Dec. 9, 1941. H. H. SCHMIDT 2,265,199

VAPORIZING SUPERCHARGER AND INJECTOR

Filed March 17, 1938 2 Sheets-Sheet 1

Fig. 1

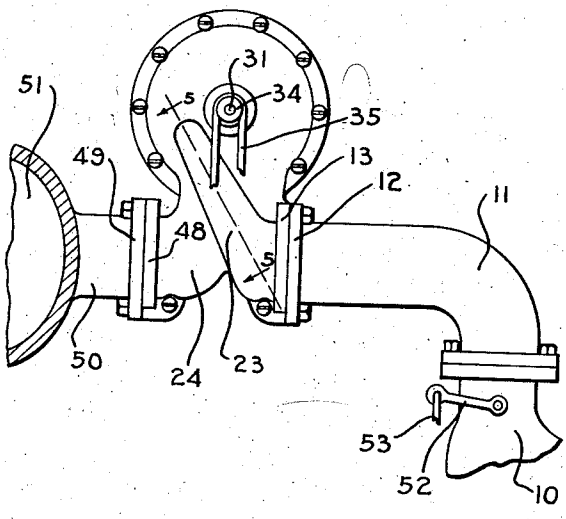


Fig. 2

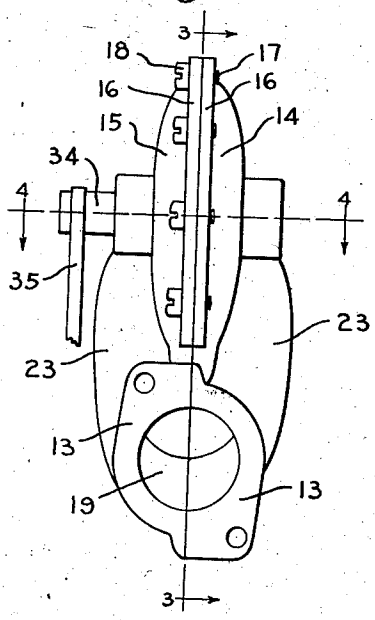


Fig. 3

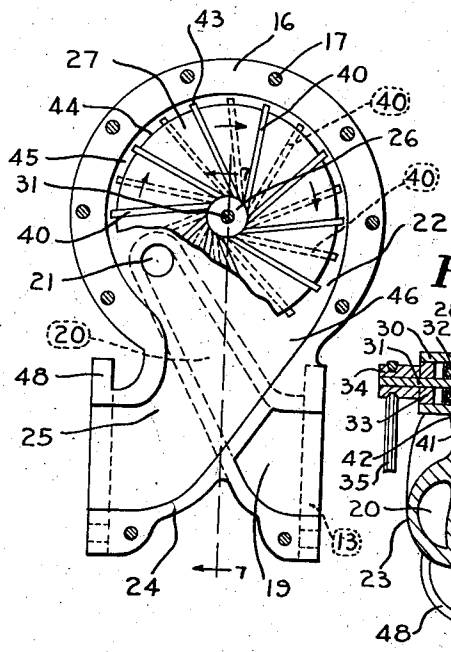


Fig. 4

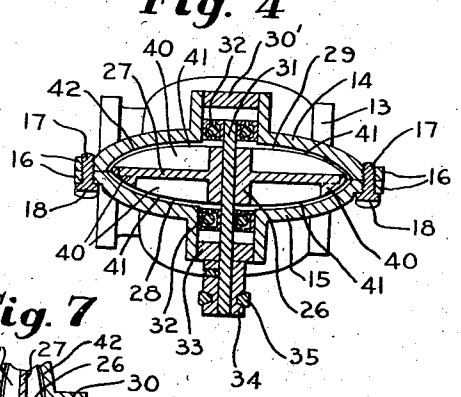
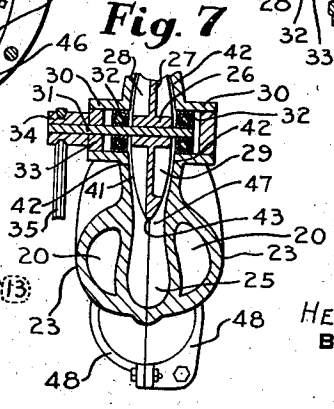


Fig. 7



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VAPORIZING SUPERCHARGER AND INJECTOR

Filed March 17, 1938 2 Sheets-Sheet 2

Fig. 8

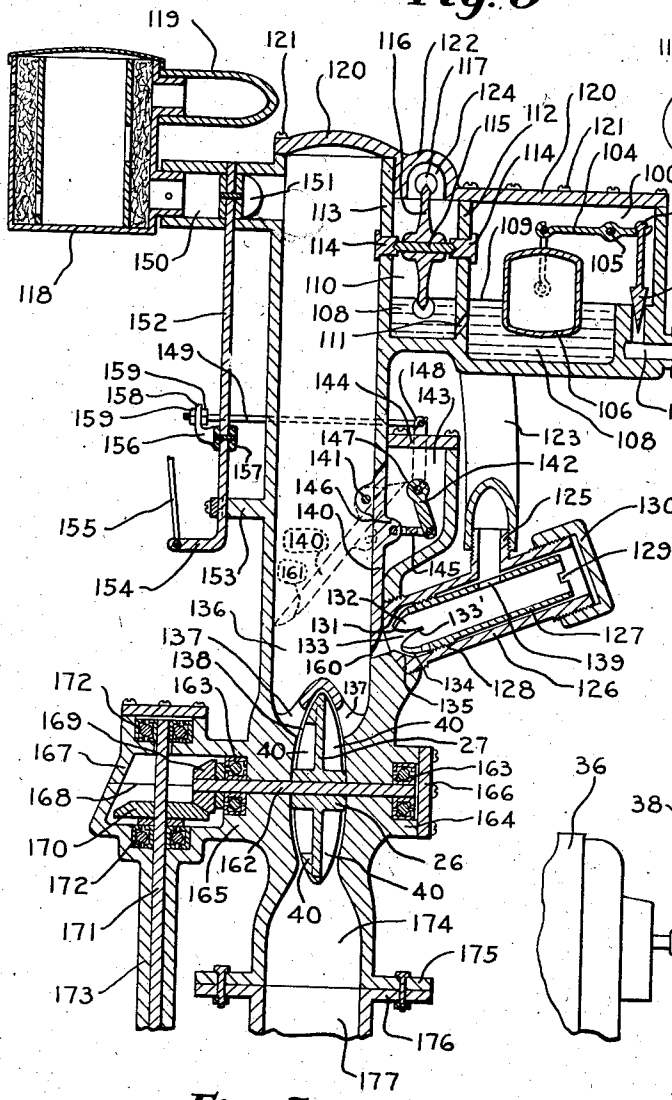


Fig. 9

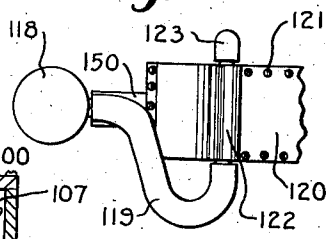


Fig. 6

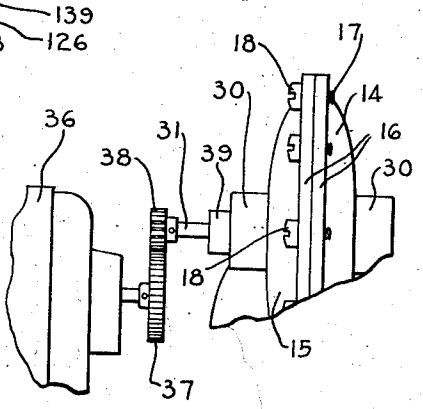
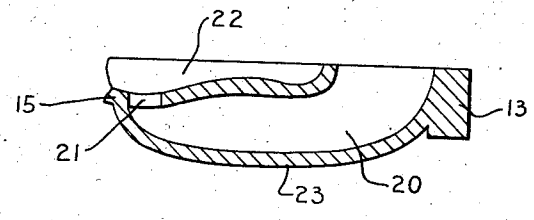


Fig. 5



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Patented Dec. 9, 1941 2,265,199

UNITED STATES PATENT OFFICE

2,265,199

VAPORIZING SUPERCHARGER AND INJECTOR

Hermann H. Schmidt, Hanover, Kans., assignor to The Universal Royalty and Development Company, St. Joseph, Mo., a corporation of Missouri

Application March 17, 1938, Serial No. 196,525

12 Claims. (Cl. 48—180)

My invention relates to apparatus for vaporizing and injecting fuel into a combustion chamber.

It is a purpose of my invention to provide a device for vaporizing fuel and injecting the same into a combustion chamber that will produce a much better combustible mixture than has been possible with means previously known for vaporizing a fuel for introduction in a combustion chamber, such as that of an internal combustion engine. This is accomplished by rotatively whipping air and combustible fluid about in a casing or chamber to intimately mix the same and at the same time break up the particles thereof more finely than has previously been the case, substantially vaporizing all of said combustible fluid. My apparatus is particularly adapted for vaporizing gasoline or similar volatile fluids for introduction into an internal combustion engine, but is also adapted to vaporize other liquid fuels and fuel compounds that are of a less volatile nature for introduction into an internal combustion engine, or any combustion chamber. The apparatus is further adapted for making substantially a vapor of a powdered fuel, or a mixture of a powdered and liquid fuel, for introduction into a combustion chamber.

It is a further purpose of my invention to provide an apparatus of the above mentioned character that is simple in operation and which has a relatively small number of parts, so as to avoid the complications frequently found to exist in apparatus that is intended for obtainind more perfect combustion of a fuel, such as that for example, used in internal combustion engines.

More particularly my invention comprises a rotatable member or rotor that is provided with blades, and which is rotatable in a casing that conforms closely to the shape of the blades on said rotor, so that said rotor will violently throw the combustible material in the casing or chamber against the walls thereof and force the same between said blades and the adjacent walls to more thoroughly break up and finely divide the same to produce a substantial vapor thereof.

It is a specific purpose of my invention to provide an apparatus of the above mentioned character, in which the rotor or rotating member mounted in the casing that conforms closely to the shape of said rotor or rotating member, is provided with means for dividing said casing into a plurality of chambers, and to provide bladed means in each of said chambers operating to rotatively whip about and centrifugally throw the contents of said chamber outwardly toward the annular periphery thereof to bring about the vaporization, or substantial vaporization, of the fuel content of said chamber and the intimate mixing of the same with the air in said chamber, and furthermore it is a purpose of my invention to so construct said rotor and the blades thereon and the walls of the chamber adjacent thereto, that the centrifugally whipped or whirled air and fuel on one side of the partitioning means is thrown across the periphery of the rotor toward the other side of the partitioning means, so that the contents of the two chambers on opposite sides of the rotor are thrown into engagement with each other to more thoroughly blend the contents of said chambers, and break up the combustible fluid contained therein, so that a true vapor is produced thereby, which is injected into the internal combustion engine, or other combustion chamber, by the centrifugal force developed by said rotor during such rotative whipping action thereof.

My invention is adapted for use in conjunction with any standard carburetor, such as is now in use. The carbureted fuel passing from the carburetor is introduced into the casing in which the rotor of my apparatus is located, to break up the small particles of liquid fuel therein and substantially vaporize the same and mix the same with the air so that a uniform blend of the air and liquid fuel results, without creating a pressure as the fuel is injected into the intake manifold that might cause condensation of the fuel after it has been vaporized.

My invention also includes means for picking up volatilized liquid fuel, such as gasoline, for example, in a stream of air and introducing said stream of air along with air that has not been contacted with the fuel, into the rotor chamber, or casing, and means for controlling the proportions of such air having the fuel vapor therein, and the air that has no fuel vapor therein, so as to obtain the proper amount of air for completely burning the fuel.

Other objects and advantages of my invention will appear as the description of the drawings proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawings:

Fig. 1 is a side elevation partly broken away, of my apparatus for vaporizing and injecting fuel into a combustion chamber, interposed between the ordinary carburetor and the ordinary intake manifold of an internal combustion engine.

Fig. 2 is an end elevation of my improved apparatus detached.

Fig. 3 is a section taken on the line 3—3 of Fig. 2, the rotor being shown partly in elevation and partly broken away.

Fig. 4 is a section taken on the line 4—4 of Fig. 2.

Fig. 5 is a section taken on the line 5—5 of Fig. 1, on a slightly enlarged scale.

Fig. 6 is a fragmentary elevational view of a modification.

Fig. 7 is a fragmentary section taken on the line 7—7 of Fig. 3, but on a smaller scale than Fig. 3.

Fig. 8 is a vertical sectional view of another form of my apparatus, showing the same used in conjunction with means of my own design for introducing fuel into a stream of air to take the place of the ordinary carburetor, and

Fig. 9 is a fragmentary top plan view of the apparatus shown in Fig. 8 on a reduced scale.

Referring in detail to the drawings, in Fig. 1 is shown a portion of a carburetor 10, from the discharge end of which a conduit 11 extends, said conduit 11 being provided with a flange 12, which is adapted to be bolted in fluid-tight relation to a flange 13 on the casing of my improved vaporizer and injector.

My improved vaporizer and injector comprises a casing made up of two sections 14 and 15, each of which is provided with a flange 16, through which securing members 17 extend, said securing members having heads 18 engaging the one flange 16 and being threaded to engage in threaded openings in the other flange 16. The flange 13 is formed partly on the member 14 and partly on the member 15, and from the central opening 19 in said flange 13 a pair of passages 20 extend, one being formed in each of the casing portions 14 and 15. The passages 20 extend through openings 21 into the chamber 22, formed between the two halves of the casing 14 and 15, as will be evident from Fig. 5, and it will be obvious from Fig. 5 that the passages 20 gradually decrease in size toward the opening 21, avoiding any sharp corners or offsets, or variations in size therein that might cause whistling or other noise as the fluid passes through the passage 20. In order that said passages will not have any reduced portions or sharp offsets therein, the same are provided in the form of tubular conduits having outer wall portions 23 that extend along opposite sides of the casing members 14 and 15, so as to terminate inwardly from the outer peripheral edge of the annular portions of said casing members and at a point spaced circumferentially from the outlet conduit 24, said outlet conduit having a passage 25 extending outwardly from the chamber 22 between the two passages 20, as will be evident from Fig. 7.

Within the chamber 22 provided between the casing members 14 and 15, is a rotor having a hub portion 26 and a central disk-like dividing wall 27, which divides the casing into a pair of chambers 28 and 29 lying on opposite sides of said wall 27. Each of the casing portions 14 and 15 is provided with a bearing portion 30. A shaft 31 is mounted in an opening in the hub portion 26 in fixed position, and is mounted for rotation in the casing by means of the ball bearings 32 mounted in the bearing portions 30. One bearing portion 30 is provided with a plug 30' providing a fluid tight closure, and a sleeve 33 in which the shaft 31 rotates is mounted in the other bearing member 30. Mounted on the shaft 31 to rotate therewith is a pulley 34, which is provided with a groove in which the belt 35 operates for rotating the rotor, said belt being driven in any desired manner, as by means of a suitable pulley carried by the engine shaft, or by a shaft geared to the engine shaft of an internal combustion engine, said pulley engaging the sleeve 33.

Instead of driving the shaft 31 in the manner above referred to, it can be driven as shown in Fig. 6, in which a motor 36 is shown as being provided with a gear 37 on the shaft thereof that meshes with the gear 38 carried on the shaft 31, a suitable collar 39 being provided on said shaft that engages with the bearing member 30 to prevent endwise movement of the shaft and thus of the rotor in a direction transversely of the casing.

The rotor is rotated in the direction of the arrows, as shown in Fig. 3, and is rotated at a very high velocity. Said rotor is provided with blades or vanes 40 thereon, which are preferably arranged in staggered relation on opposite sides of the partitioning or dividing disk portion 27. Said vane or blade members 40 are cast integral with the central partition 27 and extend at an acute angle to the radial, being inclined backwardly from the hub portion to the periphery of the rotor, considering the direction of rotation of the rotor as being forward. While the particular angle at which said vanes or blades extend to a radial line, through their inner ends for example, may be varied, these are shown as extending at substantially an angle of 45 degrees to the radial in the drawings. Said blades or vanes taper outwardly toward the periphery of the rotor, becoming gradually narrower toward their outer ends, the edges thereof being formed on a gradual curve, as shown at 41 in Figs. 4 and 7. The casing portions 14 and 15 are similarly curved, the side walls of said casings adjacent the side edges of the bladed rotor being of substantially the same contour as said blades, the walls gradually approaching each other toward the peripheral flanged portions 16 on a curve, as shown at 42 in Figs. 4 and 7.

It will be noted that a clearance is shown between the edges 41 of the blades or vanes and the curved concave wall portions 42. It is to be understood that the clearance between these blades and the wall portions is only sufficient for mechanical purposes, so that there will be no engagement of said blades with said wall portions, the edges of the blades and the wall portions being of substantially the same cross-sectional contour at their adjacent portions.

The disk-like central wall or partition portion 27 of the rotor ends short of the blades or vanes 40, the vanes or blades having portions 43 that extend outwardly beyond the peripheral edge 44 of the disk-like portion 27, and said projecting blade portions 43 extend across the peripheral edge 44 of the disk-like portion 27, and closely adjacent the annular periphery of the chamber 22 adjacent the wall portions 42, so as to just have mechanical clearance from said casing beyond the periphery of the disk-like portion. A space is thus provided between the vanes or blades 40, as shown at 45, between the casing wall and the peripheral edge of the disk-like portion 27.

It will be noted that at the lower end of the casing adjacent the outlet passage 25 said casing widens, as indicated at 46, to provide an outlet chamber 47 leading into the outlet passage 25, into which the peripheral edge or rim portion of

the rotor extends. The members 14 and 15 are provided with flange portions 48 thereon, that together form a flange that is bolted in fluid-tight relation to the flange 49 on the inlet conduit 50 leading into the intake manifold 51, of which only a fragmentary portion is shown in the drawings.

The carburetor 10 may, of course, be provided with any suitable means 52, controlled by any suitable control member, such as a rod, or wire, 53, for controlling the proportions of air and combustible fluid entering the conduit 11. The rotation of the rotor in the casing draws the mixture of air and combustible fluid in through the passages 20 and the opening 21 into said casing, part of the mixture of air and combustible fluid passing through the one passage 20 into the chamber 28, and the other portion thereof through the other passage 20 into the chamber 29. As the mixture of air and combustible fluid is drawn into the chambers it comes into engagement with the vanes or blades on the rotor and is given a violent centrifugal whirling or whipping motion, causing the same to be thrown outwardly centrifugally toward the outer peripheral edge of the annular passage adjacent the peripheral edge 44 of the partitioning means 27, and also into engagement with the side walls of said chambers, causing some of said air and combustible fluid to be forced between said side walls and said blades 40, and some of the same to be thrown transversely across the peripheral edge 44 of the partitioning means 27 from the chamber 28 to the chamber 29, and vice versa, thus causing a complete breaking up into a vapor of any of the fluid that may not have previously been in a vaporous state, and thoroughly and completely mixing the air and fluid vapor, so as to make a uniform blend thereof having a uniform proportion of air and combustible vapor therein throughout the mass thereof. The rotation of the rotor throws the blended gaseous fuel outwardly toward the periphery of the rotor and into the outlet chamber 47 and outlet passage 25, the velocity given said combustible mixture causing the same to pass into the intake manifold and to be injected into the cylinder, or cylinders, of the internal combustion engine, or other combustion chamber, that may be open to the intake manifold at the time that the combustible mixture is being passed into the same.

While my apparatus is referred to as being a vaporizing supercharger and injector, it does not produce any material amount of compression of the combustible mixture produced thereby, thus preventing any condensation of the fuel vapors that have been produced by the device due to the rapid rotation of the rotor, causing the centrifugal whirling or whipping action above referred to. It will be obvious that such proportions of air and combustible fluid can be introduced into the chambers 28 and 29 that all of the combustible fluid will be burned when combustion takes place in the cylinder or other combustion chamber into which the same is introduced. This is possible because of the fact that sufficient air is utilized to completely vaporize the fuel and a sufficient quantity of air is mixed therewith that there will be sufficient oxygen for the complete combustion of the fuel present in the cylinder or other combustion chamber when the combustion takes place.

The passage 19 and the passages 20 constitute what can be called an intake manifold for the mixing and vaporizing device. My apparatus does not operate merely as a mixer for the combustible fluid and the air, but acts to break up the fluid so that it will be much more finely divided than would be otherwise possible, producing from the air and combustible fluid what is, in its properties, similar to a dry gas, when the same leaves the rotor chamber and passes into the intake manifold 51 through the discharge passage 25.

In order to prevent any of the liquid fuel from being drawn into the chambers 28 and 29 by the suction that may be created by the rapid rotation of the rotor, which produces the whirling or whipping action in the chamber 22, comprising the portions 28 and 29 on opposite sides of the rotor, the carburetor can be dispensed with and the means for producing a combustible mixture of fuel and air shown in Fig. 8 can be provided. Said means comprises a casing that has a chamber 100 therein, the liquid fuel line 101 entering said chamber through an inlet passage 102, and communication between said passage 102 and the chamber 100 is controlled by a needle valve 103 that is mounted on a lever 104, which is mounted on a pivot 105 and has a float 106 mounted on the opposite end thereof from said needle valve, a universal joint being provided at 107 between the needle valve stem and the lever 104. A fuel bowl portion 108 is provided in the chamber 100, in which the liquid fuel 109 collects, the float controlling the level thereof so that the needle valve 103 will be opened when the liquid level reaches a slightly lower point than that shown in Fig. 8, and closes when the liquid level reaches the point shown in Fig. 8.

A chamber 110 is provided adjacent the chamber 100, a passage 111 providing communication between said chambers, and a partition 112 separating the same. The liquid level of the fuel 109 in the chamber 110 will be substantially that of the fuel in the chamber 100. Bearings 114 are provided in the wall 112 and wall 113, in which the ends of a shaft 15 rotate, said shaft 115 having mounted thereon a rotor 116, which is provided with vanes or blades 117 on the periphery thereof, said vanes or blades picking up some of the fuel as the same pass into the liquid 109 in the bottom of the chamber 110 as said rotor 116 is rotated in a manner to be described below.

Any suitable type of air cleaner 118 is provided, from which an air conduit 119 extends, said air conduit 119 passing into the chamber 110 by means of a suitable connection with a top plate 120 extending over the chambers 110 and 100, and secured in fluid-tight relation with the walls of said chambers by suitable securing elements 121. The top plate is provided with an inverted channeled portion 122, which is in communication with the conduit 119 at one end thereof and with a conduit 123 at the other end thereof, a substantially U-shaped passage 124 being provided within the inverted channeled portion 122, in which the rotor 116 operates, the blades or vanes 117 extending into said U-shaped passage 124. The conduit 123 is detachably connected with a nipple 125 extending from the casing 126 for an adjustable fuel inlet nozzle comprising an inner tubular portion 127 that screw-threadedly engages an internally threaded portion of the tubular casing portion 126 at 128 for adjustment thereof lengthwise of the casing 126.

A pair of diametrically opposed notches 129 are provided in the one end of the adjustable

nozzle member 127 for engagement with a screwdriver, or similar tool, access being had to said end of said member 127 by removal of the cap 130 detachably screw-threadedly engaging with the casing 126 of the nozzle. The opposite end of the nozzle is cut away at a plurality of points, as indicated at 131, to provide projecting portions 132 and notches 133 between said projecting portions, said nozzle having said projecting portions bent inwardly at an angle to provide a tapering end 134 engaging a beveled shoulder 135 on the casing 126 and having slots 133'. The nozzle can thus be contracted at its discharge end by screwing the slotted tapering portion 134 against the shoulder 135, thus providing an adjustable jet or nozzle for introduction of air and fuel vapor into the inlet chamber 136.

The character and direction of the stream of fuel vapor entering the chamber 136 can be varied by adjustment of the member 127 inwardly or outwardly by means of the screw-threads at 128. The nozzle is in a retracted position as shown in Fig. 8, being adapted to be advanced further into the casing, to decrease the opening therethrough. The important thing is to get an adjustment of the nozzle, whereby fuel is distributed so that the same amount of fuel vapor, or substantially the same amount of fuel vapor, enters the two inlet passages 137 that extend from the inlet chamber 136 into the rotor chamber 138. It will also be noted that the tubular member 127 has an opening 139 therein providing a passage into the same.

An opening is provided in the wall of the inlet chamber 136 that communicates with the interior of the tubular casing 126, and means is provided for controlling the size of said opening, and controlling the proportion of air and fuel vapor in said chamber 136, which means comprises a flap valve, or shutter member, 140, which is pivoted at 141 and which is provided with operating means comprising a crank 142, mounted in a chamber 143 that has a fluid-tight cover 144 thereon. Said crank is provided with a link 145 that connects the same with an apertured ear 146 on the flap valve 140, and is keyed on the shaft 147 to rotate therewith. Said shaft 147 also has a crank arm 148 exteriorly of the chamber 143, keyed thereto, to which a rod 149 is connected.

An air inlet passage 150 is provided, extending from the air cleaner 118 into the inlet chamber 136, the cover 120 extending over said inlet chamber and the securing members 121 being used for securing said cover member in fluid-tight relation to the walls of said chamber 136. A butterfly valve 151 controlling the size of the passage 150, is provided in said air inlet passage 150, the same having a shaft or operating member 152 that is pivotally mounted in the walls of the passage 150 and in a bracket 153 extending from a portion of the wall of the chamber 136. Said shaft 152 is provided with an angular end portion 154 serving as a crank, and an operating rod or wire 155 extends therefrom to any suitable point convenient to the operator of the engine, or other combustion means, having the combustion chamber to which the combustible mixture is to be supplied.

The rod 149 may be operated by means of the wire 155, or by any other operating member independently of said wire. In order that the flap valve 140 and the butterfly valve 151 may be operated in unison, a bracket member 156 may be provided that has a sleeve portion 157 pinned to the shaft 152, that has an ear 158 thereon, through which the rod 149 extends, said rod being secured in fixed adjusted position relative to said ear by means of the nuts 159 engaging the threaded end of said rod 149. It will be obvious that as the shaft 152 is rotated to open and close the butterfly valve, it will also actuate the flap valve 140 to open and close the same. Thus, when the butterfly valve is closed, the flap valve 140 will be closed, and thus when an engine with which the apparatus is utilized is operating under idling conditions there will be only a very narrow passage at 160 between the beveled end 161 of the flap valve 140 and the opening in the wall of the chamber 136 communicating with the casing 126 of the nozzle or jet, through which the fuel vapor enters. However, when said flap valve is unseated it will extend at an angular position across the chamber 136 under the control of the operator, and when in the dotted line position shown, will almost close the passage provided by said chamber from the passage 150 to the rotor.

The rotor provided in the rotor chamber 138 is a substantial duplicate of the rotor shown in Figs. 3, 4 and 7 of the drawings, and the same reference numerals are applied thereto as in said figures. The vanes or blades thereon have curved edges and the adjacent walls of the chamber 138 conform to the shape of the blades and have only mechanical clearance therefrom, in the same manner as described in connection with Figs. 1 to 7, inclusive, the partition, or disk-like portion, 27 terminating short of the peripheral annular wall of the chamber to provide passages 137, similar to the passages 45, shown in Fig. 3. The shaft 162 is secured to the hub 26 in the same manner as is the shaft 31. Said shaft 162 is provided with suitable ball bearings 163 mounted in the casing portions 164 and 165, a cover plate being provided at 166 to provide a fluid tight joint between the casing 164 and said cover plate. A housing 167 projects from the casing portion 165, the housing being made in two parts, which are clamped together in any desired manner in fluid tight relation, so as to permit assembly of the shaft 162 and the rotor in the rotor chamber 138, the joint between the two parts of the casing being indicated at 168. The shaft 162 has a bevel gear 169 thereon that meshes with a bevel gear 170 that is provided on a shaft 171, which is provided with suitable ball bearings 172, mounted in suitable recesses in the housing portion 167 and extending downwardly in a tubular extension 173 of said housing to any suitable means for rotating the same, such as any type of counter-shaft that may be driven from the engine supplied with fuel by my improved apparatus.

The casing of my apparatus terminates in a downwardly extending outlet chamber, or discharge chamber, 174, which is similar to the chamber 47 described in connection with the form of the invention shown in Figs. 1 to 7, inclusive, said chamber 174 being provided with a flange 175 for connecting the same in fluid-tight relation with a flange 176 on an inlet passage 177 leading to an intake manifold, or any other suitable means, for introducing a combustible vapor into a combustion chamber.

The rotation of the rotor in the rotor chamber 138 causes the mixture of air and fuel vapor to be drawn in through the inlet passages 137 into the rotor chamber 138, creating a suction both in the passage 150 and in the conduit 123. The suction created in the conduit 123 draws air

from the air cleaner 118 through the passage 119, into engagement with the blades or vanes 117, causing rotation of the rotor 116, which lifts up the liquid fuel on said vanes or blades, causing the same to be engaged by the stream of air and vaporized thereby, the vaporized fuel and air coming in engagement therewith passing through the conduit 123 into the nozzle 127 and out into the chamber 136, where it mingles with the air passing through the passage 150 to introduce additional air sufficient for complete combustion of the fuel. The chamber 136 and the passages 137 thus act as an intake manifold leading into the rotor chamber 138. The air and fuel vapor introduced into the rotor chamber is violently whirled or whipped about by the rotor, to finely divide, break up and vaporize the same to produce a substantially dry gaseous fuel in the same manner as described in connection with the form of the invention shown in Figs. 1 to 7, inclusive. The proportion of air and fuel vapor introduced into the inlet passages 137 is determined by the position of the flap valve 140. The nearer the valve is to the nozzle opening the greater the proportion of air supplied, as the less restricted the passage lengthwise through the chamber 136 will be. The greater the restriction of said passage through said chamber 136 the more air will be drawn through the passage 119 and the more rapidly the rotor 116 will rotate, picking up more fuel and thus supplying a richer mixture to the rotor in the chamber 138.

What I claim is:

1. In an apparatus for preparing a combustible mixture, an annular casing substantially symmetrical about a central plane perpendicular to the axis thereof, a rotor in said casing, said rotor being mounted for rotation on the axis of said casing, means on said rotor for partitioning said casing on substantially said central plane to provide a pair of substantially annular chambers in said casing on opposite sides of said partitioning means, vanes on said rotor on opposite sides of said partitioning means, the peripheral edge of said partitioning means being spaced from the peripheral wall of said casing, vanes projecting beyond the outer peripheral edge of said partitioning means, means for introducing air and a combustible fluid into said casing on opposite sides of said partitioning means, means for rotating said rotor to rotatively whip said air and combustible fluid about in said casing to intimately mix the same, and means for discharging said intimate mixture of combustible fluid and air from the periphery of said rotor from said casing.

2. In an apparatus for preparing a combustible mixture, an annular casing substantially symmetrical about a central plane perpendicular to the axis thereof and tapering gradually from adjacent the axis to the annular periphery thereof, a rotor in said casing, said rotor being mounted for rotation on the axis of said casing, means on said rotor for partitioning said casing on substantially said central plane to provide a pair of substantially annular chambers in said casing on opposite sides of said partitioning means, vanes on said rotor on opposite sides of said partitioning means, said vanes extending from substantially the axis of said rotor to the periphery thereof and tapering to conform to the tapering walls of said casing, and being inclined to the radial, means for rotating said rotor to rotatively whip said air and combustible fluid about in said casing to intimately mix the same, and means for discharging said intimate mixture of combustible fluid and air from the periphery of said rotor from said casing.

3. In an apparatus for preparing a combustible mixture, a casing having annular side walls converging from the center toward the periphery thereof to provide an annular chamber tapering from the axial center to the annular periphery thereof, a rotor mounted in said casing to rotate about the axis of said casing, said rotor having blades extending outwardly from near the center of rotation of said rotor to adjacent the periphery of said chamber, said blades tapering from the inner to the outer ends thereof and having side edges conforming substantially to the contour of said side walls, inlet means for introducing air and combustible fluid into said casing through said side walls, and a discharge passage for combustible mixture leading from said chamber adjacent the periphery of said rotor.

4. In an apparatus for preparing a combustible mixture, a casing having annular side walls converging from the center toward the periphery thereof to provide an annular chamber tapering from the axial center to the annular periphery thereof, a rotor mounted in said casing to rotate about the axis of said casing, said rotor having blades extending outwardly from near the center of rotation of said rotor to adjacent the periphery of said chamber, said blades tapering from the inner to the outer ends thereof and having side edges conforming substantially to the contour of said side walls, inlet means for introducing air and combustible fluid into said casing through said side walls into engagement with opposite sides of said rotor between the center and the periphery thereof, and a discharge passage for combustible mixture leading from said chamber adjacent the periphery of said rotor, said discharge passage being spaced more than 180 degrees in the direction of rotation of said rotor from said inlet means.

5. In an apparatus for preparing a combustible mixture, a casing having a pair of oppositely curved concave annular side walls converging from the center toward the periphery thereof to provide an annular chamber tapering from the axial center to the annular periphery thereof, a rotor mounted in said casing to rotate about the axis of said casing, said rotor having non-radial blades extending outwardly from near the center of rotation of said rotor to adjacent the periphery of said chamber, said blades tapering from the inner to the outer ends thereof and having curved side edges conforming substantially to the contour of said side walls, inlet means for introducing air and combustible fluid into said casing through said side walls on opposite sides of said rotor, and a discharge passage for combustible mixture leading from said chamber adjacent the periphery of said rotor.

6. In an apparatus for preparing a combustible mixture, a casing having annular side walls converging from the center toward the periphery thereof to provide an annular chamber tapering from the axial center to the annular periphery thereof, a rotor mounted in said casing to rotate about the axis of said casing, said rotor having a central wall dividing said chamber substantially centrally, said wall terminating in spaced relation to the annular periphery of said chamber, vanes on said rotor on opposite sides of said wall extending outwardly from near the center of rotation of said rotor to adjacent the periphery of said chamber, said vanes tapering from the inner

to the outer ends thereof and having side edges conforming substantially to the contour of said side walls, the vanes on opposite sides of said wall being staggered, inlet means for introducing air and combustible fluid into said casing through said side walls, and a discharge passage for combustible mixture leading from said chamber adjacent the periphery of said rotor.

7. An apparatus of the character described, comprising a disk-like rotor, non-radial agitator members on opposite faces of said rotor, an annular casing co-axial with the axis of rotation of said rotor, means for rotating said rotor about its axis in a direction such that the ends of said agitator members nearest the periphery of said rotor are back of the ends thereof nearest the axis of rotation of said rotor, said agitator members having edges conforming substantially to the shape of the adjacent casing wall and extending in close adjacency to said casing wall from near the center of said casing to the annular periphery thereof, means for introducing a combustible fluid and an air on both sides of said rotor between the ends of said agitator members, means for rotating said rotor at a speed to break up and thoroughly mix said combustible fluid and air, and means for discharging the combustible mixture substantially centrifugally from said casing.

8. An apparatus of the character described, comprising a disk-like rotor, non-radial agitator members on opposite faces of said rotor, an annular casing co-axial with the axis of rotation of said rotor, means for rotating said rotor about its axis in a direction such that the ends of said agitator members nearest the periphery of said rotor are back of the ends thereof nearest the axis of rotation of said rotor, said agitator members having edges conforming substantially to the shape of the adjacent casing wall and extending in close adjacency to said casing wall from near the center of said casing to the annular periphery thereof, said agitator members on opposite sides of said rotor being staggered and extending outwardly beyond the peripheral edge of said disk-like rotor, means for introducing a combustible fluid and air on both sides of said rotor between the ends of said agitator members, means for rotating said rotor at a speed to break up and thoroughly mix said combustible fluid and air, and means for discharging the combustible mixture substantially centrifugally from said casing.

9. In an apparatus for preparing a combustible mixture, an annular casing substantially symmetrical about a central plane perpendicular to the axis thereof and tapering gradually from adjacent the axis to the annular periphery thereof, a rotor in said casing, said rotor being mounted for rotation on the axis of said casing, means on said rotor for partitioning said casing on substantially said central plane to provide a pair of substantially annular chambers in said casing on opposite sides of said partitioning means, vanes on said rotor on opposite sides of said partitioning means, said vanes extending from substantially the axis of said rotor to the periphery thereof and tapering to conform to the tapering walls of said casing, and the vanes on one side of said rotor being staggered relative to the vanes on the other side thereof, means for rotating said rotor to rotatively whip said air and combustible fluid about in said casing to intimately mix the same, and means for discharging said intimate mixture of combustible fluid and air from the periphery of said rotor from said casing.

10. In an apparatus for preparing a combustible mixture, a casing, means for introducing air and a combustible material into said casing, rotatable means in said casing, and means for rotating said rotatable means, said casing having a discharge outlet, said rotatable means comprising a disk-like member of less diameter than said casing having means for creating a centrifugal whirl on opposite sides thereof and said casing having means for directing the air and combustible material centrifugally impelled by said rotatable means on one side of said disk-like means transversely across the periphery of said disk-like member into engagement with that centrifugally impelled by said rotatable means on the other side of said disk-like means.

11. In an apparatus for preparing a combustible mixture, a casing, means for introducing air and a combustible fluid into said casing, a rotor mounted in said casing, said rotor having means for partitioning said casing, vanes on said rotor on opposite sides of said partitioning means having edges lying adjacent the walls of said casing, means for rotating said rotor to rotatively whip said air and combustible fluid about in said casing to intimately mix the same, and means for discharging said intimate mixture of combustible fluid and air from said casing, said rotor and said casing wall being formed to throw the air and fluid on opposite sides of said rotor transversely across the periphery thereof.

12. In an apparatus for preparing a combustible mixture for combustion, a casing, means for introducing air and a combustible fluid into said casing, rotatable annular means extending centrally of said casing and dividing said casing into a pair of similar chambers on opposite sides of said dividing means but providing communication between the chambers formed thereby in said casing outwardly beyond the periphery of said dividing means and bladed means on opposite sides of said dividing means for creating a centrifugal whirl in each of said chambers, said casing walls and said bladed means cooperating to throw the centrifugally whirled contents of said chambers on opposite sides of said dividing means into violent engagement at the periphery of said rotatable annular dividing means.

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