March 18, 1947. H. A. CARLSON ET AL 2,417,734

CARBURETOR

Filed Aug. 11, 1943

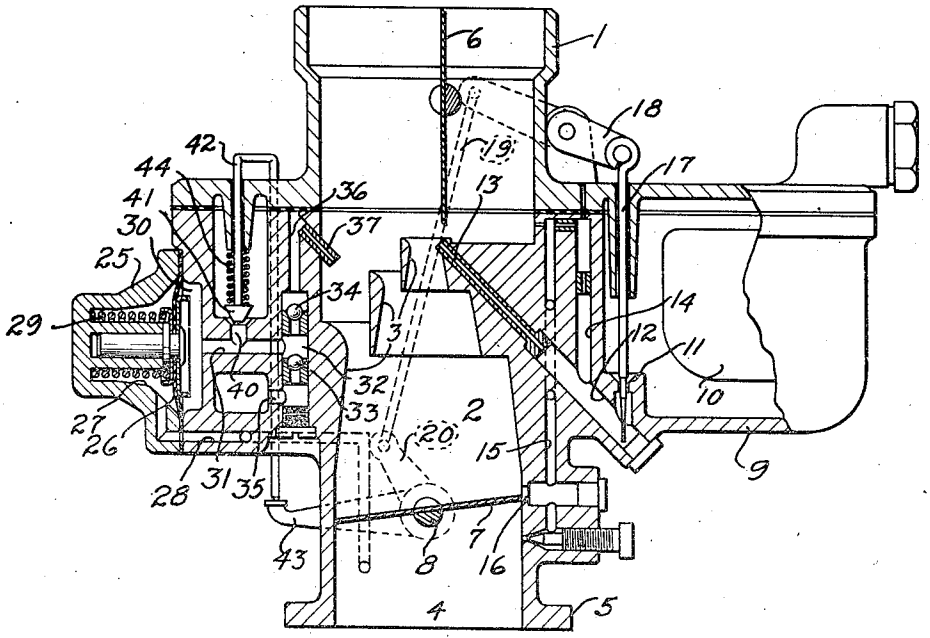


FIG. 1.

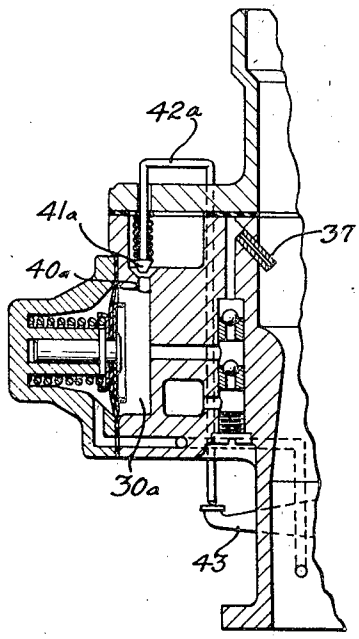


FIG. 2.

INVENTOR.
HAROLD A. CARLSON
OLIN J. EICKMANN

George R. Erickson
ATTORNEY

Patented Mar. 18, 1947 2,417,734

UNITED STATES PATENT OFFICE

2,417,734

CARBURETOR

Harold A. Carlson, University City, and Olin J. Eickmann, Normandy, Mo., assignors to Carter Carburetor Corporation, St. Louis, Mo., a corporation of Delaware

Application August 11, 1943, Serial No. 498,440

3 Claims. (Cl. 261—34)

1

This invention relates to carburetors for internal combustion engines and consists particularly in novel means for controlling the discharge from an accelerating pump particularly of the pressure responsive type.

Where an automotive engine is provided with a carburetor having an accelerating pump, it is frequently necessary to insure a discharge from the pump immediately the throttle valve is opened even though the vehicle, at the time, may be coasting with the engine in gear and the carburetor throttle closed. Where an accelerating pump of the pressure responsive type is provided, this requires that the pump piston or diaphragm reach its fully charged position only when the engine suction corresponds with that which exists under such coasting conditions. This suction is substantially higher than the normal idling suction, and in case of an acceleration under such coasting conditions, the engine suction may drop from perhaps 24 inches of mercury down to 18 or 19 inches of mercury, which is approximately normal idling suction. An accelerating pump so calibrated, however, has the disadvantage that when the engine is being decelerated by rapid closing of the throttle, a similar variation of engine suction may occur so as to cause a discharge from the accelerating pump, which is undesirable under these conditions. Repeated deceleration of the engine, as when the vehicle is being maneuvered for parking, may cause stalling of the engine due to an excess of fuel in the intake manifold.

It is an object of the present invention to provide means insuring the discharge from the accelerating pump during acceleration while coasting in gear and, at the same time, preventing discharge from the pump during deceleration.

A more detailed object is to provide means to prevent discharge of a suction responsive accelerating pump when the throttle is fully closed, regardless of variations in engine suction.

An object is to provide a valved vent in a wall of the pump pressure chamber which is open only when the throttle is closed to relieve pressure built up whether from operation of the pump or the formation of gas in the fuel.

These objects and other more detailed objects hereafter appearing are attained substantially by the device illustrated in the accompanying drawing in which

Fig. 1 is a vertical sectional view of a carburetor embodying the invention, certain parts being arranged diagrammatically for clearer illustration.

2

Fig. 2 is a detail view similar to Fig. 1, but showing a modification.

The carburetor shown has a downdraft mixture barrel or conduit including an air inlet horn 1, central mixing chamber portion 2, including a series of venturis 3, and an outlet portion 4, flanged as at 5, for attachment to the engine intake conduit (not shown). The entry of air into the carburetor is controlled by a choker valve 6 and the discharge of mixture is controlled by a throttle valve 7 pivotally mounted on throttle shaft 8. Adjacent the barrel is a bowl 9 within which fuel is maintained at a substantially constant level by a float 10 and the usual needle valve mechanism (not shown). Fuel is supplied to the mixture conduit through a main metering orifice 11, an upwardly inclined passage 12, and the main nozzle 13 discharging into the smallest or primary venturi 3. Fuel for idling is supplied through a passage 14 extending upwardly from inclined passage 12 and a downward passage 15 terminating in idling port 16 adjacent the edge of the throttle when closed. A metering pin 17 controlling metering orifice 11 is supported at its upper end on a lever 18 pivoted above the fuel bowl and connected by a link 19 to an arm 20 rigid with throttle shaft 8.

A cap-like casing 25 is attached to one side of fuel bowl 9 and a diaphragm 26 is secured between this casing and the bowl wall. The suction chamber 27 on the left side of the diaphragm is connected by a passage 28 to the mixture conduit posterior to throttle 7. A coiled spring 29 constantly urges the diaphragm toward the right against the force of the effective suction. The pressure chamber 30 on the right side of the diaphragm is connected by a cross passage 31 to a valve chamber 32 within which are mounted an inlet check 33 and an outlet check 34. The valve chamber communicates through an inlet passage 35 with the fuel bowl and through an outlet passage 36 and a restricted nozzle 37 with the mixture conduit.

An ample relief passage 40 connects pump pressure passage 31 with the fuel chamber and this passage is controlled by a valve 41 carried by a goose neck stem 42 which extends through the bowl cover and thence downwardly and terminates adjacent a second arm 43 rigid with throttle shaft 8. A coiled spring 44 normally maintains valve 41 seated so as to close relief passage 40. Arm 43 is shaped so that when the throttle valve is fully closed, stem 42 and valve 41 are lifted to open the relief passage.

In operation, engine suction is applied through passage 28 against spring 29 and tends to move

diaphragm 26 to the left so as to draw a charge of fuel from the bowl into pressure chamber 30. Spring 29 is calibrated so that the diaphragm does not reach its fully charged position until the engine suction reaches a value of perhaps 24 inches of mercury which is considerably higher than normal idling suction. Upon any drop of suction from this value, spring 29 urges the diaphragm to the right so as to force fuel past outlet check 34 and through nozzle 37 into the mixture conduit. However, in case this drop of suction occurs when the throttle is closed, as during rapid deceleration, relief valve 48 will be held open so that the pumped fuel is by-passed through the relatively large relief passage 40 instead of through restricted nozzle 37. Thus, a prompt accelerating charge is insured upon a drop of engine suction, during opening of the throttle, but such discharge is prevented when the throttle is in closed position regardless of variation in suction.

The modification in Fig. 2 is generally constructed the same as Fig. 1, except for the vent 40*a* which is located in the top wall of the pump pressure chamber 30*a*. The connection 42*a* to throttle lever 43 operates, as in the first form, to hold valve 41*a* open only when the throttle is closed. Thus, this vent efficiently serves to release gas bubbles which may form in the pressure chamber because of excessive heat often created shortly after the engine has stopped. Except for the vent, such bubbles may cause fuel to spill into the mixture conduit through nozzle 37.

The positioning and arrangement of the pump cut out valve on the outlet side of the pump may be considerably varied and the invention may be otherwise varied as will occur to those skilled in the art without departing from the spirit thereof and the exclusive use of modifications as come within the scope of the appended claims is contemplated.

We claim:

1. In a carburetor for an internal combustion engine, an intake conduit, a throttle therein, a fuel chamber, an accelerator pump having a suction responsive element operable in the charging direction in response to intake suction posterior to said throttle, said suction responsive element being movable to fully charged position responsive to suction substantially higher than the suction at normal idling, inlet and outlet ports for said pump, inlet and outlet check valve controlling said ports, a fuel pressure chamber connecting the pump with said ports, an outlet passage connected to the outlet port of said pump and discharging into said intake conduit at a point anterior to said throttle valve, a vent in the upper wall of said pressure chamber discharging into said fuel chamber, a valve for normally closing the vent, and means for opening the valve in said vent by said throttle as said throttle approaches its closed position to prevent the discharge of the fuel in the pressure chamber into said intake conduit after said throttle is closed

2. In a carburetor, means forming a mixture conduit, means forming a constant level fuel chamber, a throttle for said mixture conduit, a suction charged pump having its inlet connected to said constant fuel chamber and its outlet connected to said mixture conduit at a point anterior to said throttle, check valves controlling said pump inlet and outlet, said pump being constructed and arranged to discharge upon a decrease in suction at a point posterior to said throttle, a by-pass to permit fuel to be discharged from said pump to said fuel chamber without flowing through said discharge outlet, a valve normally closing said by-pass, and means operated by said throttle as it approaches its closed position for opening said by-pass valve to permit the discharge of fuel from said pump.

3. In a carburetor, means forming a fuel mixture conduit, means forming a constant level fuel chamber, a throttle for said mixture conduit, a suction charged pump having a pump chamber, an inlet passage connecting said pump chamber to said fuel chamber and an outlet passage for said pump discharging into said mixture conduit at a point anterior to the throttle, check valves controlling said inlet and outlet passages, said pump having spring means arranged to discharge the fluid in the pump chamber upon a decrease in suction, a by-pass to permit fuel to be discharged from said pump to said fuel chamber without flowing through said discharge outlet, a valve controlling said by-pass, and means for opening said by-pass valve by the throttle when the latter approaches closed position.

HAROLD A. CARLSON.
OLIN J. EICKMANN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,948,999	Westcott	Feb. 27, 1934
2,021,694	Messinger, Jr.	Nov. 19, 1935
2,133,033	Messinger, Jr.	Oct. 11, 1938
2,136,959	Winfield	Nov. 15. 1938
2,230,144	Kittler	Jan. 28, 1941
2,235,797	Carlson	Mar. 18, 1941

FOREIGN PATENTS

Number	Country	Date
521,230	British	May 15, 1940