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FUEL PUMP FILTER COMBINATION

Filed Oct. 16, 1962

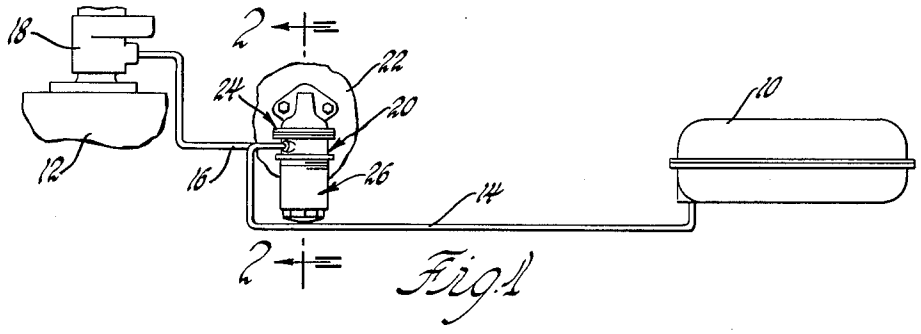



Fig. 1

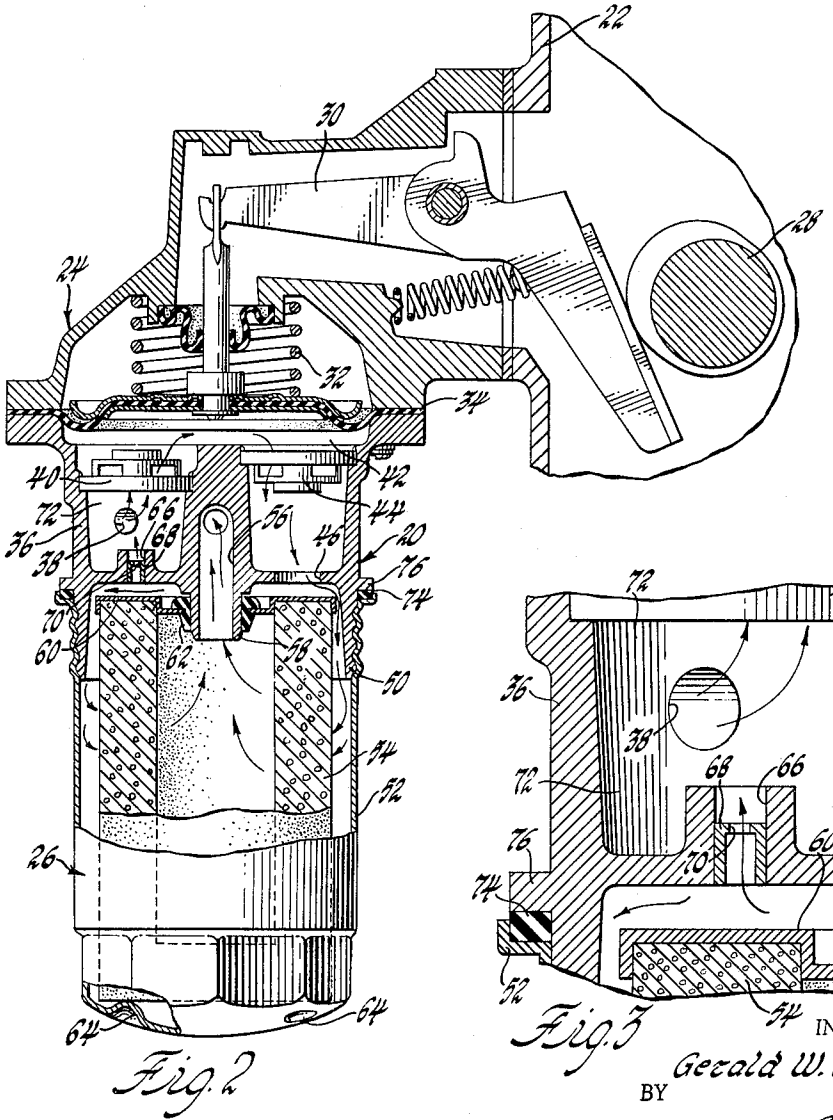



Fig. 2




Fig. 3

INVENTOR.
Gerald W. McArthur
BY
George E. Johnson
ATTORNEY

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# FUEL PUMP FILTER COMBINATION

Gerald W. McArthur, Flint, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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This invention relates to fuel pumps and filters for internal combustion engines and more particularly to diaphragm pump and filter combination units suitable for use in liquid fuel systems of automotive vehicles.

Heretofore fuel pumps and fuel filters have often been associated in unitary structures insertable in fuel lines leading from fuel tanks to the carburetors of internal combustion engines. A difficulty has risen in such combinations, however, in that excess pressure often would build up in the fuel line between the filter element and the carburetor and cause flooding of the latter.

An object of the present invention is to provide an improved fuel pump and filter combination unit in a fuel system in which the build up of undue fuel pressure adversely affecting a carburetor or the operation of an engine is avoided.

A feature of the present invention is a fuel system in which a diaphragm pump is associated with a fuel filter in a unitary construction involving a single pump body enclosing a valved inlet and a valved outlet, the inlet side of the filter being in communication with the inlet side of the pump by means of a bleed hole. Another feature is a diaphragm pump in which a cover or body portion of the pump provides a bleed hole connection between the inlet side of a fuel filter element and the inlet side of the pump.

These and other important features of the invention will now be described in detail in the specification and then pointed out more particularly in the appended claims.

In the drawings:

FIGURE 1 is a diagrammatic view of a fuel system for an internal combustion engine, one embodiment of a pump unit of the present invention being utilized in the system;

FIGURE 2 is an enlarged sectional view looking in the direction of the arrows 2—2 in FIGURE 1 and showing a diaphragm pump and fuel filter combination unit; and

FIGURE 3 is a sectional view of a portion of the structure shown in FIGURE 2 and which is drawn to a much larger scale.

In FIGURE 1, a fuel tank **10** is depicted as a source of liquid fuel for an internal combustion engine partially shown at **12**. Conduit means **14** and **16** are illustrated as connecting the tank **10** to a carburetor **18** of the engine **12** by way of a pump and filter combination unit indicated at **20**. This unit is adapted to be supported on a portion **22** of the engine **12**.

In FIGURES 1 and 2, the pump and filter combination unit **20** is in the form of a diaphragm pump **24** and a filter **26**. The pump **24** is adapted to be operated by an engine camshaft **28** through a combination rocker arm arrangement **30** as is customary. By virtue of the action of the camshaft **28** and a coiled spring **32**, a pumping diaphragm **34** is adapted to produce a flow of fluid through the pump body portion **36** by way of an inlet **38**, an inlet valve **40**, a pump displacement chamber **42**, an outlet valve **44** and an intermediate outlet **46** leading to the filter **26**. The fuel pump **24** is not further described herein as the diaphragm operating parts and one-way valves **40** and **44** are much like those disclosed in the United States Patent No. 2,873,688, granted February 17, 1959, in the name of Gordon B. Elder. The body



portion is changed, however, to accommodate the attachment and detachment of the filter **26**. The pump body portion **36** is threaded as at **50** for the connection of a cuplike container **52** retaining a filter annulus **54** of suitably porous material. The pump body **36** is formed with a right angle outlet **56** which is connected to the conduit **16** leading to the engine. Coaxial with the body portion **36** the passage **56** extends downwardly through a stub **58**. The latter is held in fluid-tight relation with a filter element cover **60** by means of a resilient grommet **62**. The element **54** is held in operative position by means of indentations **64** formed in the bottom of the container **52**. The pump body portion **36** is apertured as at **66** for the reception of a bleed hole unit **68**. This unit is in the form of a small cup with a bleed hole **70** at one end and is tightly fitted into the opening **66** thereby giving communication between the inlet side of the filter element **54** and a chamber **72** of the pump leading to the pump inlet valve **40**. A gasket **74** is interposed between one end of the cup **52** and a flange **76** formed on the pump body thereby making a seal-proof joint between the filter and the pump within the combination unit.

It should be noted that, between the pumping diaphragm **34** and the filter container **52**, the simple construction disclosed is characterized by the single pump body or housing **36** for accommodating the valves **40** and **44** and the pump inlet and outlet. With this construction, a separate pulsator chamber with its separate diaphragm to even the flow is not needed as the filter element acts as a "cushion" between the inlet chamber **72** and the right angle outlet passage **56**.

Assuming that the engine **12** is operating, the pump **24** will effect a flow of fuel from the tank **10** through the line **14** into the chamber **72** of the pump. This fluid will then pass by means of the one-way valves **40** and **44** and by way of the pumping chamber **42** discharge from the valve **44** through an outlet chamber and through the outlet **46** and then to the space surrounding the filter element **54** within the container **52**. This fuel will pass through the filter element and then up into the right angle passage **56** into the line **16**.

Assuming that the engine has been operated on a hot day and then is stopped, the temperature in the zone immediate to the line **16** may cause tendency of a pressure to arise in the latter and, as a result cause the carburetor **18** to flood. This flooding is prevented, however, by the fact that any undue pressure in the line **16** would be slowly dissipated from the latter by means of the filter element **54** and the bleed hole **70**. Any fluid withdrawn from the line **16** to cause the pressure to reduce would pass back through the line **14** into the fuel tank **10**.

I claim:

**1.** A fuel system for an internal combustion engine, said system comprising a source of fuel, an engine, and a combination unit having a pump body and a filter container directly and detachably fixed to said body, said body having an inlet chamber connected to said source, a pump chamber and an intermediate outlet chamber connected to the discharge side of said pump, said pump chamber connected to the inlet chamber and the outlet chamber by means of one-way valves, said outlet chamber also communicating with said filter container to form a flow path, and a discharge outlet connected to said engine, a passage in said body connecting said filter container to said body discharge outlet, a permanently open relatively restricted bleed hole in said body connecting said filter container to said body inlet chamber, and a filter element in said filter container traversing said flow path in the latter leading from said intermediate outlet chamber to said passage.

2. A fuel system as set forth in claim 1, said filter element, filter container and one end of said body passage being coaxial, and said filter element being cylindrical with an outlet at one end connected to said body passage.


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REUBEN FRIEDMAN, *Primary Examiner.*

H. L. MARTIN, *Examiner.*

F. W. MEDLEY, *Assistant Examiner.*