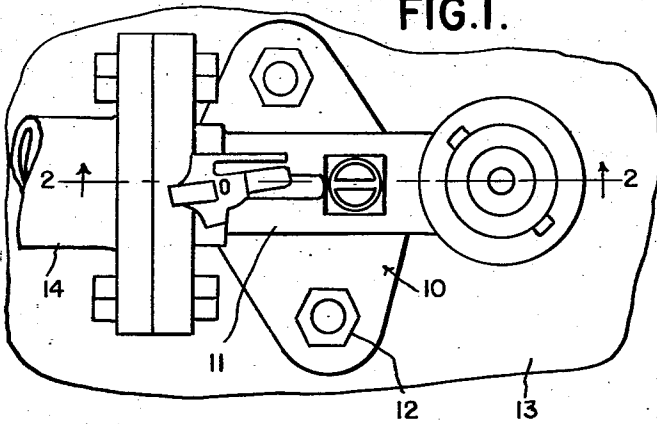
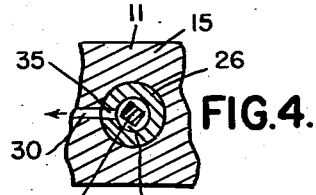
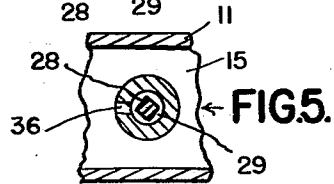
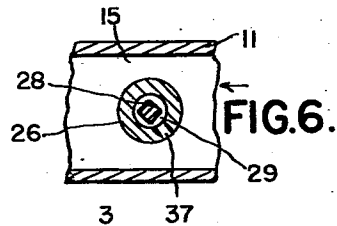
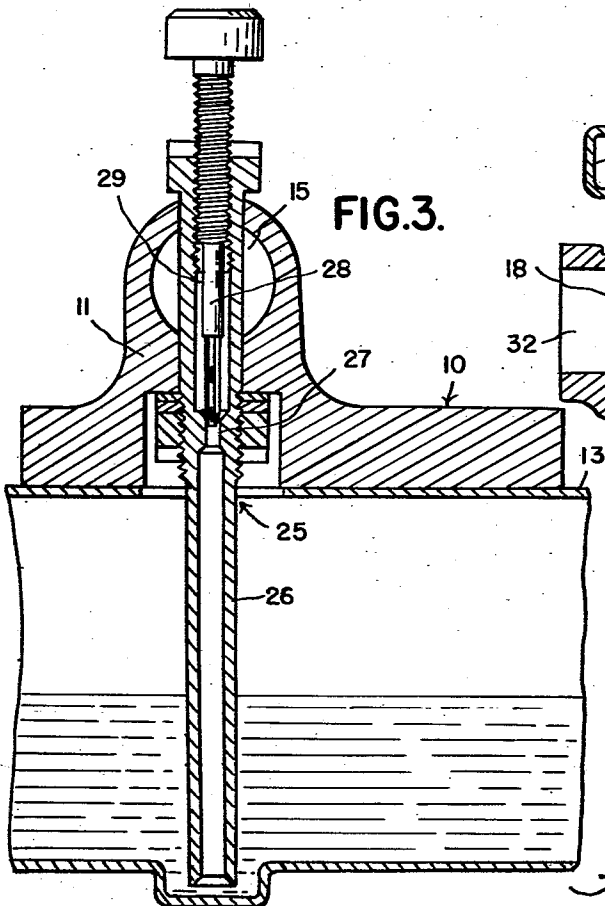
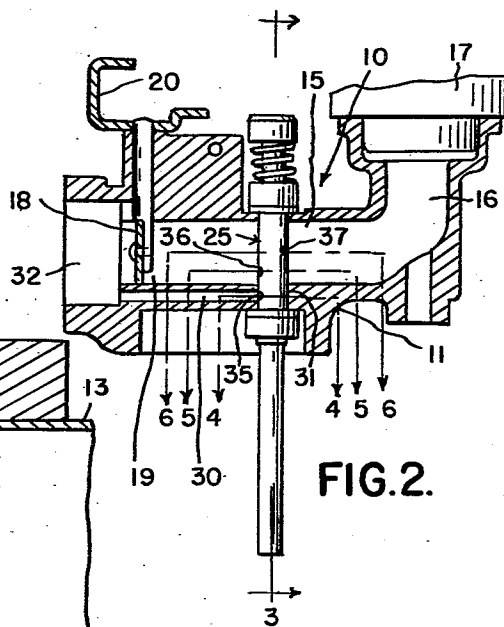


G. P. TESCHENDORF ET AL

FUEL MIXING VALVE FOR INTERNAL COMBUSTION ENGINE

FIG.1.



INVENTORS
Gerald P. Teschendorf
Daniel L. Donovan
BY Henry O. Pehrle

Thurke & Hardesty.

ATTORNEYS

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FUEL MIXING VALVE FOR INTERNAL COMBUSTION ENGINE

Gerald P. Teschendorf, St. Clair Shores, Daniel L. Donovan, Hazel Park, and Henry O. Pohrt, Ferndale, Mich., assignors to Continental Motors Corporation, Detroit and Muskegon, Mich., a corporation of Virginia

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5 Claims. (Cl. 261—41)

This invention relates to a fuel mixing valve for an internal combustion engine and has for its object the provision of a mixing valve operable to provide for improved engine performance, and more particularly to provide for quick throttle response to insure positive operation of the engine when the throttle is advanced after idling.

In the small engine field, particularly with engines employed for powering lawnmowers and other types of manually controlled cultivating equipment, such machines are often operated at idling speeds and then quickly advanced. It is quite desirable in the operation of such machines or equipment to have a power plant immediately responsive to a sudden throttle advance, and such power plants are only operable under such conditions with proper and efficient carburetion.

The fuel mixing valves as presently employed are mostly deficient in this respect with the result that many of the better type power plants employ a float carburetor, which is relatively more complex and expensive than a fuel mixing valve. The present invention provides a fuel mixing valve capable of giving satisfactory performance equal in most respects to the better constructed carbureted engines.

For a more detailed understanding of this invention, reference may be made to the accompanying drawing, illustrating a preferred embodiment of the invention, in which like characters refer to like parts through the several views, and in which Fig. 1 is a plan view of the improved fuel mixing valve embodying the principles of the invention,

Fig. 2 is a longitudinal sectional view of the fuel mixing valve taken substantially on the line 2—2 of Fig. 1,

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 2, and

Figs. 4, 5 and 6 are detail sectional views taken on the lines 4—4, 5—5 and 6—6 of Fig. 2.

The fuel mixing valve 10 as herein illustrated comprises a body 11 fastened by bolts 12 or other suitable means directly on a fuel tank 13, and arranged to deliver a fuel and air mixture to the intake manifold or duct 14 of an internal combustion engine (not shown).

The body 11 is provided with an air passage 15 having an air intake 16 through which air is drawn into the fuel mixing valve from a suitable air cleaner 17. A butterfly valve 18 is associated with the outlet 19 preferably immediately upstream of the outlet where same is joined to the engine intake manifold duct 14. This butterfly valve is suitably actuated through a lever 20, which is in turn normally adjustable by the operator in the customary manner to control engine operation.

Medially of the air inlet 16 and outlet 19, there is provided a fuel intake device 25, which comprises an elongated tube or pipe 26 extending normal to the passage 15, and bridging said passage as best illustrated in Figs. 2 and 3. Said tube 26 extends below the fuel mixing valve assembly and projects into the fuel tank 13 (see Fig. 3). Midway of the tube, the internal bore is reduced in diam-

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eter and provides a seat 27 in which a manually adjustable needle valve 28 is seated to regulate or meter the fuel which may be drawn by said valve into the internal fuel passage portion 29 in said tube 26, where same traverses the air passage 15.

The body 10 is provided with an auxiliary drilled passage 30 lying preferably immediately below the passage 15 and open to the bore 31 through which tube 26 extends and opens to the enlarged bore 32 downstream of the butterfly valve 18 (see Fig. 2). The internal bore 29 of the tube 26, above the needle valve seat 27 is open to this passage 30 by a small hole or port 35. Opening into passage 15 is a hole or port 36 facing downstream of said valve assembly. Preferably just above the hole or port 36 is another hole 37 facing partially upstream of the valve assembly, whereby to admit a relatively small amount of air into the internal bore 29 of tube 26 where same is mixed with the fuel and conducted as a relatively fuel and air mixture through passage 30 directly into bore 32 beyond or downstream of said butterfly valve 18, serving to provide an adequate fuel and air mix to the engine for idling operation, when the butterfly valve or throttle valve 18 is closed.

On opening of the valve 18 fuel is drawn through port 36 for direct mixture with the air in passage 15 and at this time any air flow from port 37 to port 35 is substantially reversed and any air admitted through port 37 is mixed with the fuel in bore 29 and exhausted through port 36, since the suction effect at port 36 is greater than the suction effect at port 35.

Although but one form of the invention is illustrated and described in the foregoing specification, it is apparent to those skilled in the art to which this invention pertains that various changes and modifications may be made without departing from the spirit of said invention or from the scope of the appended claims.

We claim:

1. In an internal combustion engine having a fuel tank, an air intake system, and an intake manifold, a fuel and air mixing valve assembly comprising a valve body having a main passage therethrough openly connecting said air intake system with said intake manifold, a throttle valve in said passage at the end nearest said intake manifold, and a single hollow fuel induction tube in said passage and upstream of said throttle valve, said hollow tube comprising a mixing chamber and adapted to open at one end into a fuel supply contained in said fuel tank, the interior of said tube comprising a single auxiliary fuel induction pump, a port in said tube opening into said valve body passage and facing substantially upstream thereof, a second port in said tube opening into said valve body passage and facing substantially downstream thereof, and a third port in said tube intermediate said tube open end and said first two ports, a fuel passage in said valve body open at one end into said intake manifold and openly connected at the other end to the third port aforesaid, said second port being located in intermediate said first and third ports, and a manually adjusted needle valve in said fuel induction tube intermediate said third port and said tube open end, all of said ports at all times openly communicating with said mixing chamber whereby said second and third ports discharge a fuel and air mixture into said manifold.

2. In an internal combustion engine having a fuel tank, an air intake system, and an intake manifold, a fuel and air mixing valve assembly comprising a valve body having a main passage therethrough openly connecting said air intake system with said intake manifold, a throttle valve in said passage at the end nearest said intake manifold, and a single hollow fuel induction tube in said passage

and upstream of said throttle valve, said tube comprising a mixing chamber and adapted to open at one end into a fuel supply contained in said fuel tank, the interior of said tube comprising a single auxiliary fuel induction pump, a port in said tube opening into said valve body passage and facing substantially upstream thereof, a second port in said tube opening into said valve body passage and facing substantially downstream thereof, and a third port in said tube intermediate said tube open end and said first two ports, a fuel passage in said valve body open at one end into said intake manifold and openly connected at the other end to the third port aforesaid, said second port being located intermediate said first and third ports, and a manually adjusted needle valve in said fuel induction tube intermediate said third port and said tube open end, said fuel induction tube positioned substantially normal to the longitudinal axis of said valve main passage and substantially vertical therein, all of said ports at all times openly communicating with said mixing chamber whereby said second and third ports discharge a fuel and air mixture into said manifold.

3. In an internal combustion engine having a fuel tank, an air intake system, and an intake manifold, a fuel and air mixing valve assembly comprising a valve body having a main passage therethrough openly connecting said air intake system with said intake manifold, a throttle valve in said passage at the end nearest said intake manifold, and a single hollow fuel induction tube in said passage and upstream of said throttle valve, said hollow tube comprising a mixing chamber and adapted to open at one end into a fuel supply contained in said fuel tank, the interior of said tube comprising a single auxiliary fuel induction pump, a port in said tube opening into said valve body passage and facing substantially upstream thereof, a second port in said tube opening into said passage and facing substantially downstream thereof, and a third port in said tube intermediate said tube open end and said first two ports, a fuel passage in said valve body open at one end into said intake manifold and openly connected at the other end to the third port aforesaid, said second port being located intermediate said first and third ports, and a manually adjusted needle valve in said fuel induction tube intermediate said third port and said tube open end, said fuel induction tube positioned substantially normal to the longitudinal axis of said valve main passage and substantially vertical therein, said first upstream-facing port relatively offset from the longitudinal axis of said main passage and in a substantially horizontal plane containing said main passage longitudinal axis, all of said ports at all times openly communicating with said mixing chamber whereby said second and third ports discharge a fuel and air mixture into said manifold.

4. In an internal combustion engine having a fuel tank, an air intake system, and an intake manifold, a fuel and air mixing valve assembly comprising a valve body having a main passage therethrough openly connecting said air intake system with said intake manifold, a throttle valve in said passage at the end nearest said intake manifold, and a single hollow fuel induction tube in said passage and upstream of said throttle valve, said hollow tube comprising a mixing chamber and adapted to open at one end

into a fuel supply contained in said fuel tank, the interior of said tube comprising a single auxiliary fuel induction pump, a port in said tube opening into said valve body passage and facing substantially upstream thereof, a second port in said tube opening into said passage and facing substantially downstream thereof, and a third port in said tube intermediate said tube open end and said first two ports, a fuel passage in said valve body open at one end into said intake manifold and openly connected at the other end to the third port aforesaid, and a manually adjusted needle valve in said fuel induction tube intermediate said third port and said tube open end, said fuel induction tube positioned substantially normal to the longitudinal axis of said valve main passage and substantially vertical therein, said first upstream-facing port relatively offset from the longitudinal axis of said main passage and in a substantially horizontal plane containing said main passage longitudinal axis, said second downstream-facing port contained in a horizontal plane below and parallel to the horizontal plane containing the main passage longitudinal axis aforesaid, all of said ports at all times openly communicating with said mixing chamber whereby said second and third ports discharge a fuel and air mixture into said manifold.

5. In an internal combustion engine having a fuel tank, an air intake system, and an intake manifold, a fuel and air mixing valve assembly comprising a valve body having a main passage therethrough openly connecting said air intake system with said intake manifold, a throttle valve in said passage at the end nearest said intake manifold, and a single hollow fuel induction tube in said passage and upstream of said throttle valve, said hollow tube comprising a mixing chamber and adapted to open at one end into a fuel supply contained in said fuel tank, the interior of said tube comprising a single auxiliary fuel induction pump, a port in said tube opening into said valve body passage and facing substantially upstream thereof, a second port in said tube opening into said passage and facing substantially downstream thereof, and a third port in said tube intermediate said tube open end and said first two ports, a fuel passage in said valve body open at one end into said intake manifold and openly connected at the other end to the third port aforesaid, said second port being located intermediate said first and third ports, and a manually adjusted needle valve in said fuel induction tube intermediate said third port and said tube open end, said fuel passage substantially parallel to the longitudinal axis of said main passage, and said third port facing in a substantially downstream direction relative to said main passage, all of said ports at all times openly communicating with said mixing chamber whereby said second and third ports discharge a fuel and air mixture into said manifold.

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