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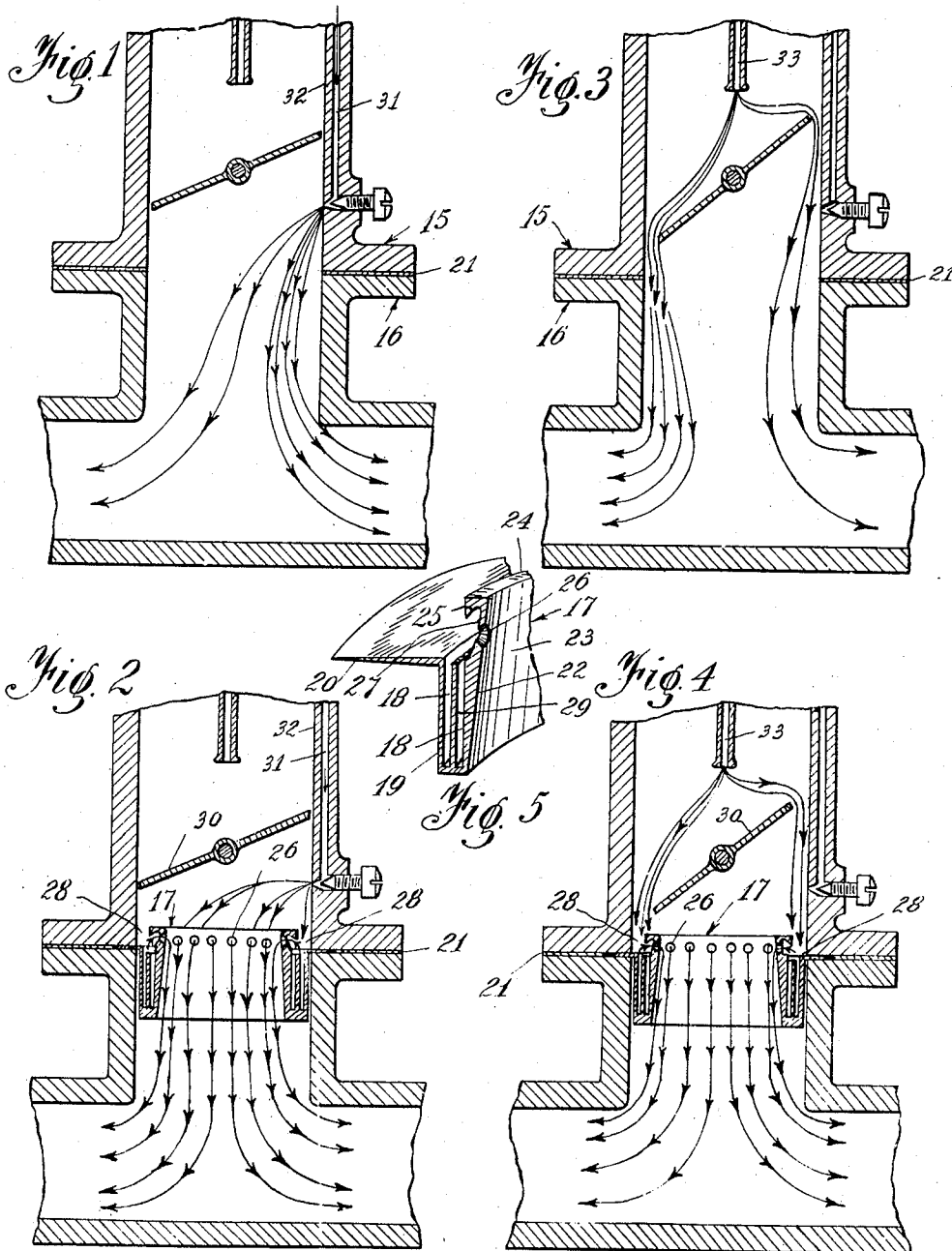
W. J. LINN

2,377,088

FUEL VAPORIZER

Filed Aug. 12, 1943

2 Sheets-Sheet 1



William J. Linn
INVENTOR.

BY *Reep D. Smith*
Attorney

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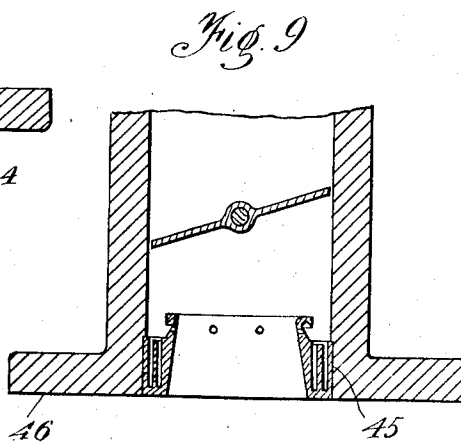
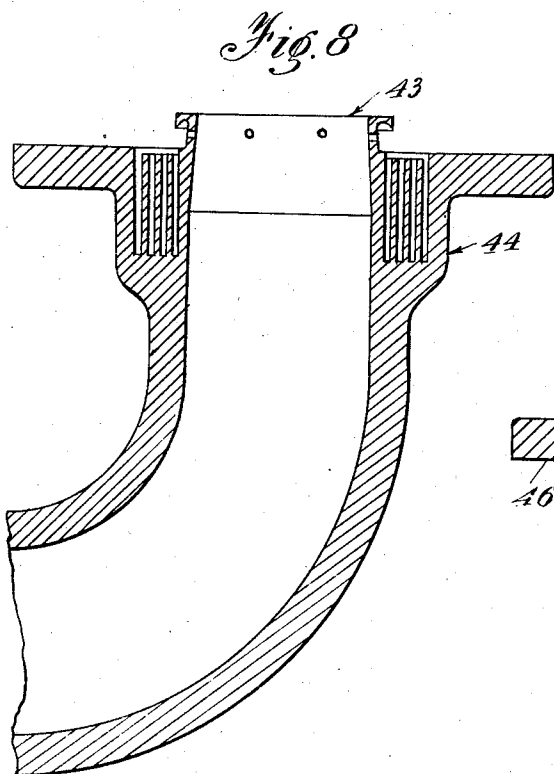
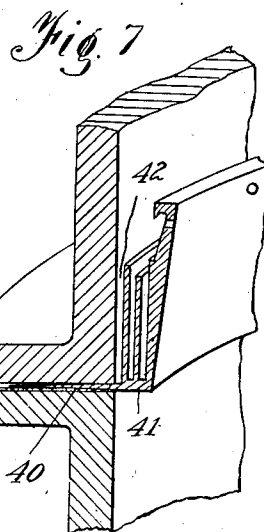
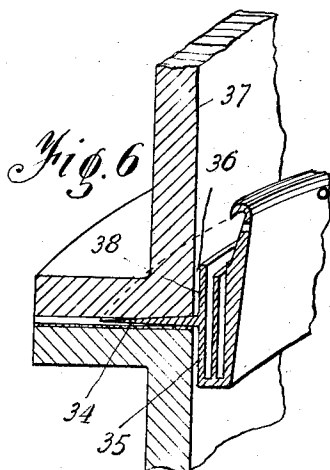
W. J. LINN

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FUEL VAPORIZER

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2 Sheets-Sheet 2



William J. Linn

INVENTOR.

BY *Ralph Douthett*
Attorney

UNITED STATES PATENT OFFICE

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FUEL VAPORIZER

William J. Linn, Pittsburgh, Pa.

Application August 12, 1943, Serial No. 498,399

5 Claims. (Cl. 48—180)

This invention relates to improvements in vaporizers especially adapted for use in connection with the carburetor of an internal combustion engine and may be considered as an improvement of the type shown for certain internal combustion engines in my application, Serial No. 462,441, filed October 17, 1942.

The primary object of the present invention relates to a device by means of which the heavy particles or globules issuing from the carburetor may be more completely vaporized.

Another object of the invention is to improve the fuel mixture substantially throughout the various speed ranges of the engine and during the idling thereof.

Yet another object of the present invention is to provide a vaporizer which is adapted to be interposed between the carburetor and intake manifold flanges without alterations and without requiring additional gaskets between the carburetor and the intake manifold, such as are usually placed there-between to provide a tight joint.

Still another object of the invention is to insert the device between the flanges of the carburetor and the intake manifold in the minimum of time.

Another important object of the present invention is to provide a vaporizer with a plurality of concentrically disposed wells, having walls of minimum thickness and being adapted to receive all heavy fuels, completely vaporize the latter by convection and conduction of the heat from the manifold and deliver same through the throat of the venturi of the device and then to the firing chambers of the cylinders of the engine.

Yet another object of the invention is to provide a vaporizer with a deflector by means of which the vapors rising from the wells may be controlled for additional vaporization.

A further object of the invention is to provide the vaporizer, adjacent its upper edge, with a series of apertures of measured size to permit a portion of the rising vapors from the wells to be drawn into the venturi of the device to further improve the vaporization of the fuel mixture and to preserve a constant velocity of the fuel mixture while passing through the venturi.

A still further object of the invention is to provide a vaporizer which utilizes the heat from the intake manifold effectively, thereby eliminating interposed resistance coils or other auxiliary means for applying heat to the heavy fuel as it passes through the intake manifold of the engine.

Another important feature of the invention is to considerably improve the distribution of the

fuel mixture whereby each of the engine cylinders receives a substantially equal charge, quantitatively and qualitatively.

Yet another object of the invention is to provide a device for re-atomizing heavy particles of fuel which may be produced as an auxiliary device or attachment, or as an integral part with the carburetor or as an integral part with the intake manifold.

A still further object of the invention is to provide a re-atomizing device which, when installed, will function efficiently in any internal combustion engine without adjustment or attention for the life of the engine.

The invention, therefore, aims to provide means which will under any circumstances prevent the entry of condensed fuel into the intake manifold and consequently to the cylinders of the engine, and in obtaining this important object, the invention is provided with a centrally disposed Venturi bore surrounded by a plurality of concentric annular wells capable of trapping all condensed fuels which usually move radially and outwardly at the point of least restriction or low velocity.

These trapped fuel condensations are revaporized by subjecting the same to the heat from the intake manifold.

Other objects and advantages of the invention are contemplated which will become apparent in the following description read in connection with the accompanying drawings forming part of the disclosure in which:

Figure 1 represents a vertical sectional view through the assembled flanged ends of a carburetor and intake manifold as presently used and without my invention; the throttle of the carburetor being shown closed or in idling position. In this case, the flow of the fuel mixture is indicated diagrammatically by the arrows and shows the unevenly distributed fuel entering the intake manifold. Obviously, in such condition, the firing chambers of the cylinders receive an unequal amount of highly condensed fuel which dilutes the lubricant in the crankcase and also will cause stalling of the engine after a substantially short idling time.

Figure 2 corresponds to Figure 1 for idling, but is equipped with my new fuel vaporizer comprising the present invention, the arrows show diagrammatically the evenly distributed flow of the fuel mixture into the intake manifold, and it will be noted, that all heavy drops discharged from the carburetor, which usually adhere to its inner walls, are positively trapped in a series of concentrically arranged wells, as shown, and

heated to a boiling temperature by convection and conduction of the heat from the manifold which transforms the trapped condensed fuel into a vaporized fuel which is then drawn through the throat of the Venturi bore of the device and delivered in the proper form to the firing chambers of the cylinders.

Figure 3 is a vertical sectional view through the flanged ends of an assembled carbureter and intake manifold without my device, the throttle of the carbureter being shown open for cruising or speeding and the arrows indicating diagrammatically the flow of the fuel mixture from the carbureter to the intake manifold. In this case, the carbureter throttle actually deflects the heavy fuel to the rich side and the light fuel passes into the lean side of the intake manifold, a condition as undesirable as described for Figure 1.

Figure 4 shows my vaporizer installed between the flanges of a carbureter and intake manifold, the throttle valve of the carbureter being shown in the identical position as the throttle valve shown in Figure 3. The arrows indicate diagrammatically the flow and equal distribution of the fuel mixture, so that each engine cylinder will receive an equal charge, quantitatively and qualitatively.

Figure 5 is an enlarged, fragmentary, sectional perspective view of the device.

Figure 6 represents a fragmentary, sectional perspective view of the assembled device in which the knife-edged, annular flange is shown substantially midway of the outer wall of the device, it will be noted that by doing this an additional well is provided between the outer shell of the device and the inner wall of the carbureter.

Figure 7 is a view similar to Figure 6 with the exception that the knife-edged flange is shown flush with the bottom of the device, thereby creating an additional well of full depth.

Figure 8 represents a vertical cross-section of another modified form of the device in which a plurality of concentric wells, including the top or deflector portion of the device are formed integrally with the flanged end of an intake manifold.

Figure 9 shows the device inserted into the flanged end of a carbureter, the knife-edged flange being eliminated.

Similar reference characters are used to designate similar parts throughout the several views.

As shown in Figures 2, 4 and 5 of the accompanying drawings, 15 denotes the flanged end of a carbureter and 16 denotes the flanged end of an intake manifold having interposed therebetween my improved vaporizer 17.

Referring now to Figure 5, the numeral 18 indicates vertically disposed, annular concentric wells, the outer wall 19 of which being provided with an outwardly extending horizontal annular flange 20 of substantially knife-edge thickness in order to insert the device between said flanged ends 15 and 16 and the gasket 21, which is customarily interposed to prevent leakage.

The inner shell 22, having a Venturi bore 23, extends upwardly and is provided at its extended portion 24 with a V-shaped undercut deflector 25. A series of small fuel ports 26 of the Venturi type extend transversely through the neck-portion 27 of said inner shell 22, thereby establishing communication from the annular pocket 28, which serves the function of a container for holding and receiving additional drops or condensates of non-vaporized fuel should the wells 18 overflow.

The concentric partition 29 of the vaporizer shown in Figures 2, 4 and 5 is made substantially lower than the other portions of the device so as to prevent closing of the wells should the gasket 21 be shifted accidentally while assembling and close the wells 18.

The operation of the above described device is as follows: During idling conditions, that is when the throttle 30 is closed or nearly closed, the fuel mixture is charged through the aperture 31 in the wall 32 of the carbureter and due to the poor directional distribution of the fuel only a portion of the fuel mixture is properly vaporized and in that condition passes through the throat of the Venturi bore 23, while the balance of the fuel in unvaporized condition passes into the wells 18 of the device, thereby preventing the same from passing through the intake manifold and reaching the firing chambers of the cylinders until all unvolatilized particles of the fuel in the wells 18 become heated to a high degree of temperature, by convection and conduction from the heated manifold; thus, the liquefied fuels become vaporized and are then drawn through the throat of the Venturi bore of the device and delivered to the firing chambers of the cylinders as a greatly improved combustible mixture. The series of transversely positioned holes 26, which penetrate through the neck portion 27 of the inner shell 22, greatly facilitate the rising vaporized fuel from the wells to be additionally vaporized and mixed with the vaporized fuel issuing from the carbureter, thus creating a greatly improved idling mixture.

Under normal operating or driving condition, the throttle 30 is more or less open, depending on the speed of the engine. In that case, the major portion of the fuel charge issues from the carbureter nozzle 33, as diagrammatically shown in Figure 4 of the drawings; otherwise, the function of the invention is identical with the action in condition for idling.

The modification shown in Figure 6 is similar to the device shown in Figures 2, 4 and 5, with the exception that the location of the horizontally disposed, knife-edged flange 34 is changed to a position about mid-ways of the height of the outer shell 35. It will be noted, that this modification provides an additional well 36 created between the inner wall 37 of the flanged carbureter end 15 and the outer face 38 of the outer shell 35 of the device.

Figure 7 illustrates another modification of my invention. In this design the horizontally disposed knife-edge flange 40 is shown in alignment with the bottom 41 of the device. The additional well 42, in this case, holds considerably more liquefied fuel as the one previously described.

In Figure 8 there is shown another modification of the device in which the improved vaporizer 43 is shown integral with the flange end of an intake manifold 44, otherwise the said vaporizer is substantially the same structurally and functionally as the ones previously described.

Figure 9 shows the vaporizer without the knife-edged flange and pressed into position into a recess 45 in the flange end 46 of a carbureter.

While the invention has been described and illustrated with a down-draft carbureter, it will be understood that the same conditions exist relatively with an up-draft carbureter.

In order to interpose either of the devices shown in Figures 2, 4, and 5 to 7 inclusive in existing engines it is only required to remove the bolts

which secure the carbureter to the intake manifold, spread the flanges thereof sufficiently apart to permit the insertion of the invention between their flanges. There is no need of changing the gasket, which is usually placed between the flanges and since no visible height is added by insertion of the invention, due to the knife-edged flange of the device, the same bolts are replaced to secure the carbureter to the intake manifold. Such installation may be accomplished in less than five minutes.

My device is in actual use on thousands of automobile and airplane engines and I have clearly proved that with the use of my improved device entirely eliminates burnt out valves, sticking valves, forming of carbon under the valve seats and spark plugs and dilution of the lubricant in the crank-case.

Although I have shown and described the several constructions of my device, it will be understood that variations in construction and arrangement, which are consistent with the appended claims, may be resorted to without detracting from the spirit or scope of the invention, or sacrificing any of the advantages thereof.

I claim:

1. A vaporizer adapted to be interposed between a carbureter and an intake manifold comprising an inner shell and an outer shell having a bottom common to both to form an annular well; a Venturi bore in said inner shell; a horizontally disposed flange of razor-blade thinness extending outwardly and formed integral with said outer shell; concentric partitions within said annular well dividing the latter into a plurality of concentric annular wells adapted to receive fuel in liquid state issuing from the carbureter, said liquid fuel in the wells adapted to be vaporized by convection and conduction of the heat from said intake manifold and means to control the vaporized fuel rising from said wells and direct same into the throat of said Venturi bore.

2. A vaporizer of the character described comprising a flange end of an intake manifold provided with an integral Venturi tube extending upwardly and beyond the face of said flange; a plurality of concentric annular wells surrounding said Venturi tube; the top portion of said extended Venturi tube provided at the exterior thereof with an inverted, V-shaped undercut neck portion, said neck portion provided with a plurality of radially arranged apertures.

3. A vaporizer of the character described comprising an inner shell and an outer shell, both having a common bottom to form an annular well, concentric partitions within said well dividing it into a plurality of concentric wells, said partitions being substantially of less height than said inner and outer shells; a Venturi bore in said inner shell; said inner shell extending upwardly and beyond the upper edge of said outer shell, the extended portion provided with an outwardly widened rounded top portion, the neck portion thereof being provided with a V-shaped undercut having a plurality of radially disposed apertures and means to secure the device.

4. A fuel vaporizer for internal combustion engines comprising an annular inner shell having a Venturi bore and an annular outer shell, both shells provided with a common bottom to form an annular well and concentric partitions within said well dividing the latter into a plurality of concentric annular wells.

5. A fuel vaporizer for internal combustion engines comprising an annular inner shell having a Venturi bore and an annular outer shell, both shells provided with a common bottom to form an annular well; concentric partitions within said annular well dividing the latter into a plurality of concentric wells and means integral with said outer shell for securing the vaporizer between the flanges of a carbureter and intake manifold.

WILLIAM J. LINN.