June 19, 1945. A. J. RASCOV 2,378,864

CARBURETOR

Filed March 14, 1944 2 Sheets-Sheet 1

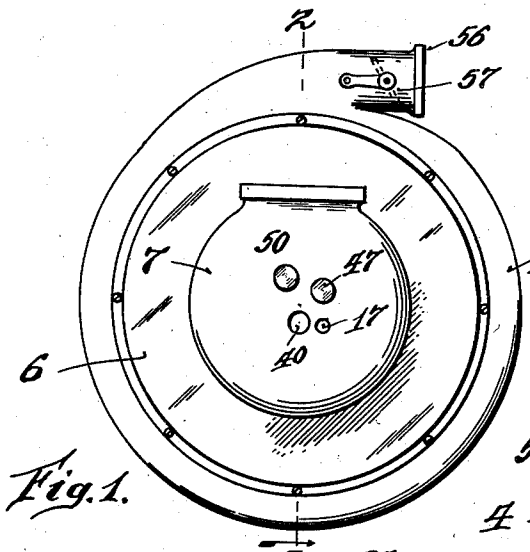


Fig. 1.

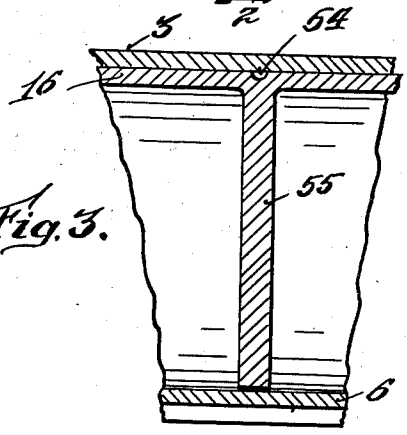


Fig. 3.

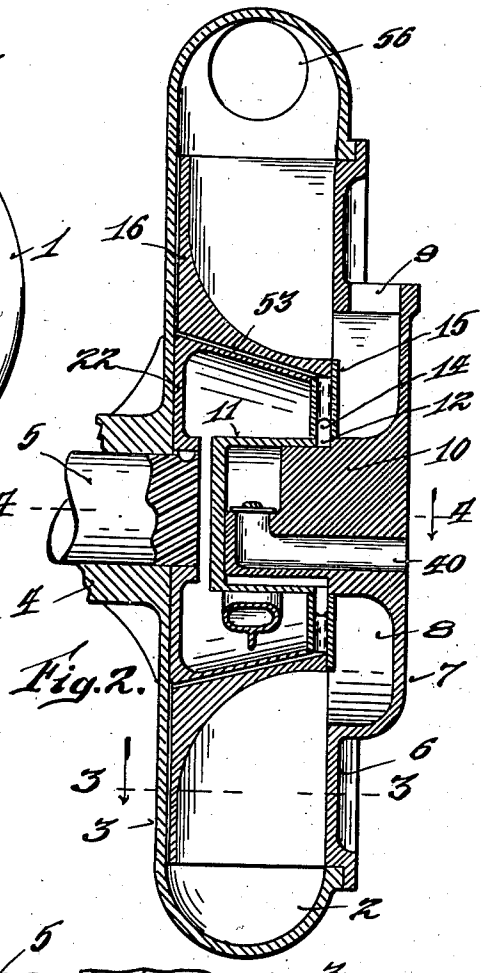


Fig. 2.

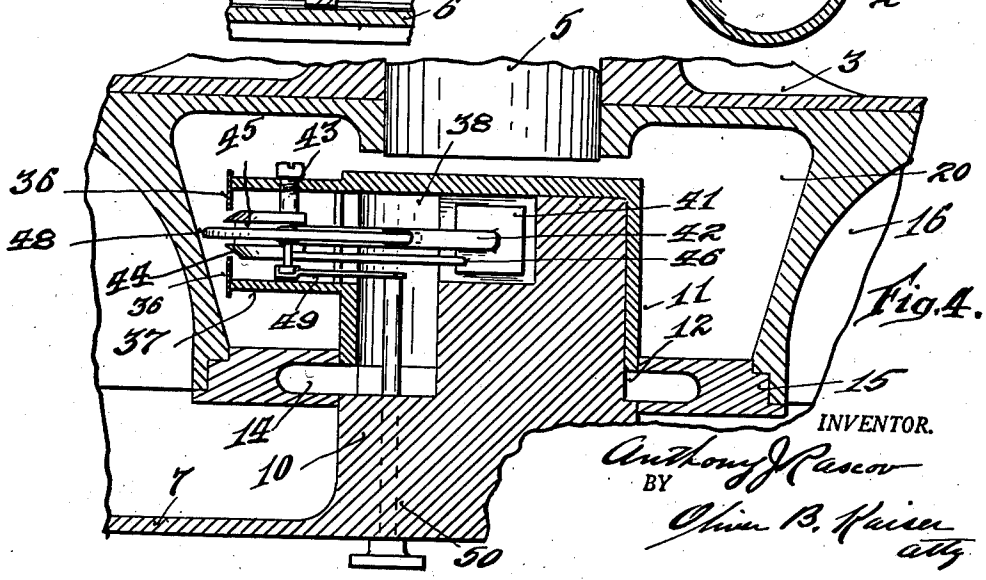


Fig. 4.

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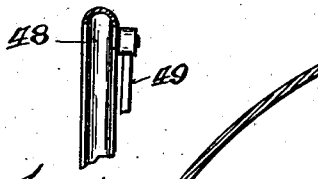


Fig. 8.

Fig. 5.

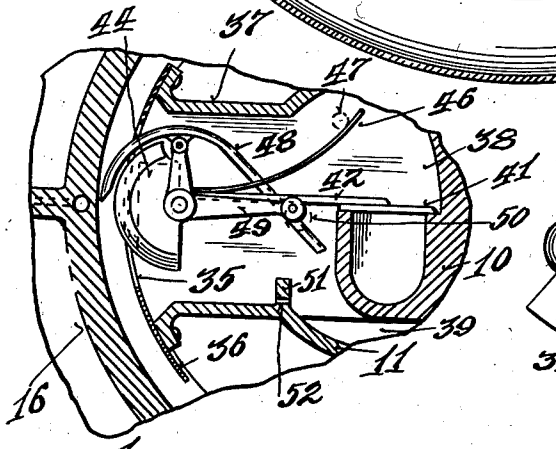


Fig. 7.

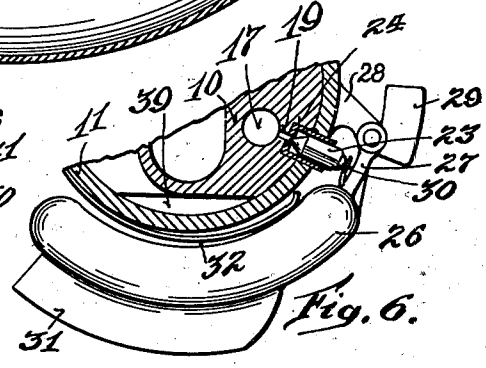


Fig. 6.

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2,378,864

CARBURETOR

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Application March 14, 1944, Serial No. 526,364

7 Claims. (Cl. 261—90)

This invention relates to an improved carburetor, primarily for use in connection with internal combustion engines, as the medium for vaporizing volatile hydrocarbon liquids and the mixing of air therewith in a preliminary treatment and for the carbureting of air for an engine fuel in its delivery to the engine chamber or chambers. The carburetor may be said to possess compound characteristics, exalted by centrifugal action producing improved and superior results, not possible by what may be termed a still type of carburetor conventionally employed.

An object of the invention is to provide an internal combustion engine carbureting apparatus as a duct for conducting air from the atmosphere to the engine with an impeller for inducting and moving air through the duct from the atmosphere to the engine and centrifugally introducing fuel into the duct for carbureting the moving air.

Another object is to provide a carburetor with an annular carbureting channel surrounding an impeller, the channel for conducting a combustible mixture to the engine and open to the atmosphere through the impeller, the impeller moving the vaporous products in the channel and jetting fuel therein to form a combustible mixture.

Another object is to provide a carburetor with a rotative turbinate cylinder forming a chamber for holding and maintaining a liquid fuel charging supply and for gyrating the liquid to promote and induce vaporization of the liquid fuel.

Another object is to provide a carburetor with a liquid fuel charging and gyrating chamber having a fuel mixing chamber disposed concentrically therein and in communication therewith and an annular channel concentrically about said charging chamber having an inlet open to the atmosphere and in connecting with a duct for conducting the combustible mixture to the engine, the channel in communication with the mixing chamber through an impeller exposed to the channel for inducing the influx and movement of the air in said channel and for jetting the fuel therein for carbureting the moving air.

Another object is to provide a carburetor within an inner liquid fuel charging chamber and an outer air carbureting chamber, the chambers in concentric arrangement, with an impeller interposed therebetween for gyrating the liquid fuel within the charging chamber to promote vaporization of the liquid fuel, to propel the air in said carbureting chamber and radiantly jet the fuel from said charging chamber into said carbureting chamber to carburet the propelled air.

Another object is to provide a carburetor of simple and compact structure having power driven rotative means incorporated therein for impulsively moving the liquid fuel to promote vaporization, cyclonically moving air from the atmosphere admitted into the carburetor and centrifugally discharging the fuel into the moving air for carbureting the same.

Various other features and advantages of the invention will be more fully set forth in the description of the accompanying drawings exemplifying a preferred embodiment and forming a part hereof, in which:

Figure 1 is a front elevation of the improved carburetor.

Figure 2 is an enlarged section taken on line 2, 2, Figure 1.

Figure 3 is an enlarged section taken on line 3, 3, Figure 2.

Figure 4 is an enlarged section taken on line 4, 4, Figure 2.

Figure 5 is a central vertical section through the carburetor.

Figure 6 is an enlarged detail section of the float operated valve, correspondingly as shown in Figure 5, for controlling the liquid fuel inlet into the vaporizing chamber.

Figure 7 is an enlarged detail section, illustrating in side elevation the counterbalanced valve for air intake into the mixing chamber and the beak for feeding liquid fuel into the mixing chamber, correspondingly as shown in Figure 5.

Figure 8 is an enlarged transverse section through the liquid fuel feeding beak.

Referring to the drawings, 1 indicates the casing of the carburetor, preferably circular in contour, and its setting will be described with its axis in a horizontal plane, stationing the casing vertically. The circular contour of the casing provides a peripheral or rim portion, interiorly forming annular channel or chamber 2, semi-circular in cross section. The rim at one side is joined, integrally, by a side wall 3, forming the body of the casing having a central hub 4, integral therewith and extending laterally from the exterior side, for journaling a shaft 5, entering into the casing, as the driving means for an impeller within and housed by the casing.

The opposite side of the casing provides an opening for the area within the semi-circular cross-sectional rim, to permit of the assembly insertion of the impeller and the opening is sealed by a circular closure cap or plate 6, annularly

fixed to the casing by a plurality of uniformly spaced screws. The closure plate 6, has a central boss 7, extending from its outer or exterior side providing an annular recess 8, within its inner side, having an air inlet opening 9, through the upper side of the boss. The inner side of the boss of the cover plate has a stud 10, extending centrally therefrom and projecting into the casing, coaxially with the shaft 5, to provide a journal for the impeller. The outer end portion of the stud 10, is counterturned and covered by a cap 11, slightly short of the length of the counterturn, the spacing between the end of the cap and adjoining shoulder of the stud formed by the counterturning, forming an annular channel 12, about the stud and intermediate of the length thereof. The annular channel 12, is in registry with an annular channel 14, radially within an end wall or flange 15, of the impeller 16, the wall having a journal support upon the cap and stud as a unit.

The stud 10, has a bore 17, longitudinally therein, as a liquid fuel supply duct into the carburetor, opening to the exterior side of the boss 7, for connecting a feed conduit 18, therewith. A radial or transverse port 19, in the stud and through the cap 11, communicatively connects the duct 17, with a cylindrical liquid fuel supply and vaporizing chamber 20, centrally and coaxially within the impeller 16, and annularly about the stud 10. The chamber 20, is formed by a cylindrical hub 21, of conical form, the flange or hub capping plate or end wall 15, and the opposite body wall 22, of the impeller and therefore concentrically surrounds the stationary stud 10, of the casing 1.

The port 19, is controlled by a check valve 23, housed within a valve casing 24, engaged and fixed into the stud 10. The regulating movement of the check valve 23, is governed by a float 26, within the liquid fuel accumulating portion of the chamber 20, having a supporting arm 27, extending from the rear end of the float and pivotally mounted upon a bracket 28, extending from the stud cap 11. The outer end of the float arm 27, carries a float counter balancing weight 29. The float arm 27, has a lip 30, extending from its inner edge for engagement with the outer end of the check valve 23.

The float 26, is of arc form longitudinally, to partially encompass the stud 10, which it underlies, thereby accommodates for a maximum arc of swing within the confines of the annular or cylindrical fuel supply and vaporizing chamber 20. The lower side of the float has a fin 31, projecting therefrom in line longitudinally of the float. The upper side of the float is engaged by a flat spring 32, fixed to the outer side of the stud cap 11, exerting its pressure to move the float outward in a valve opening direction and which is governed by the liquid level within the liquid accumulating portion of the chamber 20. The normal liquid level when the engine is stationary, is approximately as indicated by dotted line 33, in Figure 5. The spring serves to stabilize the float against undue quiver or vibration due to the turbulence and motivation of the liquid resulting from the rotative motion of the impeller of which the wall of the chamber 20, forms a part and upon and against which the liquid bears, and the fin of the float serves to balance the same against the motivated action of the liquid.

The liquid fuel as it is drawn or siphoned into the chamber 20, thus accumulates in a pool in the lower wall portion of the chamber, the pool shifting normally under the velocity of the revolving cylindrical wall or shell of the hub 21. The liquid therefore is constantly subjected to the turbinate action of the revolving cylindrical wall or the conical hub 21, of the impeller which sweeps beneath the pool sustained thereon, carrying a film of liquid fuel therewith, effecting a rapid vaporization thereof. The liquid of the film layer upon the cylindrical wall of the hub 21, is also conveyed or moved laterally thereover due to the centrifugal action and the radial inclination of the wall away from the axis toward the body wall 22, of the impeller.

The fuel vaporizing chamber is open to an induction port 35, through a curved plate 36, across the mouth of a snout 37, laterally extending from the periphery of the cap 11, and radially of the cylindrical wall of the hub 21. The curved plate 36, is concentric with the surface of the cylindrical wall of the hub 21, and slightly spaced therefrom, the spacing providing a passage for the film of liquid conveyed over the plate 36, and exposed to a mixing chamber 38, formed by the cap 11, and the cap enclosed end of the stud 10.

The outer end of the stud 10, within the enclosure of the cap 11, is notched to form an end wall of the mixing chamber 38, and at its lower side, with the cylindrical wall of the cap, a passage 39, in communication with the annular channel 12, and the registering annular channel 14, of the impeller.

An air inlet passage 40, longitudinally within the stud 10, adjoiningly to the liquid fuel inlet passage 17, is open to the atmosphere at the outer side of the boss of the carburetor casing and the opposite end of said air inlet passage 40, is in communication with the mixing chamber 38, controlled by a flap valve 41, within the mixing chamber 38.

The flap valve 41, has a stem 42, projecting therefrom and is pivotally mounted upon a pivot pin 43, journaled in a snout 37, of the cap 11. The stem 42, has a counterbalance weight 44, fixed upon its outer end. The weight 44, is a semi-spherical form and slightly protrudes through the induction port 35, and is centrally notched circumferentially to provide a channel 45, in its face side.

The flap valve 41, is yieldingly urged against its seat by a spring 46, having one end fixed to the valve stem 42, and its opposite end engages the end of a spring tension regulating rod 47, slidably engaged through the stud 10, to the exterior of the carburetor for accessibility and manual operation.

A hook-shaped needle or beak 48, having its underside of channel form is mounted upon the axis of the float and disposed within the central channel 45, in the forward side of the counter weight 44, with its free or pointed end directed downward opposing to the direction of rotation of the impeller. The leading or pointed end of the needle 48, therefore is exposed to the conveyed or moving film of liquid carried by the turbinate hub of the impeller for interception of a portion of the transgressing liquid to be picked up thereby and injected into the lateral passage 39. The liquid as it is intercepted by the needle moves under centrifugal force about and within the channel in its underside and annular tail extension thereof for delivery into the passage 39. The needle swings on the axis of the valve stem 43, and operates independent of the valve and its free end or point is on a horizontal diametric line through the support-

ing axis, in plane with the valve or its seat, at which position the needle is in a position of closest proximity to the surface of the revolving hub of the impeller, and any controlling movement thereupon shifts the beak or point end away from the inner surface of hub.

The needle is manually adjusted by a crank 49, within the mixing chamber 38, having a crank or eccentric connection with a rod 50, extending longitudinally through the stud 10, for accessibility from the front side of the carburetor casing.

As the mixing chamber 38, is constantly open to the liquid fuel and vaporizing chamber 20, through the induction port 35, some of the liquid fuel may splash or be inducted through the port, which is collected by and confined within a trough in the lower portion of the snout 37, formed by a flange or cross wall 51, gapping the inner end of the snout, the wall being of a heighth to extend above the level or plane of the lower extremity of the induction port 35. The wall, at its base is pierced, providing a minute duct or port 52, leading into the passage 39, at the base of the mixing chamber 38. Therefore the accumulation of liquid in the trough within the mixing chamber is limited, as any surplus will drain or flow back through the induction port 35, into the vaporizing chamber 20.

The aerated vapor from the mixing chamber under the action of the impeller is drawn from the passage 39, into the annular passage or chamber 14, in the front wall of the impeller, from whence it passes through a series of angular and radial ducts 53, for a jetting or dispersing centrifugal discharge of the aerated vapor from the perimeter of the impeller into the annular channel 2, within the carburetor casing. The radial portion of the ducts 54, are formed by kerfs or grooves cut into the outer surface of the rear wall 22, of the impeller. The ducts 54, are preferably in symmetric arrangement, uniformly spaced and in alignment, each with a respective radial vane 55, of the impeller.

The impeller comprises a plurality of uniformly spaced vanes 55, extending radially of and laterally from the inner face side of the rear or body wall 22, and periphery of the hub or cylindrical shell 21, the wall and hub merge in a curved surface for the base of the spacing between the vanes. The spacing between the vanes toward the axis of the impeller is in communication with the annular recess or air chamber 8, within the inner side of the boss centrally of the front side of the carburetor casing, while the opposite or outer end is in communication with annular air chamber 2, of the casing.

The impeller draws or siphons the air towards its axis and discharges it centrifugally into the annular chamber 2, from whence after being carbureted with the gaseous vapor it is conveyed through the discharge passage 56, opening eccentrically into the annular chamber 2, to an engine cylinder or manifold. The discharge passage 56, is controlled by a butterfly valve 57, having its axis extending through the casing for making an actuating connection therewith.

In a starting period of the engine, the impeller, in a transmission connection with the engine, rotates at a comparatively slow or reduced rate of speed, sufficient, however to cause a forward shifting or surging of the liquid pool in the base of the annular liquid fuel vaporizing chamber 20, resulting in a spill of liquid through the induction port 35, into the trough within the mixing chamber 38, and a seepage discharge through the duct 52, into the passage 39, at the base of the mixing chamber 38. From the passage 39, the fuel is subjected to more violent action of the impeller and centrifugally injected into the carbureting chamber or channel 2, for mixing with the air induced into said chamber by the impeller, from whence the combustible mixture is forcibly delivered to the engine, the influx being augmented by the action of the engine.

The carburetor, independent of any momentum or centrifugal action instituted therein, and in a relatively static capacity is effective for supplying fuel to the engine in accordance with the ordinary principles of a conventional carburetor, aside from any increased or beneficial results obtained in a delivery of fuel into the major carbureting chamber 2, issuing therein in radiant lines, as distinguished from a single needle controlled point.

The liquid fuel admission controlling float 26, with the carburetor in a dry state, is in full open check valve controlling position for a siphoning of the liquid fuel into the vaporizing chamber 20, and the valve regulatively moved to its closed position and seated when the minimum liquid fuel level is reached. Any forward surging of the liquid pool resulting from the rotation of the cylinder of the impeller may cause a slight deflection on the float and opening of the valve and also to compensate for fuel consumption, its control being automatic as governed solely by the liquid level within the vaporizing chamber. As the velocity of the impeller increases, a material increase results in the radiant discharge of the fuel, correspondingly there is a coordinated increase in the volume of fuel vaporization, as the liquid fuel is carried in a film upon the rotative surface of the hub or cylindrical shell of the impeller, together with the turbulent action administered to the liquid. This permits the use of a lower octane grade of liquid fuel.

The pressure within the vaporizing chamber 20, will cause an opening of the air intake controlling flap valve 41, unless interfered with by the positive control through the application of excessive pressure of the spring 46, for a preliminary mixing of the vaporized fuel and air. Any rarefication of atmosphere, as upon reaching higher altitudes, pressure against the air valve is diminished permitting the valve to move in a closing direction, correspondingly reducing the volume of air admitted and mixed with the vaporized fuel within the mixing chamber 20, thereby materially altering the specific gravity of the vapor.

The carburetor provides an exceedingly compact structure, easily assembled, with the automatic control elements all mounted upon the cover of the casing and unitary therewith. The carburetor may be said to possess three chambers, fuel interconnected and in concentric arrangement, with a mixing chamber centrally thereof and surrounded by an annular liquid fuel holding and vaporizing chamber formed by the cylindrical hub of an impeller and therefore rotative therewith for influencing the contents of the chamber formed thereby. The vaporizing chamber is in communication with the central mixing chamber for the admission of both vapor and liquid fuel into the mixing chamber. A third

annular carbureting chamber surrounds the vaporizing chamber with the impeller interposed between said chambers. The impeller serves a compound function, as for the administration of air and radiant jetting of the fuel into the carbureting chamber.

Having described my invention, I claim:

1. Internal combustion engine carbureting apparatus which includes a duct for connection to the engine for conducting air from the atmosphere to the engine, an impeller for moving air in said duct from the atmosphere to the engine and for jetting fuel into the duct for carbureting the moving air therein, a valve for regulating the passage of combustible mixture from said carbureting apparatus to the engine, a liquid fuel charging chamber within the hub of the impeller, the hub providing a turbinating surface for the liquid fuel for vaporization thereof, said chamber in conduit connection through the impeller with said duct for jetting the fuel therein, and a float actuated check valve for controlling the liquid fuel feed into said chamber, having its float within said chamber, controlled by the liquid level supply therein.

2. Internal combustion engine carbureting apparatus which includes a duct for connection to the engine for conducting air from the atmosphere to the engine, an impeller for moving air in said duct from the atmosphere to the engine, a valve for regulating the passage of combustible mixture from said carbureting apparatus to the engine, a liquid fuel charging chamber within the hub of the impeller, the hub providing a turbinating surface for the liquid fuel for vaporization thereof, said chamber in conduit connection with said duct for introducing the fuel therein to carburet the moving air, and a float actuated check valve for controlling the liquid fuel feed into said chamber, having its float within said chamber, controlled by the liquid level supply therein.

3. Internal combustion engine carbureting apparatus which includes a duct for connection to the engine for conducting air from the atmosphere to the engine, an impeller for moving air in said duct from the atmosphere to the engine, a valve for regulating the passage of combustible mixture from said carbureting apparatus to the engine, a liquid fuel charging and vaporizing chamber within the hub of the impeller, the hub providing a turbinating surface for the liquid fuel for vaporization thereof, a float actuated check valve for controlling the liquid fuel feed into said chamber having its float within said chamber controlled by the liquid level supply therein and a mixing chamber in communication with said liquid fuel vaporizing chamber and having a valve controlled opening to the atmosphere for the admission of air therein, said mixing chamber in communication with said duct for introducing the air mixed fuel therein.

4. Internal combustion engine carbureting apparatus which includes a duct for connection to the engine for conducting air from the atmosphere to the engine, an impeller for moving air in said duct from the atmosphere to the engine and for jetting fuel into the duct for carbureting the moving air therein, a valve for regulating the passage of combustible mixture from said carbureting apparatus to the engine, a liquid fuel charging and vaporizing chamber within the hub of the impeller, the hub providing a turbinating surface for the liquid fuel for vaporization thereof, a float actuated check valve for controlling the liquid fuel feed into said chamber having its float within said chamber controlled by the liquid level supply therein and a mixing chamber in communication with said liquid fuel vaporizing chamber and having a valve controlled opening to the atmosphere for the admission of air therein, said mixing chamber in communication with said duct through the impeller for jetting the fuel therein.

5. A carburetor for internal combustion engines, comprising: a casing, an impeller journaled within the casing having a plurality of radial vanes, the casing forming an annular channel about the impeller and having a duct extending tangentially from the channel and in communication therewith for conducting the combustible mixture to the engine, the channel, through the spacing between the radial vanes of the impeller in communication with the atmosphere through an air inlet port in the casing, the impeller having a hub providing a liquid fuel charging chamber, a section of the casing protruding into said hub and providing a journal support therefor and having a mixing chamber therein in communication with said charging chamber, air and liquid fuel intake ducts in said casing section respectively in communication with said mixing and charging chambers and ducts in said impeller for communicatively connecting said mixing chamber and annular channel for centrifugally jetting the fuel into said annular channel for carbureting the moving air therein.

6. A carburetor for internal combustion engines, comprising: a casing, an impeller journaled within the casing having a plurality of radial vanes, the casing forming an annular channel about the impeller and having a duct extending tangentially from the channel and in communication therewith for conducting the combustible mixture to the engine, the channel, through the spacing between the radial vanes of the impeller, in communication with the atmosphere through an air inlet port in the casing, the impeller having a hub providing a liquid fuel charging chamber, a section of the casing protruding into said hub and providing a journal support therefor and having a mixing chamber therein in communication with said charging chamber, air and liquid fuel intake ducts in said casing section respectively in communication with said mixing and charging chambers and ducts in said impeller for communicatively connecting said mixing chamber and annular channel for centrifugally jetting the fuel into said annular channel for carbureting the moving air therein, a float actuated check valve for controlling the liquid fuel feed into said charging chamber, the float for said check valve within said charging chamber for governing its valve actuating movement by the liquid volume level in said chamber.

7. A carburetor for internal combustion engines, comprising: a casing, an impeller journaled within the casing having a plurality of radial vanes, the casing forming an annular channel about the impeller and having a duct extending tangentially from the channel and in communication therewith for conducting the combustible mixture to the engine, the channel, through the spacing between the radial vanes of the impeller, in communication with the atmosphere through an air inlet port in the casing, the impeller having a hub providing a liquid fuel charging chamber, a section of the casing pro-

truding into said hub and providing a journal support therefor and having a mixing chamber therein in communication with said charging chamber, air and liquid fuel intake ducts in said casing section respectively in communication with said mixing and charging chambers and ducts in said impeller for communicatively connecting said mixing chamber and annular channel for centrifugally jetting the fuel into said annular channel for carbureting the moving air therein, a float actuated check valve for controlling the liquid fuel feed into said charging chamber, the float for said check valve within said charging chamber for governing its valve actuating movement by the liquid volume level in said chamber, and a pressure actuated valve within said mixing chamber, for regulating the passage of air from said air intake into the mixing chamber.

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