April 16, 1957 J. S. FALZONE 2,789,041

FUEL MIXING MEANS

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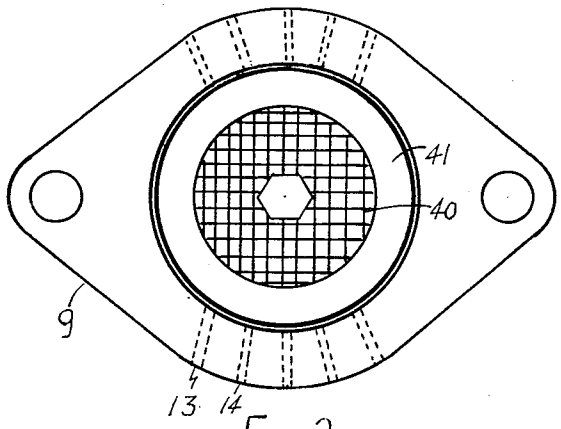


Fig 2

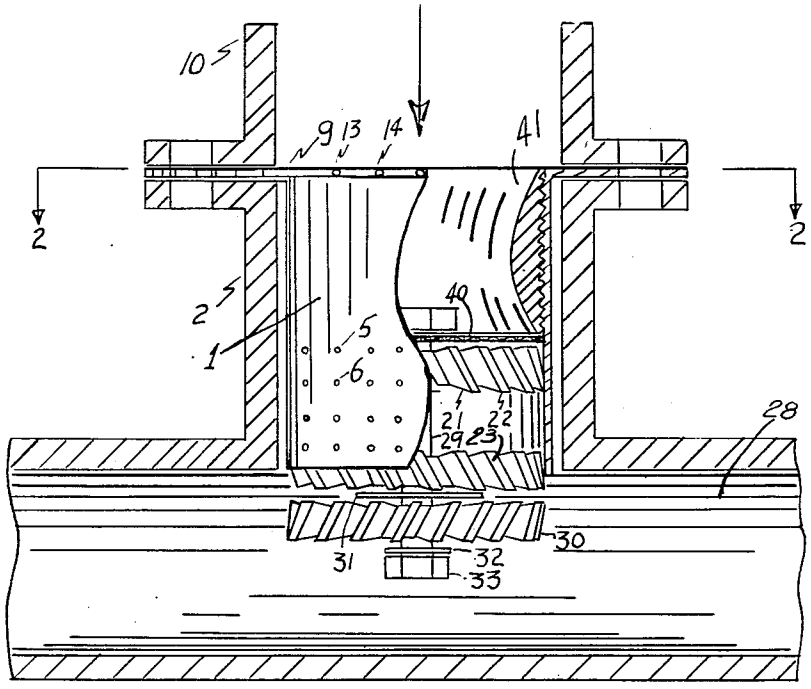


Fig 1

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FUEL MIXING MEANS

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4 Claims. (Cl. 48—180)

This invention relates to fuel mixing means, and, more particularly, to such means incorporating turbine members for agitating and mixing the fuel and air output from a carburetor.

This application is a continuation in part of my prior co-pending application Serial No. 426,663, filed April 30, 1954, for Fuel Mixing Means.

It is well known that the efficiency of internal combustion engines is quite low. One of the factors in this low efficiency is the lack of the maximum possible distribution of the fuel and air mixture so as to insure an optimum mixture for combustion. The output of a carburetor is a mixture of air and droplets of fuel and this mixture in conventional engines is fed to the intake manifold whence it is supplied to the various cylinders.

The present invention provides mixing means connected between the carburetor and the intake manifold to provide a better mixing and distribution of the air and fuel.

My prior application comprised a cylindrical member having a flange for mounting inside the fuel passage, a first stator member connected at the top of said cylindrical member, a pair of rotary turbine wheels connected inside the cylindrical member, a second stator member at the bottom of the cylindrical member and a rotor member connected to the bottom stator member.

The present invention is an improvement over my prior application in that the cylindrical member is spaced somewhat from the fuel passage and has a plurality of holes in its lower surface so that the mixture may pass through these holes through the side of the cylindrical member. Also, it eliminates the two rotor members inside the cylindrical member. The flange also has a plurality of holes to admit air.

Therefore, the present invention consists of a cylindrical member having a plurality of holes, a flange connected to one end of the cylindrical member for mounting purposes, said flange having a plurality of small holes perpendicular to the axis of said cylindrical member. The purpose of these holes is to admit air into the cylindrical member. A first stator member having a plurality of radial vanes is connected inside the cylindrical member and a second stator member is connected inside the cylindrical member near its bottom edge and extending out somewhat from the bottom edge. A rotor member having a plurality of radial vanes is rotatably connected below the second stator member. The direction of pitch of the first and second stator members is preferably the same and the direction of pitch of rotor member is opposite to that of the first and second stator member.

Accordingly, a principal object of the present invention provides new and improved means for increasing the efficiency of internal combustion engines.

Another object of the present invention is to provide new and improved means for increasing the efficiency of fuel combustion.

Another object of the present invention is to provide new and improved fuel mixing means.

Another object of the present invention is to provide new and improved fuel mixing means comprising a plurality of turbine wheels.

Another object of the present invention is to provide new and improved fuel mixing means comprising a plurality of turbine wheels cooperating with stationary means for changing the direction of flow.

Another object of the present invention is to provide new and improved fuel mixing means comprising a venturi.

These and other objects of the present invention will be apparent from the following specifications of which:

Figure 1 is an elevational view partly in section of an embodiment of the invention and Figure 2 is a sectional view of the embodiment of Figure 1 taken through the mounting flange.

Referring now to the figures, the present invention comprises a cylindrical member 1 which is adapted to be connected to the output conduit of pipe 2 of a carburetor by means of the flange 9. The direction of the flow of the mixture from the carburetor is shown by the arrow. The cylindrical member is preferably spaced slightly from the conduit 2 and the cylindrical member has a plurality of small holes, 5, 6, etc., which will permit some of the mixture to escape from the cylindrical member, thus increasing the turbulence and mixing properties.

The flange 9 is adapted to be inserted between the conduits 2 and 10 and be held by bolts. Suitable gaskets may be used. The flange 9 has a plurality of small holes 13, 14, etc., perpendicular to the axis of the cylindrical member. The purpose of the small holes is to admit air into the cylindrical member to thereby increase the turbulence and mixing and also to enrich the mixture. A first stator member having a plurality of radial vanes 21, 22 is connected inside the cylindrical member, for instance, by brazing it to the inside surface of the cylindrical member 1. A second stator member 23 is brazed to the cylindrical member at the bottom edge so that it extends out the bottom of the cylindrical member. The direction of pitch of the radial vanes of the two stator members is preferably in the same direction although this may be subject to variation.

A venturi member 41 is threaded to the inside surface of the barrel member 1 to increase the air velocity, and, therefore, the mixing action.

A shaft 29 is connected through the center of the first and second stator members and extends below into the input manifold passage 28.

A rotor turbine member 30 is mounted on the shaft 29 preferably with ball bearings and is spaced from the second stator member by means of a spacer 31. The rotor member is conventionally mounted on the shaft 29, the end of which is threaded by means of a washer 32 and nut 33, which is preferably secured by a cotter pin in a conventional manner.

The operation of the invention is as follows:

The mixture is received from the carburetor in the direction shown by the arrow. The mixture is mixed in the cylindrical member because of the stator vanes 21 and

23 and is further mixed by the action of the venturi, by the increase in velocity of the mixture without resistance and the rotor member 30 which is turned rapidly by the flow of the mixture induced by the vacuum pressure in the inward manifold 28. Some of the mixture will escape through the holes 5, 6, etc., in the sides of the cylindrical member and will flow down in space between the cylindrical member 1 and the fuel passage 2. This increases the turbulence and mixing effect of the stator and rotor members, and prevents heavier fractions of the fuel from collecting on cylinder wall and forming fuel film.

The function of the small holes 13 and 14 in the flange is to admit air into the cylindrical member to thereby increase the mixing and enrich the mixture, and blend the volatile liquid fuel with proper amount of air.

A screen 40 is preferably mounted inside the cylindrical member above the first stator member in order to strain out any foreign material in the mixture and also increase the mixing effect within the turbine chamber.

The rotor 30 which spins very rapidly due to the vacuum pressure tends to accelerate the mixture through the manifold in the turbine chamber and minimizes eddy current effects around the chamber corners, and, therefore, avoids any back pressure. It also tends to avoid any possibility of flashback through the mixing chamber.

As the fuel mixture flows through the turbine chamber, it is deflected by the first and second stator members which tend to back up the flow and create a certain amount of turbulence and mixing. They also impart a centrifugal direction to the flow of the mixture so that some of the mixture will escape through the holes in the side of the cylindrical member, and reduces the collection of heavier fractions of the fuel on cylinder wall. There is, therefore, a great amount of turbulence and agitation causing the collision of the suspended fuel particles so that the fuel particles are broken up in very fine portions, and for all practical purposes, may be said to be atomized. The collisions and agitation will cause an increase of temperature, and, therefore, provide greater thermal efficiency. This agitation and turbulence will greatly enhance the distribution and disbursement of the fuel, and, will, therefore, provide a mixture which will be more combustible than that provided by the carburetor alone.

The venturi 41 is inserted to insure better colliding action of fuel and air by increasing the velocity of the mixture, without resistance, and employment of the jet holes in cylinder housing secures air-fuel ratio, constant over the full range of throttle openings. This also prevents heavier fractions of the fuel from collecting on the cylinder wall and forming a fuel film. This collection affects the air-fuel ration of the mixture reaching the cylinders of the engine.

The components of the invention are preferably made of non-corrosive material, such as stainless steel, aluminum, or brass.

The mixing device of the present invention may be referred to as a collision nozzle since it is the collision of the particles of fuel which break down into very fine particles.

An operating object of this nozzle is to converge the fuel and air particles, for continuous positive colliding action, to prevent disassociation of the air fuel particles which become ionized form negative particles which decreases positive action, creates a low potential, and slow movement of the particles, which decreases their collision for rapid expansion and velocity.

The following advantages will be apparent:

1. The air fuel mixture collides continuously to insure the maximum thermal value of the fuel, with increase of efficiency.

2. The fuel is completely burned, and will show greater economy on a gallon basis.

3. Decreases the amount of positive products remaining in the combustion chamber, after combustion due to partial disassociation of the combustion products.

4. Aids valves from becoming warped and pitted, due to water vapor that is not condensed, due to negative particles of low thermal values.

The gases emerge thru the final directional stationary stator, a rotor which directs the gases thru the manifold and then to the combustion chambers, with positive colliding action and expanding particles, with high thermal values, making available a greater amount of energy and efficiency for greater economy on a gallon basis of fuel utilized.

This device may be installed on automotive carburetors, a single flange mixer being inserted into the bore of the barrel of the carburetor. A two port unit flange will be used for two barrel carburetors and a four port unit flange for four barrel carburetors.

In household heating plants that use fuel oil for heating, a nozzle mixer may be attached to barrel of oil gun, in front of spray nozzle. The present mixer nozzle will prevent large particles from entering combustion chamber. The disadvantages of large particles is that only the surface of the particles are burned, and the center converted into sludge substance which is deposited on the combustion chamber walls, with a decrease in B. t. u., and an increase in fuel consumption.

The physical dimensions of this device will vary with the size, make or type of carburetor or barrel of oil burner to which it is to be affixed.

I claim:

1. Fuel mixing means comprising a fuel conduit adapted to be connected to the output of a carburetor comprising a cylindrical member having a plurality of holes, a flange connected to one end of said member, said flange having a plurality of holes perpendicular to the axis of said cylindrical member to admit air into said cylindrical member, a first stator member having a plurality of radial turbine vanes having a first direction of pitch, said stator being connected to and inside said cylindrical member, a second stator member having a plurality of radial turbine vanes having said first direction of pitch, said second stator being connected to and inside said cylindrical member at the bottom of said cylindrical member and extending slightly below the lower end of said cylindrical member.

2. Fuel mixing means comprising a fuel conduit adapted to be connected to the output of a carburetor comprising a cylindrical member having a plurality of holes, a flange connected to one end of said member, said flange having a plurality of holes perpendicular to the axis of said cylindrical member to admit air into said cylindrical member, a first stator member having a plurality of radial turbine vanes having a first direction of pitch, said stator being connected to and inside said cylindrical member, a second stator member having a plurality of radial turbine vanes having said first direction of pitch, said second stator being connected to and inside said cylindrical member at the bottom of said cylindrical member and extending slightly below the lower end of said cylindrical member, a rotor turbine member rotatably connected to said second stator member having a plurality of radial vanes and having the direction of pitch of said vanes opposite to that of said first and second stator members.

3. Apparatus as in claim 2 having a screen member connected inside said cylindrical member above said first and second stator members, and a venturi member connected to said cylindrical member above said screen.

4. Fuel mixing means comprising a fuel conduit adapted to be connected to the output of a carburetor comprising a cylindrical member having a plurality of holes, a flange connected to one end of said member, said flange having a plurality of holes adapted to admit air into said cylindrical member, a first stator member having a plurality of radial turbine vanes having a first direction of pitch, a second stator member having a plurality of radial turbine vanes having said first direction of pitch, said second stator being connected to and inside said cylindrical member at the bottom of said cylindrical member

and extending slightly below the lower end of said cylindrical member.

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