

[54] **VARIABLE VENTURI CARBURETORS**
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 71291

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Primary Examiner—Tim R. Miles

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 261/DIG. 56

[51] Int. Cl. **F02m 23/02**

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 261/41 D, DIG. 53, 41 C, 44 A, 63, 52, DIG.
 56; 123/157; 137/484

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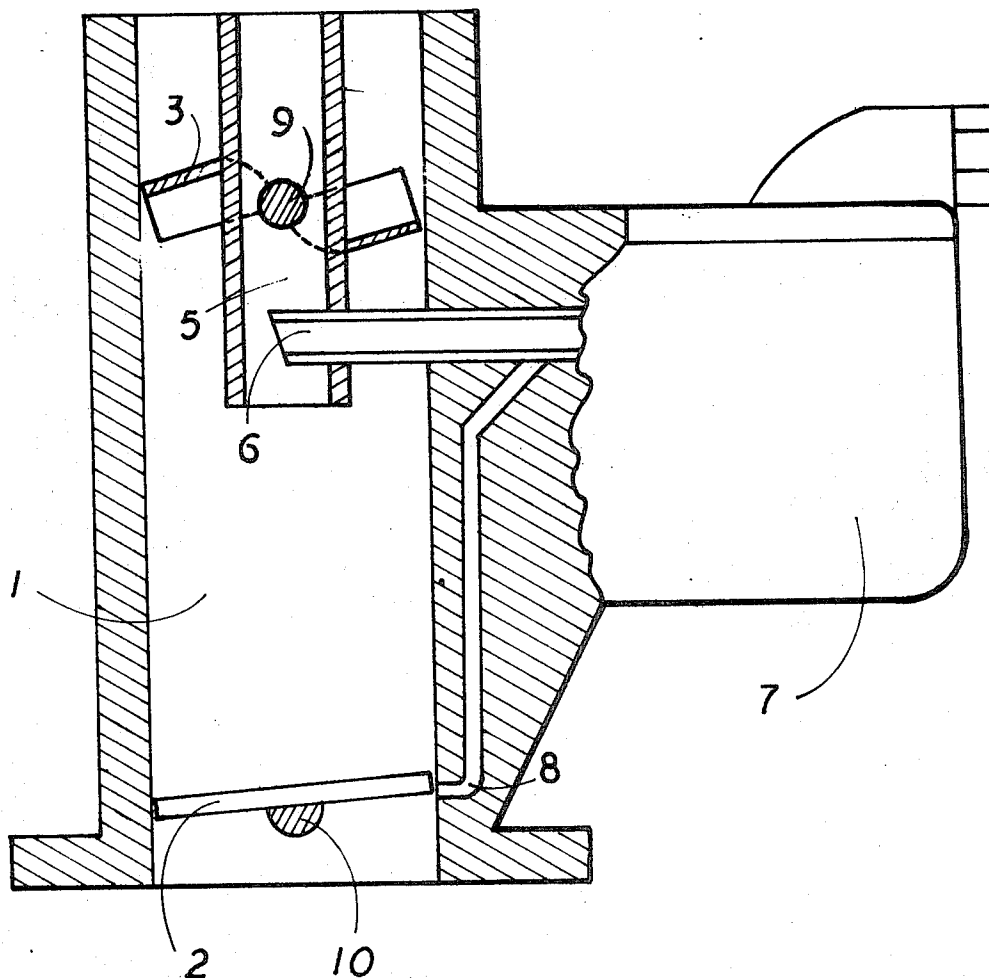
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[57] **ABSTRACT**

A variable venturi carburetor comprises respective vacuum sustaining and throttle plates, swingably disposed in respective input and output ends of said carburetor, said ends being connected by a through passageway mixture conduit. A nozzle tube conduit extends from said inlet end to discharge into said through passageway mixture conduit intermediate said vacuum sustaining and throttle plates. Fuel orifices are defined respectively in said nozzle tube conduit between a vacuum sustaining plate and said nozzle tube conduit discharge, and in said through passageway mixture conduit adjacent said throttle plate.

1 Claim, 4 Drawing Figures



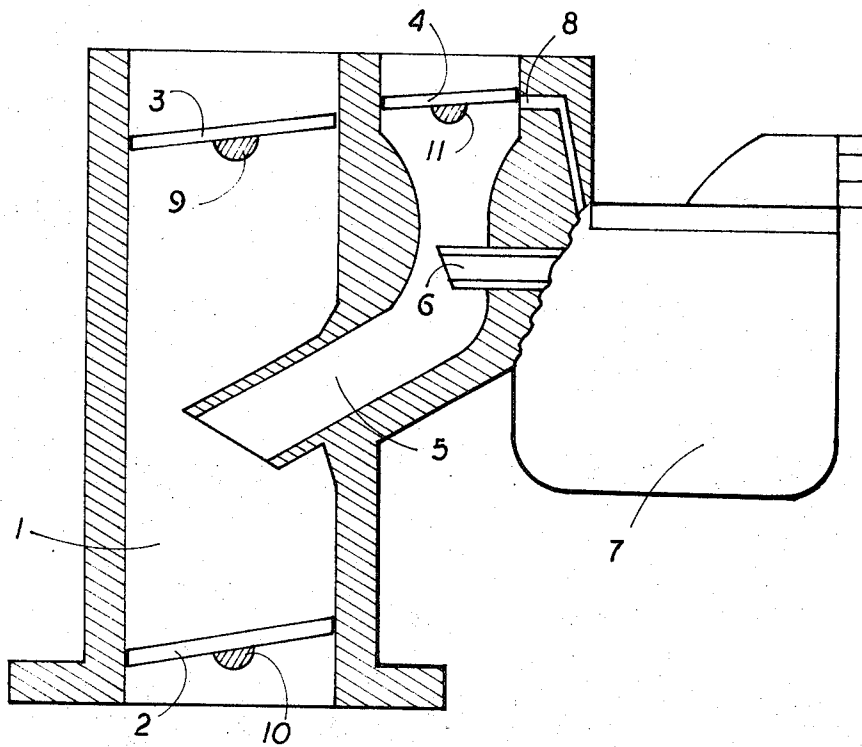


FIG. 1

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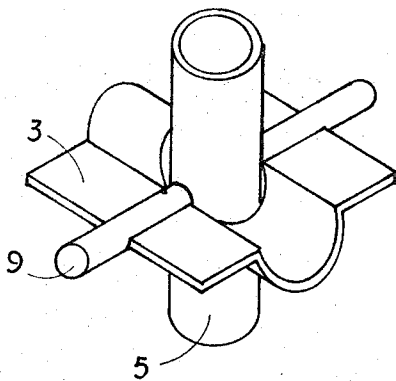


FIG 3

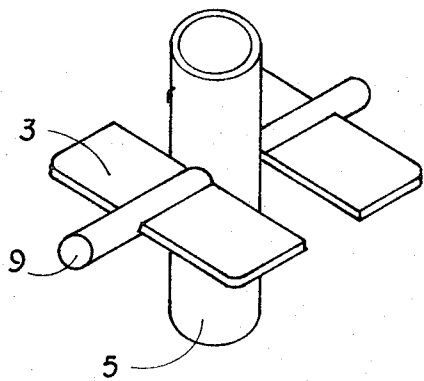


FIG 4

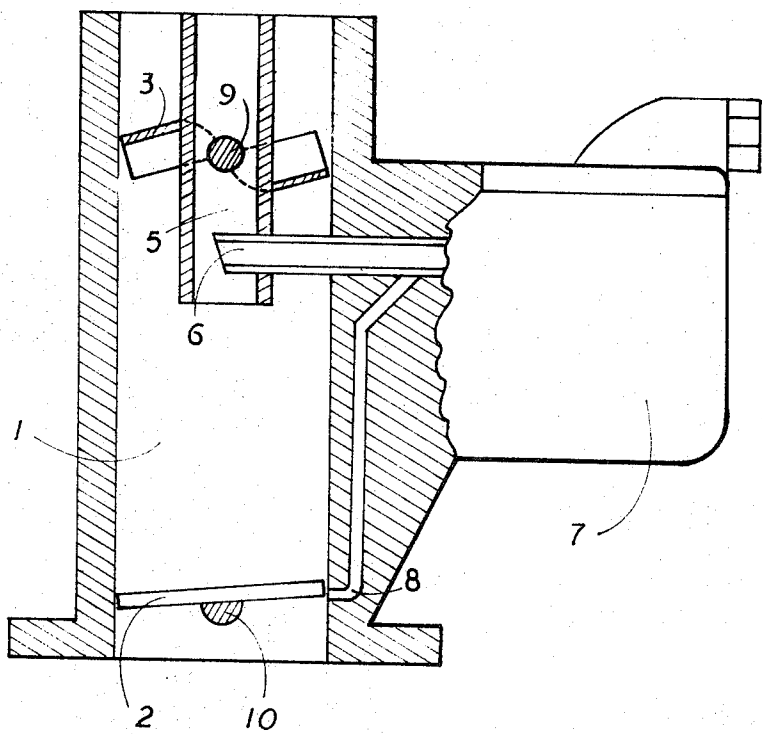


FIG 2

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VARIABLE VENTURI CARBURETORS

This invention generally relates to an improved variable venturi carburetor and more particularly to improvements of a previously filed U.S. Pat. application (ser. No. 872,044) by me on Oct. 29, 1969.

An object of the invention is to provide a carburetor for internal combustion engines that is simple in construction, well adapted for its intended purposes and relatively inexpensive to manufacture.

Another object of this carburetor invention is to provide a carburetor with the novel means wherein a more precisely controlled fuel-air mixture may be obtained to help meet strict emission standards.

Still another object of this carburetor is to provide a carburetor with the means to deliver those precise fuel-air mixture over a wide operational speed range.

These together with other objects and advantages which will become subsequently apparent, reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof wherein:

FIG. 1 shows a crosssection of this device in one of its simplest forms;

FIG. 2 shows a similar partial crosssection wherein a different shape of vacuum sustaining plate is used in connection with a nozzle tube conduit disposed in a different manner;

FIG. 3 shows a more complete view of vacuum plate and nozzle tube conduit relationship as shown in FIG. 2;

FIG. 4 shows a different arrangement of a nozzle conduit tube and vacuum sustaining plate;

In carrying out the invention and referring more specifically to FIG. 1 there is provided a through passage-way mixture conduit (1) with oppositely disposed input and output ends, said conduit having at least one swingably disposed vacuum sustaining plate (3) on axis (9) to open and partially close the intake end of conduit (1), at least one nozzle tube conduit (5) opening into said mixture conduit (1) at a point on the downstream side of vacuum plate (3) when said plate is at its most closed position within the mixture conduit (1), said nozzle tube conduit generally serves the purpose of a mixture conduit at lower operating speeds, and operates primarily as a fuel nozzle for the conduit (1) at higher operating speeds and larger air flow rates; said nozzle tube conduit (5) may have one or more vacuum plates (4) swingably disposed on axis (11) within its inlet end or other suitable place to regulate airflow through said nozzle conduit; also at least one throttle plate (2) is swingably disposed on axis (11) within the outlet end of conduit (1) to open and close said conduit and thereby meter the amount of mixture that exits from said conduit (1).

In operation the throttle plate (2) may be used to control idle mixtures in the same way that is common practice in conventional carburetors. Also idle fuel orifices (8) might be disposed in the nozzle tube (5) and be controlled by the correlative action of throttle plate (2) and vacuum plates (3) and (4). Naturally some form of fuel regulating device and cutoff valve would shut off and control fuel flow from the reservoir (7) to the main fuel orifice (6) during the idle, as well as at all the different phases of operation of this carburetor.

As throttle plate (2) is opened further from the idle position to allow more mixture flow to exit; plate (4)

should open and allow more airflow through nozzle conduit (5). This increased airflow through said nozzle tube conduit (5) will tend to cause a vacuum effect that will draw fuel from controlled orifice (6) to be mixed with said airflow. Of course some form of linkage on the outside of the carburetor should be provided to interconnect the throttle plate (2) and vacuum sustaining plates (3) and (4). As the throttle plate (2) is opened towards its most open position; vacuum plate (3) opens an appropriate corresponding amount to allow more air to be mixed with the controlled fuel air mixture exiting from nozzle tube conduit (5). At this point tube (5) might be considered to be more of a fuel orifice that discharges fuel air mixtures to be mixed with air passing through conduit (1).

The important fact about nozzle tube conduit (5) is that at idle and low speeds it serves as a mixture conduit when said plate (3) is closed and at higher air-flow rates when plates (3) and (4) (if said plate (4) is used to control idle mixture) are opened to some degree, said tube (5) serves primarily as a fuel nozzle that feeds fuel into the airstream passing through the conduit (1).

Another fact to be remembered about this or a similar arrangement of plates and nozzle tube conduits is that the means are provided to sustain high airflow speeds, no matter what amount of airflow passes through conduit (1). This tends to atomize fuel more completely and in conjunction with appropriate fuel metering devices which might be disposed in reservoir (7) to control the amount of fuel that exits from orifices (6) and (8), the means are present for a more precise mixture control over all operating speeds.

Also it should be noted again that throttle plate (2) could be used as in FIG. 2 to control idle orifices that could be disposed about its edges as in a conventional carburetor.

This would leave plate (4) to serve as a choke valve for nozzle tube conduit (5) or it could be used to regulate an auxiliary fuel orifice disposed in said tube or not used at all, depending on the total design.

It is apparent that the flexibility this design allows by the disposition of the nozzle tube (5) outlet opening with respect to the placement of throttle plate (2) and vacuum plates (3) and (4).

FIG. 2 shows another arrangement and shape of the nozzle tube conduit (5) and the vacuum sustaining plate (3). In this partial crosssection the nozzle tube conduit (5) is mounted more or less in the center of the inlet end of conduit (1).

The original idea and concept is still retained because the outlet end of said tube (5) still terminates on the downstream side of the plate (3) when said plate is at its most closed position within the conduit (1).

In this arrangement a pivoting pin (9) goes through nozzle tube (5) to facilitate an axis for said plate to open and close upon, wherein no nozzle pierced the plate (3) in FIG. 1. Again it is apparent that any number of combinations of nozzle tube conduits (5) and vacuum sustaining plates (3) may be envisioned. It is apparent that when plate (3) in FIG. 2 is at its most closed position as shown that most air flow will be diverted through nozzle tube conduit (5). The idle orifices (8) are placed about throttle plate (2) in this figure much as they would be in a conventional carburetor. No choke plate (4) is shown in FIG. 2 although it is possible that one can be used if the total design so dictated.

FIG. 3 serves to further clarify the arrangement of vacuum plate (3) in relation to nozzle tube conduit (5) and its pivot pin (9).

FIG. 4 shows another arrangement of plate (3) tube (5) and pivot pin (9) that might be envisioned.

The interfunction of plates (2); (3) and (4) (when used) is a basic and important consideration and in conjunction with a suitable regulating, connecting linkage will provide the means for sustaining an adequate amount of vacuum about the outlet end of nozzle tube (5) to meter and atomize fuel from orifice (6) or other similarly placed orifices in a more precise manner.

Referring again to FIG. 1 it is envisioned that when throttle plate (2) is opened enough to pass a given amount of fuel air mixture to supply an engines normal medium speed requirements and when; by design the nozzle tube conduit (5) is not being of sufficient size to efficiently pass this demanded amount of mixture; the vacuum plate (3) will be opened enough by an outside regulating mechanism to admit the extra amount of air that the engine will need at said medium speed. Also a signal will be sent by an outside interconnection mechanism to a regulating mechanism in reservoir (7) to allow extra fuel to be discharged from fuel orifice (6) down through tube (5) to be added to the increased amount of airflow passing through conduit (1).

The foregoing illustrates the inter-relating action of various parts and mechanisms of this carburetor at a given speed. There is an infinite number of variations of plate openings just as there are an infinite number of given engine speeds.

The foregoing is also considered illustrative only of the principles of the invention. Further since numerous modifications and changes readily occur to those skilled in the art, it is not desired to limit the exact construction and operation shown and described, and ac-

cordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed:

- 5 1. A variable venturi carburetor having oppositely disposed inlet and outlet ends and a fuel reservoir, and comprising: a through passageway mixture conduit means defined in said carburetor between said carburetor's inlet and outlet ends for providing a place to vaporize fuel and mix it with air; a nozzle tube conduit defined in said carburetor and adapted to discharge into said through passageway mixture conduit means intermediate said carburetor's inlet and outlet ends; a vacuum sustaining plate swingably mounted to open and partially close said inlet end for controlling admission of air and for generating venturi effects in said through passageway mixture conduit means that are variable with the swingable positions of said vacuum sustaining plate, said vacuum sustaining plate having a pair of flat plates transversely spaced apart by reversely channeled plates, all said plates in combination defining a center hole adapted to receive said nozzle tube conduit, and the reversely channeled plates being adapted to nest with said nozzle tube conduit when swung for their respective channels to be concentric therewith; throttle plate means swingably mounted to open and partially close said outlet end of said carburetor for controlling amount of output therefrom; and fuel orifice means defined in said nozzle tube conduit and in said through passageway mixture conduit means connected to said fuel reservoir and discharging between said vacuum sustaining plate means and said outlet end for providing fuel in amounts dependent on flow of air in said conduits as per said generated venturi effects.

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