March 4, 1924.

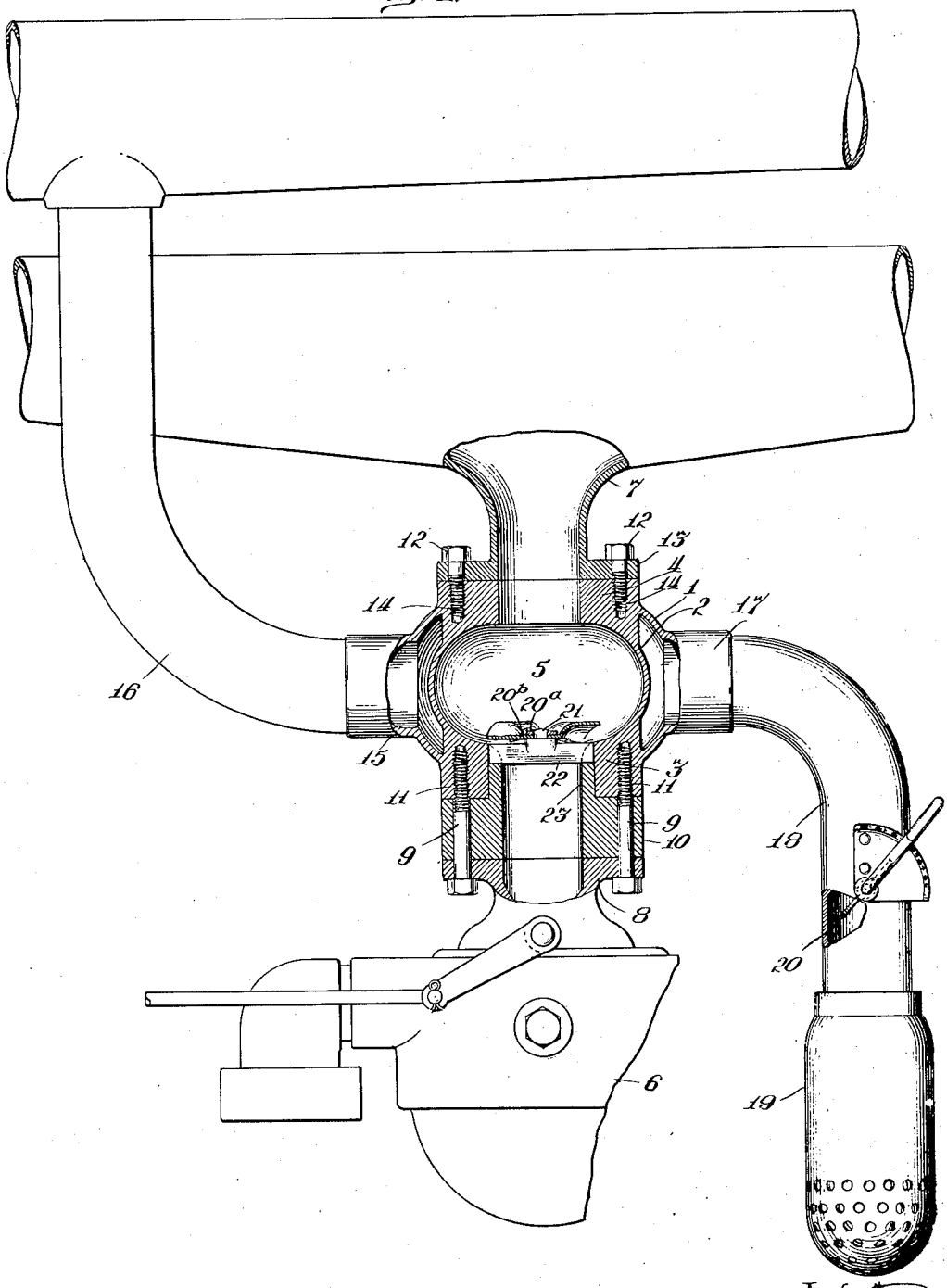
1,485,927

K. D. HOLLAND

VAPORIZING DEVICE

Filed Jan. 8, 1920 2 Sheets-Sheet 1

Fig. 1.



Inventor

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Fig. 2.

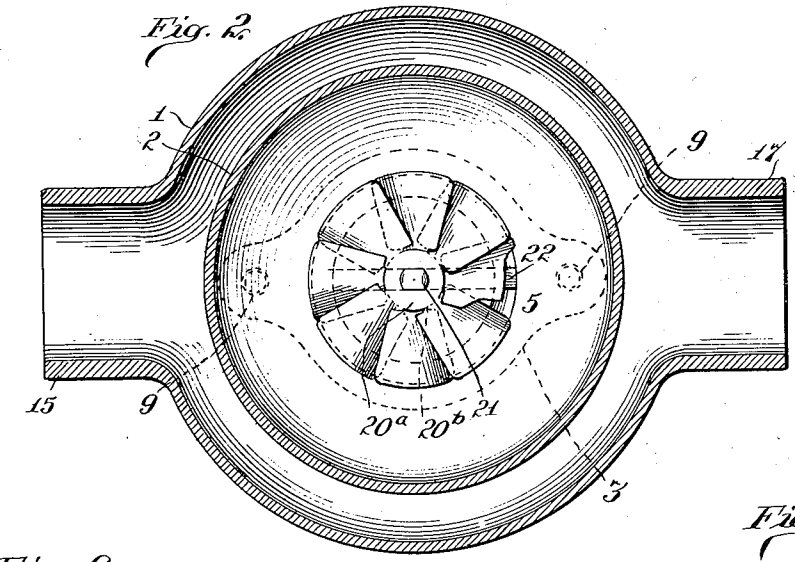


Fig. 5.

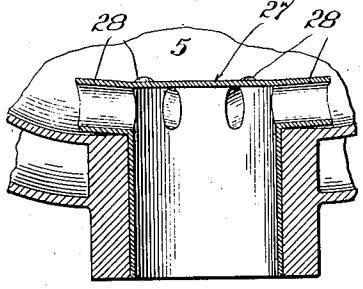


Fig. 6.

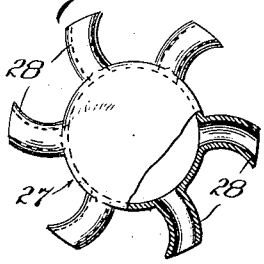


Fig. 4.

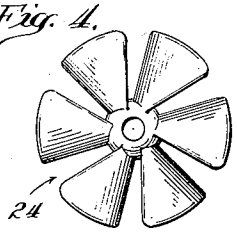
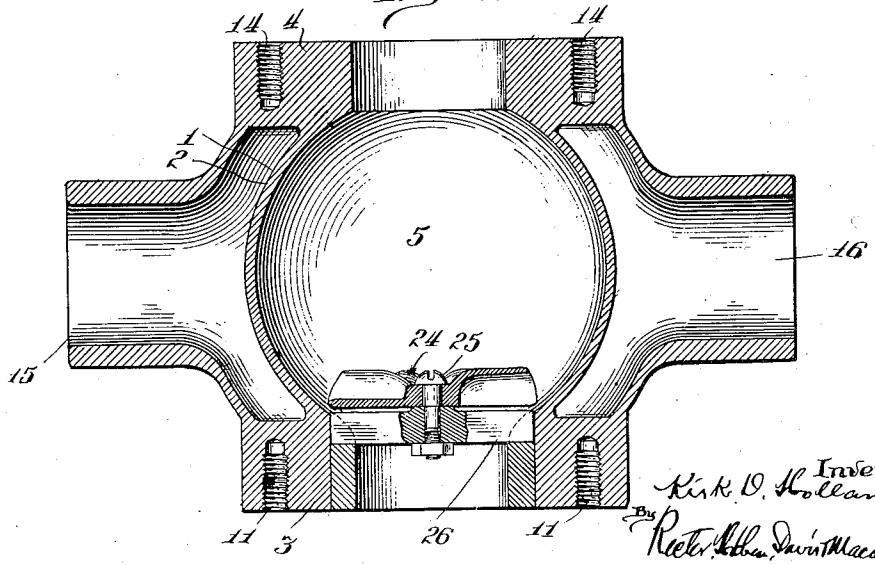


Fig. 3.



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Patented Mar. 4, 1924. 1,485,927

UNITED STATES PATENT OFFICE.

KIRK D. HOLLAND, OF CHICAGO, ILLINOIS.

VAPORIZING DEVICE.

Application filed January 8, 1920. Serial No. 350,143.

To all whom it may concern:

Be it known that I, KIRK D. HOLLAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Vaporizing Devices, of which the following is a specification.

My invention relates to a device designed to be interposed in the intake passage of a gasoline engine between the carbureter and the engine cylinders, and which has for its object the complete vaporization of the heavier components of the fuel, which otherwise would enter the explosion chamber in the form of liquid particles. It is well known that most of the liquid fuel now commercially sold as "gasoline" for use in automobile engines and other motors contains a relatively higher percentage of the heavier hydrocarbons, such as kerosene, than was formerly the case, and that with the various forms of carbureters in general use these heavier constituents of the fuel charge are only atomized and in large part are not volatilized, and therefore pass from the carbureter into the intake manifold and engine cylinders in the form of minute, liquid particles which collect upon the walls of the cylinder and mix with the oil used for lubricating purposes, thus being lost to the explosive mixture and acting to dilute the oil used for lubricating purposes. The object of my invention is the production of a highly efficient vaporizing device which will act to permit the vaporized or gaseous portion of the mixture issuing from the carbureter to pass to the intake manifold without impinging on heated surfaces and being rarified,—thus reducing its volumetric efficiency,—but which will cause the liquid particles to be thrown against heated walls where they will be volatilized and then pass with the first-mentioned unheated gas portion into the intake manifold and combustion chambers of the engine. With this object in view I have designed and invented the novel vaporizing device hereinafter described, and which is illustrated in certain figures of the accompanying drawings and which constitutes a preferred form of my invention, and have also devised certain modified forms of my invention which are shown in other figures.

In the appended claims I have more particularly pointed out the essential elements of my invention, it being understood, however, that still other modifications, besides those shown, are possible within the spirit of my invention and the scope of the claims.

In the drawings, Figure 1 is a view showing in vertical section the preferred form of my novel vaporizing device, connected to a carbureter and intake manifold of well-known form, portions of the associated parts being shown in elevation; Fig. 2 is a horizontal section through the center of the device; Fig. 3 is a central vertical section of a modified form of my invention; Fig. 4 is a plan view of the deflecting fan member of the same, detached; and Figs. 5 and 6 are respectively a sectional view of a portion of the inlet side, and a top plan view of the deflecting member of a second modification of my invention.

The same reference characters indicate the same parts in all the figures of the drawing.

As shown in Fig. 1, the casing of my vaporizing device is formed with double walls, the outer wall 1 and inner wall 2 uniting at the inlet side of the device to form a short tubular partition, or neck 3, and being joined at the outlet side by a similar tubular neck 4. The chamber 5 within the inner wall 2 of the device is in communication through the neck 3—adjacent which is arranged a deflecting member, hereinafter described—with the carbureter 6, and is in open communication, through the neck 4, with the intake manifold 7 of the engine. In the present instance the device is secured to the upper flange 8 of the carbureter by means of bolts 9 passing through a spacing block 10 and engaging screw-threaded sockets 11 formed in solid portions of the body of the vaporizing device adjacent the neck 3, and the outlet side of the device is secured to the intake manifold by headed bolts 12 engaging an orificed flange 13 at the lower end seated in screw sockets 14 formed in the casing body adjacent the neck 4.

On opposite sides the outer wall 1 of the casing is extended to form tubular hub connections, one of which, marked 15 on the drawings, provides an opening through which the hollow space between the walls 1 and 2 of the casing communicates with a pipe 16 which is in communication with the exhaust manifold or exhaust passage of the engine. The opposite flange, marked 17, is in the present instance connected through a pipe 18 to a muffler 19, and a damper 20 is provided in the pipe 18 to control the amount of heated gases permitted to pass through the connected passages.

Adjacent the inlet side of the device and in axial alignment with the carburetor outlet is arranged a deflecting member arranged to impart a circular or whirling movement to carbureted mixture entering the chamber 5. In the preferred form of my invention shown in Figs. 1 and 2, this deflector, marked 20 as a whole as helicoidal blades formed which impart the desired whirling or spiral movement to the fuel mixture. The outer or upper edge of each blade extends to or slightly overlaps the plane of inner edge of the adjacent blade in order that there may be no direct path between the blades and that every particle of the mixture may be acted upon. For convenience in manufacture and assemblage, the deflector is in the present instance composed of two sheet metal members 20^a and 20^b, each having the same number of blades and mounted with their blades in staggered relation. These sheet metal deflector members are both formed with a non-circular central perforation through which they are secured to an upset lug 21 projecting from a cross-bar 22, the ends of which bar are frictionally seated in opposite notches formed in a ring 23 tightly fitted within the bore of the partition 4. The parts of the deflector structure may either be rigidly secured together and mounted in the casing through the frictional engagement of the parts described, or if desired, for greater security, may be brazed or otherwise rigidly connected.

It will be noticed that while the stream of carbureted mixture is given a whirling movement, the passage-way within the device is not constricted, but on the contrary is enlarged in the form of an open, unobstructed chamber. The suction through the outlet of the chamber therefore tends to draw the vaporized or gasified contents of the mixture in a whirling column extending in a direct line across the chamber from the fan to the outlet, while the heavier particles of liquid fuel, which are merely commingled with and carried along by the gaseous stream and are not so directly subject to the influence of the suction, are separated by centrifugal action from the main central stream and pass tangentially through the gases toward and against the heated inner wall 2 which constitutes the side of the chambers and there vaporized. The resulting vapor is then drawn by suction into and mingled with the previously vaporized unheated portion of the stream and passes out of the outlet opening into the engine manifold. Since the deflector is supported at the center of a narrow cross-bar at the inlet of the device it is, so far as effective heating action is concerned, out of conductive relation to the heated wall of the chamber, and because of this fact and because of the unobstructed path to the outlet within the chamber, the gaseous portion of the mixture, including the air and that portion of the fuel which has already been vaporized by the carburetor, is therefore heated but very slightly in passing through the device, and the temperature of the completely vaporized explosive mixture passing to the engine cylinders, now containing the liquid particles vaporized in the device, is not increased to such an extent as to materially reduce its volumetric efficiency.

In the modified form of my invention illustrated in Figs. 3 and 4 of the drawings, I have provided a one-piece rotating deflector 24 which is pivoted upon a headed pivot 25 having a reduced threaded lower portion engaging a socket in a cross-bar 26 which may be supported in the casing, as illustrated, in the same manner as the cross-bar 22 of the preferred form of my invention before described.

In this form of my invention, as in the preferred form previously described, the deflector member produces an unobstructed central whirlpool extending directly across the chamber from the fan member to the outlet orifice, the liquid particles being thrown tangentially against the chamber wall by momentum, and the gaseous portion of the mixture winnowed out from such particles through engine suction.

In the form of my invention shown in Figs. 5 and 6, the member which imparts a whirling motion to the carburetor mixture consists of a shell or bushing 27 fixed inside the wall 3, this shell being closed at its inner end and provided with a plurality of laterally extending curved nozzles 28. While in this form of my invention the stream of carbureted mixture entering from the carburetor is subdivided and directed laterally, yet the deflecting member has the effect of producing a circular eddy at the entrance of the central chamber of the device, and the suction through the outlet orifice immediately draws the vaporized portion of the charge directly toward the outlet while the momentum of the liquid

particles dashes them against the heated inner wall of the casing resulting in a vaporization of the liquid particles and a relatively direct unheated flow of the initially gaseous portion of the mixture similar to that which takes place in the forms of my invention already described.

While my novel vaporizing device is designed primarily for use upon engine employing as fuel the mixture of lighter and heavier hydrocarbons commercially supplied as gasoline, it will be understood that it may be applied to engines employing other and heavier grade of fuel which are either partly atomized and partly vaporized, or are atomized only, by means of a suitable carbureting device, the capacity of the device and the amount of heat supplied to it being increased according to the density of the fuel.

I claim:

1. A vaporizing device for hydrocarbon engines comprising a casing formed with an inner chamber having an inlet communicating with the carburetor and an outlet communicating with the inlet passage of the engine and formed also with an exhaust vapor jacket in communication with the exhaust passage of the engine and surrounding said inner chamber, and a deflector arranged adjacent the inlet of said chamber and arranged to produce a whirling motion in a column of carbureted mixture extending across said chamber from said inlet to said outlet and surrounding the axis of such chamber, the heated wall of said chamber expanding laterally intermediately of said inlet and outlet to form an enlargement of the passageway around said whirling column and the chamber being unobstructed forwardly from the plane of said deflector.

2. A vaporizing device for hydrocarbon engines comprising a casing formed with an inner chamber having an inlet communicating with the carburetor and an outlet communicating with the inlet passage of the engine and formed also with an exhaust vapor jacket in communication with the exhaust passage of the engine and surrounding said inner chamber, and a deflector arranged adjacent the inlet of said chamber and having stationary helicoidal blades arranged to produce a whirling motion in a column of carbureted mixture extending across said chamber from said inlet to said outlet and surrounding the axis of such chamber, the heated wall of said chamber expanding laterally intermediately of said inlet and outlet to form an enlargement of the passageway around said whirling column and the chamber being unobstructed forwardly from the plane of said deflector.

3. A vaporizing device for hydrocarbon engines comprising a casing formed with an inner chamber having an inlet communicating with the carburetor and an outlet communicating with the inlet passage of the engine and formed also with an exhaust vapor jacket in communication with the exhaust passage of the engine and surrounding said inner chamber, and a deflector arranged adjacent the inlet of said chamber, in alignment with said inlet and said outlet thereof and having deflecting blades arranged to direct the carbureted mixture in the form of a whirling column extending across said chamber between said inlet and outlet and surrounding the axis of such chamber, the heated wall of said chamber expanding laterally intermediately of said inlet and outlet to form an enlargement of the passageway around said whirling column and the chamber being unobstructed forwardly from the plane of said deflector.

4. A vaporizing device for hydrocarbon engines comprising a casing formed with a rounded inner chamber having an inlet communicating with the carburetor and a diametrically opposite outlet communicating with the inlet passage of the engine and formed also with an exhaust vapor jacket in communication with the exhaust passage of the engine and surrounding said inner chamber, and a deflector arranged adjacent the inlet of said chamber, and arranged to produce a whirling motion in a column of carbureted mixture extending across said chamber from said inlet to said outlet and surrounding the axis of such chamber, the heated wall of said chamber expanding laterally intermediately of said inlet and outlet to form an enlargement of the passageway around said whirling column and the chamber being unobstructed forwardly from the plane of said deflector.

5. A vaporizing device for hydrocarbon engines comprising a casing formed with an oblately spheroidal inner chamber having axially arranged an inlet communicating with the carburetor and an outlet communicating with the inlet passage of the engine and formed also with an exhaust vapor jacket in communication with the exhaust passage of the engine, and a deflector arranged axially of said chamber adjacent the inlet thereof and arranged to direct the carbureted mixture in the form of a whirling column extending across said chamber between said inlet and outlet and surrounding the axis of said chamber, said chamber being unobstructed between said deflector and outlet.

6. A vaporizing device for hydrocarbon engines comprising a casing formed with an inner chamber having an inlet communicating with the carburetor and an outlet communicating with the inlet passage of the engine and formed also with an exhaust

vapor jacket in communication with the exhaust passage of the engine and surrounding said inner chamber, and a deflector in said chamber adjacent the inlet thereof supported out of effective heat-conductive relation to the heated chamber wall adjacent such inlet, such wall expanding laterally intermediately of said inlet and outlet to constitute an enlargment of the passageway at such chamber and the chamber being unobstructed forwardly from the plane of said deflector and such deflector, having inclined blades arranged to direct the carbureted mixture in the form of a whirling column extending across said chamber between said inlet and outlet and surrounding the axis of such chamber.

KIRK D. HOLLAND.