Jan. 18, 1927. 1,614,664

B. E. DYER

FUEL MIXER FOR INTERNAL COMBUSTION ENGINES

Filed Dec. 7, 1922

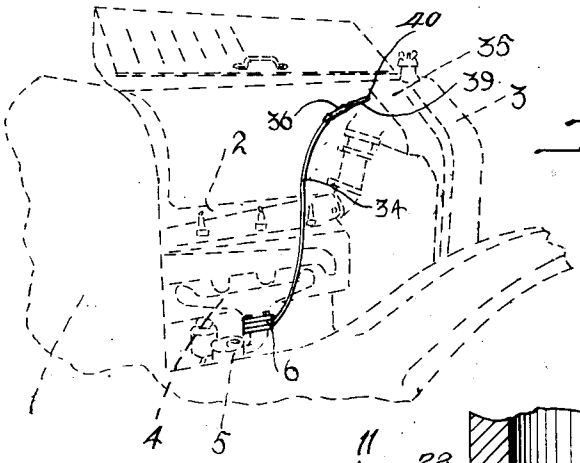


Fig. 1.

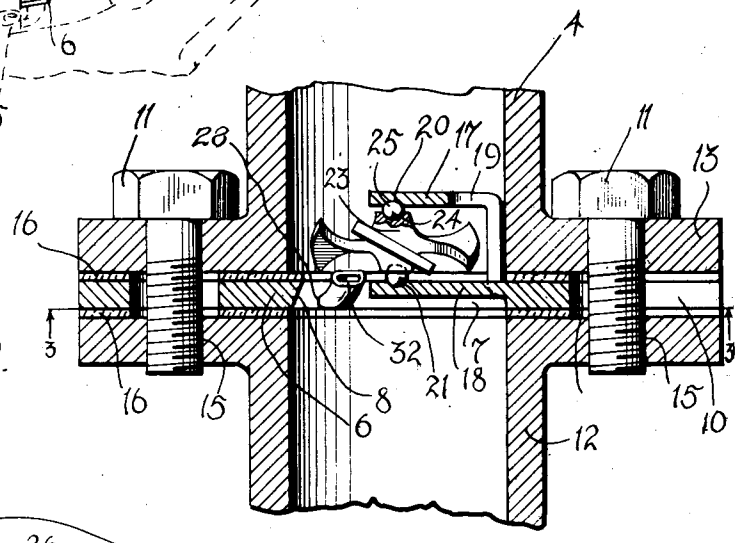


Fig. 2.

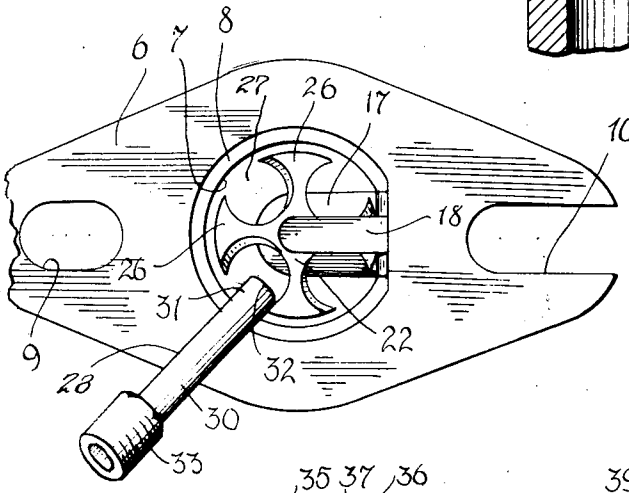


Fig. 3.

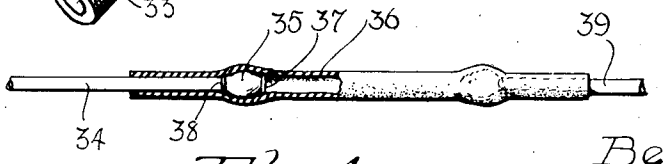


Fig. 4.

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FUEL MIXER FOR INTERNAL-COMBUSTION ENGINES.

Application filed December 7, 1922. Serial No. 605,416.

My invention relates to improvements in fuel mixer for internal combustion engines, more particularly that type of internal combustion engine employed in motor vehicles, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide a device of the character described in which the rotatable mixing member is rotatably supported upon an anti-friction bearing, thereby precluding the disadvantage eminent in similar devices of the binding of the mixing member. In devices of this character it is absolutely necessary that the mixing member shall rotate at a maximum speed and my present invention embodies a structure obtaining this necessary result.

A further object of my invention is to provide a device of the character described in which the bearing surface of the rotatably mounted mixing member is reduced to a minimum, thereby reducing the surface upon which accumulation of extraneous substances may be deposited to hinder the free movement of the member.

A further object of my invention is to provide a device of the character described in which a flexible union is employed in the vapor intake line, thereby precluding the possibility of breakage of this line which is quite common in devices of this character and which is brought about by the continued vibration of the car as it runs upon the road. This vibration causes the radiator and the engine which is suspended upon the frame of the car to vibrate at different periods, and the result is that crystallization of a portion of the metal tube causes the breakage of the tube at a point adjacent the radiator.

A further object of my invention is to provide a device of the type described which possesses a maximum degree of efficiency as to the mixture of the water or vapor with the fuel charge.

A further object of my invention is to provide a device of the type described that is extremely simple in construction, that is durable, and that is thoroughly practical for the purpose intended.

Other objects and advantages will appear in the following specification. and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application, in which—

Figure 1 is a perspective view of an embodiment of my invention applied to the internal combustion engine of a motor vehicle,

Figure 2 is an enlarged sectional view of a portion of the mechanism illustrated in Figure 1,

Figure 3 is a view along the line 3—3 of Figure 2, and

Figure 4 is a view partially in section of a portion of the mechanism illustrated in Figure 1.

In carrying out my invention I provide a motor vehicle 1 having an internal combustion engine 2 and a water cooling radiator 3 therefor. The engine 2 is provided with an intake manifold 4 for conducting the fuel charge to the valve ports of the cylinders. The engine 2 is further provided with a carburetor 5 in which the liquid fuel is vaporized so that it may be drawn through the manifold 4 and into the cylinders.

It is well known in the art that water vapor introduced to the fuel charge of an internal combustion engine brings about certain beneficial results, namely, a more effective explosion of fuel when ignited.

It is also well known that if the fuel charge is thoroughly agitated prior to its entrance to the intake manifold that a further beneficial result is obtained. There are at present in use several devices which propose to agitate this charge in one way or another prior to its entrance to the intake manifold, but in most cases the mechanism for agitating the charge is mechanism which becomes practically inoperative after a short period of use or in which the friction of the moving parts is so great that the relatively slight force applied to operate the mechanism is not sufficient to properly actuate the moving element. This disadvantage has been entirely overcome in my present invention.

My mixing mechanism consists in a plate 6 which is clearly shown in Figure 3. The plate 6 is provided with a relatively large

centrally located opening 7 therethrough. The walls of the opening 7 are tapered as shown at 8, (see Figure 2). The plate 6 is further provided with an elongated opening 9 adjacent one end and a slot 10 at the opposite end.

The openings 9 and the slot 10 serve as a means for receiving bolts 11 which are normally provided to secure the intake manifold 4 to the outlet 12 of the carburetor 5. On both the outlet 12 and the manifold 4 are provided radially extending flanges 13 and 14 respectively which are similar in shape to the plate 6 and concentric with the axis of the opening 7.

The plate 6 is introduced between the adjacent surfaces of the flanges 13 and 14 respectively and the bolts 11 are tightened, thereby insuring a vapor-tight connection between the outlet 12 and the intake manifold 4 as though the plate 6 were not introduced into the combination at all.

The plate 6 is provided with a pair of supporting members 17 and 18 both of which are parallel with the plate and which are spaced apart from one another. These supporting members may be stamped out directly from the plate or may be secured to the plate in any well known manner, such as welding, soldering, or the like. The structure of the supporting members is more clearly shown in Figure 3, the supporting member 18 being sheared away from the supporting member 17, leaving a longitudinal opening 19 in the member 17.

The supporting members 17 and 18 are each provided with arcuate cavities 20 and 21 respectively in their adjacent side walls. These arcuate cavities 20 and 21 are in axial registration with one another and concentric with the axis of the opening 7.

A rotatable mixing member generally indicated at 22 is rotatably mounted upon the supporting members 17 and 18 by means of a shaft portion 23 centrally located therein and extending transversely on each side of the mixing member. The shaft portion 23 is provided with an arcuate cavity 24 in each end thereof. Steel balls 25 are partially received in each of the cavities 20 and 21 and in the adjacent cavities 24 of the shaft portion 23, thereby providing an anti-friction bearing for the mixing member 22. In order to introduce the steel balls 25 it is necessary of course to spring the supporting member 17 slightly away from the member 18.

The mixing member 22 is constructed with a plurality of radially extending blades 26 which are inclined relative to the plate 6 so that the fuel charge in passing from the outlet 12 to the intake manifold 4 will cause the member to rotate rapidly. The space between the adjacent blades 26 of the mixing member is relatively large as shown at 27, which structure reduces the resistance of the flow of the fuel to a minimum without sacrificing the propelling force necessary to successfully operate the mixing member 22. It should be stated at this time that in the ordinary type of device, the opening 27 must be relatively small since the friction of the moving parts of such devices is relatively great.

The plate 6 is further provided with a groove 28 on the under surface thereof extending from the outer peripheral edge thereof and communicating with the opening 7. A copper tube 30 is flattened at a point adjacent to its outer end and that flattened portion is disposed in the groove 28 and permitted to project within the opening to a point adjacent the mixing member 22. The inner end 31 of the tube is bent upwardly so that the mouth 32 is as close to the moving blades 26 as possible. The mouth 32 is of course beneath the blades 26.

The tube 30 is provided with a suitable coupling device 33 by means of which the tube may be removably connected with a relatively small tube 34. This small tube 34 is connected as shown in Figure 1 to the upper chamber 35 of the radiator 3 above the water level of the radiator through a suitable flexible, shock absorbing union. This union is more clearly illustrated in Figure 4 and comprises a rubber tube 36 constructed of a quality of rubber which prevents decomposition or hardening from passage of the water vapor and heat from the radiator therethrough. The outer end of the tube 34 has thereon an enlarged sleeve 35 which is held against displacement upon the tube by means of an outturned portion 37 thereof and a ring 38 at the opposite side of the sleeve. The rubber tube 36 is disposed over the sleeve 35 and the sleeve effectively prevents the disengagement of the tube 34 with the tube 36. A second tube 39, similar in construction with the tube 34 is also connected with the opposite end of the rubber tube 36 in precisely the same manner as is the tube 34. The opposite end of this tube I have shown at 40 as connected with the chamber 35 of the radiator 3, heretofore described.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. My present invention, because of the provision of the anti-friction bearing or moving member 22 will function immediately upon starting the engine, and without racing the engine. It is therefore not necessary in order to make use of the beneficial result of the mixing device to race the engine upon starting as is the case of the ordinary type of device, where the friction of the bearings of the moving member is so great that beneficial results are

not obtained unless the engine is going very fast and the force of the fuel charge as it passes from the outlet 12 to the intake manifold 4 is relatively great.

My present device operates immediately upon the first inrush of vapor from the carburetor and thoroughly atomizes and agitates that vapor so that it is in an apt condition for combustion.

As the fuel charge 12 is drawn from the carburetor of the manifold, a vacuum is created in the relatively small tube 34 by virtue of its opening adjacent the mixing member 22 and water vapor from the chamber 35 is forced through the tube by atmospheric pressure and delivered through the mouth 32 of the tube 30. This water vapor thoroughly mixes with the agitated fuel charge and the final mixture of fuel charge and water vapor are drawn through the manifold and into the cylinders of the engine. The result obtained is an increase in the efficiency of the power factors of the engine, due to a more complete combustion of the fuel charge.

It is well known that in the ordinary type of motor vehicle the radiator vibrates as the car passes over the road, especially if the road is a loosely packed macadam road or a gravel road and that the engine and other parts of the car vibrate as well. It is also apparent that the radiator and the engine will not vibrate at the same period of vibration simultaneously and that one will move with greater dexterity than the other. This condition has brought about a certain grievous disadvantage in the fuel mixing devices of the character now in use. This disadvantage is that the metal tube which connects the plate 6 or its equivalent actually breaks at a point adjacent to the radiator. In my present invention I employ a flexible union 36 which serves to permit the unequal motion of the tubes 34 and 39 without any danger to the line. This structure has proven highly satisfactory and precludes entirely the possibility of the line breaking due to the vibratory motion of the radiator.

I claim:

A fuel mixer of the type described comprising a supporting member arranged to lie between the intake manifold of an internal combustion engine and a carburetor therefor, a lug having a semi-spherical recess therein, being integral with said supporting member and extending inwardly through the center portion thereof, a second lug having a semi-spherical recess therein, being integral with said supporting member and extending perpendicular to the plane of said supporting member and turned inwardly parallel with said first named lug, a turbine wheel having a shaft portion and semi-spherical recesses in the end walls of the shaft portion, and single ball bearings partially disposed in said recesses and in registration with said lugs, said lugs being integral, whereby the distance between said bearing members may not vary during the operation of said device.

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