

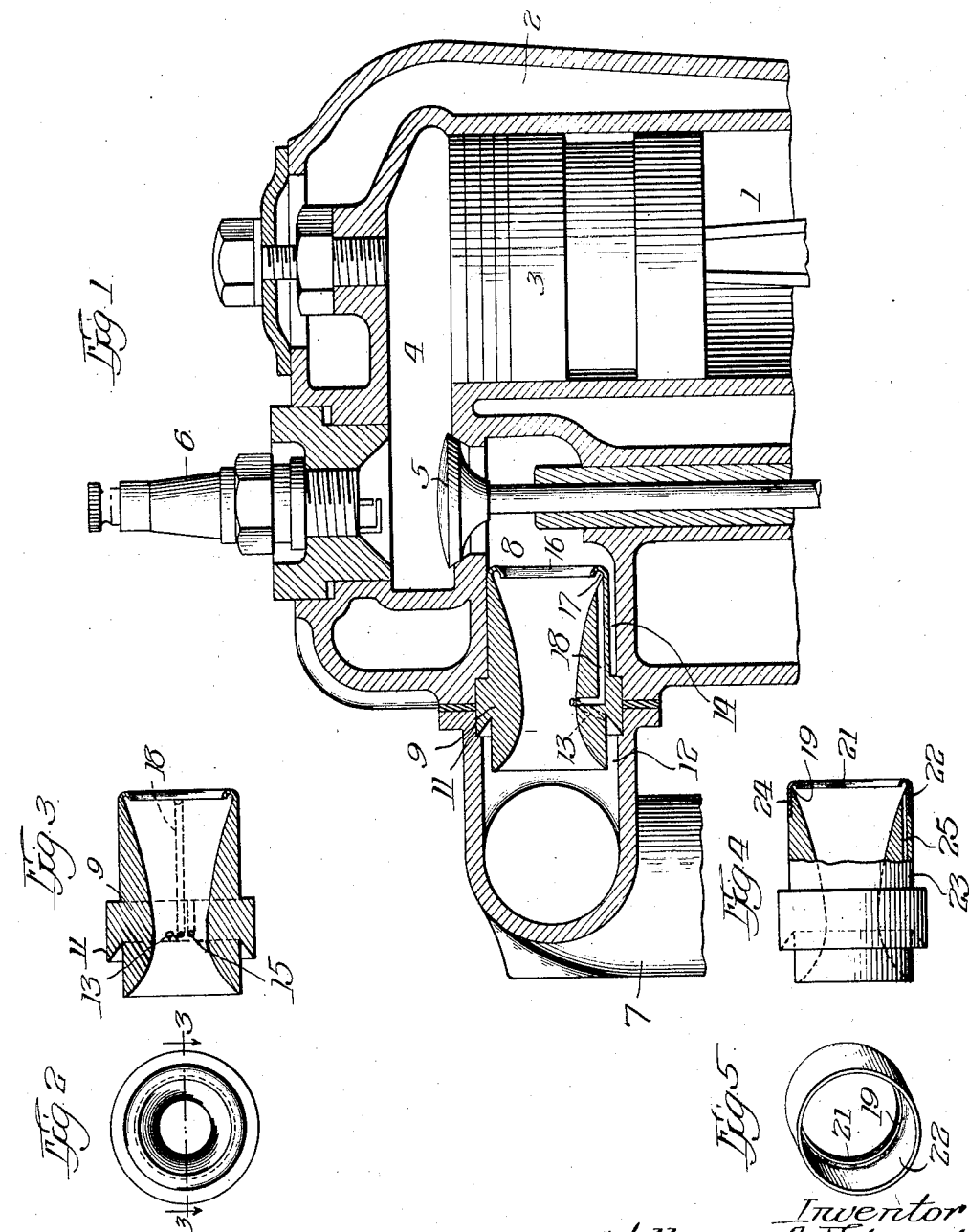
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W. A. EDWARDS

REATOMIZER

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UNITED STATES PATENT OFFICE.

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REATOMIZER.

Application filed October 17, 1921. Serial No. 508,260.

To all whom it may concern:

Be it known that I, WILLIAM A. EDWARDS, 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 Reatomizers, of which the following is a specification.

This invention relates in general to means for atomizing a liquid fuel, and while capable of many uses in connection with furnaces, boilers, and other apparatus in which liquid fuel is employed, I have shown it in the present instance for illustrative purposes, as applied to a gas engine, and in this connection, it constitutes an improvement upon my pending application, Serial No. 505,713, filed October 6, 1921.

In devices which employ liquid fuel as a source of power, such as internal combustion engines for instance, the fuel is atomized by a carbureter or other similar device, from which it is delivered into the cylinders or other combustion chamber. In my prior application, I have disclosed a Venturi tube disposed in the path of the fuel mixture being delivered to the engine cylinders, the tube being constructed to provide a collecting pocket surrounding the intake end of the tube in which liquid fuel is collected and from which the collected fuel is delivered to the throat of the venturi for further atomization action. The present low grade of gasoline which is used for motive purposes contains a considerable proportion of low grade units, which can only be vaporized with extreme difficulty, and by being repeatedly subjected to vaporizing action; these are the particles which are collected at the intake end of the venturi in my prior application and delivered to the throat thereof, where they are further atomized. Some of the particles, however, even after this second action, remain still in condensed form, and as they issue from the throat of the venturi, they tend to move radially outwardly and along the expanding walls of the tube.

My present invention is designed to collect these fuel particles, leaving the venturi and return these particles again to the throat of the venturia for further atomization action, and if they are still only partially atomized, they are again collected and returned as many times as may be necessary to complete the atomization.

In order to facilitate an understanding of my invention, I have illustrated the same on the accompanying drawings, from an inspection of which, when considered in connection with the following description, my invention and many of its inherent advantages should be readily understood and appreciated.

Referring to the drawings:

Fig. 1 is a fragmentary sectional view of an internal combustion engine equipped with my invention;

Fig. 2 is an end view of the Venturi tube shown in Fig. 1;

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a side elevation partially in section of a modified form of my invention;

Fig. 5 is a perspective view of the collecting ring pocket illustrated in Fig. 4.

Referring to the drawings, 1 indicates the cylinder of an internal combustion engine surrounded by the customary water jacket 2, the cylinder being equipped with the usual reciprocating piston 3 and communicating at its upper end with the explosion chamber 4, to which the fuel mixture is admitted at predetermined intervals through the intake valve 5, and in which the mixture is ignited by the spark plug 6. These parts and others of the engine including the intake manifold or fuel supply passage 7 may all be of any well known or preferred construction and arrangement.

At the juncture of the manifold 7 with the passage 8 leading into the explosion chamber, I have positioned a Venturi tube, indicated generally by reference character 9, and comprising an annular shoulder or flange 11 adapted to fit snugly in the groove formed jointly by the manifold and the adjacent wall of the cylinder block. At its outer intake end, the external diameter of this tube is reduced, as will be apparent from Figs. 1 and 3, providing a circumferential collecting chamber or pocket 12 between the perimeter of the tube and the surrounding walls of the manifold. The fuel particles in the charge delivered from the manifold are collected in this pocket, from whence they are conducted to the throat of the venturi for reatomization purposes by a duct 13, establishing communication between the pocket and the throat of the tube. Such heavy fuel particles as

pass axially from the venturi into the passage 8 are returned by gravity through a passage 14 beneath the delivery end of the venturi to the forward or inner face of the flange 11, from whence these particles are returned to the throat of the venturi for further atomization action by a duct 15 establishing communication between the passage 14 and the throat of the tube.

The major portion, however, of the liquid fuel particles issuing from the venturi, tend to expand or travel radially along the outwardly flaring walls of the tube, and it is for the purpose of collecting these particles and returning them to the throat of the venturi for further atomization or breaking up that my present invention is designed.

In order to effect this result, the Venturi tube is provided at its delivery end with an inwardly extending flange 16 forming an annular collecting pocket 17 at the mouth of the tube. The fuel particles are intercepted by this flange and collected in the pocket, where they flow by gravity to the lowest point thereof. Communication is established between this point and the throat of the venturi by a duct 18 so that the suction exerted in the throat of the venturi upon this duct draws the liquid fuel particles from the collecting pocket back into the throat of the venturi, where they are further atomized. Should this reatomizing action fail to break up the particles, they will be caught a second time in the pocket and again returned to the throat, and this action will be repeated as often as the particles are caught in the pocket.

In addition to collecting the fuel particles issuing from the venturi, this flange at the mouth of the venturi sets up a whirling motion in the vaporized mixture of fuel and air being delivered from the tube, or in other words, establishes a turbulent condition in the mixture which facilitates and augments the atomization and diminishes the condensation, so that the mixture is delivered into the combustion chamber in a condition most favorable to the exertion of maximum power effort.

The flange 16 illustrated in Figs. 1 to 3 inclusive, is shown as constructed integrally with the body of the tube, but in Figs. 4 and 5, I have shown a modification in which the collecting pocket 19 is provided by a flange 21 formed upon the end of a sleeve or thimble 22 adapted to fit over the delivery end of the Venturi tube 23, which in this instance, is preferably circumferentially grooved, as indicated at 24, to receive this sleeve. The collected fuel particles are returned from the pocket 19 to the throat of the venturi through a duct or passage 25 similar in construction and function to the duct 18 previously described.

It is believed that my invention, its manner of construction, mode of operation and its advantages will be understood from the foregoing without further description, and it should be manifest that the structural details thereof may be varied within considerable limits without exceeding the scope of the invention as defined in the following claims.

I claim:

1. The combination with a fuel supply passage of an internal combustion engine, of a Venturi tube disposed in the path of the mixture of fuel and air being delivered to the engine, and means disposed at the inner and outer walls of said tube for collecting the unatomized liquid fuel particles and returning the same to the throat of said venturi for further atomizing action.

2. The combination with a fuel supply passage of an internal combustion engine, of a Venturi tube disposed in the path of the mixture of fuel and air being delivered to the engine, means on the inner walls of said tube for collecting the unatomized liquid fuel particles, and means disposed on the exterior wall of said tube for collecting unatomized fuel and means for repassing such collected fuel through the throat of the venturi.

3. In an internal combustion engine having a fuel supply passage, a Venturi tube disposed in said passage, means for collecting the un-atomized fuel particles which have issued from said venturi and returning them thereto, and means for collecting the un-atomized fuel particles accumulating on the inner walls of said venturi and passing them through the throat of said venturi.

4. In an internal combustion engine having a fuel supply passage, a Venturi tube located in said passage and provided at its delivery end with an annular collecting pocket opening toward the throat of the venturi, said tube being also provided with a passage leading from said pocket to the throat of the tube.

5. In an internal combustion engine having a fuel supply passage, a Venturi tube located in said passage and provided adjacent its delivery end with an inwardly extending annular flange having a duct leading from the flange to the throat of the tube.

6. In an internal combustion engine having a fuel supply passage, a Venturi tube located in said passage, means for collecting the un-atomized particles travelling radially along the inner wall of the venturi, said Venturi tube having a passage establishing communication between said collecting means and the throat of the tube.

7. In an internal combustion engine having a fuel supply passage, a Venturi tube

having a collecting pocket on its inner wall and a passage establishing communication between the pocket and the throat of the tube.

5 8. In an internal combustion engine having a fuel supply passage, a Venturi tube located in said passage and provided adjacent its delivery end with a collecting pocket disposed in the path of the margin
10 of the stream of fluid flowing from said tube, and means for re-passing the particles

collected in said pocket through the throat of the venturi.

9. In an internal combustion engine having a fuel supply passage, a Venturi tube 15 located in the path of fuel mixture, said tube having an inturned annular lip or flange at its delivery end forming a pocket for collecting the unatomized liquid fuel particles, and a passage leading from said 20 pocket to the throat of the venturi.

WILLIAM A. EDWARDS.