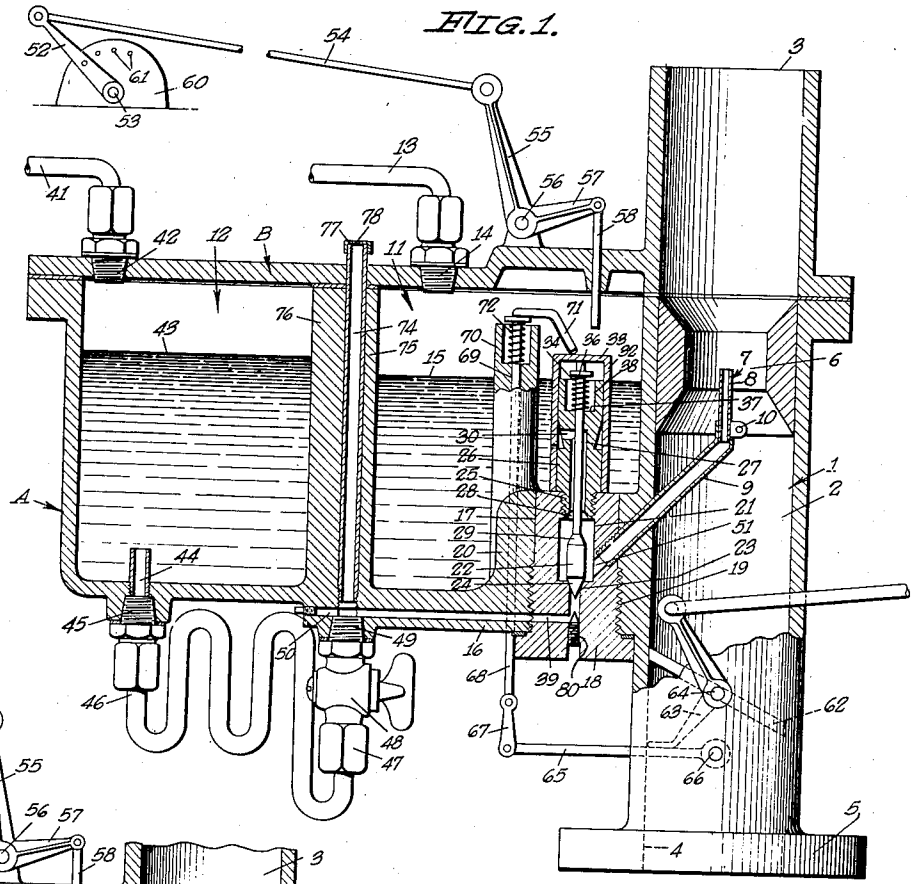
April 25, 1939. A. M. MALOUF 2,155,560

CARBURETOR

Filed Oct. 11, 1937

FIG. 1.



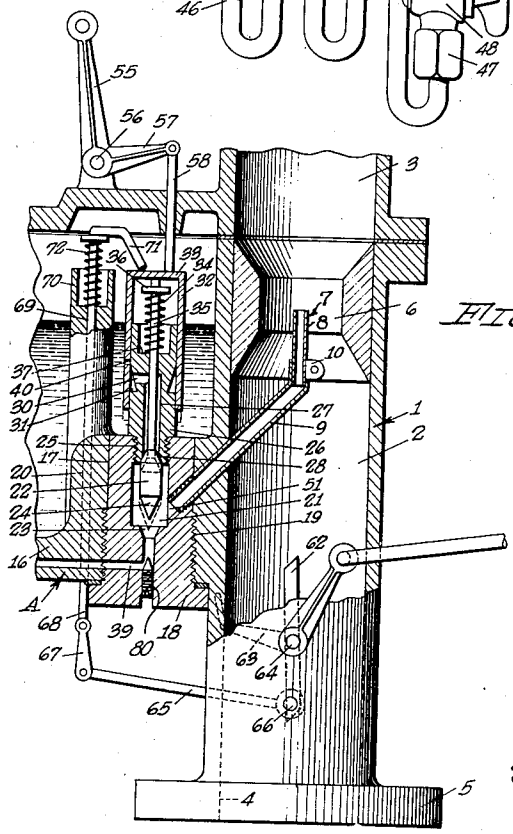


FIG. 2.

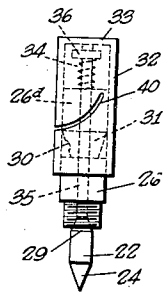


FIG. 3.

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CARBURETOR

Abraham M. Malouf, Los Angeles, Calif.

Application October 11, 1937, Serial No. 168,356

2 Claims. (Cl. 261—18)

My invention relates to carburetors and has particular reference to a carburetor adapted to supply a regulated quantity of fuel to the jets, which fuel may be either gasoline or light motor fuels or heavy motor fuels or a mixture of light and heavy fuels.

Many attempts have been made to adapt the ordinary gasoline type carburetor for ordinary automobile and truck engines to use a low grade motor fuel as by furnishing to the carburetor either gasoline or light fuels for starting the engine and then supplying low grade fuel to the air stream of the carburetor after the engine has been started and has warmed up sufficiently to assimilate the heavier fuels. However, such carburetors have the distinct disadvantage that when the motor is idling or has been stopped after running on the heavy fuels, the jet or jets of the carburetor are filled with the low grade fuel, making it difficult to restart the vehicle or to restart the engine after it has been stopped for an appreciable period of time.

It also frequently occurs that under certain conditions of operation, such as variations in load, the grade of the roadway and the like, the engine does not perform properly or efficiently when supplied solely with the low grade fuel and it is therefore desirable to add to the low grade fuel a quantity of gasoline or high grade fuel to assist in the more efficient performance of the motor.

It is therefore an object of my invention to provide a carburetor which may be supplied with two distinctly different types of fuels, one a high grade or heavy fuel and the other a low grade or light fuel and in which the carburetor may be readily adjusted to supply to the jets one or the other of the fuels or any desired predetermined mixture of the fuels.

Another object of my invention is to provide a carburetor of the character set forth in the preceding paragraph wherein whenever the motor is stopped or is idling, the supply of low grade fuel is cut off from the jets of the carburetor, insuring that the jets will be filled with high grade fuel for the next starting operation.

Another object of my invention is to provide a carburetor of the character set forth wherein the determination of the proportions of low grade fuel and high grade fuel may be made manually.

Another object of my invention is to provide a carburetor of the character set forth wherein the passage extending from the low grade fuel reservoir and the jet of the carburetor is opened to the atmosphere at a point adjacent the jet whereby the initial flow of low grade fuel is drawn into the jets under substantially atmospheric pressure.

Another object of my invention is to provide a carburetor of the character set forth in the preceding paragraph wherein an auxiliary small reservoir is provided in the fuel line leading from the main heavy fuel reservoir of the carburetor and the jet whereby the initial flow of heavy fuel to the jets is taken from the auxiliary reservoir instead of requiring that the friction of the fuel in the entire line from the jet to the main reservoir must be overcome before the fuel arrives at the jet.

Another object of my invention is to provide a new and novel valve structure which may be interposed between the supply lines from the high grade fuel and the low grade fuel to the jet, which will readily either cut off one or the other of the supply lines or open either or both of the supply lines to determine the proportions of a mixture of both fuels.

Another object of my invention is to provide a novel valve of the character set forth in the preceding paragraph wherein the valve is provided with a controllable orifice controlling the quantity of fuel supplied through the valve to the engine.

Other objects and advantages of my invention will be apparent from a study of the following specifications, read in connection with the accompanying drawing, wherein,

Fig. 1 is a vertical sectional view taken through a carburetor constructed in accordance with my invention;

Fig. 2 is a partial sectional view similar to Fig. 1 but illustrating the control valve in the opposite position to that shown in Fig. 1; and

Fig. 3 is a detail elevational view of the control valve illustrated in Figs. 1 and 2.

Referring to the drawing, I have illustrated my carburetor as comprising a body A having a tubular portion 1 defining an air passage 2 extending from an air inlet 3 to an outlet 4, which may be coupled to the intake manifold of the ordinary combustion engine by means of a flange 5.

The air passage 2 is provided with a venturi 6, near which is disposed a small tubular fuel jet 7 which may be constructed in any desired manner though I prefer that the same may be formed of a relatively small diameter pipe 8 set into the open end of a larger pipe 9 and clamped therein as indicated at 10.

The body A of the carburetor also includes a pair of reservoirs or wells 11 and 12, the well 11 being adapted to be supplied with high grade motor fuel such as gasoline taken from a suitable

source of supply, not shown, through a gasoline flow pipe 13 coupled as indicated at 14 to the top or cover B of the carburetor body and disposed immediately over the well 11. Thus gasoline 15 may be supplied to the reservoir or well 11, the supply of each fuel to its reservoir 11 or 12 being controlled in the ordinary manner by means of a float and float valve for each reservoir of the usual construction and omitted from the drawing herein for purposes of clarity.

Through the bottom 16 of the body A, I provide a bore 17 adapted to receive a plug 18, the plug being preferably screwed into the bore 17 as by means of threads 19. The bore 17 is preferably formed in an inwardly projecting boss 20 located within the well or reservoir 11.

The plug 18 is provided with a central bore 21 forming a fuel chamber in which operates a valve member 22, the lower end of the bore or chamber 21 being formed as indicated at 23 as a valve seat, against which the lower end 24 of the valve member 22 may seat. The upper end of the bore 21 is threaded as indicated at 25 to receive the threaded end of a valve body 26, the valve body having a fuel passage 27 extending concentrically therein from the lower end and provided at its lower end with a valve seat 28 against which the valve portion 29 at the upper end of the valve member 22 may seat.

The upper end of the fuel passage 27 extends as indicated at 30 to the exterior of the valve body 26, communicating therewith a recessed or undercut portion 31 thereof. Surrounding the valve body 26 is a cap member 32 closed at its upper end 33 and making a relatively snug sliding fit with the valve body 26. The cap 32 is adapted to slide up and down upon the valve body 26, the cap 32 being normally urged upwardly by means of a spring 34 surrounding the stem 35 of the valve member 22, the upper end of the valve stem 35 bearing against the underneath surface of the top of the cap 32. The spring 34 bears at its upper end upon a washer 36 surrounding and secured to the stem 35 while the lower end of the spring 34 bears upon a shoulder 37 at the bottom of an enlarged recess 38 in the upper end of the valve body 26.

Thus when the spring 34 is in its normal expanded position, the valve member 22 will be moved upwardly from the position shown in Fig. 1 to the position shown in full lines in Fig. 2, seating the valve portion 29 against the seat 28 and closing communication through the fuel passage 27 to the chamber 21 while at the same time the lower end 24 of the valve member 22 will be lifted off of its seat 23, opening communication between a secondary fuel passage 39 and the chamber 21.

The cap 38 is preferably provided with a helical slot 40 (see Fig. 3) extending around the cap and longitudinally of the cap a distance equal to the height of the recessed or undercut portion 31 of the valve body 26, the valve cap 32 lying within the gasoline well or reservoir 11 allowing fuel from this reservoir to pass through the slot 40 to the recess 31 and thence through the fuel passages 30 and 27 to the chamber 21 whenever the valve portion 29 is unseated from the seat 28.

The reservoir or well 12 may be arranged to be supplied with low grade fuel such as distillate, Diesel oil or other similar cheap motor fuel, by supplying fuel from a suitable tank, not shown, through a pipe 41 which is coupled as indicated at 42 to the cover B immediately above and communicating with the well or reservoir 12. The fuel oil 43 may pass through the well or reservoir 12 through an outlet 44 connected as indicated at 45 to a tube or pipe 46 which may be disposed upon or around the exhaust manifold in any suitable manner so as to preheat the oil flowing therethrough. The opposite end of the pipe or tube 46 is coupled as indicated at 47 to a petcock or cut-off valve 48, which is in turn connected as indicated at 49 to the bottom wall 16 of the carburetor body A. In the bottom wall of the carburetor body A is formed the fuel passage 50 extending over and communicating with the coupling member 49 so that fuel oil passing through the tube 46 will pass into and through the fuel passage 50, one end of which is aligned with the fuel passage 39 in the plug 18 so as to supply fuel from the well 12 into the chamber 21 whenever the valve portion 24 is unseated from its seat 23.

It will be noted from an inspection of Figs. 1 and 2 that one end of the jet pipe 9 is threaded into the plug 18 and is in communication with the chamber 21 as indicated at 51 so that whatever fuel is supplied to the chamber 21 will pass into the jet pipe 9 and through the jet 7 into the air stream passing through the air passage 2.

With the construction thus far described the engine to which the carburetor is attached may be started by supplying gasoline thereto, in which instance the valve member 22 should close the fuel oil passage 39 and open the gasoline passage 27. This may be readily accomplished by supplying a manual control device under the control of an operator of the vehicle such as is diagrammatically indicated at 52 as comprising a lever 52 pivoted at 53, one end of which is coupled by means of a link 54 to a bellcrank 55 pivoted at 56 upon the cover B, the other arm 57 of the bellcrank 55 being connected to a push rod 58 which extends down through the cover B to a position immediately above the cap 32. Thus by moving the lever 52 from the position shown in Fig. 1 in a clockwise direction, the push rod 58 will be brought into contact with the cap 32 and will depress the same, pushing the valve member 22 downwardly to the position shown in Fig. 1. With this operation gasoline will be supplied from the reservoir 11 through the slot 40, fuel passage 27, valve seat 28, to the chamber 21, whence the fuel may pass up through the jet pipe 9 into the air stream, fuel oil being cut off at this time by reason of the fact that the valve member 22 is seated upon its seat 23 and is closing the fuel passage 39.

After the engine is started and has warmed up sufficiently to operate upon the fuel oil, the lever 52 may be swung back to the position shown in Fig. 1, allowing the valve member 22 to move to the position shown in Fig. 2, thus closing the gasoline passage through valve seat 28 and opening the fuel oil passage through valve seat 23 and fuel oil will be supplied from the reservoir 12 to the jet 7.

Now, however, if it is desired to supply a mixture of gasoline and fuel oil to the engine, the lever 52 may be disposed in any of its intermediate positions, which will cause a partial depression of the cap 32 and of the valve member 22, thus unseating the valve portion 29 from its seat 28 and allowing a predetermined quantity of gasoline to be supplied to the chamber 21. In order to assist in the determination of the proportions of gasoline and fuel oil which are to be so supplied, the lever 52 is preferably provided with an indicating device 60 which has thereon a plurality of indications such as indicated at 61

alongside which the lever 52 may be selectively placed to indicate the degree of depression of the cap 32.

By referring particularly to Fig. 3, it will be observed that the slot 40 extends helically about the cap 32, the upper and lower limits thereof being equal to the upper and lower limits of the recessed portion 31 of the valve body 26 so that a small depression of the cap 32 will dispose only a small portion of the slot 40 into communication with the recessed portion 31 of the valve body, the remaining portions of the slot 40 being aligned with the enlarged portion 26a of the valve body. Thus a minute opening is provided for the passage of gasoline through the cap 32 and into the fuel passage 27, this minute passage being enlarged by small increments as the cap 32 is further depressed. In this manner the amount of gasoline flowing into the chamber 21 may be readily regulated or metered by positioning the lever 52 in any one of its selected positions.

Now assuming that the engine has been operating on fuel oil and the vehicle has been brought to rest, it is desirable that upon restarting of the vehicle the engine should operate upon gasoline in order to avoid unnecessary smoking and to insure during the initial acceleration of the engine efficient performance thereof. Also after the engine has been operating upon fuel oil and the engine is stopped, it is desirable that upon restarting the engine it should restart upon a supply of gasoline.

For this reason I have provided a control for the valve member 22 automatically actuated whenever the vehicle is stopped or whenever the engine is stopped as by coupling the butterfly valve 62, ordinarily employed to control the speed and operation of the engine, to move the valve member 22 from its fuel-oil supplying position as shown in Fig. 2 to its gasoline supplying position as shown in Fig. 1. This may be readily accomplished by providing a lever 63 upon the shaft 64 of the butterfly valve adapted to bear upon a rod 65 pivoted at 66 and having its opposite end connected as by means of a link 67 to a push rod 68 extending upwardly through a bore 69 in a boss 70 projecting inwardly from the side wall of the reservoir 11. The upper end of the push rod 68 is bent over as indicated at 71 so that its outer end is disposed immediately above the cap 32. Thus each time that the butterfly valve 62 is closed, as when the vehicle is stopped and the motor is idling or when the motor is stopped for any reason, the push rod 68 will be pulled down against the force of its spring 72 and will engage and depress the cap 32, moving the valve member 22 down to the position shown in Fig. 1, cutting off the supply of oil to the jet 7 and opening the passage for the supply of gasoline thereto. Thus when the motor is to be restarted or the vehicle is to be restarted, the jet 7 is filled with gasoline rather than with fuel oil, rendering starting easier and avoiding the undesirable feature of producing large quantities of smoke upon the restarting of the vehicle or restarting of the engine.

As will be understood by those skilled in the art, the fuel oil tends to flow through the jet at a lower velocity than the lighter fuels or gasoline so that a greater degree of vacuum is required in the air passage 2 in order to pull the fuel through the jet 7. This is particularly apparent when the motor is started or is to be rapidly accelerated. Also the fuel must be drawn from the reservoir 12 through the rather long pipe 46 employed for heating the same and for this reason upon an attempt to accelerate the engine with the fuel oil there is a considerable lag before the oil flows freely through the jet 7. I overcome this difficulty by providing an auxiliary reservoir 74 communicating with the fuel passage 50 as by providing a boss 75 built out from the partition wall 76 dividing the reservoir 11 from the reservoir 12 and through this boss I extend a tube comprising an auxiliary reservoir 74. The upper end of the tube 74 is preferably open to the atmosphere as indicated at 77 though if desired a cover having a small orifice 78 may be employed thereon, the tube 75 extending to a height considerably above the maximum level of the fuel oil 43 in the reservoir 12. Thus when the throttle 62 is open to supply fuel oil to the jet 7, the immediate draft of fuel oil is made from the auxiliary reservoir 74 until the rate of flow of oil through the pipe 46 is equal to the rate at which the fuel is drawn through the fuel passage 50, the auxiliary reservoir 74 constituting a supply of fuel close to the jet 7, from which the first or initial supply of fuel may be drawn without drawing along the entire length of the pipe 46 back to the reservoir 12.

By employing the auxiliary reservoir 74 open to the atmosphere, any gases which may be generated due to the heat applied to the fuel oil will be permitted to escape and gas-lock, which commonly occurs in attempts to use fuel oil in gasoline engines, will be prevented.

While I have shown and described the preferred embodiment of my invention, I do not wish to be limited to any of the details of construction shown or described herein, except as defined in the appended claims.

I claim:

1. In a multiple fuel carburetor for supplying fuel to an internal combustion engine, a reservoir for a light fuel, a reservoir for a heavy fuel, means defining an air passage, a jet in said passage through which fuel from either of said reservoirs may be supplied to the air stream passing through said air passage, a fuel passage from one of said reservoirs communicating with said jet, a second fuel passage from the other of said reservoirs communicating with said jet, valve means interposed in said fuel passages comprising a valve body defining a portion of the fuel passage for said light fuel, a valve seat thereon, a valve seat in the other of said fuel passages, a valve member movable from seating relation with one of said seats to seating relation with the other of said seats, means for moving said valve member between said two positions including a cap slidable upon said body, a metering orifice extending longitudinally relative to said body and communicating with the fuel passage in said valve body whereby movement of said cap relative to said body controls the effective size of the fuel passage for said light fuel.

2. In a multiple fuel carburetor for supplying fuel to an internal combustion engine, a reservoir for a light fuel, a reservoir for a heavy fuel, means defining an air passage, a jet in said passage through which fuel from either of said reservoirs may be supplied to the air stream passing through said air passage, a fuel passage from one of said reservoirs communicating with said jet, a second fuel passage from the other of said reservoirs communicating with said jet, valve means interposed in said fuel passages comprising a valve body defining a fuel passage for said light fuel and having a valve seat at one end thereof, a valve seat formed in the other of said fuel pas-

sages, a valve member movable between seating relation upon one of said seats and seating relation upon the other of said seats, an elongated recess in the exterior of said valve body communicating with the fuel passage therein, and means for moving said valve between said two positions including a cap slidable upon said valve body and having an orifice therein extending in the direction of movement of said cap whereby movement of said cap to move said valve member will dispose a greater or lesser length of said orifice to said recess and regulate the flow of light fuel through said passage.

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