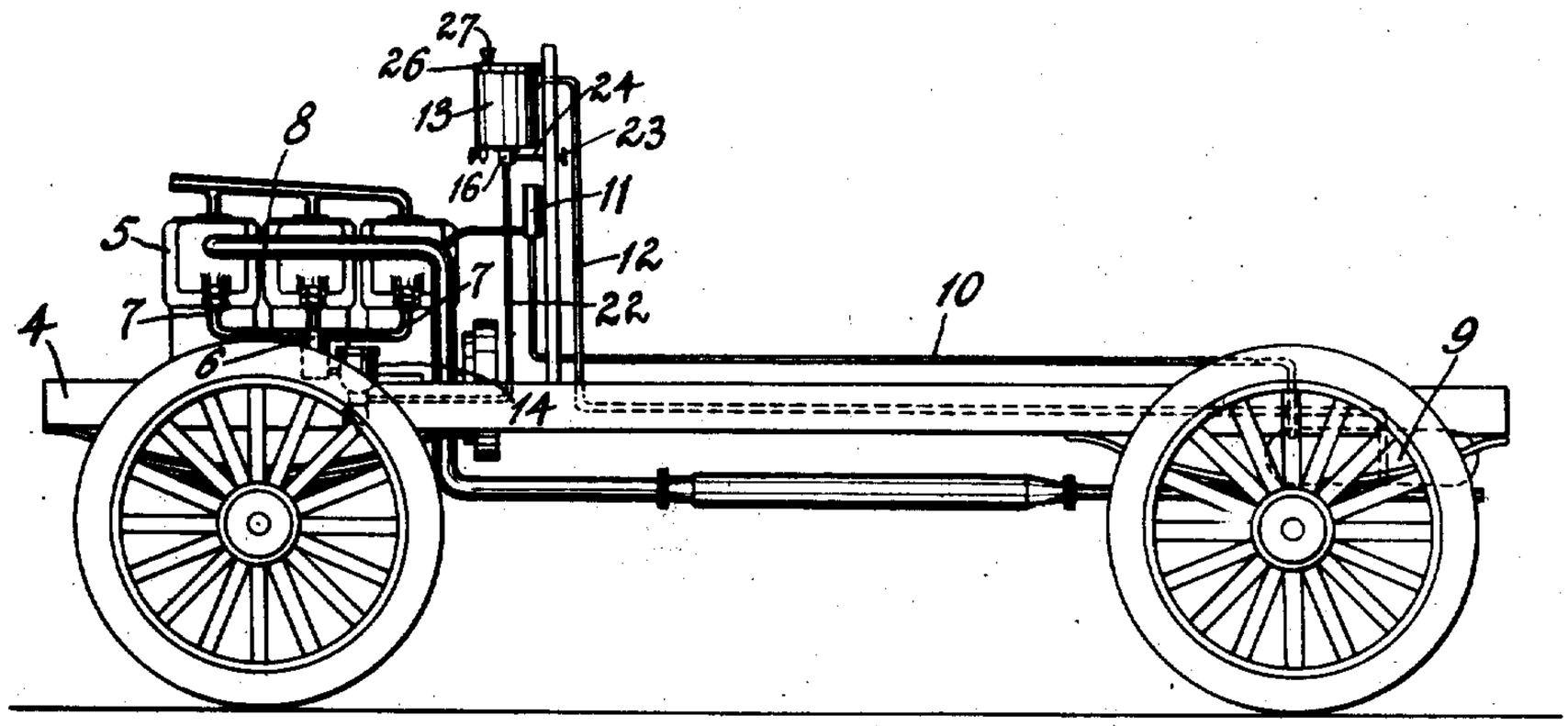


Fig. 1

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## AUXILIARY LIQUID-HYDROCARBON TANK FOR INTERNAL-COMBUSTION ENGINES.

973,880. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed January 9, 1909. Serial No. 471,488.

*To all whom it may concern:*

Be it known that I, AMBROSE ELLIOTT RANNEY, a citizen of the United States, and resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Auxiliary Liquid-Hydrocarbon Tanks for Internal-Combustion Engines, of which the following is a specification.

The present invention relates to an auxiliary liquid-hydrocarbon tank for internal combustion engines, to be used in connection with a main tank wherefrom the liquid-hydrocarbon, such as, for instance, gasolene, is fed to the charge forming device of the engine by pressure.

As well known in the art, the carbureter of an internal combustion engine may receive its supply of liquid-hydrocarbon from a tank, which supply may be fed thereto by gravity, when the tank is arranged above the level of the carbureter. If, however, the engine is arranged on a motor vehicle, boat, etc., the supply of liquid-hydrocarbon is fed to the carbureter by pressure, the tank being usually located on devices of the character described below the level of the carbureter. Any of the well known means may be used to produce the desired degree of pressure in the tank; for instance, a supply of compressed air may be carried with the engine, or a pump may be employed, or the exhaust pipe of the engine may be connected, in any suitable manner, with the liquid-hydrocarbon tank. Obviously, when the liquid fuel is fed by pressure to the tank and if, for instance, a pipe in the feed system is broken, or the pressure in the tank descends below the normal, desired degree, or any other disturbance should occur in the feed system, or if the supply of liquid-hydrocarbon is exhausted in the main tank, the communication between the tank and the carbureter must be closed, whereby, of course, the engine will come to rest after a number of revolutions.

The object of the present invention is to provide an auxiliary liquid-hydrocarbon container, and to arrange the same in such a manner in the feed system, whereby the aforementioned defect is obviated. To attain this end, the auxiliary tank, hereinbefore mentioned, is inserted in the pipe-line, leading from the main tank to the carbureter, in such a manner that the liquid-hydrocarbon, contained in said auxiliary tank, is fed by gravity to the carbureter in case any one of the aforementioned or other accidents should happen.

Another object of the invention is to provide an auxiliary liquid-hydrocarbon tank, from which fuel is supplied to the carbureter of the engine, while the main-tank is being filled.

Further objects and advantages of the invention will be apparent in reading the specification and from an examination of the drawings, forming part of the present application for Letters Patent.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a device embodying the invention, and showing the same applied to an automobile chassis, Fig. 2 is a side elevation of the auxiliary tank and the connection between the same and the carbureter on an enlarged scale, and Fig. 3 is a front view of the device illustrated in Fig. 2, partly in section.

As shown in the drawings, the mechanism is shown applied to an automobile chassis, although it will be understood that the device may be used in connection with any internal combustion engine, irrespective of its type or construction and wherever used. The chassis carries above the side frame members 4 of the same an internal combustion engine 5, of any suitable construction, and in which a combustible material is burned, which has been previously produced in a charge forming device 6 by intermingling in a proper manner a suitable liquid-hydrocarbon and air. Such combustible mixture is, as well known in the art, conducted from the charge forming device to the cylinders of the engine by means of pipes 7, 7, leading to the fuel supply inlets of the cylinders, which fuel supply inlets may be valve controlled or piston controlled or a combination of both, depending upon the mode of operation and construction of the engine to be operated. The exhaust ports of the cylinders communicate with an exhaust pipe 8, leading to the usual muffler.

The main liquid-hydrocarbon tank is in-

dicated at 9 and is arranged, as will be apparent from an inspection of the drawings, below the level of the charge forming device 6. This tank communicates through a pipe 10 with the exhaust pipe 8; the pressure reducing valve 11, which is of the usual construction and inserted in the pipe 10, serving to regulate the pressure within the tank 9. The pipe 10 leads from the top of the tank 9, while a fuel supply pipe 12 leads from near to the bottom of the same to an auxiliary tank 13, located at a higher level than the charge forming device 6. In the case illustrated in the drawings, the auxiliary tank is attached to the dash board of the motor vehicle, although it is obvious that it may just as well be secured to any other part of the vehicle, it being, however, essential that it should be arranged at such a level, wherefrom the liquid-hydrocarbon may be fed to the charge forming device by gravity.

The auxiliary tank 13 may be made of any suitable shape and size, according to the requirements, and should be made airtight. The communication between the auxiliary tank and the float chamber 14 of the charge forming device 6 is controlled by a three-way valve 15, arranged in a valve chamber 16, the passage 17 of which leads to the bottom of the tank 13, while the passage 18 of the same is connected with a pipe 19, the outlet 20 of which is arranged near to the top of the tank. The passage 21 of the valve chamber 15 communicates by means of a connection 22 with the float chamber, hereinbefore mentioned. The valve 15 may be set so that the float chamber communicates with the tank by means of the passage 17, or through the passage 18 at will, or the communication may be closed altogether. The valve is set by means of a knob 23, arranged on the valve stem 24, or by any other suitable means.

The operation of the device described is as follows: Let us suppose that the auxiliary tank and the float chamber of the charge forming device is empty, and consequently the fluid admission regulating means of the float chamber is in a position whereby the same allows the fluid pressure to enter the float chamber. In order to start the operation of the engine, the three-way valve is turned so that a communication is open between the float chamber of the charge forming device and the auxiliary tank 13 through the pipe 19, arranged in said tank. The engine being at rest, there is no pressure in the main tank 9 of the device, and, therefore, an air pump or other suitable means will be needed to create the desired degree of pressure in the main tank. This pressure forces the liquid-hydrocarbon from the main tank into the auxiliary tank, which will be filled with the liquid-hydrocarbon; the air in the same escaping through the pipe 19 and pipe 21 through the float chamber of the charge forming device, and allowing thus the auxiliary tank to be filled with liquid-hydrocarbon up to the plane of the outlet 20 of the pipe 19 in said tank. When this level is reached, the liquid-hydrocarbon is forced through the pipe 19, the passage 18 of the valve casing and through the pipe 21 into the float chamber of the charge forming device, until this communication is closed by the usual mechanism in the float chamber, that is when the liquid reaches the proper level in the same. The communication between the auxiliary air supply or air pump and the main tank 9 of the device may then be closed. As the engine is now started, the proper combustible mixture is supplied to the cylinders of the same, and the proper pressure maintained in the main tank, which is, as hereinbefore described, in communication through the pressure reducing valve 11 and pipe 10 with the exhaust pipe 8 of the engine. In this manner liquid-hydrocarbon will be supplied by pressure from the main tank to the auxiliary tank, and thus to the float chamber of the charge forming device as long as the engine is in operation, or in other words, as long as the communication between the main tank and the exhaust pipe of the engine is open. Should now either of the pipes 10 or 11 break, or the main tank leak, or for some reason the pressure in the main tank fall below the normally desired degree, or the supply in the main tank be exhausted, then, obviously, the supply of liquid-hydrocarbon from the main tank to the auxiliary tank will be discontinued. The engine will thus come to rest, as soon as the supply of liquid-hydrocarbon in the float chamber and in the pipe leading therefrom to the auxiliary tank is exhausted. When the engine comes to rest, the three-way valve is set, so that a communication is opened between the float chamber 14 and the auxiliary tank 13 through the pipe 22 and the passage 17 of the valve casing. The auxiliary tank will then continue to supply the float chamber until an additional fuel supply is obtained, or the necessary repairs made, when the three-way valve is again set, so that the liquid-hydrocarbon is supplied to the float chamber through the pipe 19 in the auxiliary tank.

It will be easily seen that the supply tank always contains an extra supply of fuel, and is always ready to furnish a supply of such fuel, when needed, by the mere turning of the three-way valve, the proper position of which may be indicated by means well known in the art. The auxiliary tank 13 may be provided with an orifice 25, ar-

ranged, preferably, in the cover 26 of the tank, and closed by a plug 27, which will allow the tank to be filled from cans or receptacles; providing at the same time means to allow the atmospheric pressure to act upon the surface of the liquid-hydrocarbon, when necessary.

Obviously many minor changes may be made in the construction and arrangement of the several parts of the device without departing from the spirit and scope of the invention.

What I claim is:

1. The combination with the charge forming device of an internal combustion engine, of a main tank for fluid under pressure, an auxiliary tank communicating with said main tank, a connection leading from said charge forming device to said auxiliary tank and branching out into two passages, one of which terminates at or near to the bottom and the other near to the top of said auxiliary tank, and a single means inserted into said connection for closing or opening either of said passages at will.

2. The combination with the charge forming device of an internal combustion engine having a float chamber, of a main tank for fluid under pressure, an auxiliary tank communicating with and being arranged above the level of said float chamber, a connection leading from said charge forming device to said auxiliary tank and branching out into two passages, one of which terminates at or near to the bottom for conducting the fluid by gravity alone to said float chamber and the other near to the top of said auxiliary tank, and a valve inserted into said connection for closing or opening either of said passages at will.

3. The combination with the charge forming device of an internal combustion engine, of a main tank for fluid under pressure arranged below the level of said charge forming device, an auxiliary tank arranged above the level of said charge forming device and communicating with said main tank, a connection leading from said charge forming device to said auxiliary tank and branching out into two passaiges, one of which terminates at or near to the bottom for conducting the fluid by gravity alone to said float chamber and the other near to the top of said auxiliary tank for allowing the fluid to pass under pressure to said float chamber, and means inserted into said connection for closing or opening either of said passages at will.

4. The combination with the charge forming device of an internal combustion engine, of a main tank for fluid under pressure arranged below the level of said charge forming device, an auxiliary tank arranged above the level of said charge forming device and communicating with said main tank, a connection leading from said charge forming device to said auxiliary tank and branching out into two passages, one of which terminates at or near to the bottom for conducting the fluid by gravity alone to said float chamber and the other near to the top of said auxiliary tank for allowing the fluid to pass under pressure to said float chamber, and a valve inserted into said connection for closing or opening either of said passages at will.

5. The combination with the exhaust pipe of an internal combustion engine, of a main tank for liquid-hydrocarbon communicating with said exhaust pipe, an auxiliary tank communicating with said main tank, a charge forming device for said internal combustion engine arranged below the level of said auxiliary tank, a communication leading from said charge forming device to said auxiliary tank and branching out into two passages, one of which terminates at or near to the bottom for conducting the fluid by gravity alone to said float chamber and the other near to the top of said auxiliary tank for allowing the fluid to pass under pressure to said float chamber, and a valve inserted into said connection for closing or opening either of said passages at will.

6. The combination with the exhaust pipe of an internal combustion engine, of a charge forming device for said internal combustion engine, a main tank for liquid-hydrocarbon arranged below the level of said charge forming device and communicating with said exhaust pipe, an auxiliary tank arranged above the level of said charge forming device and communicating with said main tank, a connection leading from said charge forming device to said auxiliary tank and branching out into two passages, one of which terminates at or near, to the bottom for conducting the fluid by gravity alone to said float chamber and the other near to the top of said auxiliary tank for allowing the fluid to pass under pressure to said float chamber, and means inserted into said connection for closing or opening either of said passages at will.

7. The combination with the exhaust pipe of an internal combustion engine, of a charge forming device for said internal combustion ergine, a main tank for liquid-hydrocarbon arranged below the level of said charge forming device and communicating with said exhaust pipe, an auxiliary tank arranged abve the level of said charge forming device and communic ng with said main tank, a connection leading from said charge forming device to said auxiliary tank and branching out into two passages, one of which terminates at or near to the bottom for conducting the fluid by gravity alone to

said float chamber and the other near to the top of said auxiliary tank for allowing the fluid to pass under pressure to said float chamber, and a valve inserted into said connection for closing or opening either of said passages at will.

Signed at New York, in the county of New York and State of New York, this 7th day of January, A. D. 1909.

A. ELLIOTT RANNEY.

Witnesses:
SIGMUND HERZOG,
C. R. RADCLIFFE.