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FUEL INJECTION FILTER SYSTEM

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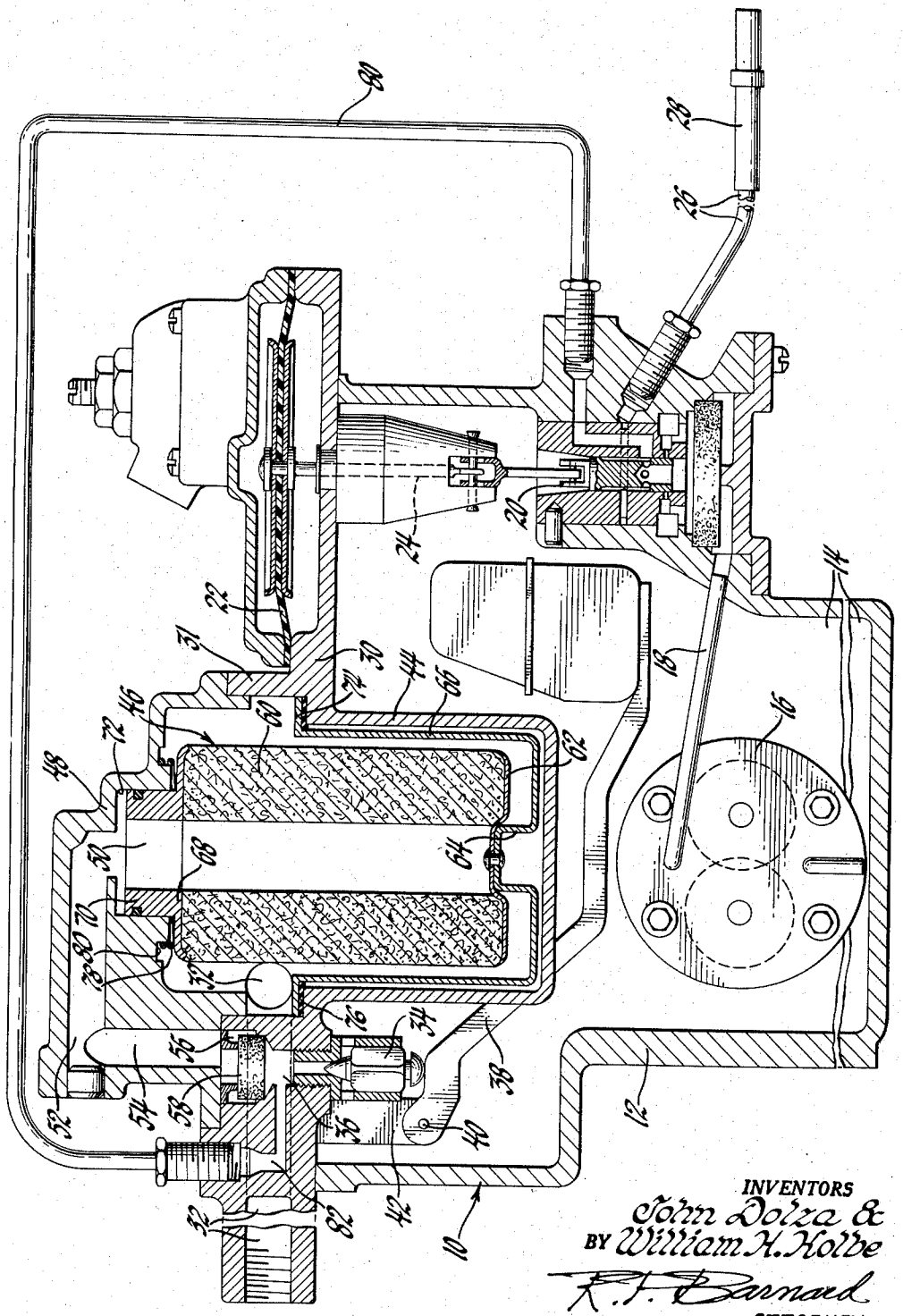

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FUEL INJECTION FILTER SYSTEM

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3 Claims. (Cl. 137—434)

The present device relates to a filter system for a fuel injection system of the type shown in copending application Serial No. 608,853 Dolza, filed September 10, 1956 and now Patent No. 2,843,098, issued July 15, 1958.

In injection type fuel systems fuel nozzles are utilized which incorporate extremely small orifices therein. As a consequence such systems are extremely vulnerable to malfunctioning due to the fouling or blocking up of such orifices. The metering valve in such system is also very susceptible to fouling by impurities carried by the fuel stream.

It is a further necessity in a fuel injection system to prevent dirt of a particle size larger than the end clearance of the metering pump from reaching the pump. Any such dirt particle is likely to become lodged between the gears and end plate in such a way as to increase the pump end clearance and thereby reduce the pump's volumetric efficiency. Accordingly, great care must be taken in a fuel injection system to provide suitable filtering means in advance of the points where impurities may impair the operation of a fuel injection system.

One of the most troublesome problems with such filtering systems has been the inability to provide filtering elements which may be removed or replaced without causing impurities to be set free in the system.

The present invention is directed to a filter device which provides satisfactory filtering of the fuel in the system and further which filter is capable of being removed from the system without danger of losing impurities therein. The present filter is of the cartridge type which is disposed in the fuel metering casing and easily accessible for removal purposes.

The details of the present invention as well as other objects and advantages are set forth in the description which follows.

The drawing relates to a fuel injection system embodying the subject filter device.

The fuel injection system as such constitutes no part of the present invention and functions in the same manner as described in the aforenoted copending application. In general, a fuel metering unit is shown at **10** and includes a casing **12** within which a fuel reservoir **14** is formed. An engine speed responsive pump **16** is submerged in the fuel reservoir **14** and supplies fuel under pressure to a conduit **18** leading to a fuel metering valve **20**. Metering valve **20** is controlled by a diaphragm **22** suitably connected thereto through linkage **24** and which diaphragm is actuated in response to the mass of air flow through said system. Metered fuel from valve **20** is supplied to conduits **26** which terminate in nozzles **28** for delivery of fuel to the individual cylinders of the engine.

A casing **30** is adapted to cover or enclose casing **12**. A fuel inlet opening **32** is provided in cover casing **30**. A fuel inlet valve **34** is slidably disposed in cover casing **30** and is adapted to coact with a passage **36** to control the admission of fuel into the reservoir **14**. The position of the fuel inlet valve **34** is controlled by a float controlled lever **38** suitably pivoted at **40** to a bracket **42** depending from cover **30**. Thus as the fuel level in the reservoir varies the flow of fuel past the inlet valve **34** similarly varies in a well known manner.

The cover casing **30** is formed to provide a cup-shaped receptacle **44** which projects within the fuel reservoir **14**. A filtering element **46** is disposed within the receptacle **44** and retained therewithin through a filter cover **48** which seats upon an upstanding wall **31** formed on cover **30**.

The fuel inlet passage **32** permits fuel to flow into the fuel receptacle **44** where it passes through filter **46** to flow upwardly through a hollow portion **50** thereof to communicate with a passage **52** in cover **48**. Passage **52** in turn communicates with a downwardly extending passage **54**. A chamber **56** is formed in reservoir cover **30** and includes a secondary filter element **58** disposed therein. The chamber **56** communicates with the passage **36** leading to inlet valve **34**. Thus, as the float controlled valve **34** is opened in response to a need for fuel in the reservoir **14**, fuel will flow through the inlet passage **32** into the receptacle **44** through the filtering element **46** passing through passages **52** and **54** and secondary filter **58**.

The filter element **46** comprises a cylindrical filtering element **60** which is suitably connected, as by cementing, to an end plate **62**. Plate **62** is fixed to an upstruck portion or boss **64** of a cup-shaped casing **66**. The filter element **60** is thus supported within the casing **66** in spaced relation thereto. An upper end cap **68** is similarly fixed to the filtering element **60** and includes an upwardly extending neck portion **70** adapted to slide within a counterbore **72** of the filter cover **48**.

The cup-shaped filter supporting casing **66** includes a radially extending flange **74** adapted to seat upon a gasketed annular shoulder **76** formed internally of wall **31**. A spring element **78** is adapted to seat against an annular seat **80** formed in cover **48** and bias upper end cap **68** downwardly causing the flange **74** of the casing **66** to sit tightly against shoulder **76**.

With the filter **46** in position fuel will actually flow into casing **66** and will deposit impurities on the outer surface as well as internally of the filtering element **60**. Any impurities which become detached from the filter element **60** will drop within the supporting casing **66**. In the event it is necessary to change filter **46**, cover **48** may be removed from casing **30** permitting the withdrawal of the filter **60** and the integral sediment catching casing **66**. In this way the filter may be changed without any impurities being set free in the fuel system. Receptacle **44** provides a further safeguard against impurities entering reservoir **14** during the change of filters.

The secondary filter **58** is intended to intercept any microscopic particles which may pass through filter element **60**.

A conduit **80** communicates the metering valve **20** with a passage **82** in cover **30** to return bypassed fuel to the reservoir **14**.

We claim:

1. A fuel injection system comprising a casing, a fuel reservoir formed in said casing, a cover for said casing, a fuel inlet passage disposed in said cover, a fuel inlet valve movably mounted in said cover, a float mechanism for controlling said valve mechanism in accordance with the fuel level within said reservoir, a receptacle formed in said cover, a filter device disposed in said receptacle, said device including a casing member supported upon said cover, a filtering element supported by said casing and projecting therewithin, a cover for said filtering element, said filter cover being adapted to be secured to said casing cover, said fuel inlet passage being adapted to deliver fuel within said filter casing whereby fuel will flow through said filtering element, passage means formed in said filter cover, said cover passage means communi-

cating with said inlet valve whereby the filtered fuel flowing through said filtering element is conveyed to said fuel inlet valve, and a secondary filter intermediate said cover passage means and said fuel inlet valve.

2. A fuel injection system comprising a casing, a fuel reservoir formed in said casing, a cover for said casing, a fuel inlet passage disposed in said cover, a fuel inlet valve movably mounted in said cover, a float mechanism for controlling said valve mechanism in accordance with the fuel level within said reservoir, a receptacle formed in said cover and projecting within said reservoir, a filter device disposed in said receptacle, said device including a cup-shaped casing member, a flange on said member for supporting the member upon said cover, a filtering element supported in radially spaced relation within said casing, a cover having a counterbored portion for supporting said filtering element, said filter cover being adapted to be secured to said casing cover, said fuel inlet passage communicating with said filter device to deliver fuel within said filter casing permitting fuel to flow through said filtering element, passage means formed in said filter cover, said cover passage means communicating with said inlet valve whereby the filtered fuel flowing through said filtering element is conveyed to said fuel inlet valve, and a secondary filter intermediate said cover passage means and said fuel inlet valve.

3. A fuel injection system comprising a casing, a fuel reservoir formed in said casing, a cover for said casing, a fuel inlet passage disposed in said cover, a fuel inlet valve movably mounted in said cover, a float mechanism for controlling said valve mechanism in accordance with the fuel level within said reservoir, a receptacle formed in said cover and projecting within said reservoir, a filter device disposed in said receptacle, said device including a cup-shaped casing member, a flange on said member for supporting the member upon said cover, a cylindrical filtering element supported in radially spaced relation within said casing, a cover having a counterbored portion for supporting said filtering element, a pair of end plates fixed to said element, one end plate being fixed to a boss centrally formed in the closed end of said cup-shaped casing, the other end cap including a longitudinally extending neck portion adapted to project within the cover counterbore, spring means seating on said filter cover and biasing said casing flange into engagement with the casing cover, said filter cover being adapted to be secured to said casing cover, said fuel inlet passage communicating with said filter device to deliver fuel within said filter casing permitting fuel to flow through said filtering element, passage means formed in said filter cover, said cover passage means communicating with said inlet valve whereby the filtered fuel flowing through said filtering element is conveyed to said fuel inlet valve.

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