J. R. RICKETTS.

DUAL FUEL FEED SYSTEM FOR INTERNAL COMBUSTION ENGINES.

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1,308,917.

Patented July 8, 1919.

Fig. 1

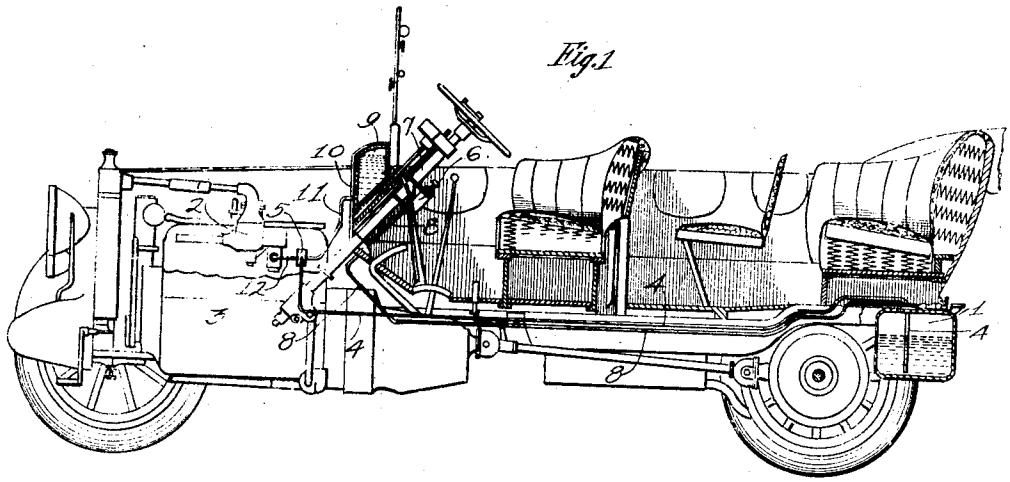


Fig. 3

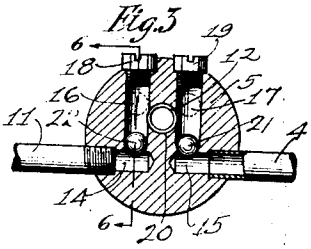


Fig. 2

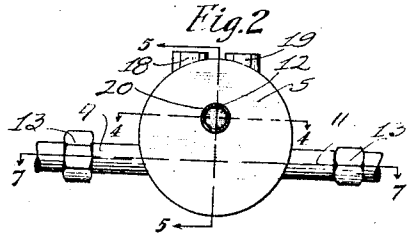


Fig. 5

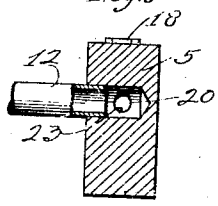


Fig. 4

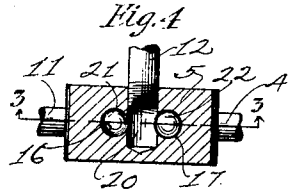


Fig. 6

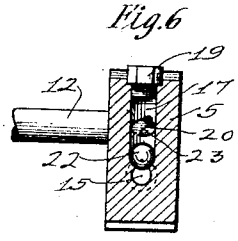
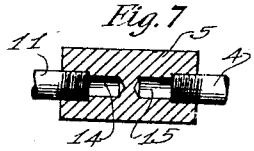


Fig. 7



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UNITED STATES PATENT OFFICE.

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DUAL FUEL-FEED SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

1,308,917. Specification of Letters Patent. Patented July 8, 1919.

Application filed March 2, 1917. Serial No. 153,480.

To all whom it may concern:

Be it known that I, JAMES R. RICKETTS, a citizen of the United States, residing at Long Beach, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Dual Fuel-Feed Systems for Internal-Combustion Engines, of which the following is a specification.

My invention relates to internal combustion engines and particularly to means for supplying the fuel thereto, the primary object being to provide means whereby two different grades of fuel may be used selectively for operating the engine. Another object is to provide means for feeding the different grades of fuel to the intake of the engine in such a manner that a high grade fuel, such as commercial gasolene may be used for operating the engine as a preliminary fuel for starting purposes, or for other special occasions, and whereby a low grade fuel, such as engine distillate, may be used for operating the engine after the cylinders and operating parts have become thoroughly heated to an extent whereby the vaporization of the low grade fuel may be quickly accomplished.

Another object is to provide means for storing the two different grades of fuel on the vehicle for use, such means being adapted to hold relatively large quantities of the low grade fuel and small quantities of the high grade fuel, inasmuch as only a relatively small quantity of the high grade fuel is necessary for starting purposes, as will hereinafter appear from the description.

Another object is to provide means whereby one or the other grades of fuel may be supplied to the engine by gravity and the other by pressure, and for connecting the two supply systems in such a manner that it will be impossible to mix the two grades of fuel, or, that the supply of one grade will interfere with the supply of the other.

Another object is to provide regulating means in the fuel supply lines which has a common connection with the fuel intake of the engine for admitting the fuel thereto, and separate connections with the individual fuel supply lines leading from the fuel storage means.

Another object is to provide means at the point of junction of the fuel supply lines whereby it will be impossible for the fuel from one line to enter the other line, thus rendering the system safe and free from trouble which might result in the event of the mixture of the two grades of fuel. Other objects will appear as the description progresses.

Referring to the drawings, Figure 1 is a sectional elevation of a well-known type of automobile showing my improved system installed thereon for use. Fig. 2 is an end elevation of my improved fuel regulating valve which is connected in the manner shown to both fuel supply lines. Fig. 3 is a section of the valve on the line 3—3 of Fig. 4; Fig. 4 is a section of the same on the line 4—4 of Fig. 3; Fig. 5 is a section of the same on the line 5—5 of Fig. 2; Fig. 6 is a section of the same on the line 6—6 of Fig. 3, and Fig. 7 is a section of the same on the line 7—7 of Fig. 2.

Similar characters of reference are employed throughout the several views of the drawings and in the specifications for indicating the same or like parts.

The type of automobile shown in Fig. 1 and other types of vehicles are provided with a main fuel storage tank 1, which in this case is supported at the rear of the vehicle and is suitably attached to the vehicle frame at a point below the plane of the carbureter 2 of the engine or motor 3 at the front of the vehicle. The fuel from this tank is fed to the carbureter through a tube 4 which is extended downwardly into the tank to a point near the bottom, as shown in Fig. 1, and the forward end thereof is in communication with a regulating valve 5 of my improved design, such as shown in Figs. 3 to 7 inclusive. The fuel from the tank 1 is forced through the tube 4 by means of air pressure in the tank supplied by means of a small hand pump 6 supported on the vehicle steering column 7 which is connected with the tank 1 by means of a tube 8.

I provide an additional fuel tank 9 at the front of the vehicle, or at any other suitable point, but preferably above the plane of the carbureter 2 and the valve 5, which is supported in the cowl of the dash 10 and is connected with the valve 5 by means of a tube 11. The valve 5 is connected with the carbureter 2 by means of a short tube 12 which is inserted in the end of the valve. The tank 1, as stated, holds a supply of fuel, preferably of high grade to conform to the

requirements of this invention, and the tank 9 holds a supply of low grade fuel which is adapted to be fed to the carbureter by gravity through the tube 11.

It is to be understood that some modern types of vehicles are equipped with the pressure tank and pressure supply pump and connections as described, but in the case of other types which have not this equipment the same may be readily added for the purposes of this invention.

The pressure supply tube 4 and the gravity supply tube 11 are attached to opposite sides of the valve 5 in any suitable manner, as shown in Fig. 3, and suitable unions 13 may be inserted in each of these tubes to facilitate the assembling of the several elements of my system, as shown in Fig. 2. The valve 5 is counterbored on opposite sides thereof and may be threaded to receive the ends of the tubes 4 and 11. The ends of these tubes communicate with smaller bores 15 and 14 which are in transverse alinement but do not communicate with each other. Vertical bores 16 and 17 are formed in the valve 5 which are slightly larger than the horizontal bores 14 and 15 and communicate therewith, as shown in Figs. 3 and 6. The upper ends of the bores 16 and 17 are threaded to receive the plugs 18 and 19 which form closures for the bores and are of such form that they may be turned by a suitable implement for firmly seating them in the bores.

A horizontal bore 20 is formed in the valve 5 at a point slightly above the center thereof and is of such size that the periphery thereof will cut the peripheries of the vertical bores 16 and 17 and thus provide ports 23 therebetween such as are shown in Fig. 6 to permit the passage of the fuel from the storage tanks to the tube 12 which is suitably threaded into the open end of the bore 20, the opposite end thereof being closed as shown in Fig. 4.

Ball check valve elements 21 and 22 are loosely seated, respectively, in the vertical bores 16 and 17 so as to close the ports between these bores and the horizontal bores 14 and 15, as shown in Figs. 3, 4 and 6, the pressure of the fuel against the lower portions of the balls, in either case, serving to raise the balls in their respective bores to points above the ports 23, thus permitting the passage of either of the fuels from the tubes 4 and 11 and the bores 14 and 15 to pass upwardly through the vertical bores 16 and 17 and ports 23 to the horizontal bore 20 and thence through the tube 12 to the carbureter 2.

It will be noted that the normal positions of the balls when they are seated in the communicating ports between the bores 16—17 and 14—15 is substantially below the plane of the bore 20 which communicates with the carbureter. Hence, when fuel is being supplied through the tube 4 from the pressure tank 1, the ball 22 in the bore 17 will be raised by the pressure of the fuel and the fuel will pass out through the bore 20; but, as the pressure from the tank 1 will be applied against the upper portion of the ball 21 in the bore 16, this valve will remain closed while the pressure fuel is being supplied to the engine and none of the fuel from the gravity tank 9 will be permitted to enter the carbureter. Likewise, for the same reason and in the same manner, when fuel is being fed to the engine from the tank 9 by gravity pressure, a sufficient pressure will be applied to the ball 22 to prevent the admission of the fuel from tank 1 to the engine.

As previously stated, the gravity tank which holds the low grade fuel, as at 9, should be the larger of the two tanks, if the dimensions of the vehicle permit, for the greater amount of the low grade fuel will be used in the operation of the engine, and fuel is withdrawn from the pressure tank 1 only when necessary for starting the motor or when an excessive load on the engine renders a higher grade of fuel necessary for the best results.

Usually only a few operations of the hand pump 6 is necessary to provide sufficient pressure in the tank 1 for supplying the fuel therefrom to the engine, as all of the tubes which lead to and connect with the engine and carbureter are of relatively small diameter and the rise therein is very small.

It will be obvious from the foregoing description of my invention that the operation of the elements constituting my improved fuel feed system is extremely simple and efficient and provides for economy and facility in operation of the motor.

I am aware that the use of both gravity and pressure tanks and supply means for motor vehicles is old and I do not claim invention therefor, but I am not aware that the use of these elements with the connections shown and for the purpose described has ever before been used or known.

It should be understood in the consideration of this invention that the system is only adapted for use in connection with engines provided with carbureters which have valves at the entrance to the float chamber, so that the end of the pipe 12 may be closed when the float chamber is filled, thus causing a pressure against the upper portion of the ball check valves 21 and 22; for otherwise, if there were no back pressure in the pipe 12, both grades of fuel would be fed through the valve 5 simultaneously and thus defeat the objects of the invention.

It will be further understood that when the pressure in the pressure tank 1 and the tube 4 leading therefrom rises to a point

greater than the gravity pressure in the tube 11 leading from the tank 9, the excessive pressure in tube 4 will counteract that in tube 11 and acting against the ball check valve connected with the tube 11, will serve to close the tube 11 and prevent the passage of the low grade fuel from tank 9 to the carbureter. Also, when it is desired to feed the low grade fuel to the carbureter from tank 9 it is necessary to reduce the pressure in the tank 1 and tube 4 to the minimum, which may be accomplished by an ordinary valve usually provided in pressure supply systems, thus releasing the counteracting pressure against the check valve connected with tube 11 and permitting the passage of the low grade fuel to the carbureter through valve 5 and tube 12. It is obvious that the tank 9 may be filled through and by means of an ordinary filling cap extending through the dash of the vehicle, the cap being provided with a suitable air vent so as to insure the discharge of the fuel therefrom by gravity, and the tank 9 thus being open to the atmosphere.

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

1. A dual fuel feed system for internal combustion engines comprising separate gravity and pressure fuel tanks, a carbureter, and automatic valve means intermediate of said tanks and said carbureter, whereby either of said fuels may be selectively supplied to said carbureter.

2. A dual fuel feed system for internal combustion engines comprising separate gravity and pressure fuel tanks, a carbureter, a common connection for said tanks leading to said carbureter, and automatic valve means intermediate of said connection and said tanks for selectively regulating the passage of the fuel therethrough to said carbureter.

3. A dual fuel feed system for an internal combustion engine, comprising separate gravity and pressure fuel tanks, a carbureter connected with the fuel intake of the engine, automatic valve means having a single connection with said carbureter, and separate connections with said tanks whereby either of the fuels may be supplied selectively to said carbureter.

4. A dual fuel feed system for internal combustion engines comprising an engine having a carbureter attached thereto, combined gravity and pressure actuated valve means exterior of said carbureter and connected therewith, a gravity fuel tank connected with said valve means, and a pressure fuel tank also connected therewith, independently of said gravity tank, said valve means permitting the selective use of one and preventing the use of the other of the fuels from said tanks, at will.

5. A dual fuel feed system for internal combustion engines comprising an engine having a fuel intake means, a fuel tank supported above the plane of said intake for feeding the fuel therefrom by gravity to said engine, a fuel tank supported below the plane of said intake and arranged for feeding the fuel therefrom by pressure to said intake, a common valve body intermediate of and connected with both of said tanks, a pair of independently and automatically operable valves therein, and independent connections between said valves and said tanks.

6. In a device of the character described, the combination of an engine and a fuel intake therefor, a gravity tank and a pressure feed fuel tank, a pipe leading from each of said tanks to the vicinity of the engine, a valve body connected with said pipes and with the fuel intake of the said engine and having a chamber therein connected respectively with said pipes, and a valve in each of said chambers to permit the selective use of the fuels.

7. In a device of the character described, the combination of an engine and a fuel intake therefor, a gravity tank and a pressure feed fuel tank, a fuel actuated duplex check valve communicating with each of said tanks and arranged for independently regulating the passage of the fuel therefrom to the intake of the engine for preventing the mixture of said fuels, and means for connecting said valve with said fuel intake.

8. In a device of the character described, the combination of an engine and a fuel intake therefor, a gravity tank and a pressure fuel tank, a carbureter connected with the fuel intake, a pipe leading from each of said tanks to the vicinity of said carbureter, a pipe leading from said carbureter to the vicinity of the ends of said other pipes, a valve body connected with all of said pipes, and independent valve means therein operable by the flow of the fuel therethrough for permitting the selective use of the fuels from said tanks.

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