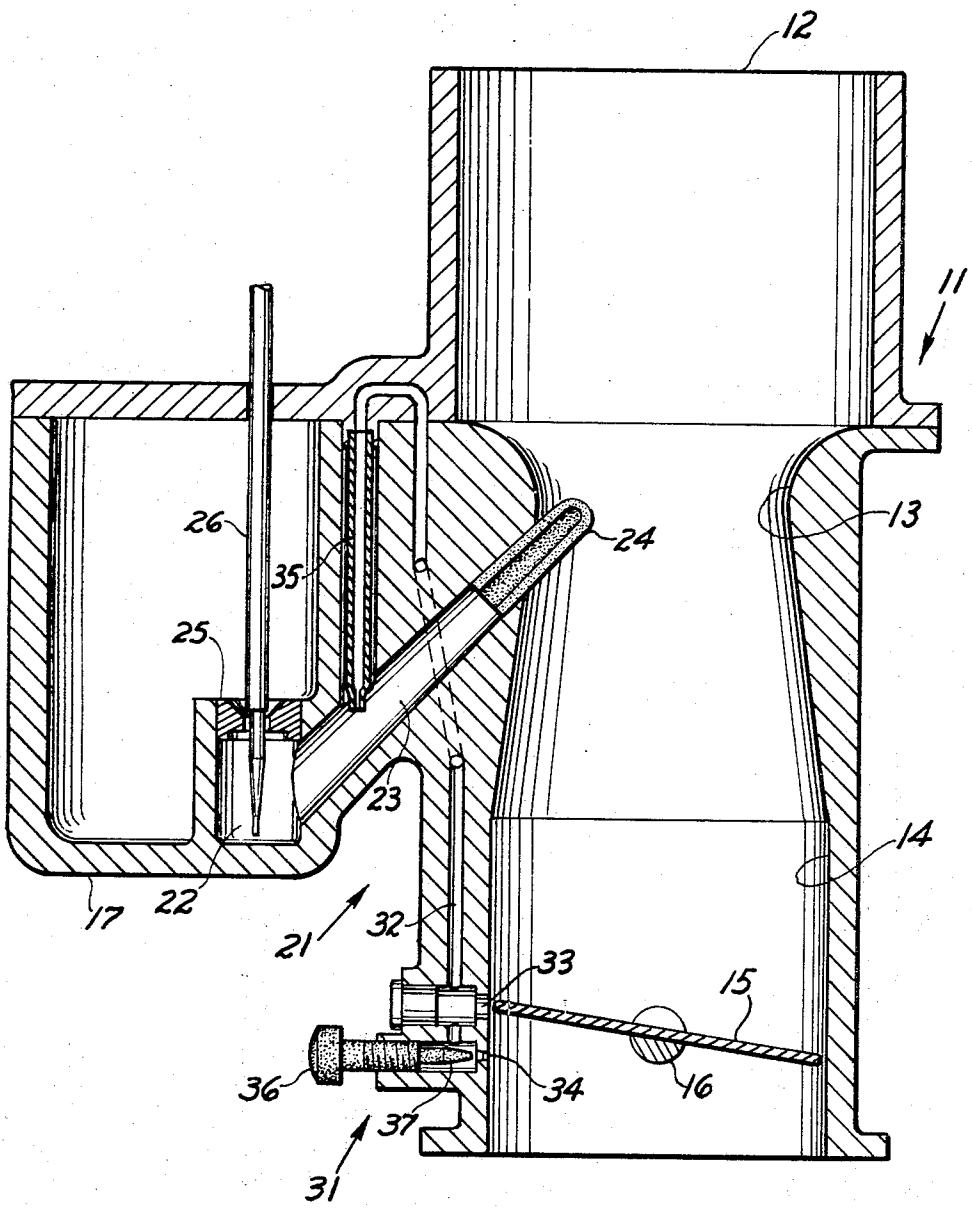
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CARBURETOR CONSTRUCTION

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CARBURETOR CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

A carburetor apparatus for improving the efficiency and performance of internal combustion engines. The carburetor comprises a fuel regulating idle screw formed of a relatively porous material which both disperses and aerates fuel delivered to the engine.

This invention relates generally to carburetors for use with internal combustion engines and more particularly to a novel fuel supply system for such carburetors.

A large variety of carburetor developments have resulted from attempts to improve the efficiency and performance of internal combustion engines. These developments have included, for example, multi-stage fuel systems, automatic chokes, fuel flow metering devices, economizing and enriching devices, etc. The common object for many of the prior improvements was to obtain a more thoroughly mixed fuel and air charge which would result in a more complete combustion of the fuel upon ignition. Such a result would reduce or eliminate many of the inherent problems associated with internal combustion engines such as carbon deposition, relatively low efficiency, poor cold weather operation, rough engine operation at low speeds and during acceleration, etc. However, the prior carburetor improvements have failed to fully satisfy the desired objective or to fully eliminate the problems.

The object of this invention, therefore, is to provide for use with internal combustion engines an improved carburetor which improves both the efficiency and performance characteristics of internal combustion engines.

One feature of this invention is the provision for internal combustion engines of an improved carburetor having a primary fuel supply system which discharges fuel from a fuel reservoir into a mixing conduit anterior to a throttle valve and an idle fuel system which discharges fuel from the fuel reservoir through an idle port into the mixing conduit posterior of the throttle valve and wherein the idle fuel system includes an adjustment element composed of a relatively porous material and adapted to regulate the rate of fuel flow through the idle port. The relatively porous adjustment element disperses and aerates the fuel which in turn improves engine efficiency and performance.

Another feature of this invention is the provision for internal combustion engines of an improved carburetor having a primary fuel system adapted to discharge fuel from a fuel reservoir into a mixing conduit anterior to a throttling valve and including a fixed fuel nozzle composed of a relatively porous material and projecting into the mixing conduit adjacent a venturi. As above, the porous nozzle effects a greatly improved dispersion and aeration of the injected fuel to thereby improve engine efficiency and performance.

Another feature of this invention is the provision for internal combustion engines of a carburetor of the above featured type wherein an adjustable idle screw forms at least a part of the adjustment element.

Another feature of this invention is the provision of an internal combustion carburetor of the above featured types wherein the relatively porous material used for the fuel nozzle and idle adjustment is sintered metal.

Another feature of this invention is the provision for internal combustion engines of a carburetor of the above featured types wherein the relatively porous material utilized for the fuel nozzle and adjustment element possesses an open porosity of between 30 and 60 percent.

Another feature of this invention is the provision for internal combustion engines of a carburetor of the above featured types wherein the relatively porous material used for the fuel nozzle and the adjustment element has an average pore size of between 2 and 50 microns.

These and other objects and features of the present invention will become more apparent upon a perusal of the following specification taken in conjunction with the accompanying drawing which is a schematic cross-section showing a preferred embodiment of the invention.

Referring now to the drawing there is shown the mixing conduit **11** including the air horn **12**, the venturi section **13** and the throttle bore **14**. Positioned within the mixing conduit **11** is the throttle valve **15** which is mounted for rotation with the throttle shaft **16**. The fuel bowl **17** functions as a fuel reservoir for the device.

The primary fuel supply system **21** including the fuel well **22**, the high speed fuel passage **23** and the fuel nozzle **24** provides a fuel discharge path between the fuel bowl **17** and the mixing conduit **11**. The fuel nozzle **24** projects into the mixing conduit **11** adjacent the venturi portion **13**. Regulating the flow rate of fuel from the fuel bowl **17** is the metering orifice member **25** and fuel metering rod **26**. The metering rod **26** is actuated by a conventional mechanism (not shown) so as to provide a controlled fuel flow rate.

The idle fuel supply system **31** includes the idle fuel passage **32** which provides a fuel flow path between the idle ports **33** and **34** and the idle tube **35** which opens into the high speed fuel passage **23**. The upper idle port **33** opens into the mixing conduit **11** anterior to the throttle valve **15** when in a closed position and the lower idle port **34** opens into the mixing conduit posterior to the throttle valve **17** when in the closed position. Supported by threads in the wall of the mixing conduit **11** is the idle screw **36** with valve stem **37** which extends an adjustable distance into the lower idle port **34** so as to regulate fuel flow therethrough.

According to the invention the fuel nozzle **24** and the idle screw **36** are composed of a relatively porous material. During movement along the surfaces of the porous material and through the pores therein, fuel is broken up into an extremely fine dispersion and thoroughly aerated before injection into the mixing conduit **11**. Also, because of the increased area of exposed fuel surface a substantial increase in the rate of fuel evaporation occurs. The fuel evaporation which occurs on the surfaces of the porous material and within the mixing conduit **11** provides a beneficial cooling of the entire carburetor body. As a result of the improved fuel dispersion and carburetor cooling a much more complete fuel combustion is obtained. Accordingly, there is obtained a reduction in fuel consumption, smoother engine performance, increased power, reduction of carbon depositions, improved cold weather engine performance, etc.

While sintered metals such as steel, nickel, and particularly bronze are preferable for use as the relatively porous material in the fuel nozzle **24** and idle screw **36**, other porous materials are suitable. These can include, for example, composite materials formed by porous granules of alumina, silicon carbide, mulite, etc., bonded together with a suitable ceramic. It is important, however, that the material possess a relatively high open porosity so as to be permeable to both air and fuel. For example, it has been found extremely desirable for reasons of permeability and strength that the material possess an open

porosity of between 30 and 60 percent as established by the following formula:

$$P=\frac{W_2-W_1\times D_1}{W_1\times D_2}\times 100$$

where P represents the percentage of open porosity, W_1 represents the weight of a material sample in air, W_2 represents the weight of the same material sample after immersion in a given liquid, D_1 represents the apparent density of the sample material and D_2 represents the density of the given liquid. It has also been found desirable that the material have pores with an average size of between 2 and 50 microns.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. For example, the fuel nozzle **24** or the idle screw **36** can be composite units composed of both porous and solid materials. In that case, the portion of the element which is most effective in dispersing the fuel would preferably be composed of a porous substance. Thus, the valve stem **37** could be porous and the threaded base of the idle screw **36** could be solid. Similarly, the end of the nozzle **24** which projects into the mixing conduit **11** could be porous and the nozzle base supported within the fuel passage **23** could be solid. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A carburetor for use in an internal combustion engine and comprising a mixing conduit, a fuel reservoir, a rotatable throtle shaft extending into said mixing conduit, a throttle valve mounted on for rotation with said throttle shaft, venturi means in said mixing conduit anterior to said throttle valve, a primary fuel supply system adapted to discharge fuel from said fuel reservoir to said mixing conduit adjacent said venturi means in response to engine demands, a metering means adapted to regulate the amount of fuel passing from said fuel reservoir to said main supply system, an idle fuel system adapted to discharge fuel from said fuel reservoir through an idle port which opens into said mixing conduit posterior to said throttle valve when in a substantially closed position, and said idle fuel system including an adjustment means extending into said idle port so as to regulate the rate of fuel flow therethrough, and wherein said adjustment means is composed of a relatively porous material.

2. A carburetor according to claim **1** wherein said relatively porous material is sintered metal.

3. A carburetor according to claim **1** wherein said relatively porous material has an open porosity of between thirty and sixty percent.

4. A carburetor according to claim **3** wherein said relatively porous material is sintered metal.

5. A carburetor according to claim **1** wherein the pores in said relatively porous material have an average size of between two and fifty microns.

6. A carburetor according to claim **1** including an adjustable idle screw which comprises said adjustment means.

7. A carburetor according to claim **6** wherein said relatively porous material is sintered metal.

8. A carburetor according to claim **7** wherein said relatively porous material has an open porosity of between thirty and sixty percent.

9. A carburetor according to claim **1** wherein said primary fuel supply system includes a fixed fuel nozzle at least partly composed of a relatively porous material and projecting into said mixing conduit adjacent said venturi means.

10. A carburetor according to claim **9** wherein both said relatively porous materials comprise sintered metal.

11. A carburetor according to claim **9** wherein both said relatively porous materials have an open porosity of between thirty and sixty percent.

12. A carburetor according to claim **11** wherein both said relatively porous materials comprise sintered metal.

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