May 14, 1957 A. K. MALOUF 2,792,291

MULTIPLE ELEMENT VAPORIZER AND BALL CONSTRUCTION THEREFOR

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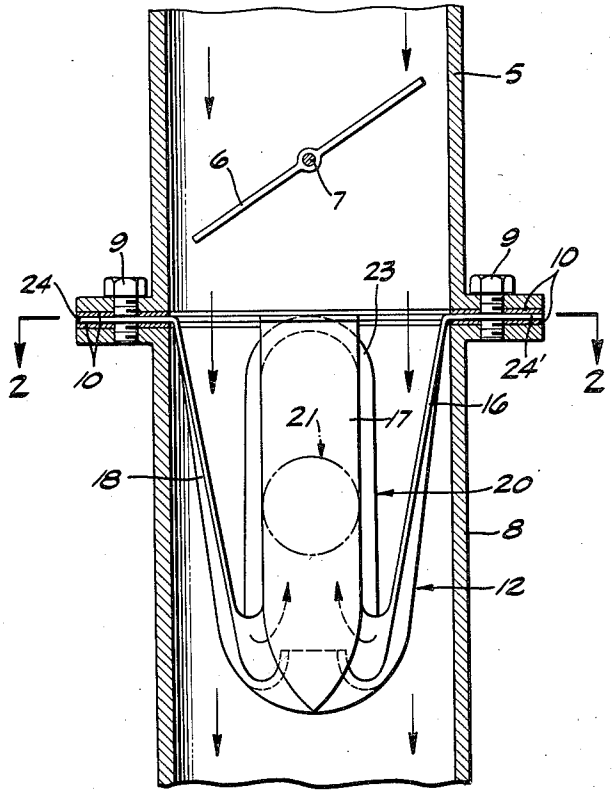


FIG. 1.

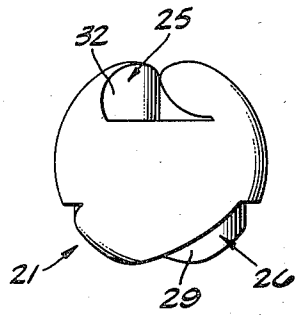


FIG. 3.

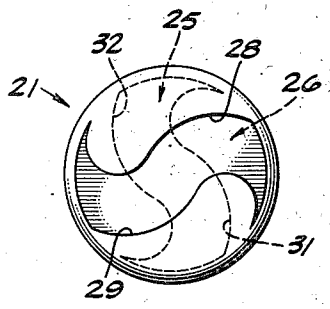


FIG. 4.

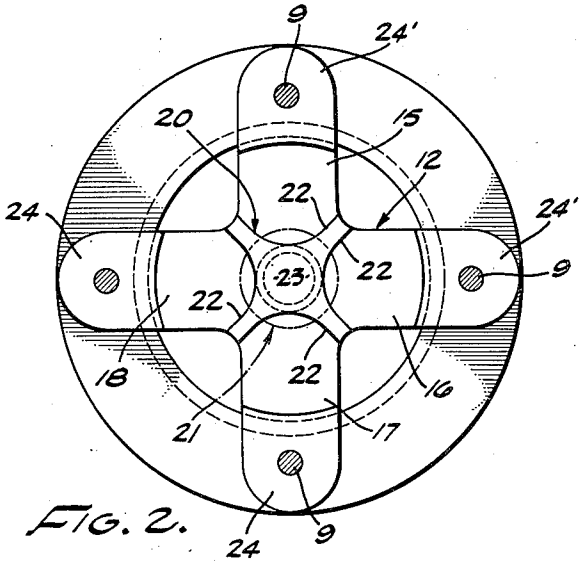


FIG. 2.

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MULTIPLE ELEMENT VAPORIZER AND BALL CONSTRUCTION THEREFOR

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6 Claims. (Cl. 48—180)

This invention relates to vaporizing devices, and particularly to a vaporizing or atomizing device for insertion in and for treating a combination or mixture of liquid fuel and air for use in internal combustion engines.

In my co-pending application, Ser. No. 450,058, filed August 16, 1954, I disclose and claim a device mounted underneath the butterfly valve of a standard downdraft carbureter normally used in internal combustion engines of motor cars. It was found that this type of device was more efficient than heretofore suggested devices for atomizing a mixture of gasoline and air.

The present invention is directed to a similar device which still further increases the efficiency of operation of an internal combustion engine, and particularly when used in motor cars where the speed of the engine is being constantly varied, such as when driving in city traffic. The invention functions at low engine speeds as well as at high engine speeds, and at lower engine speeds than prior devices of this type. This increases the motor efficiency by increasing combustion and reducing the non-combustible gases from the engine, from which an increase in gas mileage is obtained as well as better engine performance.

Another feature of the present invention is the type of ball used, the new ball being of the same material and size as the balls used in certain prior devices but being notched in such a way that more turning torque is given to the ball from a certain predetermined mixture flow. Thus, by both increasing the amount of mixture directed under the ball, and by using a more efficient type of ball, a considerable improvement in motor efficiency is obtained.

The principal object of the invention, therefore, is to facilitate the vaporization or atomizing of liquid fuel.

Another object of the invention is to provide an improved vaporizer for liquid fuel used for internal combustion engines.

A further object of the invention is to provide an improved vaporizing unit for use with downdraft carbureters for floating and rotating a spherical element in a flowing mixture of fuel and air.

A still further object of the invention is to provide an improved vaporizer which obtains a greater amount of mixture of fuel and air under an improved type of rotating ball.

The novel features which are believed to be characteristic of this invention, both as to the manner of its organization and the mode of its operation, will be better understood from the following description, when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a cross-sectional view of an intake manifold conduit in which the invention is embodied;

Fig. 2 is a plan view taken along the line 2—2 of Fig. 1;

Fig. 3 is one view of the ball used in the device shown in Figs. 1 and 2; and

Fig. 4 is another view of the ball shown in Fig. 3.

Referring now to the drawings in which the same numerals idenitfy like elements, the lower portion of a carbureter is represented by a conduit 5 in which is

located a standard butterfly valve 6 pivoted at 7. Attached to the conduit 5 is a lower manifold conduit 8, the conduits 5 and 8 having flanges which are attached by bolts 9, the flanges being separated by gaskets 10.

Suspended below the jointure between conduits 5 and 8 is a vaporizing device 12 embodying the invention and which operates on the general principle of the device disclosed and claimed in my above-mentioned co-pending application. The device 12 is shown with four mixture-directing scoop elements 15, 16, 17, and 18, although it is to be understood that only two or three of such elements may be used. The four scoop elements are joined at their lower ends so that the mixture gathered by the four elements is directed horizontally and upwardly into a cage 20 having an opening in its bottom and having a ball 21 therein. This cage is of the same general construction as the cage shown in my above-mentioned co-pending application. That is, the cage has a vertical axis, side openings 22 and a closed top section 23.

The device 12 is mounted on the conduit 8 by the upper flanges of the scoop elements as shown at 24 and 24', the flanges extending at substantially right angles to the axis of the cage 20. If two or three scoop elements are used, they will be equally spaced and similarly joined to the bottom of the cage 20 to permit the mixture to be directed upwardly under the ball 21. When only two scoop elements are used, they will be positioned opposite one another and under the left and right hand edges of the butterfly valve 6 as shown in Fig. 1. In this manner, the major portion of the mixture is directed to the scoop elements as the butterfly valve is rotated to control engine speed.

Referring to the ball 21 as shown in Figs. 3 and 4, this ball is provided with two S-shaped grooves or notches 25 and 26 which are on opposite sides of the spherical surface of the ball but which have their axes at right angles to each other. Also, the planes of the bottom surfaces of the notches are parallel with each other. The notches are cut to the depth shown in Fig. 3 so that a large amount of fluid is able to contact the active rotating surfaces of the ball. The increase in torque is obtained since the fluid mixture will first strike the surface 28 to give the ball a certain amount of left hand turning force, and the mixture is then deflected to surface 29 to provide additional turning force. Thus, each notch will provide two contact surfaces for the mixture, which surfaces are large radially of the ball as compared with prior balls. To the turning force provided by notch 26 is added the turning force of notch 25, also having two contact surfaces 31 and 32.

The device, therefore, as above described, has two features which permit a small amount of mixture to lift and rotate the ball and thus permit an increased efficiency of the device at low engine speeds. These two features are the multiple scoops for directing more mixture to a single ball than heretofore and a more efficiently constructed ball which will rotate quicker and at higher speeds on small amounts of liquid flow.

I claim:

1. An atomizing system for a liquid fuel and air mixture comprising a conduit, a plurality of scoop elements adapted to be positioned in a downwardly flow of said mixture and having their upper ends attached adjacent the walls of said conduit and their lower ends joined together and adapted to direct said mixture from the lower ends of said scoop elements perpendicularly thereto and upwardly, a cage mounted on the lower ends of said conduits and adapted to receive any of said mixture directed thereto by said elements, said cage having an opening in the lower end thereof, and a rotatable ball within said cage, said down-

wardly flowing mixture being adapted to be impressed under said ball.

2. An atomizing system in accordance with claim 1, in which said ball has a spherical outer surface having two S-shaped notches therein, each notch providing two striking surfaces for said mixture passing through said notch one notch being on each side of said ball, said notches having their axes perpendicular to one another.

3. An atomizing system in accordance with claim 1, in which said cage has a vertical axis, side openings therein and a closed top section.

4. An atomizing unit for a downwardly flowing mixture of liquid and air comprising a vertical cage having side openings therein and a closed top section, said cage having an opening in the bottom thereof, a ball within said cage, and a plurality of scoop elements joined together under and attached to said cage, said elements being adapted to conduct said downwardly flowing mixture under said ball.

5. An atomizing unit in accordance with claim 4, in which said scoop elements have concave surfaces on their sides toward said cage and are positioned in substantially vertical alignment.

6. An atomizing unit in accordance with claim 4, in which said ball has an S-shaped notch on each side thereof, with the axes of the notches perpendicular to each other and the inner surfaces of the notches lying in parallel planes, each notch providing two striking surfaces for any mixture passing therethrough.

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