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CARBURETOR

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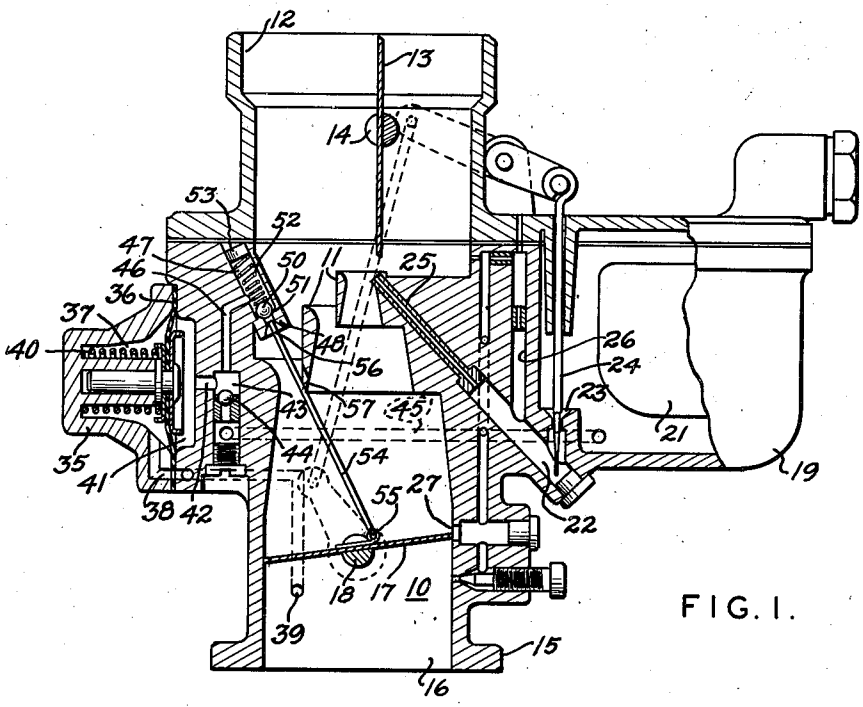


FIG. 1.

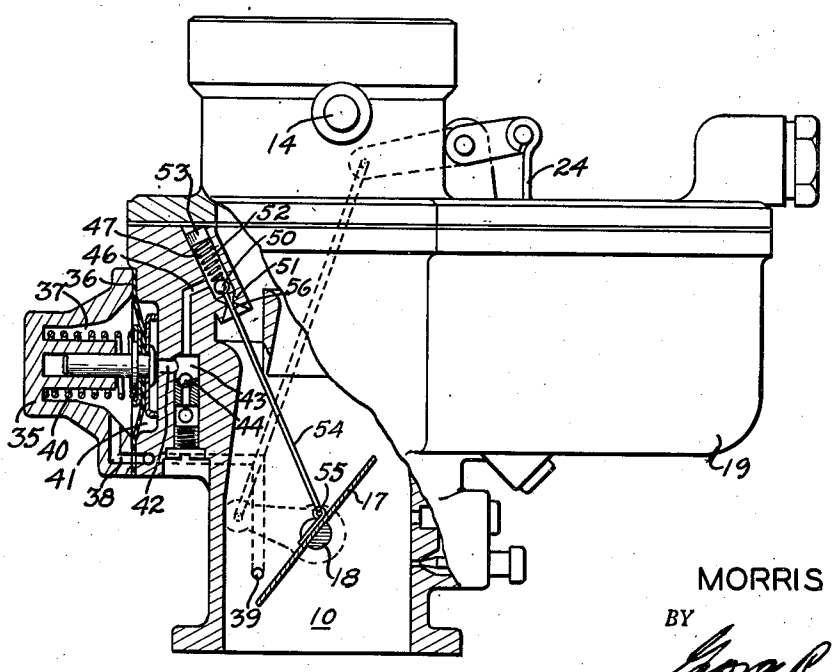


FIG. 2.

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CARBURETOR

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4 Claims. (Cl. 261—34)

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This invention relates to carburetors for internal combustion engines and has particular reference to novel and highly effective accelerating pump discharge control means suitable in particular for acceleration pumps of the pressure responsive or suction operated type.

In the operation of an automotive engine having a carburetor provided with an acceleration pump, it is desirable to afford acceleration pump discharge immediately upon throttle opening. This is true even when the vehicle is coasting with the engine in gear. Therefore, where an acceleration pump of the pressure or suction responsive type is utilized, the pump piston or diaphragm must attain its fully charged position only when the engine suction corresponds with the highest which obtains under such coasting conditions. As is known, the suction present under the foregoing stated conditions is substantially higher than the normal idling suction, so that upon acceleration, the engine suction may drop from a value of the order, say, of 24 inches of mercury, to substantially the normal idling suction of 18 or 19 inches of mercury. An acceleration pump so calibrated is subject, however, to a decided disadvantage, in that when the engine is used as a brake in stopping the vehicle, an undesirable pump discharge will occur. Moreover, repeated deceleration of the engine, when effected, for example, during maneuvering of the vehicle for parking, may result in a stalling of the engine due to an excess of fuel in the intake manifold, produced by correspondingly successive discharging of the acceleration pump.

Accordingly, it is an object of the present invention to provide a novel and effective means for controlling acceleration pump discharge such as to insure discharge promptly during acceleration even while the vehicle is coasting in gear, and to prevent in a positive manner, pump discharge upon deceleration consequent to rapid closing of the throttle.

A more detailed object is to provide throttle controlled closure means for the discharge nozzle of a suction responsive acceleration pump, which is effective in a positive manner and regardless of variation in engine suction, to prevent pump discharge when the throttle is fully closed, and which is equally effective to prevent spilling of fuel through the pump nozzle consequent to increased fuel pressure in the pump chamber due to gas bubbles formed therein by excessive heat, as sometimes occurs under certain conditions, when or shortly after the engine is stopped.

Other objects and advantages will appear from

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the following description of a presently preferred embodiment of the invention as illustrated in the accompanying drawing in which:

Fig. 1 is a vertical sectional view of a carburetor as shown diagrammatically in part, wherein is embodied the present invention, and

Fig. 2 is a sectional view similar to Fig. 1, further illustrating the present invention.

With reference now to the drawing, the carburetor shown is of a downdraft type and provides a casing having a fuel mixture conduit or passage 10 therein, and a Venturi stack 11 suitably located in the passage. At the upper end of passage 10 is an air inlet 12, with air admission therethrough controlled by a choke valve 13, the latter being mounted on a pivot shaft 14 and operated in any suitable or desired manner not here illustrated. The lower end of the casing may be flanged as shown at 15, for attachment of the carburetor to the intake manifold (not shown) of an associated engine, in a position to register the outlet end 16 of mixture passage 10 with the inlet opening of the manifold. Within passage 10 and near the outlet 16 thereof, is a throttle valve 17 mounted on pivot shaft 18 and controlled by the usual or any other desired throttle-operating instrumentality (not shown here).

Formed by the casing structure adjacent the mixture passage 10, is a bowl or fuel reservoir 19 within which fuel is maintained at a predetermined, substantially constant level by the usual needle valve (not shown) controlled by bowl float 21. Fuel from the reservoir is admitted to main fued duct 22 through a fuel metering jet 23 under control of a throttle operated metering rod 24, and is conducted by duct 22 to the carburetor fuel nozzle 25, the outlet tip of which is disposed in the throat of the innermost Venturi element of the Venturi stack 11. Branching from duct 22 is an idling fuel supply passage 26 leading to the idling port 27.

A cap-like casing 35 is attached to one side of the carburetor barrel and a diaphragm 36 is secured between the casing and the adjacent wall of the barrel. The suction chamber 37 on the left hand side of the diaphragm piston, is connected by a passage 38 to a suction port 39 in the mixture conduit 10 posterior to the throttle valve 17. A coiled spring 40 constantly loads or urges the diaphragm piston toward the right against the suction effected in the suction chamber 37. The pressure chamber 41 on the right hand side of the diaphragm piston, is connected by a passage 42 to a valve chamber 43 within which is mounted an inlet check valve 44. A fuel supply

duct 45 leading from fuel reservoir 19 to the valve chamber 43, affords pump supply of fuel past the inlet check 44. Pump discharge to mixture conduit 10 is afforded by an outlet passage 46 leading from valve chamber 43 to an outlet valve chamber 47, the latter terminating at one end in a restricted nozzle 48 opening to the mixture conduit in the region of the venturis 11.

According to the present improvements, there is embodied in the acceleration pump assembly hereinabove described, a novel and highly effective means under throttle control, for preventing pump delivery of fuel to the carburetor mixture conduit under certain conditions as hereinbefore described. As appears in the drawing, a non-return valve here shown as a ball check 50, is arranged in the outlet valve chamber 47 for seating upon valve seat 51 formed preferably at the inner or fuel receiving end of the discharge nozzle 48. Constantly urging the ball check 50 onto its seat 51, such as to effect positive closure of the discharge nozzle, is a compression spring 52 of predetermined capacity, bearing between the ball check and an abutment or plug 53 at the upper or rear end of chamber 47. Displacement of the ball check in the nozzle opening direction against spring 52, is afforded, responsive to throttle opening movement, by an operating element or push rod 54 pivoted to the throttle valve 17, as at 55, eccentrically to but relatively near the pivotal axis of the throttle valve. The push rod extends upwardly in conduit 10 and has its upper free end 56 received in the nozzle 48 in actuating alignment with the ball check 50. The middle Venturi element of the Venturi stack 11, may have a lower marginal portion 57 thereof cut away to accommodate the rod 54, as shown.

As will be observed in Fig. 1, rod 54 is of such length that when the throttle valve is in the closed or normal idle position shown, the rod end 56 while retained in an operative, guided relation in the nozzle 48, is clear of engagement with the ball check 50, so that the ball check may seat fully without hindrance by the push rod. However, promptly upon opening movement of the throttle valve (Fig. 2), the push rod engages the ball check 50 to lift the same off its seat 51 and inwardly of the chamber 47 against the force of spring 52, to open the nozzle 48 and hence condition the acceleration pump for fuel discharge through the nozzle.

It is to be noted here that the eccentric pivoting of the rod 54 to the throttle axis, affords a desirable minimum of displacement of the rod 54 and hence of the ball check 50, upon opening movement of the throttle valve from its closed position to full open position, the arrangement however, being such as to effect a full nozzle opening disposition of the ball check in any position of the throttle valve between full open position and a position of near throttle closure, as when the ball check is relatively near its seat 51. It is to be observed also, that the size or diameter of the nozzle 48 is selected so as to afford in cooperation with the push rod end 56 received therein, an effective nozzle opening of the desired restrictive character.

In operation, upon the application of suction to the pump diaphragm 36, the latter responds by movement to the left against spring 40, so as to draw a charge of fuel from the reservoir 19 into pump pressure chamber 41. Spring 40 is here calibrated so that the diaphragm does not attain its full charging position until the engine suction reaches a value, say, of the order of 24 inches of mercury, which as before noted, is considerably higher than normal idling suction and is obtained for example, when the vehicle is coasting in gear and the throttle is closed. Now upon accelerating actuation of the throttle from its closed position, the push rod 54 will displace the ball check 50 to open the pump nozzle 48, while the pump diaphragm in response to the consequent drop in suction, will move to the right under the influence of its spring 40, so as to force fuel past the open ball check and through the nozzle into the mixture conduit 10. On the other hand, in the event of a similar drop in suction upon engine deceleration by rapid movement of the throttle to its closed or normal idle position, the resulting retraction of the push rod 54 will allow immediate and full seating of the ball check on its seat 51, under the influence of spring 52, so as to prevent, in the positive manner now evident, any pump discharge of fuel through the nozzle. Accordingly, a prompt accelerating charge is thus assured upon a drop of engine suction in response to opening of the throttle, while pump delivery is most effectively prevented regardless of suction variations, when the throttle is in closed position. The latter function of the present improvement is of particular advantage, in that it not only precludes undesirable pump discharge and hence wastage of fuel, but serves to avoid engine stalling due to an excess of fuel in the manifold as would otherwise occur upon repeated deceleration of the engine consequent for example, to maneuvering of the vehicle for parking.

In an acceleration pump system of the character shown, excessive heat may develop in the pump pressure chamber shortly after the engine is stopped, in which event gas bubbles would tend to form in the fuel remaining in the pump. Unless prevented, such gas bubbles may cause fuel to spill through the pump discharge nozzle into the mixture conduit, with consequent fuel wastage and possible flooding of the manifold. The present nozzle control provision thus is fully effective to preclude any possibility of such fuel spilling, as will be now appreciated.

The present invention may be varied as will occur to those skilled in the art, without departing from the spirit thereof, and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In a charge forming device, a mixture conduit, a throttle therein, a suction charged accelerating pump having an outlet passage discharging into said conduit, a valve in said passage, a yieldable element influencing the valve to a position of passage closure, and a throttle actuated member engageable with said valve and effective in any open position of the throttle, to maintain the valve open, said member in response to full closing of the throttle, disengaging said valve to release the valve for passage closure under the influence of said element.

2. In a charge forming device, a mixture conduit, a throttle therein, a suction charged accelerating pump having an outlet passage discharging into said conduit, a valve and a valve seat in said passage near the nozzle outlet, a yieldable element influencing the valve to a position of passage closure, and a throttle actuated member extendable through said nozzle and effective in any open position of the throttle, to maintain the valve open, said member in response to full closing of the throttle, acting to release said valve

for passage closure under the influence of said element said valve and valve seat being correlated and shaped to insure maximum opening of said valve upon slight movement thereof away from said seat.

3. In a charge forming device, a mixture conduit, a throttle therein, a suction charged accelerating pump having an outlet passage terminating in a nozzle in said conduit, said nozzle forming a valve seat within the passage, a valve in said passage, a yieldable element urging said valve onto said valve seat so as to close the passage to said nozzle, and a valve-actuator member connected to said throttle and having an end portion arranged in and extendable through said nozzle, said actuator member acting in response to movement of the throttle to any open position thereof, to displace said valve from its seat for establishing communication between said passage and nozzle, and said actuator member being positioned upon full closing of the throttle, such as to space said end portion thereof from said valve, whereby the valve may seat fully on its valve seat as urged thereto by said yieldable element.

4. In a charge forming device, a mixture conduit, a throttle therein, a suction charged accelerating pump including an outlet passage terminating in a nozzle in said conduit, a valve in said passage near said nozzle and including a yieldable element influencing the valve to a position of passage closure, and a throttle-actuated member extendable through said nozzle and effective in any open position of the throttle, to maintain the valve open, said member in response to full closing of the throttle, acting to release the valve for passage closure under the influence of said element, said throttle-actuated member further coacting with said nozzle to effect a predetermined restricted opening at the nozzle.

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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
2,150,081	Schorsch	Mar. 7, 1939
2,235,797	Carlson	Mar. 18, 1941
2,267,570	Markham	Dec. 23, 1941
2,391,755	Twyman	Dec. 25, 1945
2,403,390	Moseley et al.	July 2, 1946

FOREIGN PATENTS

Number	Country	Date
497,674	Great Britain	Dec. 23, 1938
521,230	Great Britain	May 15, 1940