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W. A. SHIRE, JR., ET AL
FUEL SYSTEM EMERGENCY PUMP AND TRAP

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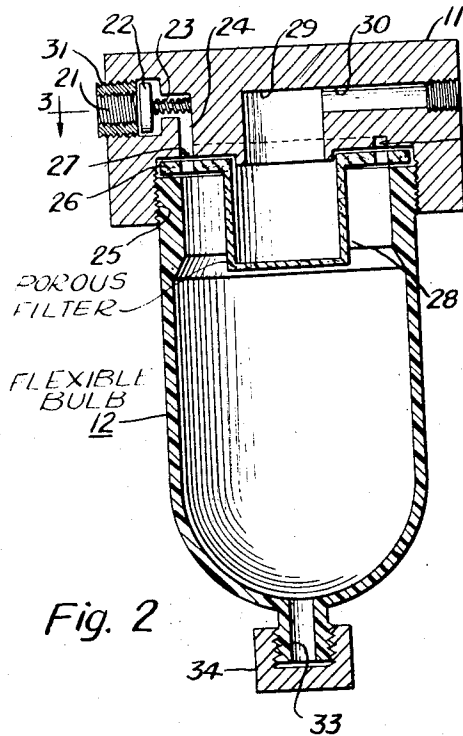


Fig. 2

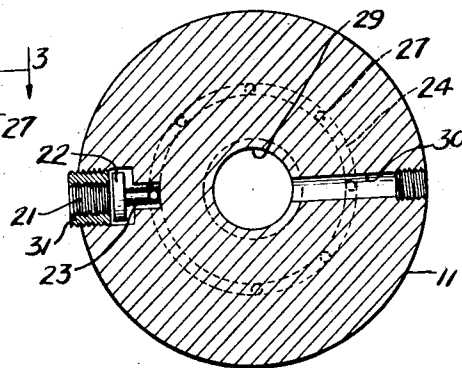


Fig. 3

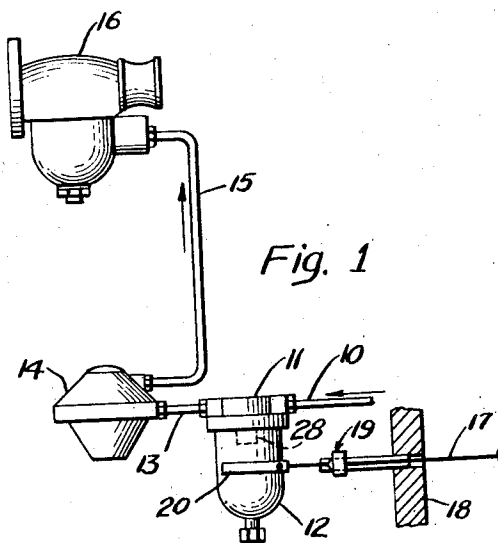


Fig. 1

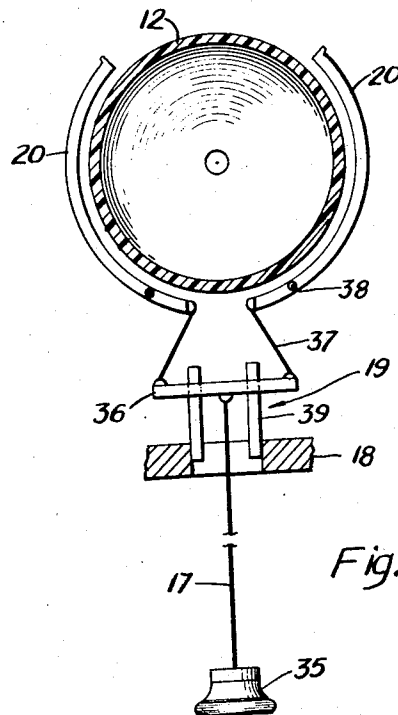


Fig. 4

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FUEL SYSTEM EMERGENCY PUMP AND TRAP

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6 Claims. (Cl. 210—416)

This invention relates to fuel systems for internal combustion engines and, more particularly, relates to an accessory for use on such system.

In systems of this type, it is usual to provide a carburetor to which fuel is delivered by means of a fuel pump from a supply tank. Improper operation of the engine may result upon failure of the fuel pump, stoppage of the fuel line by sediment and the like, and by vapor lock occurring in the system. Vapor lock is malfunctioning of the carburetor and fuel feed systems caused by evolution of bubbles of vapors from the gasoline.

Likewise, in fuel oil heating systems the supply lines and/or burner tips may become plugged which results in the failure of the supply and the quenching of the flame. Further, in general, throttle valves and the like in such fuel and oil systems may become temporarily plugged with foreign matter to the extent that proper flow is impaired.

Many systems involving sediment traps, fuel line insulation, and the like have been attempted to obviate these difficulties, but none has been wholly satisfactory under all circumstances and conditions.

It is, therefore, a primary object of our invention to provide an apparatus which is rugged, inexpensive, and simple in operation whereby vapor lock and plugging of fuel lines may be readily and quickly cleared. A further object of the invention is to provide such an accessory which serves the additional dual functions of a sediment trap and as an emergency fluid pump. An additional object is to provide an adaptor for existing sediment traps on motor fuel pumps which can be operated to perform these functions. These and other objects will become apparent as the invention is described hereinafter.

Briefly, we provide a device which, during normal operations, serves as a fuel sediment trap and filter. Water and fuel sediment can be drained from the device without removing it from the fuel system. It is unbreakable and of simple construction. It comprises a flexible bowl capable of holding several ounces of motor fuel and is inserted in the fuel line system with suitable check valve means. To eject fluids therefrom, it may be squeezed by hand or by remote control from the driver's compartment. When the bowl is released from the squeezing action, it returns to its normal shape, drawing fuel from the supply tank. An outlet check valve prevents backflow from the carburetor and fuel pump back to the bowl.

When fuel stoppage occurs, the bowl can be squeezed, thereby ejecting the supply of motor fuel in the flexible bowl which flushes out the carburetor and fuel pump thereby eliminating the vapor bubbles causing the vapor lock and thereby displacing any sediment which may be lodged in the system.

The invention will be described in more detail with reference to preferred embodiments thereof illustrated in the accompanying drawings wherein:

Figure 1 is a diagrammatic view showing the improved

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device associated with a portion of a conventional motor fuel system;

Figure 2 is a vertical section illustrating details of one embodiment of the accessory;

Figure 3 is a section taken along the line 3—3 in Figure 2; and

Figure 4 is a plan view, partly in section, illustrating one means for operating the apparatus from the driver's seat.

Referring to Figure 1, the fuel is drawn by line 10 from a supply tank (not shown) through the body 11 supporting the bowl 12 into the inlet line 13 of fuel pump 14 and discharged therefrom through feed line 15 into the carburetor 16. A cable 17, mounted on the dash 18 of the automobile, operates the linkage 19 which causes the arms 20 to converge thereby squeezing the bowl 12 to eject liquid gasoline therefrom through the fuel system.

The body 11 of the assembly comprises an inlet 21, check valve 22, check valve spring 23, and annular inlet passage 24. The bowl 12 is threaded into the recess 25 in the body 11. A gasket 26, having flow ports 27, is interposed between the body 11 and the threaded end of the bowl 12, the ports 27 communicating with the annular inlet passage 24. A filter element 28 is disposed about the outlet chamber 29 in the body 11 and may be threaded thereto or may be integral with the gasket 26 as shown in Figure 2. An outlet port 30 communicates with the outlet chamber 29 and terminates in threaded connection with the pump suction line 13 which in turn discharges into the fuel pump 14.

When the apparatus is placed on the fuel line, fuel from the supply tank is drawn from supply line 10 through line 13 which is connected by threaded adaptor 31 to inlet port 21, the adaptor 31 retaining the inlet check valve 22 and check valve spring 23 within the body 11. The fuel then passes into the bulb or bowl 12 wherein any water and sediment present in the liquid fuel settles out and accumulates in the bottom of the bowl 12. Periodically, the settled material can be drained off through the bulb drain 33 by removing the drain cap 34.

The liquid fuel passes through the filter element 28 which effects a further separation of water or sediment and clean fuel flows through discharge chamber 29 and outlet port 30.

The filter element 28 is inert to the fuel, is light weight, and is preferably flexible. We may use filter element 28, for example, which comprises porous Teflon having a contiguous flange 26 provided with flow channels 27 and which serves as a gasket between the bowl 12 and the body 11. Such a filter element 28 has high temperature resistance, is unbreakable, can be easily cleaned and reused, and provides a gasket 26 which is integral with the filter element 28.

The check valve assembly 22—23 may be a unitary line insert and may be connected to either the inlet port 21 or the outlet port 30 as the need may be depending upon whether the flexible bowl assembly 11—12 is disposed on the suction side of the fuel pump 14, as illustrated in Figure 1, or is interposed between the pump and carburetor 16 on line 15. In either case, the check valve means is operated so that flow of fuel is from inlet port 21 and thence through outlet port 30. It is also contemplated that two check valves, one in each of ports 21 and 30, may be provided.

It is also contemplated that the bulb 12, and our necessary filter element 28, may be substituted for the rigid glass bowl conventionally used upon fuel pump sediment traps. In such event, the operation of the bulb 12 to remove the vapor lock or displace plugging foreign

matter is the same as described in connection with the illustrated and preferred embodiment of our invention.

The bulb 12 is an open-ended cylinder threaded at its upper end and capable of holding several ounces of fuel. It is constructed of flexible material inert to gasoline and oil that retains its distended shape during normal operations, yet is capable of being squeezed by hand or by mechanical action controlled remotely from the driver's seat, for example as illustrated in Figure 4. Suitable materials are preferably translucent and may comprise Teflon or Kel-F (polytetrafluoroethylene), polyethylene, nylon, or the like.

Referring to Figure 4, the arms 20 are constricted about the bulb 12 by manipulating the knob 35 fixed to the cable 17 which actuates the linkage 19 including the bar 36 and the cables 37 fixed to the ends of arms 20 which are supported by pivots 38. The bar 36 is slidably guided on rods 39 which are relatively fixed and may, for example, be supported by the dash 18.

Other means may be used for compressing the bulb 12, one form thereof comprising a rigid support or chamber encircling the bulb 12 with a plunger being adapted to collapse the bulb 12 against the rigid support either manually or electrically. Other means for effecting the collapse of the bulb 12 will become apparent to those skilled in the art and that shown in Figure 4 is merely to illustrate one satisfactory means.

It will be understood that bulb 12 is ordinarily so constructed that when the means for collapsing the bulb 12 is released the bulb 12 will return to its original shape due to its construction. However, it is also contemplated that mechanical means may be provided for expanding the bulb 12. For example, internal springs may be provided; likewise, the arms 20 may be fixed to the walls of the bulb 12 and by spring-loading the linkage 19 the arms 20 may be positively retracted to expand the bulb wall. Other means for effecting the collapsing and expanding of the bulb wall will, of course, occur to those skilled in the art.

From the above description, it will be apparent that we have attained the objects of our invention in devising and providing an apparatus which is particularly adapted for overcoming fuel pump failures due to plugged fuel lines or vapor lock. It is contemplated, however, that the mechanism of Figure 2 can be applied to furnace fuel oil lines and the like for maintaining the flow lines clean.

Although we have described our invention in terms of preferred embodiments thereof, it should be understood that these are by way of illustration only and that the invention is not necessarily limited thereto. In any event, it is contemplated that other modifications of the apparatus and uses thereof will become apparent to those skilled in the art in view of our description and can be made without departing from the spirit of our invention.

What we claim is:

1. An apparatus adapted to cause positive flow of liquid through fuel line systems which comprises in combination a rigid body portion, inlet port means in said body portion, check valve means in said inlet port means, outlet port means in said body portion, filter means disposed between said inlet port and said outlet port, trap means below said filter means and fixed to said body portion, said trap means consisting essentially of a flexible bulb capable of being collapsed under external pressure to eject liquid therefrom through said outlet port means while causing the closing of said check valve means in the inlet port means, said filter means comprising a generally cylindrical

porous plastic cup element, a flange about the open upper end of said cup element, and a flow port in said flange in register with said inlet port means, said flange serving as a support for the cup element and as a gasket between said body and said trap means.

2. The apparatus of claim 1 wherein the flexible bulb is provided at its lower end with a removable drain cap whereby sediment can be removed without disturbing the bulb or filter means.

3. A combined sediment trap and emergency fuel pump adapted to be connected on a fuel line which comprises in combination a rigid body portion, inlet and outlet port means in said body, and check valve means in said body, a recess in said body communicating with said inlet port means and said outlet port means, an annular flow channel in said recess communicating with said inlet port means, a collapsible bulb fixed within said recess and extending a substantial distance from said body portion, a filter element disposed across the mouth of said bulb and having one side thereof in communication with the inlet port means and the other side thereof in communication with the outlet port means, said filter element comprising a porous cup having an annular flange extending from the rim thereof, said flange being disposed within said recess and interposed the said body and said bulb, flow ports in said flange providing communication between said annular flow channel and the interior of said bulb, a drain channel at the lower end of said bulb, a threaded cap on said drain, and mechanical means for collapsing said bulb.

4. The apparatus of claim 3 wherein said mechanical means for collapsing said bulb includes a pair of opposed pivoted arms, and cable means for actuating said arms terminating at a point remote from said bulb.

5. An apparatus adapted to serve the functions of a sediment trap and of an emergency fuel pump on fuel line systems, which comprises in combination a rigid body portion, inlet port means in said body portion, said inlet port means including an annular flow channel, check valve means associated with said inlet port means, outlet port means in said body portion, collapsible bulb means supported below said body portion and communicating with said inlet and said outlet port means, said collapsible bulb providing a trap means below said inlet and outlet port means, a drain channel at the lower end of said bulb, a threaded cap on said drain channel, a filter element within said collapsible bulb means and between said annular flow channel and said outlet port means, said filter element being disposed in an upper portion of said collapsible bulb means and supported by said body portion, and mechanical means exterior to said bulb means adapted to collapse said bulb means thereby to expel fluid therefrom through said filter and said outlet port means.

6. The apparatus of claim 1 including means exterior of said bulb adapted to collapse said bulb.

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