July 23, 1957 E. OLSON 2,800,314

CARBURETOR

Original Filed Oct. 25, 1950

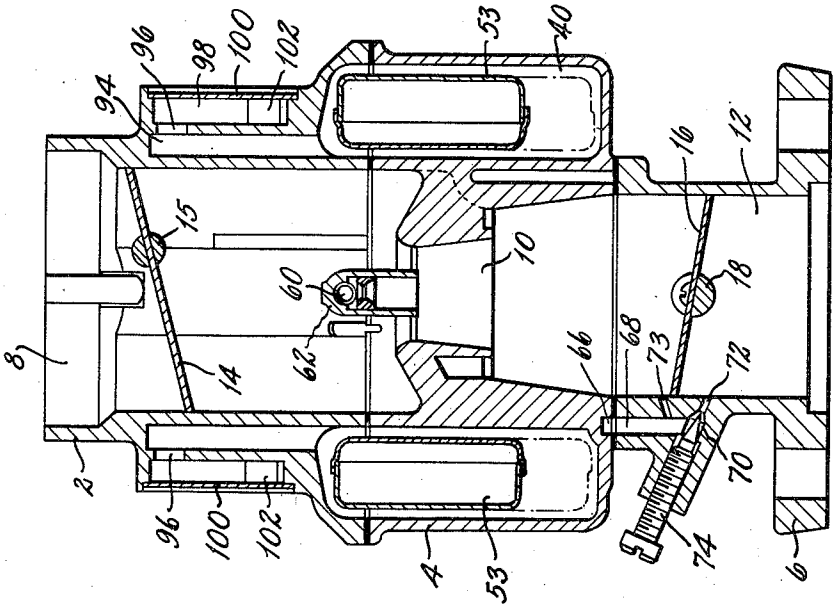


Fig. 2.

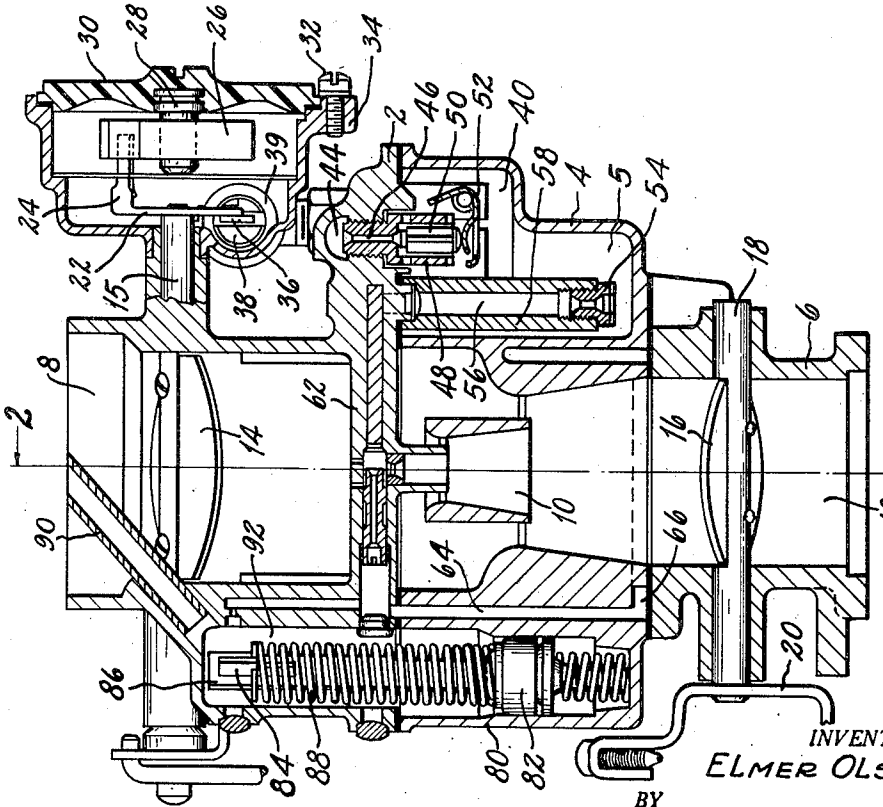


Fig. 1.

INVENTOR.
ELMER OLSON
BY
Craig V. Morton
his ATTORNEY

United States Patent Office 2,800,314 Patented July 23, 1957

2,800,314

CARBURETOR

Elmer Olson, Rochester, N. Y., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Original application October 25, 1950, Serial No. 192,035, now Patent No. 2,698,168, dated December 28, 1954. Divided and this application December 22, 1954, Serial No. 476,905

2 Claims. (Cl. 261—65)

This invention relates to carburetors for internal combustion engines, particularly for automotive use, and the invention is directed primarily to an improved construction for venting the constant level fuel chamber which is provided in conventional carburetors of this type.

Formerly, it was the general custom to provide a small opening in the upper part of the constant level fuel chamber, above the fuel level, to connect with the atmosphere and maintain atmospheric pressure in the space above the fuel in such chamber. This pressure caused a flow of fuel from the carburetor nozzle when the engine was in operation and a sub-atmospheric pressure was maintained at the delivery end of such nozzle.

At the present time, it is generally the custom to provide, instead of an atmospheric vent, an inside vent in the form of a tube connecting with the carburetor intake passage at a point anterior to the choke valve and also connecting with a passage leading to the space in the fuel chamber above the fuel level therein. This communicates to such space, during engine operation, the pressure which is maintained in the carburetor intake, and this, being subject to the restriction imposed by the air cleaner, is very slightly sub-atmospheric.

With the highly volatile fuels of the present day difficulty has been encountered because of vaporization of fuel in the fuel chamber and in the fuel supply passages, both during engine operation and after the engine has stopped. This produces irregularity in the fuel flow during operation and the vapor cannot escape to the atmosphere after the engine ceases to operate. It is, therefore, the primary purpose of the present invention to provide a venting arrangement for the fuel chamber which will eliminate the difficulties occasioned by the formation of this fuel vapor and which is so constructed that any vapor formed during engine operation will be drawn into the engine intake and any vapor formed after the engine has ceased to operate can escape to the atmosphere.

This arrangement not only eliminates the difficulties previously mentioned, but is also effective to provide a mixture of proper proportions under certain operating conditions during which, without such arrangement, the mixture might be slightly too lean. Specifically, it has been found that, under certain circumstances, as when idling at high temperatures, that there is some tendency for the engine to stall because the idling mixture became somewhat too lean, if the conventional inside vent was employed. This difficulty is eliminated by the use of a venting arrangement constructed in accordance with the present invention because vapor forming in the space above the fuel in the constant level fuel chamber is carried into the mixture passage through the inside vent conduit and the introduction of this vapor is effective to prevent the leaning of the mixture under the circumstances referred to.

In accomplishing these purposes, a vent has been provided, in addition to the conventional inside vent, which communicates with the atmosphere and through which air flows into the fuel chamber during engine operation,

mixing with the fuel vapor therein and out through the inside vent tube, which is subject to a slight degree of sub-atmospheric pressure, and into the carburetor intake passage where the vapor mixes with the idling mixture formed in such passage adding slightly to the fuel contact of such mixture and preventing the tendency to leanness previously referred to.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Figure 1 is a vertical section through a carburetor in which the present invention is incorporated; and

Figure 2 is a section on the line 2—2 of Figure 1.

The present invention is shown as embodied in a carburetor such as shown and described in application S. N. 192,035 of Elmer Olson, filed October 25, 1950, now Patent No. 2,698,168, issued December 28, 1954, of which this application is a division. Since the invention to which this particular application relates specifically is the vent arrangement for venting the fuel chamber of the carburetor, other parts of the carburetor which are shown in the drawings are only briefly described herein.

The carburetor, which is of the down-draft type, comprises three separate castings, 2, 4 and 6, positioned one above the other. The casting 2, which constitutes the air inlet, is supported on top of the casting 4, in which the fuel chamber 5 and the mixing chamber are positioned, and the casting 4 is supported on the casting 6, in which the throttle valve that controls the quantity of mixture supplied to the engine is rotatably mounted. Suitable gaskets are positioned between the several castings. The air inlet passage is indicated at 8 and this communicates with the mixing chamber 10 in casting 4 from which combustible mixture is delivered to the outlet passage 12 in casting 6.

Admission of air through the passage 8 is controlled by an unbalanced choke valve 14, secured to a shaft 15 which is rotatably mounted in the casting and automatically operated by means responsive to engine temperature and suction which will be briefly described later, while the quantity of combustible mixture supplied to the engine is controlled by a throttle valve 16 secured to a shaft 18 rotatably mounted in the throttle body casting 6.

The operating connections for the throttle and choke valves form no part of the present invention and can be of any suitable construction, but some of the mechanism is shown in Fig. 1 and will be very briefly described herein. With reference to the throttle, it will be understood that the throttle is operated manually by means of an arm 20 which is secured in any desirable way to the left end of the shaft 18 and is connected in the conventional way by a connection (not shown) to the usual accelerator pedal.

The choke valve shaft 15 has secured to the right thereof, as seen in Fig. 1, an arm 22 having a laterally projecting end 24 which is engaged by one end of a thermostat 26 which is in the form of a hook extending around the part 24 as shown in application Serial No. 192,035 and the other end of the thermostat is connected to a stud 28 secured in a cover plate 30 which is adjustable and can be held in any set position by screws 32 that engage a housing 34 which projects from the casting 2 and surrounds the thermostat 26 and its associated parts. Pivotally connected at the lower end of arm 22 is a link 36, also connected to piston 38, slidable in a cylinder 39, to which the engine suction, which is maintained posterior to the carburetor throttle, is communicated. It is unnecessary to describe the operation of this

mechanism since it forms no part of the present invention and is fully described in the parent application previously referred to. Suffice it to say that the thermostat tends to hold the valve closed at low temperatures while the piston 38 tends to open it against the force of the thermostat, to an extent determined by the degree of suction effective on the piston. It should also be understood that, so far as the present invention is concerned, the choke valve may be operated manually, if desired.

Fuel is supplied to a constant level fuel chamber 40 in the casting 4 through a conduit connecting with a passage 44 in the casting 2. A passage 46 in a nipple 48 connects passage 44 with chamber 40 and flow through passage 46 is controlled by a valve 50 which rests on an arm 52 operated by the usual float 53, in the conventional manner to maintain a constant level of fuel in the chamber 40.

Fuel flows from the chamber 40 to the main and idling fuel inlets of the carburetor through a metering plug 54 positioned at the bottom of a vertical passage 56 formed in a tubular member 58 secured at its upper end in any desirable way to the bottom of the cover plate for the float chamber which is a part of the casting 2. It should be noted particularly that the tubular member 58 has no metallic contact whatever with any part of the carburetor other than the casting 2 which is furthest removed from any source of heat and, moreover, this tubular member is completely surrounded by fuel in the chamber 40 which tends to keep such member cool.

The passage 56, at its upper end, connects with a horizontal passage 60 formed in a tubular bridge member 62 of the casting 2 which extends across the mixture passage and, at the left end thereof, connects with a vertical passage 64 formed in the wall of the casting 4 and which leads to the idling fuel inlet of the carburetor. The passage 64 connects at its lower end with a groove 66 formed in the lower face of the casting 4 and, as indicated in Fig. 2, the other end of this groove connects with a vertical passage 68 formed in the wall of casting 6. The passage 68 connects at its lower end with a bore 70 which, in turn, connects with a small fuel passage 72 connecting with the mixture outlet 12 posterior to the throttle valve 16. A valve 74 positioned in the bore 70 controls the effective area of the passage 72 and a small passage 73 connects the passage 68 with the outlet 12 adjacent but anterior to throttle 16. So far as the present invention is concerned, the form of the fuel supply passages is not material and the passages are shown herein merely for illustrative purposes. Any conventional construction could be employed.

The arrangement of the tubular member 58 to limit the application of heat to such passage as well as the provision of gaskets between the several castings and the provision of the passage 60 is a part of the air inlet casting 2 which is furthest away from any source of heat is to prevent, as far as possible, the heating of fuel in the fuel supply passages sufficiently to effect vaporization of the fuel therein. However, fuel will vaporize in the chamber 5 even if it does not vaporize in the fuel supply passages and the present invention, as already indicated, is primarily designed to eliminate difficulties occasioned by the formation of fuel vapor in such chamber. The manner in which such difficulties are eliminated will be fully described later.

In Fig. 1 is disclosed an accelerator pump which forms no part of the present invention and will be only briefly described, particularly as the mechanism is fully described in the present application. This pump includes a cylinder 80 in which a piston 82 is slidable. The piston is moved downwardly in response to rapid opening movements of the throttle to provide additional fuel during acceleration, to slightly enrich the mixture, as is required for best engine operation under such operating condition. Since the pump and its operating mechanism forms no part of the present invention, it is not shown in detail and will not be further described except to point out that a bar 84, which is operated by throttle 16 through the medium of connections (not shown), extends through a slot in a bar 86 which is connected to the piston and downward movement of the bar 84 moves the piston 82 downwardly, generally through the spring 88 but under some circumstances, through direct engagement of the bar 84 with the end of the slot in bar 86, as fully set forth in the parent application.

Coming now to a description of the venting arrangement which constitutes the invention claimed herein, the float chamber 5 is vented by the tube 90 which extends from the carburetor air intake to a space or recess 92 formed in the casting 2 and positioned in alignment with the pump cylinder 80 when the parts are assembled, so that the operating means for the piston extends upwardly into this space. This space 92 is in communication with the space above the fuel in the chamber 5, as fully shown in the parent application, so that whatever pressure is maintained at the upper end of tube 90 is communicated to the space in chamber 5 above the fuel therein and, as already pointed out, this pressure will be slightly sub-atmospheric, due to the restriction imposed by the air cleaner.

In addition to the inside vent, according to the present invention, the chamber 5 is also vented to atmosphere. In the specific embodiment of the invention herein disclosed, there are two atmospheric vents on opposite sides of the mixture passage and each includes a vertical passage 94 formed in the wall of the casting 2 and communicating with the space in chamber 5. Each of these passages is connected by an opening 96 with a chamber or passage 98 also formed in the wall of casting 2 and closed by a cover plate 100 secured in position in any desirable way. An opening 102 connects each chamber 98 with the atmosphere and when the carburetor is in position on the engine, these openings face the front of the automotive vehicle, so that there is a slight positive pressure created in chamber 98, passage 94 and chamber 5 because of the rearward movement of air past the carburetor, created by the forward movement of the vehicle.

The arrangement of the passage 94 and chamber 98 is primarily for the purpose of preventing dirt which might be in the air entering the opening 102 from getting into the chamber 5. Obviously, any dirt in the air entering the openings 102 would tend to collect in the bottom of the chambers 98 and the quantity of dirt carried into chamber 5 would be much reduced. Also, the two outside venting devices are provided to produce more uniform pressure in chamber 5. However, it will be understood that chambers 98 could be eliminated and the passage 94 communicate directly with the atmosphere, if desired, also that only one outside venting device could be employed and the primary functions of the arrangement would be carried out substantially as well as with the specific arrangement disclosed.

As already pointed out, the venting arrangement which forms the subject of the present invention is provided primarily to accomplish two results, i. e. the elimination of difficulties occasioned by the presence of fuel vapor in the float chamber and to slightly enrich the fuel mixture under a certain operating condition. Since the inside vent tube 90, during engine operation, communicates a slight sub-atmospheric pressure to chamber 5 and the pressure communicated to such chamber by passages 94 is a little more than atmospheric, there is a passage of air through the chamber and into the intake passage through the tube 90. Any vapor formed in the chamber, during engine operation, will, in this way, be carried out of such chamber and into the engine. Obviously, if the openings 102 did not face forward and were not subject to the effect of impact, so that the pressure in passages 94 was atmospheric, there would still be a flow through the

chamber, although at somewhat less velocity, because the tube **90** is subject to sub-atmospheric pressure.

When the engine is stopped after operation and is hot, there is likely to be considerable vapor formed in the chamber **5** and this will escape, some through the tube **90** into the carburetor and the greater part through the openings **102**, into the atmosphere. Since the tube **90** communicates a slight sub-atmospheric pressure to the chamber **5** which tends, to a slight extent, to retard the flow of fuel therefrom, the effect might be enough to cause sufficient leaning of the idling mixture to bring about irregularity in idle operation of the engine, particularly at high temperatures, if the outside venting arrangement was not provided. This possibility is eliminated by the provision of the outside venting means which is the subject of this invention, and the fuel vapor which is carried into the carburetor intake brings about the formation of a fuel-air mixture of the proportions required for smooth idling operation.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A charge forming device for an internal combustion engine having in combination, a constant level fuel supply chamber, an intake passage having an air inlet and a mixture outlet for supplying combustible mixture to the engine, a throttle valve for controlling the flow of mixture

through said outlet, means for supplying fuel to said intake passage, a vent passage communicating with the space above the fuel in said fuel chamber and with the intake passage at a point adjacent the air inlet so that the suction maintained at such point is communicated to the fuel chamber, a second fuel vent passage formed in the wall of said intake passage and communicating with said fuel chamber above the fuel level, a chamber formed in the wall of the air intake passage adjacent the second fuel vent passage, a third passage communicating said vent passage with said chamber, and means for connecting said chamber with the atmosphere to admit air thereto, said latter means being disposed substantially below said third passage whereby impurities entrained in the air entering said latter means will be deposited in said chamber and not carried into the second vent passage.

2. A charge forming device as set forth in claim 1 in which the means for connecting said chamber with the atmosphere comprises an air admitting opening formed therein and positioned to face forward when the charge forming device is assembled on the engine of an automotive vehicle so that such opening is subject to the impact created by the forward movement of the vehicle.

References Cited in the file of this patent

UNITED STATES PATENTS

2,201,603 Wirth ---------- May 21, 1940