K. SPLUVAK

FUEL LINE CLEANER DEVICE

Filed Sept. 13, 1952
This invention relates as indicated to a fuel line cleaner device, and more particularly to a magnetic cleaner for removing particles of rust and the like from the fuel flowing through a fuel feeding system. It has been found that fuels, such as gasoline, which have been stored in steel storage tanks gradually accumulate an extremely fine sediment of rust. Some of this sediment is so fine that it not only will pass through the fuel pump of an automobile fuel system, for example, but also through the mechanical filters with which present carburetors and fuel pumping systems are ordinarily equipped. The presence of rust in a fuel system is highly undesirable since its abrasive action hastens fuel pump deterioration and it tends to clog very fine carburetor orifices or jets thereby reducing jet and carburetor efficiency, and sometimes causing failure of the engine fed by the carburetor.

It is accordingly a primary object of my invention to remove particles of rust and the like in fuel line systems by establishing a magnetic field of attraction therein. It is also an object of my invention to provide a magnetic cleaner which may be removable inserted in an automobile fuel system and in which a magnet, preferably of a spiral form, is enclosed in a transparent housing so that magnetic particles collected on its surface will be readily visible. It is a further object of my invention removable to insert in an automobile fuel system a magnet within a transparent enclosure wherein the magnet is coated with a light colored rust preventative coating, thereby readily showing magnetic particles attracted to and adhered upon the magnet.

Other objects and advantages will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

Fig. 1 is an elevation view showing an automobile fuel feeding system as connected with the engine of the automobile;

Fig. 2 is a longitudinal cross-section of one form of my invention wherein the magnet is in the form of a coil spring;

Fig. 3 is a vertical section taken on lines 3—3 of Fig. 2;

Fig. 4 is a modified form of the invention wherein the magnet comprises an elongated rod; and

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 4.

Referring now to the drawing, and especially to Fig. 1, my invention is there shown in operative association with a conventional automobile engine M and gasoline storage tank T. Between such engine and the tank is the fuel feeding system which comprises a first fuel line 1 connecting the tank with a conventional pump 2, and a second fuel line 3 leading from the pump to the carburetor 4. There is shown inserted in such fuel lines cleaner devices 5 and 6 in accordance with my invention, with cleaner 5 being located in the fuel line connecting the tank and the fuel pump and cleaner 6 located in fuel line 3 between the pump and the carburetor 4.

The fuel cleaner devices 5 and 6 are identical and may be of the specific construction shown in Fig. 2. In this embodiment of the invention a magnet 7, preferably in the form of an expanded helical spring, is disposed within a transparent enclosure 8 which may be formed from glass, plastic or other suitable material. Such enclosure is preferably cylindrical and has an inside diameter substantially the same as the diameter of the fuel lines 1 and 3. The magnet 7 is maintained within enclosure 8 by means of non-magnetic fittings 9 and 10 located at the respective ends of the enclosure 8. Fitting 9 is a female connector having a reduced end portion 11 which threadably engages the inner surface of enclosure 8 at one end thereof and is provided with a frusto-conical shaped seat 12 adapted to receive an end of the fuel line. Such connector has of course a center bore 13 to allow the passage of fuel therethrough. The fitting 10 is a male connector which likewise has a reduced end portion 14 adapted to threadably engage the inner surface of enclosure 8 at the other end thereof. This fitting has an axial passage 15 communicating with the interior of enclosure 8. The end faces of fittings 9 and 10 engage the respective ends of the magnet 7 and thereby maintain the same within the enclosure.

It will be apparent that rust particles in the fuel flowing through the described cleaner will be attracted by and collected upon the surface of the magnet. Since the magnet is in the form of an expanded helix and the enclosure 8 is transparent, the particles thus collected will be readily visible. To further enhance such visibility, the magnet desirably will be coated with a rust preventative coating such as a chrome or cadmium coating, which is light colored and thereby not only prevents oxidation of the magnet, but also provides a distinguishing background for the collected particles. The male and female connectors 9 and 10 enable the device to be readily inserted in the fuel line and removed for cleaning when inspection discloses the same to be advisable.

In Fig. 4 there is shown another embodiment of my invention wherein the magnet is an elongated rod 16. The enclosure 17 for this magnet is similar to the previously described enclosure 8 and is threaded internally at its ends to receive female fitting 18 and male fitting 19 as in the spring.
magnet form of the invention. These fittings are made from non-magnetic material and have reduced end portions 20 and 21 respectively extending interiorly of the enclosure 17. Each of these fittings 18 and 19 is provided with a supporting web 22 likewise formed of non-magnetic material and having a threaded hub portion 23 centrally supported by spaced members 24. The rod magnet 16 is threaded at each end thereof and engages the respective hub portions 23 of supporting webs 22 whereby it is centrally maintained within the enclosure 17. Magnet 16 is, of course, of lesser size than the central passage through member 17 thereby permitting fuel flow therethrough around the magnet.

The rod magnet 16 desirably will be coated with a protective substance in the same manner as the magnet 7 of Fig. 2 and it will be apparent that in this form of the invention, the particles of rust and the like attracted to the magnet will likewise be readily visible.

Although the system shown in Fig. 1 comprises two fuel cleaners 5 and 8, it will be obvious that only one such device could be used. Regardless of which specific physical form of my invention is used there will be disposed in the path of fuel flow from the fuel tank to the carburetor and jets thereof a magnet which will effectively remove rust contained in the fuel. It will also be obvious that such cleaners will remove any other type of magnetic particles such as fine metallic shavings which may find their way into the fuel feeding system.

It will be further appreciated that in both forms of my invention the flow of fuel through the cleaner or cleaners is influenced in such manner as to enable the magnet to more readily attract the magnetic particles contained in the fuel. Thus, in the helical spring form of Fig. 2, the respective turns of the helix are angularly located relative to the fuel flow thereby causing turbulence in such flow and agitation of the magnetic particles. In the form of the invention shown in Fig. 4, the centrally disposed magnet causes the fuel to flow therethrough, reducing the flow area and therefore the maximum possible distance of any particles in the fuel from this magnet.

While my invention has been specifically described in connection with an automobile fuel system, it will be understood that the invention may be used to equal advantage in other types of vehicles, such as tractors, airplanes, and the like, and applied as well to fuel feeding systems for stationary equipment.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. An automotive fuel line cleaner device comprising a hollow cylinder of transparent plastic material having an inner diameter corresponding generally to the inner diameter of such fuel line, a non-magnetic female connector having a frustococonical shaped seat therein and a reduced end portion threadably engaging the inside of said cylinder at one end thereof, a non-magnetic male connector having a reduced end portion in threaded engagement with the inside surface of said cylinder at the other end thereof, said connectors and said cylinder providing a passage for fuel flow therethrough, a magnet in the form of an expanded helical spring disposed within such cylinder, the ends of such magnet being in contact with the respective reduced end portions of such connectors, and a light colored rust preventative coating on said magnet, whereby magnetic particles contained in fuel passing through the cleaner will be attracted to and held on said magnet where they may be readily viewed through the transparent cylinder wall.

2. An automotive fuel line cleaner device comprising a hollow cylinder of transparent plastic material having an inner diameter corresponding generally to the inner diameter of such fuel line, a non-magnetic female connector engaging the inner surface of one end of said cylinder, a non-magnetic male connector engaging the inner surface of the other end of said cylinder, said connectors and said cylinder providing a passage for fuel flow therethrough, a magnet in the form of an expanded helical spring disposed within such cylinder in endwise contact with the respective inner faces of such connectors, and a light colored rust preventative coating on said magnet, whereby magnetic particles contained in fuel passing through the cleaner will be attracted to and held on said magnet where they may be readily viewed through the transparent cylinder wall.

3. A fuel cleaner adapted to be inserted in an automotive fuel line which comprises a hollow transparent cylinder having an inner diameter substantially equal to the inner diameter of such fuel line, a non-magnetic female connector engaging the inner surface of one end of said cylinder, a non-magnetic male connector engaging the inner surface of the other end of said cylinder, a magnet in the form of an expanded helical spring within such cylinder in endwise contact with the inner faces of such connectors, and a light colored coating on said magnet, whereby magnetic particles contained in fuel passing through the cleaner will be attracted and collected by said magnet and will be readily visible through the transparent cylinder wall.

4. An automotive fuel line cleaner device comprising a hollow transparent cylinder having an inner diameter corresponding generally to the inner diameter of such fuel line, a permanent magnet in the physical form of an expanded helical spring disposed within said cylinder, a light colored rust preventative coating on said magnet, and means for retaining said magnet in such operative disposition within said cylinder, magnetic particles contained in fuel flowing through said cylinder being attracted to and collected on said magnet where they may be readily viewed through the transparent cylinder wall.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,659,136</td>
<td>Cutting</td>
<td>Feb. 14, 1928</td>
</tr>
<tr>
<td>1,948,419</td>
<td>Gramming</td>
<td>Feb. 20, 1934</td>
</tr>
<tr>
<td>2,146,397</td>
<td>Kommer</td>
<td>Feb. 7, 1939</td>
</tr>
<tr>
<td>2,621,594</td>
<td>Katcher</td>
<td>Dec. 16, 1951</td>
</tr>
<tr>
<td>2,648,438</td>
<td>Cox</td>
<td>Aug. 11, 1953</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>401,301</td>
<td>Great Britain</td>
<td>Nov. 6, 1933</td>
</tr>
</tbody>
</table>

OTHER REFERENCES

Brass World, H. C. Pierce, December 1926, pp. 397-399 cited.