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CARBURETOR VENTING DEVICE

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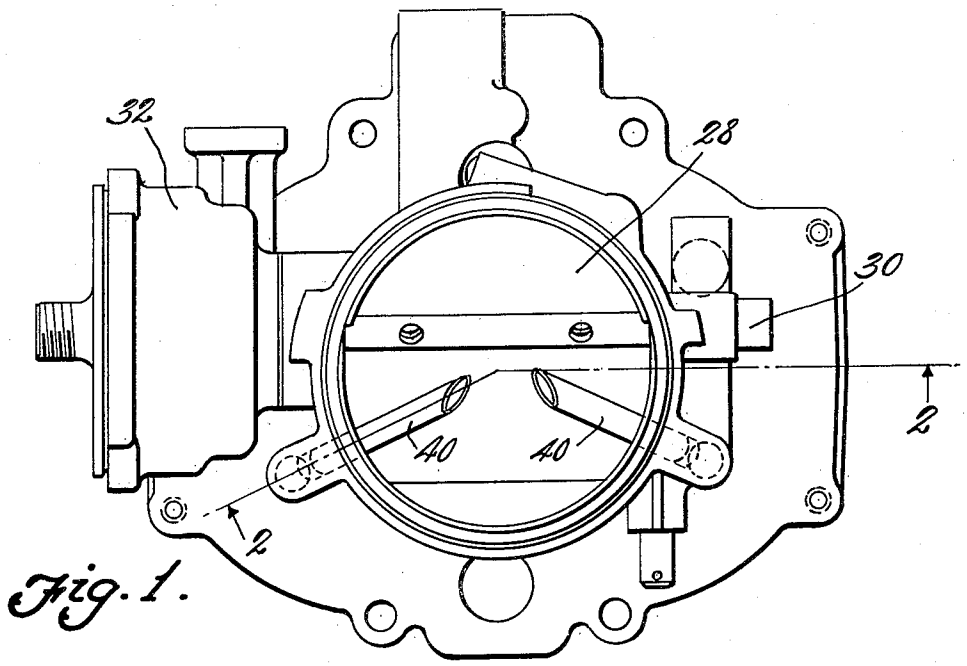


Fig. 1.

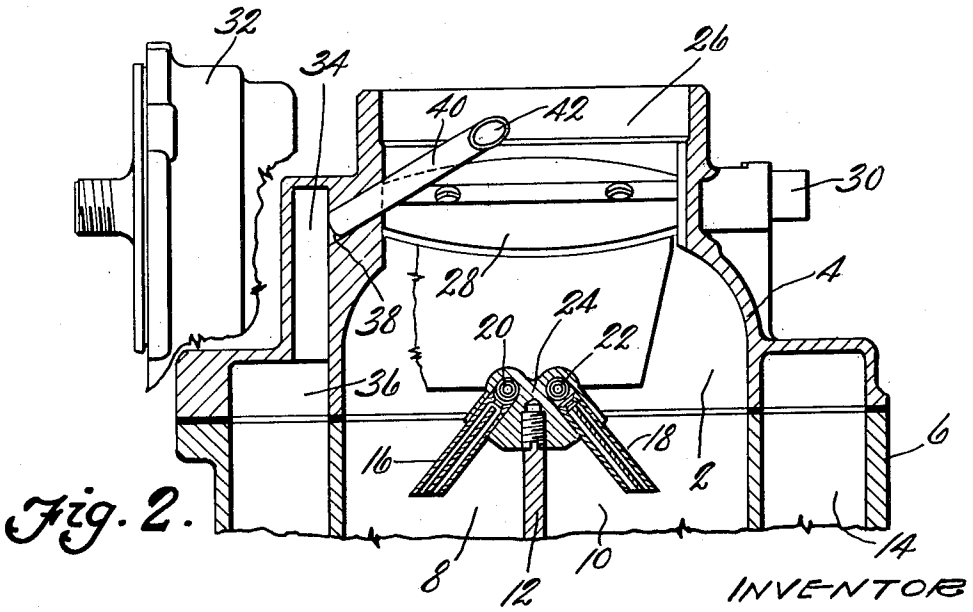


Fig. 2.

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CARBURETOR VENTING DEVICE

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This invention relates to carburetors for internal combustion engines, particularly for the engines of automotive vehicles, and more specifically to an improved form of venting means for the fuel supply chamber of the carburetor.

It has long been the practice to vent the fuel chamber of a carburetor either by a direct connection to atmosphere or by means of a passage communicating with a tube extending into the mixture passage adjacent the air intake. The latter form of vent is shown in Pat. No. 2,694,560, issued November 16, 1954, from the application of Olson, Serial No. 109,347, filed August 9, 1948, and assigned to the same assignee as this application, in many patents and is widely used commercially. The purpose of a venting means is to maintain in the space above the fuel in the fuel chamber a pressure equal or close to that of the atmosphere, but when a vent tube of the form shown in the above patent application is employed, there may be sufficient variation brought about, under different conditions of operation, in the pressure differential which causes the flow of fuel to bring about objectionable variations in the mixture proportions.

In a carburetor of this type, the flow of fuel is caused by the difference in pressure between that maintained in the space above the fuel in the float chamber and the pressure maintained in the intake passage adjacent the end of the fuel nozzle, and may be termed the fuel feeding differential. The mixture which is supplied to the engine by a carburetor of the type disclosed is of relatively constant fuel-air ratio throughout the operating range having usually from twelve parts air to one of fuel up to sixteen parts air to one of fuel. Obviously, if the quantity of air which is supplied is increased upon increase in engine speed, or to increase power without increase in speed upon increase in load, or for any other reason, there must be an increase in fuel flow at the proper rate relative to the increase in air flow in order to form a mixture of proper proportions. The velocity of air flow also increases, which increases the sub-atmospheric pressure or depression, adjacent the fuel nozzle so as to increase the fuel feeding differential to bring about the greater flow of fuel which is required when there is an increase in air flow.

In other words, the increase in velocity of air flow creates a greater difference between the pressure in the fuel chamber and that maintained at the nozzle outlet and this causes the fuel flow to increase as the air flow increases. This increase in the pressure difference between that maintained in the fuel chamber and that maintained adjacent the nozzle is due primarily to the increase in sub-atmospheric pressure or depression adjacent the nozzle, but when a vent tube such as that shown in the application above referred to is employed, there is some change in fuel chamber pressure effected by a change in air velocity as well as a much greater change in pressure at the fuel nozzle. If the fuel chamber pressure changes to an extent which is not correct with

respect to extent of change in pressure at the nozzle, the fuel feeding differential will not be correct and the mixture will be either too rich or too lean. If the fuel chamber pressure does not vary as much as it should, with respect to the change in depression at the nozzle, the fuel feeding differential will be too great and the mixture too rich. If, on the other hand, the fuel chamber depression varies more than it should with respect to the change in depression at the nozzle, the fuel feeding differential will be too little and the mixture too lean.

It is, therefore, the primary object of the present invention to provide an interior venting means for the fuel chamber which is constructed and arranged in such a manner that the fuel chamber pressure will be so controlled with respect to the pressure adjacent the nozzle that a correct fuel feeding differential will be maintained upon variations in velocity of air flow throughout the operating range and a mixture of correct proportions obtained under all operating conditions.

According to the present invention, this object is accomplished by the provision of one or more vent tubes which are fitted relatively tightly in passages formed in the wall of the carburetor housing and which lead to the space in the fuel chamber above the fuel therein. These tubes extend into the intake passage at an angle to the axis thereof, are cut off at an angle to the axis of the tube at the end which projects into the intake and while the tube or tubes can be moved in the passage or passages in which it or they are received, the tube or tubes fit sufficiently tightly in such passage or passages that when the proper position of the tube or tubes is determined, the tube or tubes will remain set in adjusted position. The tube or tubes can be set in any position from that previously described in which the bevelled inner end of the tube is normal to the axis of the intake passage and faces directly into the path of the entering air, to a position 180° from that described in which the bevelled end of the tube faces directly toward the outlet of the carburetor. As some position between these extremes, the tube or tubes will produce in the space above the fuel in the float chamber a depression or partial vacuum which will vary upon variation in velocity of air flow at the proper rate with respect to the change in depression or partial vacuum which is maintained at the nozzle to maintain a fuel feeding differential which does not vary sufficiently upon changes in velocity or air flow to create a sufficiently appreciable change in mixture proportions to be objectionable. In other words, by positioning the vent tube or tubes with the bevelled inner end thereof at the proper angle to the path of the incoming air, a fuel mixture of sufficiently constant proportions will be provided, during operation throughout the operating range and under all conditions, to effect entirely satisfactory engine operation.

It will be understood that satisfactory results can be obtained if only one tube such as 40 is used and is positioned so that the inner bevelled end thereof is at the proper angle to the path of the incoming air, but it is preferable to employ two tubes as illustrated in the drawings. The controlling effect is a little more accurate and by setting the tubes so that the ends thereof are at somewhat different angles to the path of the incoming air, there will be a pressure differential between the ends of the tubes so that air will enter one tube, flow through the space above the fuel in the fuel chamber and carry off any vapors formed therein through the other tube and into the intake passage. The two tubes can be positioned entirely independently of each other so that the bevelled ends of the tubes can be set at whatever angle to the direction of air flow will give a

mixture of the desired proportions and the tubes will be retained in set position, whereby the carburetor will continue to supply the desired mixture after the tubes have been once set in the proper position.

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:

Fig. 1 is a top plan view of a carburetor showing the vent tubes.

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

The carburetor is not shown in its entirety because it is not necessary to show the complete carburetor in order to fully illustrate the device which is the subject of this invention. The carburetor has an intake passage 2 which extends through the air intake casting 4, the fuel chamber casting 6 and through another casting which is not shown, but is positioned below the casting 6 and which is adapted to be connected with the intake manifold of the engine in the usual way. Rotatably mounted in the last named casting is the usual manually operable throttling means (not shown), for controlling the quantity of mixture supplied to the engine and the engine speed, in the usual way.

The carburetor shown is a dual carburetor having two mixture passages 8 and 10 which are separated by a partition diagrammatically indicated at 12. These passages connect with two outlet passages in the lower casting, which is not shown, and each of these passages is controlled by a separate throttle valve, both throttle valves being secured to a single throttle shaft in the usual way.

Fuel is supplied by the customary fuel pump to a fuel chamber 14 in the casting 6 and is maintined at a constant level therein by the conventional float valve mechanism, not shown. Fuel nozzles 16 and 18 supply fuel to the mixture passages 8 and 10 respectively, and these nozzles connect respectively with passages 20 and 22, formed in a cross piece 24 extending across the intake passage, and connecting with a fuel supply passage, not shown, which leads to the fuel chamber 14.

The casting 4 has an air intake 26 which supplies air to both mixture passages 8 and 10 and flow of air into such intake is controlled by a choke valve 28 secured to shaft 30 rotatably mounted in the casting 4. This valve is of the unbalanced type, being off set with respect to shaft 30 so as to be subject to the direct effect of the engine suction thereon and is also controlled in response to variations in manifold suction and engine temperature by an automatically operable choke control mechanism of conventional construction, part of which is received in the housing 32. It will be understood, however, that so far as the present invention is concerned it is wholly immaterial whether the choke valve is automatically operated or manually operated and it is also immaterial to the present invention whether the carburetor is of the dual type, such as shown, or is a carburetor with a single outlet as is generally used with engines having less than eight cylinders. The venting arrangement, which is the subject of the present invention, would perform its desired function with either type of carburetor.

The carburetor structure thus far described is wholly conventional and much the same as that of dual carburetors now in use and the specific design of the elements thus far described constitute no part of the present invention.

Coming now to the novel venting arrangement which is the subject of this invention, two passages 34, one of which is shown in Fig. 2, are formed in the casting 4 and these two passages are of identical construction. These passages are enlarged at the lower ends as indicated at 36 and the enlarged parts of each passage communicate directly with the fuel chamber 14, so that any pressure created in such passages, whether a positive or a partial vacuum, previously referred to as a depression, is transmitted to the space in chamber 14 above the fuel level therein. Connecting with the passages 34 near the upper ends thereof are the bores 38 extending through the wall of the intake passages 2 at an angle to the horizontal and received in these bores are the tubes 40. These tubes may be rotated in the bores 38, in order to move them to a position where the bevelled ends thereof are at such an angle to the direction of flow of the incoming air that the desired fuel chamber depression will be maintained, but the tubes have a sufficiently tight fit in the bores to be retained in whatever position they are set, so that when the proper position for the tubes is determined and the tubes are set in that position, the tubes will not be moved during use of the carburetor, but will remain set in the proper position, unless manually moved to some other position. However, the specific means for positioning the tubes and retaining them in position is of no importance and any suitable means could be employed, for example, threaded tubes and a set screw for locking them in position.

The tubes extend upwardly and inwardly with respect to the intake passage terminating relatively near to the center of such passage and above or anterior to the choke valve. As already stated, the inner ends of the tubes are bevelled or cut off at an angle to the axis thereof, the magnitude of this angle being such that if the tubes were set so that the anlged end faced directly into the incoming air stream the angled end would lie in a plane substantially perpendicular to the axis of the intake passage. The tubes are independently adjustable and can be set in any desired position, from one in which the bevelled ends of the tubes lie substantially normal to the path of the incoming air or to a position completely the reverse of that. By setting the vent tube or tubes at some point between these extremes, the bevelled ends of the tube or tubes will be in a position at such an angle to the direction of flow of the air entering the carburetor that the proper depression to give a mixture of the desired proportions is created within the fuel chamber and the depression is so controlled upon variation in velocity of air flow through the intake, that the mixture proportions remain relatively constant and a mixture of the desired proportions is supplied at different velocities of air flow.

Much the same result can be obtained by the use of a single venting tube if the latter is set in the proper position, but, as previously stated, a slightly more accurate control can be effected by the use of two tubes which can be independently and individually positioned and in addition, by setting the two vent tubes in slightly different positions, any vapor which forms in the fuel chamber can be drawn off and introduced into the intake passage.

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. In a carburetor having a fuel supply chamber, an air intake opening therefor and means for supplying fuel thereto; venting means for said fuel chamber adapted to maintain therein a pressure relatively close to atmospheric pressure, said venting means comprising a tube communicating with a space in the fuel chamber above the level of fuel therein and extending into the intake passage at a point relatively close to the air intake opening, said tube having its inner end cut off at an angle to the axis of the tube and being adjustably supported in the body of the carburetor so that it can be rotated to position its inner end at any desired angle to the axis of the intake passage, whereby the pressure above the fuel in the fuel chamber can be controlled by the position of the tube, and means whereby the tube can be retained in any set position.

2. In a carburetor having a fuel supply chamber, an intake passage, an air intake opening therefor and means for supplying fuel thereto; venting means for said fuel chamber comprising a plurality of venting tubes in com-

munication with the space above the fuel in said fuel chamber and extending into said intake passage relatively near to the air intake opening, the inner ends of said tubes being cut off at an angle to the axis of said tubes and said tubes being adjustably supported in the body of the carburetor so that they can be rotated to position the inner ends thereof at any desired angle to the axis of the intake passage, so that the pressure above the fuel in the fuel chamber can be controlled by the position of said tubes, and means whereby the tubes can be retained in any set position.

3. In a carburetor having a fuel supply chamber, an intake passage, an air intake opening therefor and means for supplying fuel thereto; venting means for said fuel chamber comprising a plurality of venting tubes in communication with the space above the fuel in said fuel chamber and extending into said intake passage relatively near to the air intake opening, the inner ends of said tubes being cut off at an angle to the axis of said tubes and each of said tubes being adjustably supported on the body of the carburetor so that it can be rotated independently of the other tube to position its inner end at any desired angle to the axis of the intake passage, so that the pressure above the fuel in the fuel chamber can be controlled by the position of said tubes, and means whereby the tubes can be retained in any set position.

4. In a carburetor having a fuel supply chamber, an intake passage, an air intake opening therefor and means for supplying fuel thereto; venting means for said fuel chamber comprising a plurality of venting tubes in communication with the space above the fuel in said fuel chamber on substantially opposite sides of the intake passage and extending into said intake passage relatively near to the air intake opening the inner ends of said tubes being cut off at an angle to the axis of said tubes and said tubes being adjustably supported in the body of the carburetor so that they can be rotated to position the inner ends thereof at any desired angle to the axis of the intake passage, so that the pressure above the fuel in the fuel chamber can be controlled by the position of such tubes and means whereby the tubes can be retained in any set position.

5. In a carburetor having a fuel supply chamber, an intake passage, an air intake opening therefor and means for supplying fuel thereto; venting means for said fuel chamber comprising a plurality of passages communicating with the fuel chamber on substantially opposite sides of the intake passage, tubes connected with said passages and extending into said intake passage toward

the center thereof and toward the air intake, the inner ends of said tubes being cut off at an angle to the axis of said tubes and each of said tubes being adjustably supported in the body of the carburetor so that it can be rotated independently of the other tube to position its inner end at any desired angle to the axis of the intake passage, so that the pressure above the fuel in the fuel chamber can be controlled by the position of said tubes and means whereby the tubes can be retained in any set position.

6. In a carburetor having a fuel supply chamber, an intake passage, an air intake opening therefor, means for supplying fuel thereto and a choke valve for controlling the admission of air through said opening; venting means for said fuel chamber comprising a plurality of venting tubes communicating with the space above the fuel in said fuel chamber and extending into said intake passage anterior to the choke valve, the inner ends of said tubes being cut off at an angle to the axis of said tubes and each of said tubes being adjustably supported in the body of the carburetor so that it can be rotated independently of the other tube to position its inner end at any desired angle to the axis of the intake passage so that the pressure above the fuel in the fuel chamber can be controlled by the position of said tubes and means whereby the tubes can be retained in any set position.

7. In a down draft carburetor having a fuel supply chamber, an intake passage, an air intake opening therefor and means for supplying fuel thereto; venting means for said fuel chamber comprising a plurality of venting tubes in communication with the space above the fuel in said fuel chamber and extending upwardly into said intake passage and toward the center thereof so that the inner ends of each tube terminates relatively close to the air intake opening, the inner ends of said tubes being cut off at an angle to the axis of the tubes and each of said tubes being adjustably supported in the body of the carburetor so that it can be rotated independently of the other tube to position its inner end at any desired angle to the axis of the intake passage so that the pressure above the fuel in the fuel chamber can be controlled by the position of said tubes and means whereby the tubes can be retained in any set position.

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