

Oct. 8, 1940.

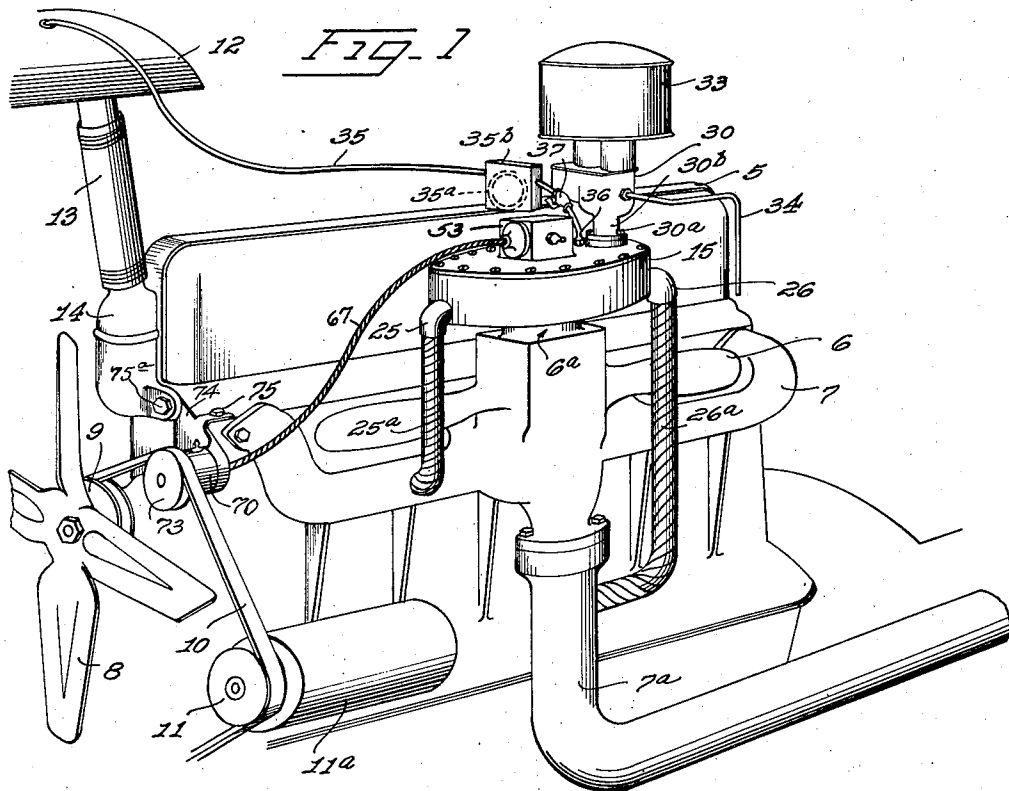
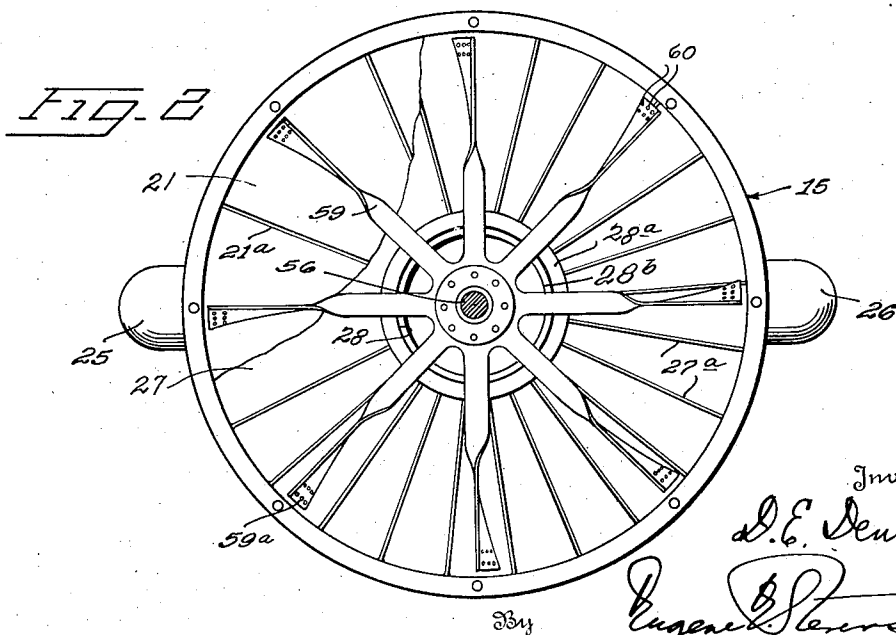
D. E. DENSON

2,216,722

FUEL MIXING AND SUPPLY APPARATUS

Filed July 27, 1938

2 Sheets-Sheet 1



Inventor
D. E. Denson
Eugene B. Steere
His Attorney

Oct. 8, 1940.

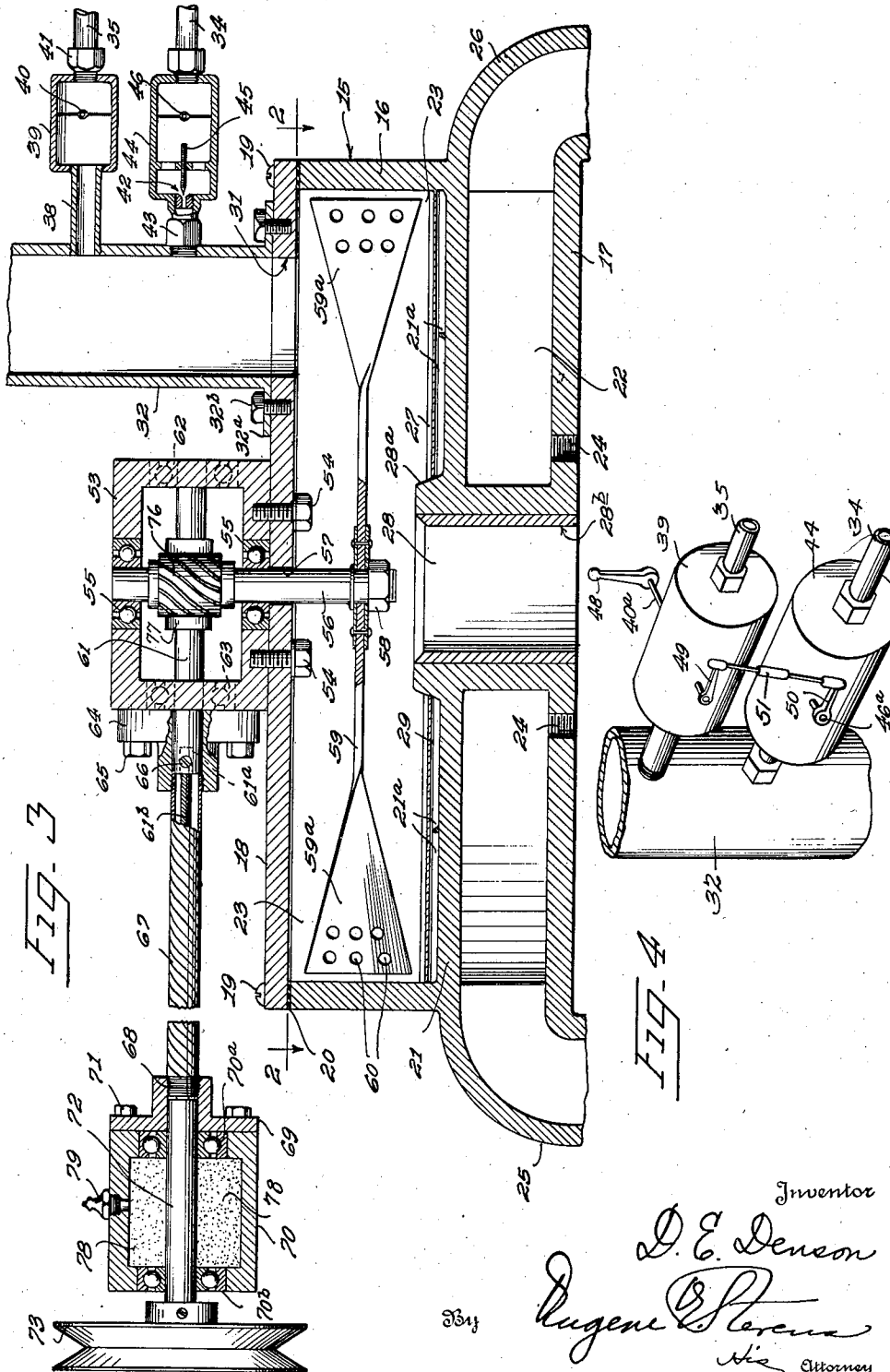
D. E. DENSON

2,216,722

FUEL MIXING AND SUPPLY APPARATUS

Filed July 27, 1938

2 Sheets-Sheet 2



334

Inventor
D. E. Denson
Eugene B. Stevens
His Attorney

UNITED STATES PATENT OFFICE

2,216,722

FUEL MIXING AND SUPPLY APPARATUS

Dewey E. Denson, Orlando, Fla.

Application July 27, 1938, Serial No. 221,652

15 Claims. (Cl. 123—122)

My invention relates to improvements in fuel mixing and supply apparatus for internal combustion engines.

Briefly and generally stated the invention has among its objects to provide a device of this character, the use of which will result in greater fuel economy, better lubrication of the motor due to complete combustion of fuel which prevents same from reaching crank case and diluting the oil therein; and which will further result in the elimination of carbon, increase of the power output of the motor, and generally makes for a longer life of the same and its parts.

More specifically the invention aims to provide, in one phase, a fuel mixing and supply apparatus in the nature of a super-charger for use in conjunction with the usual carburetor; and which in another phase may be employed without necessitating the use of an ordinary carburetor—the nature of the invention being such that it may be readily applied to all forms and types of internal combustion engines without any substantial modification of same and without requiring the exercise of more than ordinary skill.

A further and highly important detailed object of the invention is to provide, in a device for the purpose specified, driven rotary fan means so formed as to discharge the fuel mixture downwardly against the heated bottom of a fuel mixture chamber, and cause such mixture to remain in contact with said heated chamber bottom surface in its passage toward a fuel mixture outlet opening.

Additionally it is an object of the invention to provide apparatus of the character specified which is simple in construction, relatively inexpensive to manufacture, and which, once having been applied to the motor, will give long and satisfactory service without requiring periodical inspection and adjustment.

The invention also resides in various novel features of construction, combination and arrangement of the various parts, and in modes of operation, all of which will be readily apparent to those skilled in the art upon reference to the accompanying drawings in connection with the following descriptive matter.

It should be pointed out that although I have illustrated in the drawings what now appears to be a preferred form of the invention yet, nevertheless, the same is susceptible of other mechanical expressions within the spirit and scope of the subject matter claimed hereinafter.

In the drawings, wherein the same reference

characters have been used to designate the same parts throughout the several views—

Figure 1 is a perspective view of an internal combustion engine showing my apparatus applied thereto.

Figure 2 is a horizontal sectional view taken on the line 2—2 of Figure 3, but showing certain parts broken away.

Figure 3 is a central vertical sectional view through the apparatus, but illustrating a novel fuel element supply means in lieu of the carburetor shown in Figure 1, and which means also provides water vapor inlet means in lieu of that illustrated in Figure 1.

Figure 4 is a perspective view of the carburetor substitute illustrated in Figure 3 and hereinabove referred to in connection with that figure.

Referring to the drawings by reference characters, numeral 5 denotes one of the conventional forms of internal combustion engines now in use, while reference character 6 designates the intake manifold thereof and reference character 7 the exhaust manifold. The intake manifold 6 has the usual carburetor seat 6a while the exhaust manifold 7 has connection with the exhaust pipe 7a as illustrated.

The motor 5 has the usual fan 8, drive pulley 9, and drive belt 10 which also drives the pulley 11 of the generator 11a. The usual water tank 12 of the radiator (not shown) is fragmentarily illustrated and reference characters 13, 14 indicate the usual connection between the upper radiator tank 12 and the water jacket of the engine 5.

In carrying out the invention I provide the cylindrical, disc-like casing 15 having the circular side wall 16, bottom wall 17 and removable closure plate 18, which latter is clamped against the gasket 20 upon the upper end of the side wall 16 by means of screws 19 or the like as illustrated in Figure 3.

Spaced above the bottom wall 17 is the horizontal partition 21 which divides the casing 16 into a lower heating chamber 22 and an upper fuel element mixing and discharge chamber 23.

Figure 3 illustrates the preferably diametrically opposite inlet and outlet of heat chamber 22 which take the form of elbows 25 and 26, respectively. Figure 1 illustrates that the heat chamber inlet 25 has the preferably flexible pipe connection 25a with the exhaust manifold 7 and that the heat chamber outlet 26 has the similar connection 26a with the exhaust pipe 7a. It will be readily apparent from the foregoing that the heat chamber 22 will be supplied with hot exhaust

gases which are by-passed therethrough from the exhaust manifold 7. In a multiple cylinder internal combustion engine such as is shown in Figure 1 the quantity of exhaust gases by-passed to the heat chamber 22 can be varied at the choice of the installer by the location of the inlet of pipe 25a in the exhaust manifold 7 so as to deliver to heat chamber 22 exhaust gases from one or more cylinders as may be deemed desirable. Any suitable or conventional means may be employed for establishing connection between the pipes 25a, 26a and the exhaust manifold and exhaust pipe respectively.

It will be apparent from an inspection of Figures 1 and 3 that the casing 15 is adapted to be bolted to the usual carburetor seat 6a, shown in Figure 1, bolts being passed up through the conventional flange (not shown) of such seat 6a into the tapped holes 24 in the bottom wall 17 of the casing 15, as indicated in Figure 3.

The casing 15 will be a metal casting by preference and since the partition 21 may be heated to the glowing point by the hot gases in chamber 22, I preferably provide in the fuel mixing and discharge chamber 23 the partition 27 which will be spaced above partition 21 and which will be preferably relatively thin as compared to the latter and of bronze or copper, or some other metal which possesses high heat conductivity but has a high fusing point.

The partition 27 takes the form of an annulus, the central opening of which is welded to the outwardly sloping wall of the upstanding neck or collar 28a which surrounds the fuel mixture outlet 28 from chamber 23. The periphery of partition 27 will be welded or otherwise secured to the inner surface of the side wall 16 of the casing 15. Thus there is provided an annular air space between partitions 21 and 27 as indicated at 29 in Figure 3. Since partitions 21, 27 do not contact there will be no transfer of heat to partition 27 by conduction except at collar 28a and wall 16, and therefore no danger of partition 27 being heated to a glow to result in the premature explosion of the fuel charge in the chamber 23. However, in order to effect more efficient heating of the annular partition 27, I provide the partition 21 with a plurality of radially arranged heat disseminating ribs 21a which project into the air space 29 but do not—or preferably do not—touch the annular partition 27.

Coming now to the fuel element supply means for introducing fuel elements into the fuel mixing and discharge chamber 23, the installation as shown in Figure 1 discloses a conventional carburetor 30 which is bolted as at 30a to the closure plate 18 of casing 15 about the hole 31 in such closure so that the carburized fuel and air from the carburetor discharge neck 33 will pass into the fuel mixing and discharge chamber 23. It will be remembered, as pointed out in the brief description of Figure 3 that the special fuel element supply means—generally designated at 32—is illustrated communicating with chamber 23 through opening 31. The member 32 will be discussed later.

In Figure 1 there is shown a conventional air cleaner 33 which is mounted in the usual fashion upon the carburetor 30. The relatively thin, disc-like casing 15 occupies very little vertical space and therefore enables the carburetor and air cleaner to be mounted in juxtaposition as shown below the hood of the car. This is an important consideration as will be readily appre-

ciated. The fuel supply line to carburetor 30 in Figure 1 is indicated at 34.

In the installation shown in Figure 1, I provide the small vapor supply pipe 35 leading from radiator tank 12 or some other source of water supply and discharging into the fuel element mixing and discharge chamber 23 at a point adjacent the discharge neck 30b of the carburetor 30 which supplies carbureted air and gasoline or other fuel to the chamber 23 through the opening 31 of Figure 3. This water pipe 35 preferably has the coiled portion 35a which operates in the nature of a trap. This coil 35a preferably is insulated so as to hold heat in addition to excess water or vapor accumulation. Insulation such as fibre may be employed encased in a thin metal housing 35b. Any suitable control valve such as 37 may be incorporated in pipe 35 so as to regulate and properly proportion the flow of water vapor into the fuel element mixing chamber 23. While I have shown valve 37 as being manually operable, yet it will be obvious that the same may be thermostatically controlled or have connection with the carburetor control (not shown).

When it is desired to use my unit or member 15 as both a super-charger and carburetor, the conventional carburetor 30 of Figure 1 can be dispensed with and the bottom flanges 32a of pipe 32 may be bolted as at 32b to the closure pipe 13 about the opening 31, as illustrated in Figure 3. The upper end of the pipe 32 may carry an air cleaner such as 33 and the inflow of air regulated in conventional, well-known manner to be mixed with the fuel elements. Figure 3 illustrates that the pipe 32 has the water vapor inlet pipe 38 communicating thereto, and that such pipe carries the casing 39 of a conventional control valve 40. Such casing 39 has the connection 41 with the water supply line 35, as indicated in Figure 3. Figure 3 also discloses the pipe 32 as having the gasoline or other fuel inlet 43 from gasoline pipe 34 and discloses the casing 44 containing the usual needle valve 45 and seat 42 whereby the amount of gasoline admitted into pipe 32 under the control of valve 46 may be regulated. Suitable accelerator control for the valves 40, 46 of Figure 3 may be employed, and Figure 4 discloses the arm 48 for connection with a conventional accelerator control element. This arm 48 is mounted on the shaft 40a of water vapor control valve 40 and the opposite end of said shaft has an arm 49 between which and the arm 50 of the shaft 46a of valve 46 there is provided a turn-buckle connection 51. In this way the proportioning of water vapor from pipe 35 and gasoline from pipe 34 can be effected.

The fuel mixture discharge passage 28, previously referred to, will preferably be substantially centrally located as shown in Figure 3 and leads out through the heat chamber 22 as shown. Also the opening 31 for the admission of fuel mixture elements will preferably be adjacent one side of the closure plate 18 of casing 15—or in any event out of alignment with the discharge outlet 28 for the fuel so that the fuel mixture elements will be intimately associated and vaporized before they pass through passage 28 to the intake manifold 6 of the engine.

Coming now to the fuel element mixing and discharging means within chamber 23 Figures 1 and 3 illustrate the gear box housing 53 as secured upon the casing closure 18 by means of bolts 54 extending from the lower surface of such

closure into tapped holes in the bottom of housing 53. Housing 53 provides bearings 55 for journaling the vertical fan-carrying shaft 56 which extends into fuel element mixing chamber 23 through the hole 57 in closure 18.

Secured as at 58 or in any other preferred manner, to the lower end of shaft 56 is the fan 59 whose blade portions 59a are preferably apertured as indicated at 60 to make for a better atomization or mixing of the fuel elements. By preference the blades 59a terminate considerably short of the shaft 56 and are twisted or deflected in a fashion to draw fuel charge elements into the chamber 23 through the hole 31 and expel them in proper mixture out through the fuel discharge outlet 28 and into the intake manifold 6.

In the above connection it should be noted that the inner ends of the twisted portions 59a of the blades terminate just inwardly of the fuel element inlet opening 31. This structural relationship taken with the heated partition 27 disposed below the top of the collar 28a surrounding the fuel mixture discharge outlet, obviates any possibility of unvaporized fuel escaping out through the fuel outlet 28. In this same connection it should be emphasized that the hottest portion of the fuel mixing and discharge member 23 is right at the collar 28 because that portion receives heat not only by convection and radiation but also by conduction. However, the great thickness of metal from the plane of the bottom of partition 21 to the plane of the top of collar 28a is such that there is no danger of the surface of said collar 28a above the plane of the brass or copper partition 27 getting hot enough to cause premature explosion of the fuel charge before passage of same through the outlet 28.

From the foregoing it will be understood that the fan 59, 59b draws the fuel mixture in through the laterally positioned inlet opening 32 which is located above the path traversed by the outer portions of blades 59a and causes such fuel mixture to be discharged against the bottom plate 27 and to follow the surface of such plate to the fuel outlet 28. The peculiar formation of my fan with the twisted blades 59a terminating short of the central outlet is of particular advantage in causing the fuel to follow the surface of plate 29. However, I am led to believe that fans otherwise formed will achieve the desired end and therefore do not desire to limit myself to the particular fan shown.

The driving means for the fan shaft 56 takes the form of a horizontal cross shaft 61 which is journaled in bearings 62, 63 carried in the end walls of the housing 53. One end of shaft 61 extends out through an end wall of housing 53 and through an adapter disc 64 which is bolted to housing 53 about the opening which receives the shaft bearing 63. The disc 64 provides the medial outwardly extending socket 64a into which the end of shaft 61 projects, and such shaft has its ends bored as indicated at 61a to receive the end of a flexible shaft 61b which is secured in place by means of a set screw or the like 66. The usual flexible housing 67 is provided for shaft 61b and is secured in the socket 66 of disc 64.

The other end of the housing 67 for shaft 61b is secured in the socket 68 of the end closure 69 of a bracket-carried bearing housing 70. End closure 69 is secured by bolts 71 to housing 70 to close the opening which receives the bearings 70a of a shaft 72 whose other end extends through 75 and is supported by bearings 70b. The outer

end of shaft 72 carries a pulley 73 which, as shown in Figure 1, is adapted to have trained over it the fan belt 10. Any preferred form of supporting bracket 74 for the bearing housing 70 can be employed and in the present instance the same is shown attached to the engine by the head bolts 75 and one of the bolts 75a of the water jacket connector 14. In this way the bracket bearing 70 is rigidly and firmly disposed so as to effect driving engagement of the fan 10 belt with the pulley 73.

A driving connection is established between the composite pulley driven shafts 61, 61b, 72 by means of the meshing gears 76, 77 on shafts 56, 61, respectively. It will be understood, of course, that the outer end of the flexible shaft 61b will be received and secured in a socket in the end of pulley shaft 72 in the same fashion that its inner end is secured in socket 61a of shaft 61.

The bracket carried bearing housing 70 will preferably have a suitable spacing washer between bearings 70a, 70b, and such a washer is indicated at 78 in Figure 3 which also illustrates the grease inlet fitting 79 in the top of bracket bearing housing 70.

The carburetor 30 illustrated in Figure 1 is a "down-draft" carburetor. Should it be desired to use an "up-draft" carburetor the casing 15 would simply be reversed, which is to say, it would be disposed with the fuel mixing and discharge chamber 23 disposed downwardly rather than upwardly as shown.

Furthermore, I may provide the annular partition member 27 with heat radiating fins or the like 27a. Same should be an aid in vaporizing the fuel in conjunction with the action of fan blades 59a. Although the fuel discharge outlet 28 is shown as being concentrically located in respect to the wall 16 of the casing 15, yet the same may be positioned at other points but must not be in alignment with the fluid element inlet opening 31 if best results are to be obtained. The fluid outlet opening preferably is provided with the bronze bushing or collar 28b for the purpose of avoiding pre-ignition of the fuel charge as it passes out through outlet 28. Bronze, copper or other material may be used for bushing 28b, or in other words, any material having a very high fusing point. Although the particular type of fan or impeller 59, 59a which is illustrated in Figure 3 is regarded as preferable, obviously other forms of impeller fans may be used and the twisted blade portions 59a may take other form and may extend further toward the fan shaft 56 than is illustrated in Figure 3.

Obviously also, other means than the fan belt 10 may be employed for driving the shaft 61 which imparts rotation to the fan shaft 56. The fan belt driven pulley 73 is given simply as an illustration of one means of driving the fan shaft 56.

In the course of the foregoing description reference has been made to gasoline as the fuel employed, but obviously other fluid fuel may be used whether of petroleum origin or not, the nature of the apparatus being such that it lends itself to use in connection with relatively heavy fluid fuels whether petroleum or otherwise. The use of my apparatus greatly reduces the amount of carbon-monoxide gas discharged from the exhaust pipe 7a. This is an important item from the point of view of health.

The operation of the apparatus may be briefly summarized as follows. The motor will be

started as usual and the fan belt 10 or other moving portion of the motor will, through pulley 73 and shafts 72, 61b, 61, effect drive of the fan 59. The fan 59, or rather the blades 59a thereof, work in conjunction with the cylinders of the engine 5 in pulling the fuel elements, namely water vapor, air and fuel, gasoline or the like into the chamber 23. In this respect the apparatus performs the function of a super-charger. Or, if the member 32 is used in place of the carburetor 30, the apparatus serves as both carburetor and super-charger. The water vapor pipe 35 being attached to the upper portion of the water tank 12 will have sucked there-through into the chamber 23 water vapor rather than water and same will be mixed with the air and liquid fuel and volatilized in the chamber 23 as the result of the action of the fan and the heated annular partition 27. The high fusion copper or other partition 27 and the bushing 28b of corresponding material avoid any possibility of surfaces of the mixing chamber 23 or outlet passage 28 reaching a glow point to cause pre-ignition of the fuel.

Having thus described my invention, what I claim as new is:

1. Fuel mixing and supply apparatus for internal combustion engines comprising in combination, a cylindrical disk-like casing, a disk-like partition disposed between the ends of said casing and dividing the same into a circular bottom heating chamber and a superjacent circular mixing and discharge chamber, exhaust inlet and outlet connections leading from said heating chamber, a second partition disk in said mixing chamber and closely spaced from said first mentioned partition disk whereby to provide an air space therebetween, said second partition disk being thinner than said first-mentioned partition disk and of material of high heat conductivity, heat disseminating ribs projecting into said air space from said first mentioned partition disk, an intake manifold-carried fuel mixture outlet pipe leading from said fuel mixing and discharge chamber through said heating chamber and the outer wall of the latter at a point adjacent the mid-portion of the same, fuel mixture supply means opening into said mixing chamber through a wall thereof above said last-mentioned partition disk and offset laterally from said fuel mixture outlet pipe, a vertically journaled fan disposed in said mixing chamber adjacent said second-mentioned partition disk and below the plane of said supply means, said fan discharging toward said outlet pipe and having blades providing mixture activating pitched portions terminating short of the plane of said fuel mixture outlet pipe, a shaft for said fan, a housing secured on the top wall of said mixing chamber and providing bearings for said fan shaft, a right angularly journaled drive shaft for said fan shaft and carried by said housing, a geared drive connection between said shafts, a belt driven drive pulley on said drive shaft exteriorly of said housing, said drive shaft having a flexible intermediate portion between said housing and pulley, and a bearing-incorporating bracket support for the pulley-carrying portion of said drive shaft and disposing said pulley for engagement with the belt.

2. Fuel mixing and supply apparatus for internal combustion engines comprising in combination, a cylindrical disk-like casing, a disk-like partition disposed between the ends of said casing and dividing the same into a circular bottom

heating chamber and a superjacent circular mixing and discharge chamber, exhaust inlet and outlet connections leading from said heating chamber, a second partition disk in said mixing chamber and closely spaced from said first mentioned partition disk whereby to provide an air space therebetween, said second partition disk being thinner than said first-mentioned partition disk and of material of high heat conductivity, heat disseminating ribs projecting into said air space from said first mentioned partition disk, an intake manifold-carried fuel mixture outlet pipe leading from said fuel mixing and discharge chamber through said heating chamber and the outer wall of the latter at a point adjacent the mid-portion of the same, said mixture outlet pipe being heat conductively joined and sealed to said partitions and the bottom end of said casing and projecting above the plane of said second mentioned partition, fuel mixture supply means opening into said mixing chamber through a wall thereof above said last-mentioned partition disk and offset laterally from said fuel mixture outlet pipe, a vertically journaled fan disposed in said mixing chamber adjacent said second-mentioned partition disk and below the plane of said mixture supply means, said fan discharging toward said outlet pipe and having blades providing mixture activating pitched portions terminating short of the plane of said fuel mixture outlet pipe, a shaft for said fan, a housing secured on the top wall of said mixing chamber and providing bearings for said fan shaft, a right angularly journaled drive shaft for said fan shaft and carried by said housing, a geared drive connection between said shafts, a fan belt driven drive pulley on said drive shaft exteriorly of said housing, said drive shaft having a flexible intermediate portion between said housing and pulley, and an engine-carried bearing-incorporating bracket support for the pulley-carrying portion of said drive shaft and disposing said pulley for engagement with the belt.

3. Fuel mixing and supply apparatus for internal combustion engines comprising in combination, a cylindrical disk-like casing, a disk-like partition disposed between the ends of said casing and dividing the same into a circular bottom heating chamber and a superjacent circular mixing and discharge chamber, exhaust inlet and outlet connections leading from said heating chamber, a second partition disk in said mixing chamber and closely spaced from said first-mentioned partition disk whereby to provide an air space therebetween, heat disseminating ribs projecting into said air space from said first-mentioned partition disk, an intake manifold-carried fuel mixture outlet pipe leading from said fuel mixing and discharge chamber through said heating chamber and the outer wall of the latter at a point adjacent the mid-portion of the same, said mixture outlet pipe being heat conductively joined and sealed in said partitions and the bottom end of said casing and projecting above the plane of said second mentioned partition, fuel mixture supply means opening into said mixing chamber through a wall thereof above said last-mentioned partition disk and offset laterally from said fuel mixture outlet pipe, a vertically journaled fan disposed in said mixing chamber adjacent said second-mentioned partition disk and below the plane of said supply means, said fan discharging toward said outlet pipe and having blades providing mixture activating pitched portions terminating short of the plane of said fuel

mixture outlet pipe, a shaft for said fan, a housing secured on the top wall of said mixing chamber and providing bearings for said fan shaft, a right angularly journaled drive shaft for said fan shaft and carried by said housing, a geared drive connection between said shafts, a fan belt driven drive pulley on said drive shaft exteriorly of said housing, said drive shaft having a flexible intermediate portion between said housing and pulley, and an engine-carried bearing-incorporating bracket support for the pulley-carrying portion of said drive shaft and disposing said pulley for engagement with the belt.

4. Fuel mixing and supply apparatus for internal combustion engines comprising in combination, a cylindrical disk-like casing, a disk-like partition disposed between the ends of said casing and dividing the same into a circular bottom heating chamber, and a superjacent circular mixing and discharge chamber, exhaust inlet and outlet connections leading from said heating chamber, a second partition disk in said mixing chamber and closely spaced from said first mentioned partition disk whereby to provide an air space therebetween, an intake manifold-carried fuel mixture outlet pipe leading from said fuel mixing and discharge chamber through said heating chamber and the outer wall of the latter at a point adjacent the mid-portion of the same, said mixture outlet pipe being heat conductively joined and sealed in said partitions and the bottom end of said casing and projecting above the plane of said second-mentioned partition, a fuel mixture supply means opening into said mixing chamber through a wall thereof above said last-mentioned partition disk and offset laterally from said fuel mixture outlet pipe, a vertically journaled fan disposed in said mixing chamber adjacent said second-mentioned partition disk and below the plane of said mixture supply means, said fan discharging toward said outlet pipe and having blades providing mixture activating pitched portions terminating short of the plane of said fuel mixture outlet pipe, a shaft for said fan, a housing secured on the top wall of said mixing chamber and providing bearings for said fan shaft, a right angularly journaled drive shaft for said fan shaft and carried by said housing, a geared drive connection between said shafts, a fan belt driven drive pulley on said drive shaft exteriorly of said housing, said drive shaft having a flexible intermediate portion between said housing and pulley, and an engine-carried bearing-incorporating bracket support for the pulley-carrying portion of said drive shaft and disposing said pulley for engagement with the belt.

5. Fuel mixing and supply apparatus for internal combustion engines comprising in combination, a cylindrical disk-like casing, a disk-like partition disposed between the ends of said casing and dividing the same into a circular bottom heating chamber and a superjacent circular mixing and discharge chamber, exhaust inlet and outlet connections leading from said heating chamber, a second partition disk in said mixing chamber and closely spaced from said first mentioned partition disk whereby to provide an air space therebetween, an intake manifold-carried fuel mixture outlet pipe leading from said fuel mixing and discharge chamber through said heating chamber and the outer wall of the latter at a point adjacent the mid-portion of the same, said mixture outlet pipe being heat conductively joined and sealed in said partitions and the bot-

tom end of said casing and projecting above the plane of said second-mentioned partition, a fuel mixture supply means opening into said mixing chamber through a wall thereof above said last-mentioned partition disk and offset laterally from said fuel mixture outlet pipe, a vertically journaled fan disposed in said mixing chamber adjacent said second-mentioned partition disk and below the plane of said mixture supply means, said fan discharging toward said outlet pipe and having blades providing mixture activating pitched portions terminating short of the plane of said fuel mixture outlet pipe, a shaft for said fan, a housing secured on the top wall of said mixing chamber and providing bearings for said fan shaft, a right angularly journaled drive shaft for said fan shaft and carried by said housing, a drive connection between said shafts, and an engine actuated means for said drive shaft and operatively connected therewith.

6. Fuel mixing and supply apparatus for internal combustion engines comprising in combination, a cylindrical disk-like casing, a disk-like partition disposed between the ends of said casing and dividing the same into a circular bottom heating chamber and a superjacent circular mixing and discharge chamber, exhaust inlet and outlet connections leading from said heating chamber, a second partition disk in said mixing chamber and closely spaced from said first mentioned partition disk whereby to provide an air space therebetween, an intake manifold-carried fuel mixture outlet pipe leading from said fuel mixing and discharge chamber through said heating chamber and the outer wall of the latter at a point adjacent the mid-portion of the same, said mixture outlet pipe being heat conductively joined and sealed in said partitions and the bottom end of said casing and projecting above the plane of said second-mentioned partition, a fuel mixture supply means opening into said mixing chamber through a wall thereof above said last mentioned partition disk and offset laterally from said fuel mixture outlet pipe, a vertically journaled fan disposed in said mixing chamber adjacent said second mentioned partition disk and below the plane of said mixture supply means, said fan discharging toward said outlet pipe and having blades providing mixture activating pitched portions terminating short of the plane of said fuel mixture outlet pipe, a shaft for said fan, and an engine actuated drive means for said shaft.

7. The combination set forth in claim 6, and said second mentioned disk having heat disseminating protuberances at its surface which is adjacent said fan.

8. In a fuel mixing and supply apparatus for internal combustion engines, the combination of a casing, a transverse partition in said casing dividing the same into a heating chamber and a juxtaposed fuel mixing and discharge chamber, disaligned fuel inlet and outlet means for said fuel mixing chamber, engine exhaust gas inlet and outlet means for said heating chamber, a driven shaft carried rotary impeller in said fuel mixing chamber between its inlet and outlet, said inlet means and said fan discharging toward said partition, a removable closure for said fuel mixing chamber, a carrier housing for said impeller shaft and secured to said closure, and drive means for said impeller shaft and carried by said housing.

9. In a fuel mixing and supply apparatus, the combination of a casing providing a mixing

chamber having a fuel mixture inlet and a heated bottom providing a fuel mixture outlet, a driven fan in said chamber and discharging toward said bottom, the axis of said fan being substantially concentric with said fuel mixture outlet, and the fuel mixture inlet being disposed above the plane of the fan and at one side of the axis thereof.

10. In a fuel mixing and supply apparatus, the combination of a casing providing a mixing chamber having a fuel mixture inlet and a heated bottom providing a fuel mixture outlet, a driven fan in said chamber and discharging toward said bottom, the axis of said fan being substantially concentric with said fuel mixture outlet, the fuel mixture inlet being disposed above the plane of the fan and at one side of the axis thereof, and said fan having blades whose inner ends terminate short of the line of said fuel mixture outlet.

11. In a fuel mixing and supply apparatus for internal combustion engines, the combination of a casing, a transverse partition in said casing dividing the same into a heating chamber and a juxtaposed fuel mixing and discharge chamber, disaligned fuel mixture inlet and outlet means for said fuel mixing chamber, means for heating said heating chamber, a driven rotary impeller in said fuel mixing chamber between its inlet and outlet, said inlet means and said impeller discharging toward said partition, and drive means for said impeller.

12. In a fuel mixing and supply apparatus for internal combustion engines, the combination of a casing, a transverse partition in said casing dividing same into a heating chamber and a juxtaposed fuel mixing and discharging chamber, disaligned fuel mixture inlet and outlet for said fuel mixing chamber, said inlet means being located above said outlet means, means for heating said heating chamber and the bottom wall of said mixing chamber, a rotary impeller in said mixing chamber between its inlet and its outlet, and so constructed and arranged as to direct the air and fuel mixture against the bottom heated wall and sides of said heating chamber whereby the mixture is maintained in intimate contact with the bottom and side walls during its flow toward the outlet.

13. In a fuel mixing and supply apparatus for

internal combustion engines, the combination of a casing forming a vaporizing chamber, disaligned fuel mixture inlet and outlet conduits for said chamber, said outlet conduit being located in bottom of said chamber, and having its upper end extended above the bottom of said chamber, direct contact heating means engaging both said outlet conduit and at least one wall of said chamber, and said heated wall comprising spaced co-extensive sections providing an air chamber therebetween.

14. In a fuel vaporizing and supply apparatus for internal combustion engines, the combination of a casing, a transverse partition in said casing dividing the same into a heating chamber and a superjacent fuel mixing and supply chamber, said partition providing the bottom of the fuel mixing chamber, disaligned fuel mixture inlet and outlet conduits for said mixing chamber, said outlet conduit leading through said partition and heating chamber to the exterior of said casing, means for heating said heating chamber and partition and likewise the portion of the mixture outlet conduit which extends through said heating chamber, and the inner end of said fuel mixture outlet conduit projecting through said partition and into said mixing chamber whereby to intercept any unvaporized fuel in its passage to the outlet pipe, the projecting inner end of the outlet pipe being heated by conduction not only from the partition but also from portion of said pipe that is in said heating chamber.

15. In a fuel mixing and supply apparatus for internal combustion engines, the combination of a casing, a transverse partition in said casing dividing the same into a heating chamber and a juxtaposed fuel mixing and discharge chamber, disaligned fuel mixture inlet and outlet means for said fuel mixing chamber, said outlet means leading through said heating chamber through said partition and having a lip projecting into said fuel mixing chamber, means for heating said heating chamber, a driven rotary impeller in said fuel mixing chamber between its inlet and outlet, said inlet means and said impeller discharging toward said partition, and drive means for said impeller.

DEWEY E. DENSON.