July 24, 1928. 1,678,045

W. H. HILL

FUEL VAPORIZER

Filed July 16, 1925

Fig. 1.

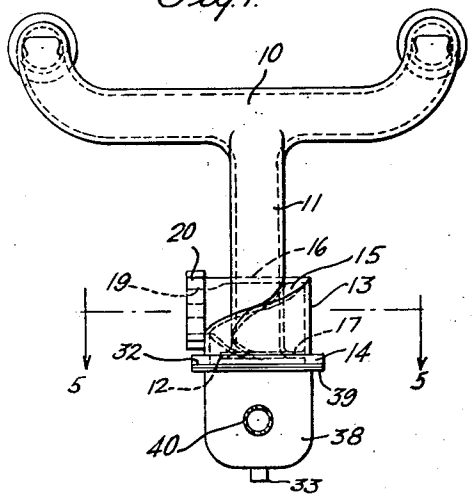


Fig. 2.

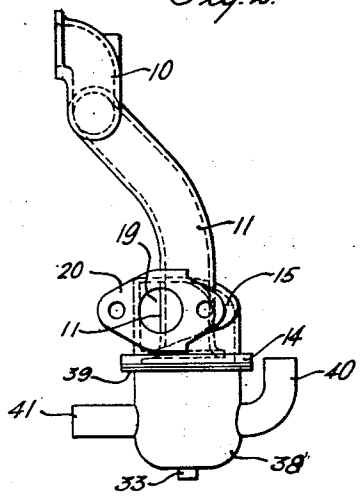


Fig. 3.

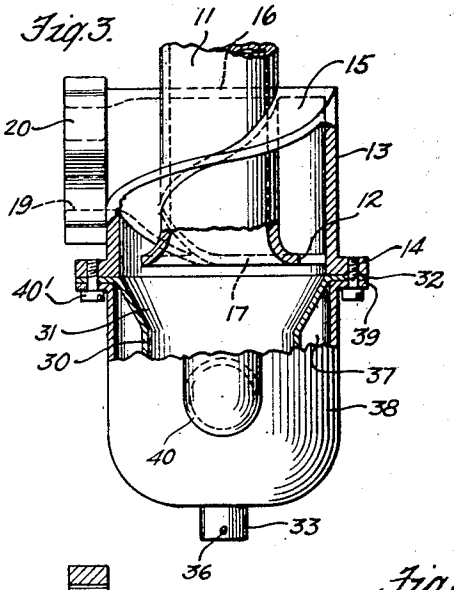


Fig. 4.

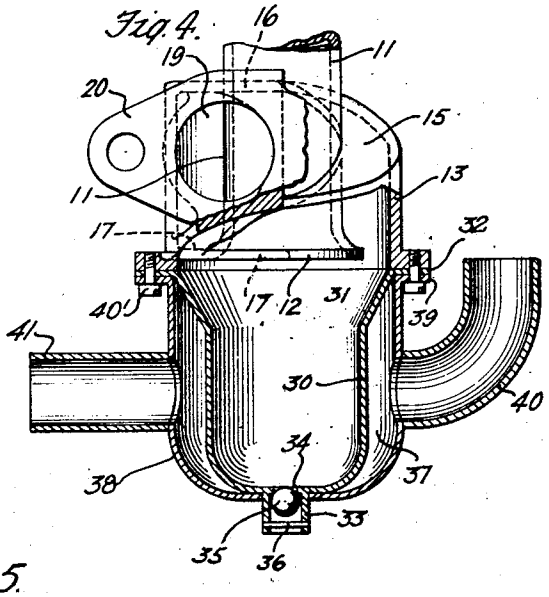
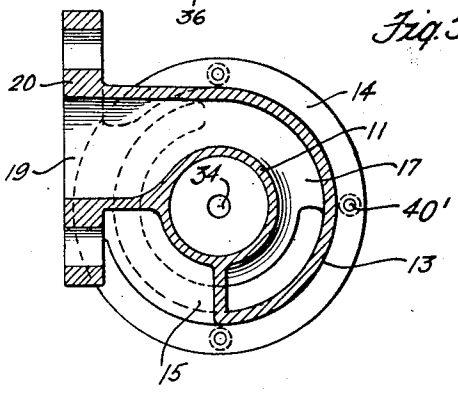


Fig. 5.



INVENTOR

WILLIAM H. HILL

BY Newell & Spencer.

ATTORNEY

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UNITED STATES PATENT OFFICE.

WILLIAM H. HILL, OF CANTON, OHIO.

FUEL VAPORIZER.

Application filed July 16, 1925. Serial No. 43,958.

This invention relates to new and useful improvements in liquid fuel vaporizers, of the type set forth in my prior Patents Nos. 1,436,099, 1,436,100, and 1,599,131, in each of which the ultimate object of the invention is completely to volatilize the fuel supplied to an internal combustion motor, and particularly fuel which has been partially volatilized by the action of a carburetor or other type of charge-forming device employed for proportionately mixing atomized fuel and air to provide a combustible charge for the motor.

The invention aims particularly to facilitate the manufacture and thereby reduce the cost of production of liquid fuel vaporizers utilizing some or all of the principles of operation set forth in my previous patents hereinbefore mentioned, to the end that such fuel-saving devices may be available to a larger proportion of the automobile-using public.

The invention aims further to provide a new and improved device of this character which is constructed in such manner that the heating and the volatilization of the fuel to be volatilized is effected more rapidly than in my prior devices heretofore mentioned, and yet with safety and without liability to cracking of the fuel constituents.

The invention further contemplates the provision of a relatively larger reservoir for the storage of unvolatilized fuel during the warming-up period of operation of the motor, as well as during the operation of the motor.

A still further object of the invention resides in the construction whereby any volatilized combustible mixture coming from the carburetor passes to the motor without entering the zone of high heat of the vaporizer, thus preventing combustion or explosion of the combustible mixture previous to its delivery to the motor.

With the above and other objects in view, reference is had to the accompanying drawings in which,

Fig. 1 is a front elevation of an intake manifold having a device constructed in accordance with the present invention attached thereto;

Fig. 2 is a side elevation thereof;

Fig. 3 is a front elevation, partly broken away to show the interior construction, of a device constructed in accordance with the present invention;

Fig. 4 is a vertical section in a plane at right angles to Fig. 3; and

Fig. 5 is a horizontal section on the line 5—5 of Fig. 1.

Referring more specifically to the drawing, the reference numeral 10 designates the intake manifold of an internal combustion motor which may be of the ordinary type and which has a depending leg 11 which forms the inlet thereof. The lower end of the leg 11 of the intake manifold is flared to provide a bell-shaped or flanged extremity 12.

Enclosing the lower flared extremity 12 of the leg 11 of the inlet manifold is a chamber 13, preferably cast integral with said leg 11. This chamber has an open lower side defined by a flange 14. The wall 15 of this chamber 13 has an upper straight portion 16 and a lower straight portion 17. Between this upper straight portion 16 and the lower straight portion 17, the wall 15 extends downwardly around the leg 11 of the intake manifold in a helical path, thus providing a chamber or passage which is gradually reduced in cross-sectional area from one end to the other. Opening into this chamber at a point beneath the upper straight portion 16 there is an inlet 19, the outer end of the inlet 19 being flanged, as at 20, to provide for attachment of the device to the carburetor or other suitable charge-forming device.

So far as described, the device operates as follows: Vaporized fuel is introduced from the carburetor into the chamber 13 through the inlet 19. The inlet 19 is tangential to the curved wall of the chamber 13, so that the vaporized fuel enters the chamber 13 tangentially thereof and impinges upon the inner surface of the wall of the chamber 13. By reason of the curvature of the wall 15 of the chamber 13, the vaporized fuel is caused to follow a downward path around the flanged end 12 of the leg 11 of the manifold 10 into and through which it is drawn by the suction action of the pistons in the cylinders of the motor when the motor is operating.

The liquid fuel is usually not completely vaporized by the charge-forming device, and therefore the mixture from the carburetor carries in suspension small particles of liquid or unvaporized fuel. These particles of unvaporized fuel, if drawn into the motor cylinders, are usually not completely con-

sumed, and if not consumed are either thrown out unburned in the exhaust or pass down around the motor pistons into the crank case of the motor and seriously affect the lubricating qualities of the oil contained therein.

To provide for trapping and vaporizing the unvaporized portions of fuel which may be present in the fuel introduced into the chamber 13, a receptacle or reservoir 30 is provided. The open end of this reservoir is flared as at 31, and to provide for its attachment said reservoir is formed with a flange 32 which is adapted to abut the flange 14 of the chamber 13.

The flared end 31 of this reservoir is so positioned with respect to the open side of the chamber 13 that the unvaporized portions of fuel entering the chamber 13 in suspension in the vaporized fuel will be centrifugally separated from the volatile mixture, collected on the walls of the chamber 13, conducted down said walls into said reservoir 30. It is to be noted, however, that any particles of unvaporized fuel which may impinge against the inner wall surface of the receptacle 13 or against the leg 11, will have vaporizing heat imparted thereto, and that only the less volatile constituents will reach the high heat of the reservoir 30.

In order that any accumulated unvaporized or unvaporizable fuel may be discharged from the reservoir 30 when the motor is not running, a valve is provided in the lower portion of the reservir 30, which valve is automatic in its operation. Extending from the lower portion of this reservoir 30 there is a tubular member 33, and for establishing communication between the reservoir 30 and this tubular member 33, the bottom of the reservoir is provided with an opening 34. Mounted within the tubular member 33 there is a ball 35 which is adapted to engage or seat in the opening 34 in order to close the same. The ball is retained within the tubular member 33 by means of a suitable cross-pin 36. It will be understood that the cross pin 36 is spaced with respect to the opening 34 a sufficient distance to insure unobstructed passage through the opening 34 when the ball 35 is supported upon the cross-pin 36.

The ball 35 will, under normal operation of the motor, occupy the position in which it is shown in Fig. 4, that is, closing the opening 34, the ball being held in this position by the vacuum produced in the chamber 13 and the reservoir 30 by the motor during its operation. Immediately, however, the motor ceases to operate, the vacuum in the chamber 13 and the reservoir 30 is relieved. Under such conditions, the ball drops to position upon the cross pin 36, out of engagement with the opening 34 and permits the discharge of any accumulated unvaporized fuel from the reservoir 30.

Enclosing the reservoir 30 and spaced therefrom to provide a space 37 is a housing 38. This housing 38 has a flange 39 formed thereon which abuts the flange 32 of the reservoir 30, as shown in Figs. 3 and 4. The flange 14 of the chamber 13, the flange 32 of the reservoir 30, and the flange 39 of the housing 38 are each provided with openings which when alined with one another receive cap screws, bolts or other fastening means 40, which serve to secure the chamber 13, the reservoir 30, and the housing 38 together in a rigid unitary structure. The bottom of this housing 38 is provided with a suitable opening through which the tubular member 33, heretofore mentioned, projects, as clearly shown in Fig. 4.

Leading into the housing 38 there is a pipe 40, and preferably at a point substantially diametrically opposed to the junction with the pipe 40 there is an outlet pipe 41. These two pipes 40 and 41 form inlet and outlet respectively for the exhaust gases from an internal combustion motor, the exhaust gases passing through and filling the space 37 between the reservoir 31 and the housing 38.

In their passage through the space 37, a portion of the heat of the exhaust gases is transferred to the unvaporized fuel contained in the reservoir 30 and accelerates vaporization or volatilization thereof. The vaporized fuel in the reservoir 30, resulting from the action of the exhaust gases, passes upwardly into the path of the incoming vaporized fuel and is carried along therewith and delivered to the leg 11 of the intake manifold, from whence it passes by way of the manifold 10 to the motor.

The reservoir 30 and the housing 38 enclosing the same may be formed by stamping, the tubular member 33 and the inlet and outlet pipes 40 and 41 being secured to their respective parts in any convenient manner, for example, by electric welding, which method is the one preferred.

While in the present illustration of the invention the chamber 13 has been shown and described as an integral part of the intake manifold 11, it is obvious that this chamber may if desired be a separate and independent element, constructed in such a manner as to be readily attachable to and removable from the intake manifold 11. Such a construction might be employed where it is desired to manufacture the device as an accessory for attachment to motors not originally so equipped.

What is claimed as new is:

1. In a fuel vaporizer for internal combustion motors, an intake manifold, a housing cast integral with said intake manifold, enclosing the inlet end thereof and itself having a flanged open side, a stamped metal receptacle having a flanged open end adapted to abut the flanged open end of the hous-

ing, a tubular extension projecting from said stamped metal housing and formed with a valve seat, a valve member adapted to engage said seat, a second stamped metal receptacle adapted to enclose the first-mentioned receptacle in spaced relation thereto and provided with an opening for the reception of said tubular extension, a flange formed integral with said second-mentioned receptacle and adapted to abut the flange of the first-mentioned stamped metal receptacle, and means for securing all of said flanges together.

2. In a fuel vaporizer for internal combustion motors, an intake manifold, a housing cast integral therewith and having at one end a fuel intake and having its other end open adjacent to the intake end of said manifold, a flange defining the open end of said housing, a stamped metal reservoir having a flanged open side adapted to abut the flange of said housing, a stamped metal receptacle adapted to enclose said reservoir and to provide an intervening space for exhaust gases, a flange formed integral with said receptacle and adapted to abut the flange of the reservoir, means acting on said abutting flanges to secure the reservoir and the receptacle to the housing, means for conducting exhaust gases to the space between the reservoir and the receptacle, and means for conducting said gases therefrom.

Signed at New York city this 8th day of July, 1925.

WILLIAM H. HILL.