June 11, 1957 W. V. KENNEDY 2,795,333

LIQUID FILTER EMPLOYING A MAGNET

Filed May 6, 1955

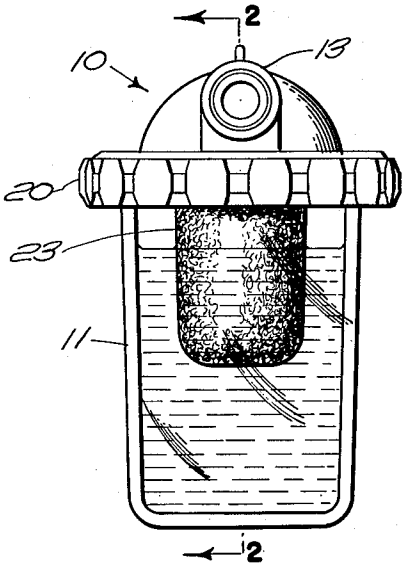


FIG. 1

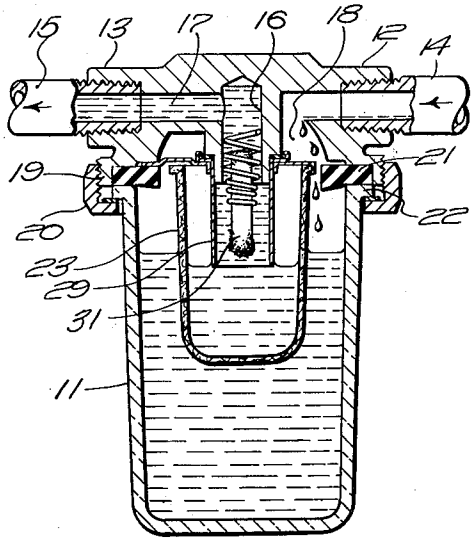


FIG. 2

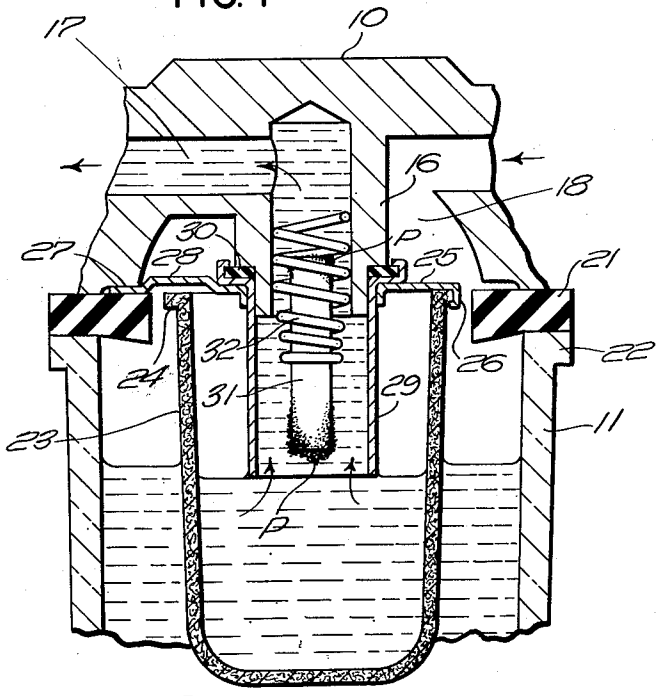


FIG. 3

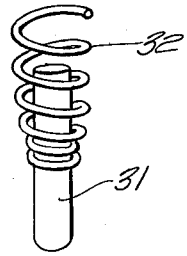


FIG. 4

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United States Patent Office 2,795,333 Patented June 11, 1957

2,795,333

LIQUID FILTER EMPLOYING A MAGNET

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Application May 6, 1955, Serial No. 506,507

1 Claim. (Cl. 210—223)

This invention relates to liquid filters, and more particularly to filters for use with internal combustion engines to filter the gasoline supplied to the engine carburetor.

Filters for filtering the gasoline supplied to internal combustion engines such as employed in motor vehicles have been used heretofore. It is found occasionally that the gasoline supplied to the engine contains minute particles of iron which are so small that they will pass through the fuel filter, and cause carburetor trouble by building up at a critical point in the fuel supply system.

These fine iron particles may become dislodged from the walls of the fuel tank at the filling station or from the fuel tank of the motor vehicle, to enter the fuel stream, and if not removed they may interfere with the supply of fuel to the engine and cause the engine to operate poorly or not at all. One critical point where these iron particles tend to accumulate is at the needle valve that controls the supply of fuel to the carburetor. Due to rust, or possibly magnetic attraction, the metal particles frequently cling together so firmly at restricted points in the fuel system that they are not washed away by the gasoline, but build up to form a hard deposit that interferes with the proper supply of fuel to the carburetor.

The present invention contemplates the use of a small permanent magnet to remove these minute particles of iron from the fuel stream, and relates particularly to simple and inexpensive means for supporting such magnet in an outlet tube of the fuel filter, so that the filtered fuel will pass close to the magnet and cause the iron particles to collect on the magnet. In this way the iron particles which pass through the fuel filter are removed from the fuel before they can reach the float chamber of the carburetor to interfere with the supply of fuel.

The above and other features of the present invention will be further understood from the following description when read in connection with the accompanying drawing; wherein,

Fig. 1 is a side view of a liquid filter having the present invention associated therewith.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 on a larger scale is a sectional view of portion of the filter mechanism shown in Fig. 2; and

Fig. 4 is a perspective view of a permanent magnet and supporting spring constituting an important part of the present invention.

The magnet means contemplated by the present invention may be employed in various types of filters to remove minute particles of iron from the liquid stream. One type of filter having such magnet associated therewith is shown in the drawing and will now be described.

The filter illustrated in the drawing is a gasoline filter for filtering the fuels supplied to an internal combustion engine and, as shown, has a head **10** which may be formed of metal, and a bowl **11** which is preferably formed of glass so that the condition of the fuel therein may be observed through the walls of the glass bowl. The head

10 has an internally threaded inlet **12** and an internally threaded outlet **13**, and this filter is connected by the pipes **14** and **15** in a fuel line leading from the fuel pump to the carburetor. The head **10** is shown as having the central sleeve **16** and a passage **17** leading from the sleeve to the outlet **13**. The gasoline which passes inwardly through the inlet **12** enters an annular space **18** about the sleeve **16**.

The head **10** has extending downwardly therefrom an externally threaded outer flange **19** adapted to receive the internally threaded ring **20**, the outer surface of which is roughened as shown so that it can be gripped firmly in the hand to turn the ring. Within the annular flange **19** is fitted a rubber ring or gasket **21** that seats against the lower face of the head **10**. The bowl **11** is provided at its upper end with an outwardly extending flange **22** adapted to be engaged by a portion of the ring **20** as shown. The arrangement is such that the bowl **11** is secured to the head **10** with a liquid-tight connection by screwing the ring **20** tightly upon the downwardly extending flange **19**.

The head **10** and bowl **11** together form a receptacle in which the filter unit which will now be described is secured. This filter unit preferably comprises a porous filter cup **23** which may be formed of molded pulp paper. This cup is provided at its upper end with an outwardly extending flange **24** which preferably is attached to a sheet metal supporting plate **25**, the outer periphery of which plate may be folded downwardly around the flange **24** as indicated at **26**. The plate **25** preferably has outwardly extending projections such as indicated by **27** and which are conveniently clamped between the lower face of the head **10** and the upper face of the gasket **21**, as shown in Fig. 3, to support the filter cup in operating position within the gasoline filter. The portion of the plate **25** having the outwardly extending projections **27** is preferably displaced upwardly in the form of a rib so as to provide a channel **28** which serves as an air or vapor vent around the upper end of the cup **23**.

The cup supporting plate **25** preferably has a central opening adapted to snugly receive a downwardly extending tube **29**, and the upper portion of this tube is of a size to receive and embrace the reduced end portion of the central sleeve **16**, and is provided with the gasket **30**.

The apparatus so far described constitutes no essential portion of the present invention but has been shown and described to make clear the operation of the magnetic means of the present invention and which will now be described.

As above pointed out the gasoline which is supplied to an internal combustion engine such as the engine of a motor vehicle some times has suspended therein very small iron particles which are so small that they will pass through a filter element such as the molded paper cup **23**. If these fine iron particles remain in the fuel stream they are likely to accumulate at some restricted point in the fuel system such, for example, as at the needle valve which is operated by a float to control the amount of fuel delivered to the carburetor. It is found that these iron particles tend to accumulate at a restricted point in the form of a compact mass that is not washed away by the flow of gasoline past such point, and are likely to interfere seriously with the proper supply of fuel to the carburetor. This difficulty can be eliminated at very little expense, in accordance with the present invention, by supporting in the tube **29** through which the filtered gasoline leaves the fuel filter, a permanent magnet such as indicated by **31** and which preferably comprises a round metal bar that may be less than an inch long. This bar is conveniently retained in the operating position, in which it is best shown in Fig. 3, by a coiled spring **32**, the lower coils of which snugly embrace the magnet **31** as shown, and the

upper coils are large enough to fit snugly in the bore of the central sleeve **16**. The arrangement is such that the spring **32** may be forced over the magnet **31** with the fingers to the position in which it is shown in Fig. 4, and this coiled spring may be forced up inside of the sleeve **16** by the fingers before the filter cup **23** and portions **25** and **29** attached thereto are moved to the position in which they are shown in Figs. 1, 2 and 3 of the drawing.

The magnet **31** is preferably supported from the head **10** by the spring **32** so that the magnet will lie within the sleeve **29**, as shown, so that as the filtered gasoline moves upwardly within this tube **29** towards the discharge port **17**, it will necessarily pass close to the magnet **31**. This will cause the iron particles within such stream to be attracted to the magnet and deposit thereupon as indicated by "P" in the drawing. When the fuel pump is operating it will force fuel to the filter shown and to the carburetor at the rate controlled by the float valve for the carburetor. As a result the fuel will enter the filter through the inlet **12** to pass downwardly in drops as shown in Fig. 2 into the bowl **11**. It will then pass through the porous filter cup **23** and move upwardly inside of the tube **29** close to the magnet **31**, as indicated by the arrows, and then pass out of the filter through the outlet **13** as indicated by the arrow. The level of the fuel at the outside of the filter cup **23** is shown as slightly higher than the level of the fuel inside of this cup, because some pressure is required to force the liquid through the filter cup. Air or vapor usually occupies the space in the bowl **11** above the liquid level.

When, after long usage, the filter cup **23** has become clogged and it is desirable to replace this filter cup and the portions **25** and **29** attached thereto with corresponding new parts, the magnet **31** at this time should be wiped clean of the particles of iron deposited thereon, so that it will be ready to again function effectively to remove iron particles from the fuel stream passing through the filter.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

A liquid filter, comprising a head having an inlet passage and an outlet passage and a central tube leading to the outlet passage, a dirt collecting bowl attached to the head, a filter unit positioned in the bowl in surrounding relation with the tube to filter the liquid as it passes from the inlet to the outlet; and magnetic means for removing ferrous particles from the filtered liquid, including a bar magnet and a coiled spring having coils of a size to embrace and support the magnet in a suspended condition and other coils of a size to fit snugly in the bore of the outlet to be retained therein solely by friction, to thereby support a substantial portion of the bar within said tube so as to bring the liquid passing through the tube into close proximity to the magnet.

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