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BLADDER FUEL PUMP

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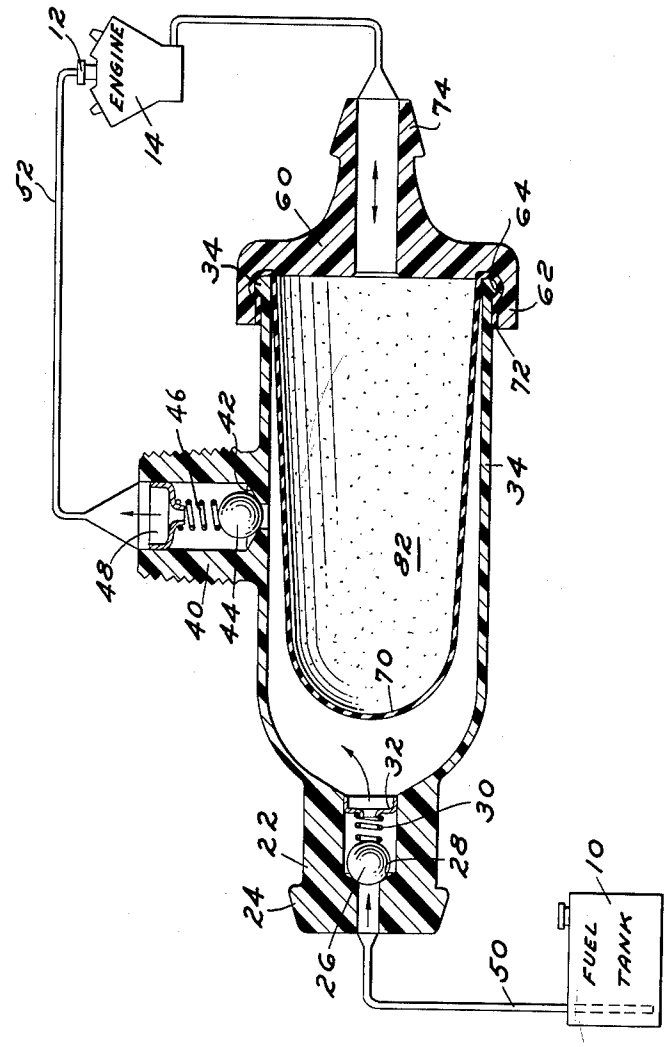

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BLADDER FUEL PUMP

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This invention relates to a bladder fuel pump and is directed to the creation of a small, simple fuel pump for small engines.

In the use of small engines for chain saws and other small appliances, frequently it is necessary to tip the engines to various angles even to the extent of complete inversion. Thus with a gas tank below the carburetor, an engine will soon stop unless means is provided to supply fuel to the carburetor. Also in the design of non-invertable engines it still may be desirable to place the fuel supply below the carburetor for design reasons relating to cost and appearance.

With cost a vital factor in the design of these engines in what is now a highly competitive industry, it has become a problem to provide a simple and effective pump to move fuel up into a carburetor from a fuel supply.

The present invention is a result of this problem and has for its object a simple design, inexpensive, and efficient.

Briefly, the invention comprises a pump to be operated from the crank case having a bladder type pulsator and so constructed that it may be made very small and inserted directly in a fuel line or screwed into the carburetor. The entire pump can be about the size of a fountain pen cap or larger if desired.

A drawing accompanies the disclosure and it shows a sectional view of the pump digrammatically presented in an engine combination.

Referring to the drawing, the pump is intended, in the illustrated circuit, to supply fuel from a tank **10** to carburetor **12** on an engine **14**.

The pump housing **20** is preferably a cast or molded part formed from die cast metal or molded from a plastic such as nylon. It may also be a screw machine part. The housing **20** has a nipple end **22** with an annular run **24** over which a house may be fitted. In the nipple end is a unidirectional check valve in the form of a ball **26** urging against a seat **28** by a spring **30** backed by a small apertured stamping **32** pressed into the neck of the nipple.

The nipple **22** flares into a skirt **34** which thins down to a shell-like extension terminating in a thickened edge **34**.

At some point in the housing **20** an outlet must be formed as shown at **40** comprising a nipple connection with a valve seat **42** and a ball **44** forming a unidirectional outlet. A spring **46** urges the ball against the seat, the retainer being again an apertured stamping **48** pressed into the nipple end.

In the drawing the inlet is connected to the fuel supply by a conduit **50** and the outlet to the carburetor by a conduit **52**.

The housing **20** is closed at the skirt end by a cap **60** having a resilient flanged edge **62** formed with a small reentrant groove **64** and a neck portion to be connected by a suitable conduit to the crank-case of engine **14**.

The bladder-like pumping element of the pump is shown at **70** having an out-turned flange **72** locked between the outer surface of skirt **34** and the resilient flange **62** of cap **60**. The flange **62** of the cap snaps on to the skirt, the edge **34** cooperating with the groove **64** to

engage the parts. In the drawing the nipple end **74** of the cap **60** is connected by a suitable conduit **76** to the crankcase of the engine.

In the assembly described the element **70** is of finger-like or digital shape formed of a flexible, relatively flaccid material such as thin neoprene or some similar substance compatible to hyro-carbons and preferably having an elasticity which has a function in the pumping action and also aids in the assembly of the cap to the body skirt. It is preferable that the shape of the bladder be tapering slightly from the locked edge to the free end. The bladder has enough body to maintain its own shape when not influenced by outside forces and divides the chamber of the housing into a finger-like chamber **82** inside the bladder and a kind of a developed parabolic chamber outside the bladder and inside the housing.

In the operation, the pulsations of the engine crank case especially in a two cycle engine, and to a lesser degree in a four cycle engine, will cause, first, an enlargement of chamber **80** between the outside of the bladder and the inside of the housing **20** and an enlargement of finger-like chamber **82** within the bladder. This will cause fuel to enter through valve **26** from the tank **10**.

The pressure pulse will ensmall chamber **80** and force fuel out of check valve **44** to the carburetor. This device, when applied to a chain saw engine with a diaphragm carburetor, has resulted in equally effective action of the engine in any position upright or inverted to any angle up to and beyond 180°. The pump is easily installed in the fuel line of an engine and has the advantage that it can be used as optional equipment depending on the requirements of the installation.

What we claim is:

1. A small fuel pump adapted to be mounted in a fuel line of an internal combustion engine for remote operation which comprises, a small elongate hollow shell open at one end, a unidirectional inlet and outlet in said shell spaced from the open end thereof, a cap for the open end of said shell, said cap including resilient means having a snap-over relation thereto, and a pumping element in said shell comprising a thin walled, digital-shaped pouch of flaccid material projecting into said shell spaced from the walls thereof, the margins of said pouch being supported and confined around the edges of the open end of said shell between the shell and the cap, said pouch being otherwise unsupported in said shell, said cap having an opening to receive remote pulsations from the crank case of an engine.

2. A small fuel pump adapted to be mounted in a fuel line of an internal combustion engine for remote operation which comprises, a small elongate hollow shell open at one end, a unidirectional inlet and outlet in said shell spaced from the open end thereof, a cap for the open end of said shell, said cap including resilient means having a snap-over relation thereto, and a pumping element in said shell comprising a thin walled, digital-shaped pouch of flaccid material projecting into said shell spaced from the walls thereof, said resilient means supporting the margins of said pouch adjacent the edges of the open end of said shell, said pouch being otherwise unsupported in said shell, said cap having an opening to receive remote pulsations from the crank case of an engine.

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