

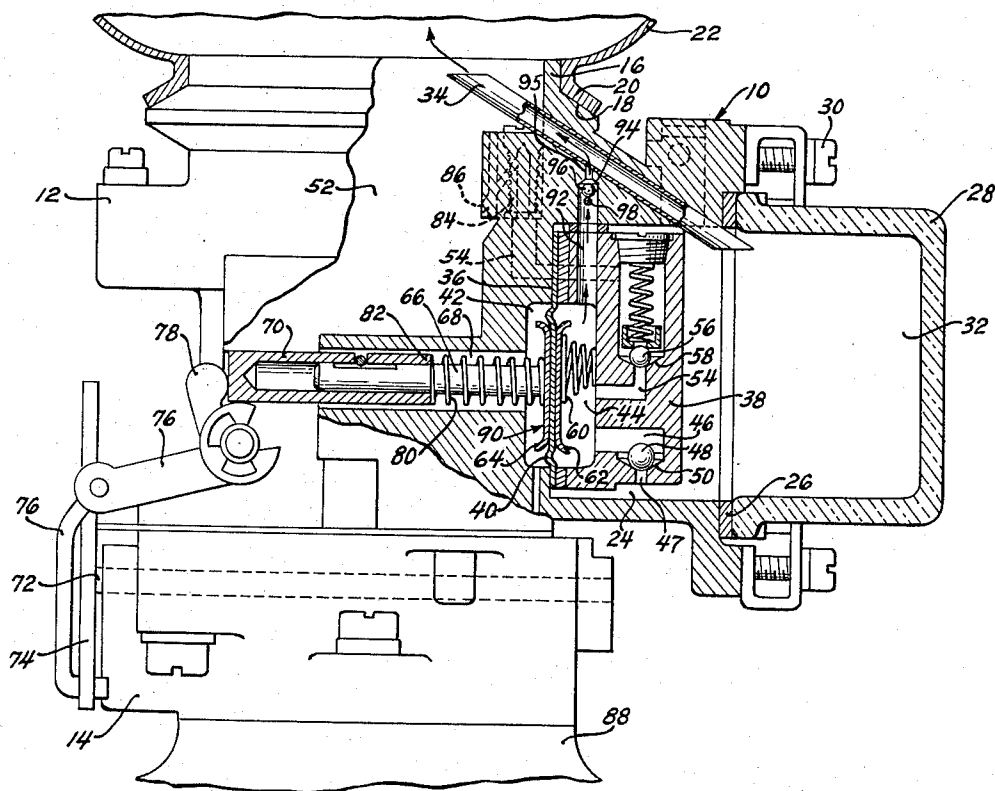
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ACCELERATING PUMP VENT

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ACCELERATING PUMP VENT

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This invention relates to accelerating pumps for carburetors and the like, and more particularly to an accelerating pump having an automatically operated vent which greatly improves the operation of the pump.

Most carburetors or other fuel controls are provided with an accelerating pump adapted to discharge additional fuel to the engine when the supply of air to the engine is suddenly increased. Such accelerating pumps usually comprise a chamber having a movable wall, a piston or a diaphragm for example, connected in some manner to the throttle linkage. When the throttle is opened, the diaphragm is moved into the chamber so that fuel is discharged to the engine; when the diaphragm is moved away from the chamber, the chamber is filled with fuel from the float chamber. The necessary check valves are provided to insure a one-way flow of fuel in either case.

It has been found that when the engine is shut down after a sufficient period of operation so that the engine is hot, the fuel in the accelerating pump chamber vaporizes. This often forces some additional fuel to be discharged into the engine intake passage, and this loading of the engine with fuel causes hard restarting. Also, a pocket of vapor is often trapped in the upper portion of the chamber. In either case, when the engine is restarted, actuation of the accelerating pump results in an inadequate amount of fuel being supplied to the engine. If a vapor pocket is present, this dangerous deficiency of fuel continues to occur until the vapor pocket is in some way removed. These objections to present fuel accelerating pumps cannot be corrected by a simple open vent, since it would make the accelerating pump useless.

It is now proposed to provide an accelerating pump structure having automatic means to vent the accelerating pump chamber when the engine is not operating so that any vapors that form may escape before the engine is restarted. With the proposed structure, the vent will be closed whenever the engine is operating and the accelerating pump is operated.

This and other objects of the invention will become more readily apparent by reference to the following specification and the attached drawing, wherein:

The figure is a side elevational view, with portions thereof cut away and in cross section, of a carburetor having an accelerating pump embodying the invention.

Referring to the drawings in greater detail, a carburetor 10 is formed to provide the usual air intake portion 12 and the throttle body portion 14. The air intake portion 12 may be provided with a flange 16 and shoulder 18 adapted to support the flange 20 of an ordinary air cleaner 22. The air intake portion 12 may be further formed externally to provide an open recess 24 which, together with the gasket 26 and the cover 28 secured by bolts 30, forms a closed float chamber 32. In accordance with well known practice, the float chamber 32 is continuously vented to the air intake portion 12 or the air cleaner 22 by means of the open tube 34.

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The inner wall 36 of the recess 24 and the block member 38 are constructed so that when the block member 38 is secured to the inner wall 36, with a flexible diaphragm 40 interposed therebetween, opposing chambers 42 and 44 having a common wall are formed. The chamber 44 is connected to the float chamber by means of a passage 46 having a gravity-actuated ball check valve 48 therein normally engaging the seat 50. In addition, the chamber 44 is connected to the air intake passage 52 by means of a passage 54 having a spring-loaded check valve 56 therein normally engaging the seat 58. A compression spring 60 is disposed between the block member 38 and the usual washer member 62 supporting the center of the flexible diaphragm 40. Extending from the washer member 64 supporting the other side of the diaphragm 40 is a rod 66 extending through the passage 68 communicating with the chamber 42 and into the hollow cylindrical member 70.

The throttle body portion 14 of the carburetor 10 is provided with a throttle shaft 72 having a throttle lever 74 connected for rotation therewith. The link 76 is pivoted at one end to the throttle lever 74 and at the other end to the accelerating pump lever 76 having the portion 78 thereof adapted to engage the hollow cylindrical member 70. As is well known in the art, when the throttle is opened the accelerating pump lever 76 is rotated clockwise, by reason of its connection to the throttle lever 74, in a manner to urge the hollow cylindrical member 70 to the right to compress the spring 80 extending along the rod 66 between the free end 82 of the hollow cylindrical member 70 and the washer 64.

The spring 80 urges the diaphragm 40 into the chamber 44 against the compression spring 60, which opens the spring-loaded check valve 56 and permits fuel to be discharged through the passage 54, the jet 84 and the orifice 86 and into the intake passage 52. When the throttle is closed, the compression spring 60 is free to urge the diaphragm 40 to the left, thus opening the check valve 58 and refilling the chamber 44.

The structure described above for purposes of illustration is typical in principle of most accelerating pumps presently employed.

When the engine 88 is shut down while hot, the carburetor 10 also immediately becomes hot due to the absence of the cooling effect of the fan and the flow of air through and around the carburetor 10. This is particularly true with the newer carburetors that are built low to the engine so as to permit lowering of the automobile hood. When this occurs, the fuel in the chamber 44 begins to vaporize or boil, just as it does in the float chamber 32, resulting in the objections already mentioned above. It is apparent that any vapors formed in the float chamber 32, whether or not the engine is running, are continuously drawn off or permitted to rise through the open tube 34. However, the chamber 44 of the accelerating pump cannot be continuously vented because the accelerating pump 90 must be maintained in a filled condition and ready to be operated, at least while the engine is running.

In accordance with the invention, which eliminates the above objections, a passage 92 is formed in the block member 38 in a manner to provide communication between the upper portion of the chamber 44 and the tube 34. The passage 92 is formed to include a seat 94 adapted to be engaged by the ball check valve 96; the ball 96, which is relatively small as compared to the inlet ball 48, is preferably made of a light weight non-absorbent material such as nylon and is prevented from dropping into the chamber 44 by means of a pin 98 extending from the wall of the passage 92. The pin 98 is preferably located so that the ball 96 is maintained in close proximity

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to the seat 94 and the ball is of such a diameter that vapors may pass around it when it is not seated.

With the above structure, it is apparent to those skilled in the art that whenever the engine is started, the pressure within the air cleaner 22 or the intake passage 52 instantly drops to below atmospheric due to the restriction provided by the air cleaner. This pressure drop, which may be equal to ½ inch of water, is sufficient to immediately lift the ball 96 against the seat 94. The lifting action on the ball 96 is due to the fact that previous to starting, the ball 96 is in an unseated position and therefore the chamber below it is at atmospheric pressure. The moment the engine starts, however, the ball, being in close proximity to its seat and having a very small mass, is quickly seated by the differential pressure which is applied to it.

Of course, as the speed of the engine increases the pressure drop across the air cleaner is greater and may become equal to more than a pressure differential of 3.00 inches of water. This means that during the higher speed ranges where the accelerating pump is required to deliver additional fuel, the force holding the ball 96 seated is six times as great as that which initially was required to move it to its seated position. This added force, plus the fact that the diameter of vent 95 is much smaller than the diameter of inlet 47, prevents the ball 96 from falling during the pump inlet stroke. However, as soon as the engine is shut down, the ball 96 drops down to the pin 94 as shown in the figure so that any vapors formed in the chamber 44 may pass upwardly around the ball 96 and into the intake passage 52 through the tube 34. As soon as the engine is restarted, the ball 96 is again seated to close the passage 92.

While but a single form of the invention has been disclosed for purposes of illustration, it is apparent that various other forms may be adopted without exceeding the scope of the invention, and no limitations are intended except those recited in the following claims:

What I claim is:

1. A fuel control for an internal combustion engine, comprising a body formed to provide an air intake passage, a throttle controlling the flow of air through said passage, a fuel bowl adjacent said air intake passage, said fuel bowl being vented to said air intake passage, an accelerating pump including a chamber disposed below said fuel bowl vent and filled by fuel from said fuel bowl, said chamber having a vent connecting all vapor trapping portions of said chamber with said fuel bowl vent, said chamber vent having a valve responsive to operation of said engine in a manner to close said vent whenever said engine is running, said valve being opened only when said engine is not running.

2. A fuel control for an internal combustion engine, comprising a body formed to provide an air intake passage, a throttle controlling the flow of air through said passage, a fuel bowl adjacent said air intake passage, said fuel bowl being continuously vented to said air intake passage, an accelerating pump including a chamber disposed below said fuel bowl vent and filled by fuel from said fuel bowl, said chamber having a fuel inlet, a fuel outlet and a separate vent passage connecting said fuel bowl vent with all vapor trapping portions in the uppermost portion of said chamber, said chamber vent being provided with a valve responsive to operation of said engine in a manner to close said vent whenever said engine is running, and to open said valve only when said engine is not running.

3. A fuel control having an air intake passage, an accelerating pump adapted to supply additional amounts of

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fuel to said intake passage, said accelerating pump including a fuel chamber, and automatic means for venting said chamber to said intake passage at all times except when air flows through said intake passage, said venting means including a valve responsive to air flow through said intake passage.

4. A fuel control for an internal combustion engine, comprising an air intake passage, an accelerating pump adapted to supply additional amounts of fuel to said intake passage, said accelerating pump including a fuel chamber, and automatic means including a valve responsive to operation of said engine for venting all vapor trapped in said chamber to said intake passage only when said engine is not operating.

5. A fuel control for an internal combustion engine, comprising an air intake passage, an accelerating pump adapted to supply additional amounts of fuel to said intake passage, said accelerating pump including a fuel chamber, and automatic means for venting the entire volume of said chamber only when said engine is not operating, said automatic means including a valve responsive to operation of said engine for preventing venting when said engine is operating.

6. A fuel control for an internal combustion engine, comprising an air intake passage, said intake passage having a throttle valve therein, and an accelerating pump connected with said throttle valve in a manner to supply additional fuel to said intake passage when said throttle valve is opened, said accelerating pump including a chamber having a movable wall the movement of which into said chamber by means of its connection to said throttle valve causes fuel to be discharged from said chamber and into said air intake passage, the entire volume of said chamber being vented by a passage extending upwardly from the upper portion of said chamber to said air intake passage, said passage having a valve responsive to engine operation and adapted to be closed when said engine is operating and opened when said engine is not operating.

7. A fuel control for an internal combustion engine having an air cleaner, comprising an air intake passage subject to air cleaner depression when said engine is operating, said intake passage having a throttle valve therein, and an accelerating pump connected with said throttle valve in a manner to supply additional fuel to said intake passage when said throttle valve is opened, said accelerating pump including a chamber having a fuel inlet passage, a fuel outlet passage and a movable wall the movement of which into said chamber by means of its connection to said throttle valve causes fuel to be discharged from said chamber and into said air intake passage, said chamber being vented by a separate passage having a valve seat and extending upwardly from the upper portion of said chamber to said air intake passage, said passage having a check valve adapted to be closed when said engine is operating and opened when said engine is not operating, said check valve including a lightweight ball adapted to be lifted against said seat by air cleaner depression and/or the flow of fuel from said chamber.

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