

[54] **ULTRASONIC CARBURETION
ENCHANCER**

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[51] Int. Cl. **F02m 29/00**

[58] Field of Search **123/141, 119 D, 124, 119 E;
48/180 R**

[56] **References Cited**

UNITED STATES PATENTS

3,730,160 5/1973 Hughes 123/141

OTHER PUBLICATIONS

Journal of the Acoustical Society of America; Vol. 24,

No. 3; May 1952; "Acoustical Characteristics of Jet--
Edge and Jet-Edge-Resonator Systems."

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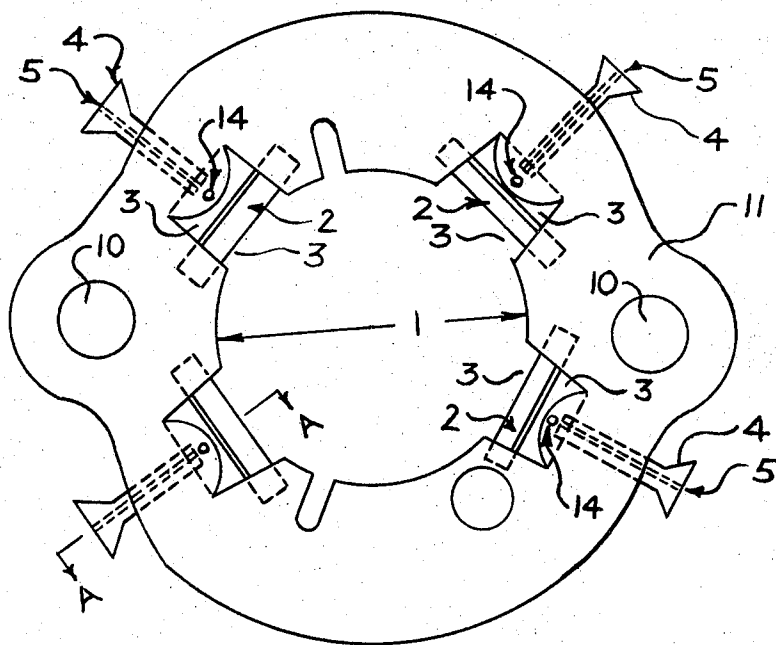
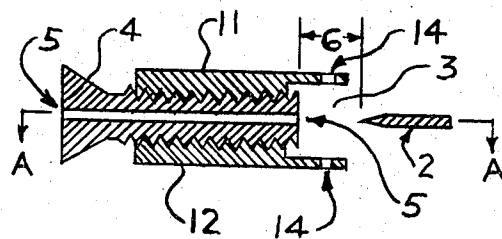
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[57]

ABSTRACT

An improved gasoline engine fuel vaporizer which is used in conjunction with a normal carburetor to further vaporize the fuel and provide increased engine efficiency and performance. The device is built into a gasket which normally is mounted between the carburetor and intake manifold, and uses the manifold vacuum to draw air through holes onto a jet-edge ultrasonic whistle. The ultrasonic sound provides the vaporizing action on the fuel.

6 Claims, 5 Drawing Figures



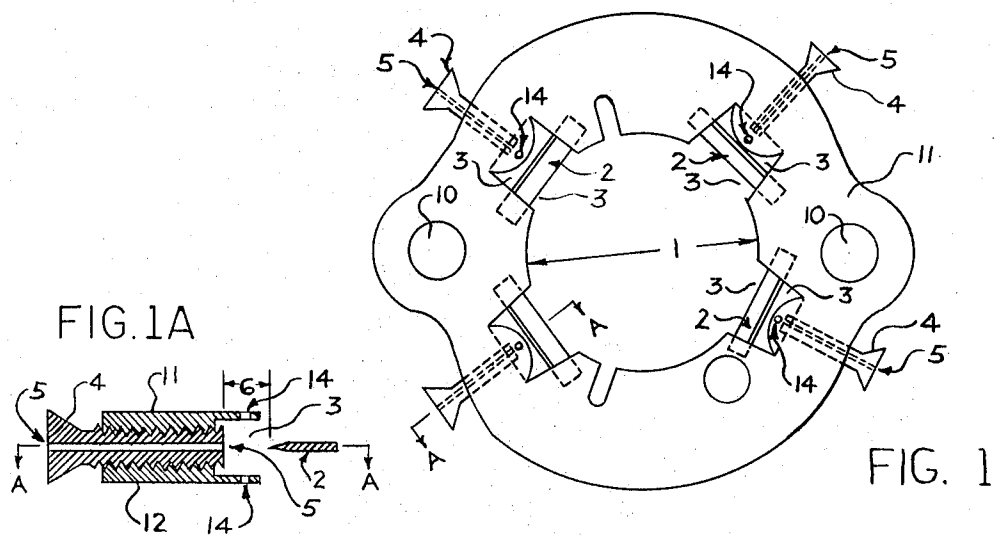
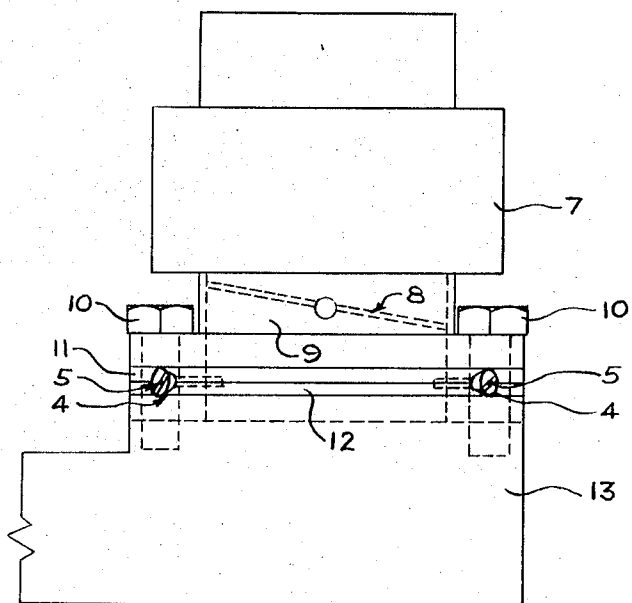
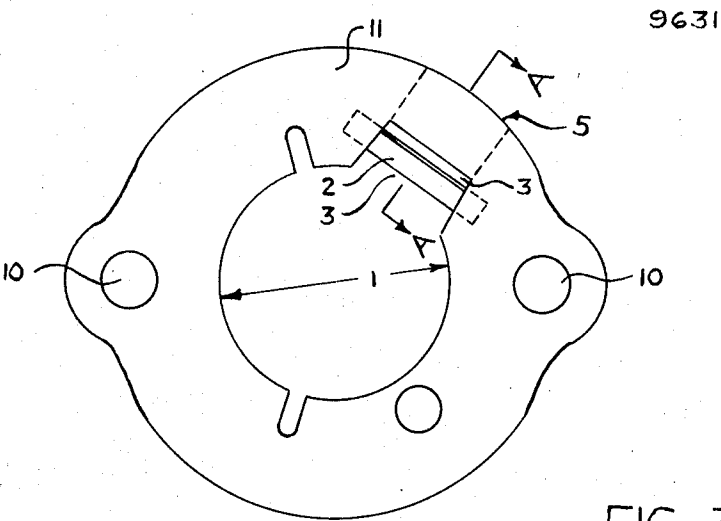
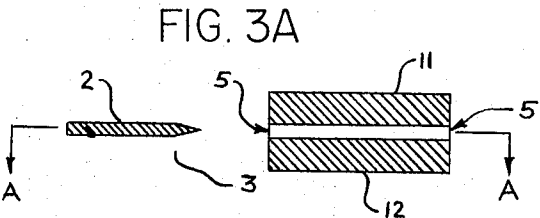


FIG. 2



ULTRASONIC CARBURETION ENCHANCER

SUMMARY OF THE INVENTION

A typical gasoline engine carburetor achieves fuel-air mixture by spraying raw gasoline into the air being drawn into the engine, and passing it through a venturi. The venturi causes high turbulence in the mixture, which creates partial vaporization. The fuel-air mixture consists of air, gasoline vapor and droplets of unvaporized gasoline. This invention acts on the droplets of unvaporized gasoline to vaporize them by the application of ultrasonic sound as follows:

One or more Jet-edge whistles is built into a carburetor mounting gasket such that the physical size and dimensions of each produces ultrasonic sound in the 30 kilohertz region. The partial vacuum which exists in the intake manifold when the engine is running is used as a power source, or an external air pump can be used.

A Jet-edge whistle is created by forming a thin air stream and directing it upon a knife-edge. The air stream oscillates alternately above and below the blade edge at a frequency determined by (a) the air stream thickness and velocity and (b) the distance between the blade edge and the orifice from which the air stream emerges.

If these dimensions are designed to produce sound in the ultrasonic region, and the sound is directed at a fuel-air mixture, it serves to disperse and further evaporate fuel in the mixture.

The location selected for operation of the device was between the carburetor mounting flange and the intake manifold, where a thick gasket is usually located. It could, however, be built into a carburetor mounting bolt, carburetor body or intake manifold with the same effect.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIG. 1 is a plan view of the invention constructed so as to fit between the carburetor mounting flange and a carburetor of a conventional automobile;

FIG. 1A is an enlarged sectional view taken on the section line A-A of FIG. 1;

FIG. 2 is a side elevation showing the construction of FIG. 1 in assembled relation with an automobile carburetor;

FIG. 3 is a view similar to FIG. 1 but showing a modified form of the invention; and

FIG. 3A is an enlarged sectional view taken on the line A-A of FIG. 3.

DESCRIPTION OF PREFERRED EMBODIMENT

FIG. 1 is a plan view of the carburetor mounting flange gasket which includes the Jet-edge Whistle. Diameter 1 describes the normal air-flow area for a single barrel carburetor which would be the same as the diameter of the ordinary gasket used on standard engines. In order to facilitate fabrication, two gaskets, 11 and 12, are cemented together with knife edges 2 fixed in position in between, so that they span air plenum 3. Screw

4 containing orifice 5 is so placed that the air jet through 5 is split by the keen edge of blade 2.

Since the area described by 1 is in a state of partial vacuum compared with the outside end of orifice 5, air is drawn through 5 causing an air-jet which is split by blade 2. The air-jet oscillates alternately above and below the blade at a rate determined by the orifice diameter 5, the volume of air passing through 5, the distance 6 from the orifice to the edge of the blade and the dimensions of resonating chamber 14. These values are so arranged that the frequency of oscillation is above 15 kilohertz.

The ultrasonic sound from each Jet-edge Whistle impinges upon the fuel-air mixture passing through 1 and further vaporizes the gasoline there.

FIG. 2 is an illustration of how the Jet-Edge device is mounted in an engine. In FIG. 2, 7 is the carburetor, 8 is the carburetor butterfly valve, 9 is the carburetor throat, 10 is the carburetor mounting bolt, 11 and 12 are the gaskets from which the device is made, 4 is the screw through which orifice 5 is drilled.

FIG. 3 shows another form of Jet-Edge Whistle which was successfully operated. In it the knife-edge 2 is served with an airstream from a rectangular orifice 5 of dimension suitable to produce approximately 30 kilohertz of ultrasonic sound.

FIG. 2 shows the ultrasonic device as it is mounted in place inbetween the carburetor 7 and the intake manifold 13. The device could also be made by some arrangement or other to occupy chamber 9 or 13 or be built into mounting bolt 10.

Resonating chamber 14 is not necessary to the operation of the device but provides additional sound amplitude and stabilizes the frequency over a wider range of orifice air flow rates.

The construction of jet-edge-resonator systems and their acoustical characteristics are well known and are explained in the Journal of the Acoustical Society of America, Volume 24, No. 3, May, 1952 in an article by W. L. Nyborg; M.D. Burkhard and H. K. Schilling in an article entitled "Acoustical Characteristics of Jet-Edge and Jet-Edge-Resonator Systems."

In the preferred embodiment of this invention, the frequency of oscillation is approximately 40 kilohertz. The dimension indicated by the dimension line 6 in FIG. 1A is 0.24 inch. The diameter of the orifice is 0.05 inch. The length of the orifice 5 is 0.625 inch. The diameter of the resonator 14 is 0.032 inch. The depth of the resonator 14 is approximately 0.073 inch.

The width of the blade 2 from front to back is 0.125 inch. The thickness of the blade 2 is 0.010 inch. The angle of the blade edge is 13°. The air plenum 3 is 0.375 by 0.675 inch. The main body of the device is constructed of two pieces of gasket material, each having a thickness of approximately 0.125 inch, making the combined height of the parts 11 and 12 0.25 inch. The construction shown in FIG. 1 is shaped to fit a 1965 Plymouth six cylinder engine. It will be understood that these figures for the preferred embodiment are given merely by way of illustration.

The preferred embodiments of the invention have been illustrated and described and the invention is defined in the appended claims.

What is claimed is:

1. In an internal combustion engine, in which fuel is mixed with air prior to induction into a combustion chamber, a carburetor in which the fuel and air are

mixed, a passage through which the fuel-air are mixture flows from the carburetor to the combustion chamber, a valve in said passage for regulating the rate of flow, an air operated ultrasonic sound generator mounted in a location downstream from the valve and in position to impress an ultrasonic jet upon the fuel-air mixture, for the purpose of improved fuel vaporization, said generator having a chamber opening directly into the fuel-air mixture passage, an orifice of said generator through which an air jet flows through a wall of said passage and into the generator chamber, and a blade in line with the air jet at a location where the air jet has unrestrained flow past said blade and into the fuel-air mixture in the passage leading from the valve to the combustion chamber, the air jet impingement with an edge of the blade setting up an ultrasonic vibration of the jet where it merges with the fuel-air mixture in said passage.

2. The combination described in claim 1 characterized by the orifice through which the air jet flows leading into a partial vacuum in the fuel-air passage from a region of higher pressure surrounding the outside of the structure from which the fuel-air passage extends, the air jet orifice and blade constituting a jet edge whistle, and the dimensions and air flow of the jet edge whistle having a frequency in and above the 15 kilohertz region.

3. The combination described in claim 1 characterized by a connection at which the carburetor passage is connected to the engine and joins a part of the engine through which the fuel-air mixture travels to the engine combustion chamber, two superimposed gaskets located between the carburetor and said part of the en-

gine, the gaskets forming a housing of the ultrasonic generators, the jet opening extending through a side of the gaskets, and into a fuel-air passage through the gaskets, and the blade being clamped between the gaskets and in line with the orifice.

4. The combination described in claim 1 characterized by the blade having its narrow width approximating the comparable width of the air jet, and one edge of the blade which faces the air jet being a knife edge for generating ultrasonic sound.

5. The combination described in claim 1 characterized by a housing that connects with the carburetor with a passage in the housing constituting a continuation of the fuel-air passage of the carburetor downstream from the valve, detachable fastening means for connecting the housing with the carburetor and a plurality of ultrasonic generators at angularly spaced locations around the passage through said housing including orifices opening through a wall of the housing for admitting air from the ambient atmosphere into the housing to form the air jets for the generators.

6. The combination described in claim 1 characterized by the orifice leading through a wall of the passage communicating at its upstream end with the ambient atmosphere, and the orifice at its downstream end being subject to the partial vacuum in the passage leading from the carburetor to the combustion chamber of the engine whereby the flow of the air jet depends upon the difference in pressure between the pressure in said fuel-air passage and the pressure of the ambient atmosphere.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,857,375 Dated Dec. 31, 1974

Inventor(s) Walter G. Jackson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the title at the top of the front page and in column 1, line 1, that portion of the title reading "ENCHANCER" should read --- ENHANCER ---.

Signed and Sealed this

Twenty-seventh Day of July 1976

[SEAL]

Attest:

RUTH C. MASON

Attesting Officer

C. MARSHALL DANN

Commissioner of Patents and Trademarks