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Wingate

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[54] **FREE FLOW SIPHON PUMP AND ASSEMBLY**

[76] Inventor: **Glen R. Wingate,** 810 Blue Ridge Parkway, Longview, Tex. 75601

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[51] **Int. Cl.²** **H01M 2/14**

[58] **Field of Search** 137/147–149; 417/DIG. 1, 437

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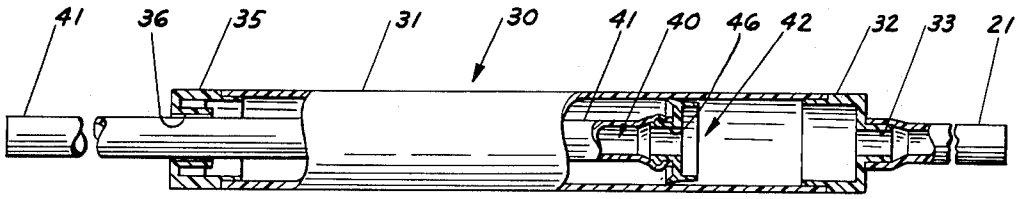
Primary Examiner—William L. Freeh

Attorney, Agent, or Firm—Peter J. Murphy

[57] **ABSTRACT**

A pump for use as a siphon includes an elongated cylindrical body having an inlet nipple at one end to which an inlet hose is attached, the inlet hose being substantially smaller in diameter than the cylinder body. The actuator for the pump includes a piston dimensioned to engage the cylinder walls, and having a central hollow nipple to which a length of discharge hose is attached, the discharge hose being substantially longer than the housing. The housing includes a guide bushing at the discharge end, having a central opening for guiding the discharge hose. Moving the piston toward the discharge end while closing the free end of the discharge hose, enlarges the expansible pump chamber creating partial vacuum to initiate flow of liquid through the pump.

6 Claims, 2 Drawing Figures



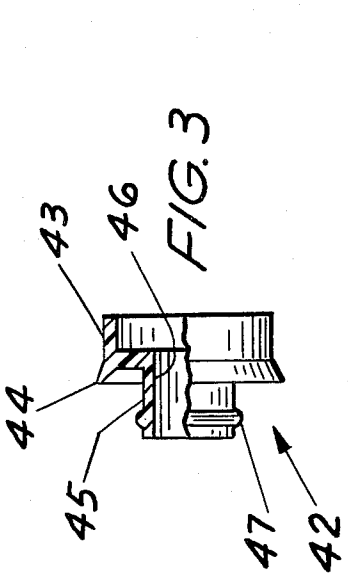


FIG. 3

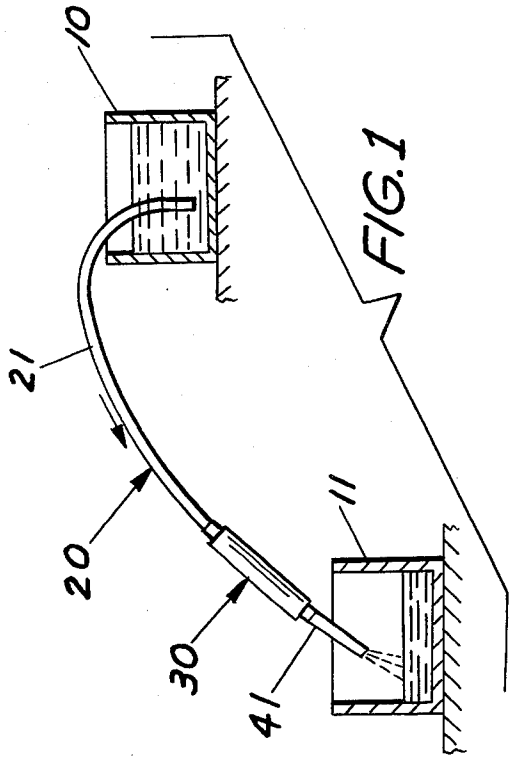


FIG. 1

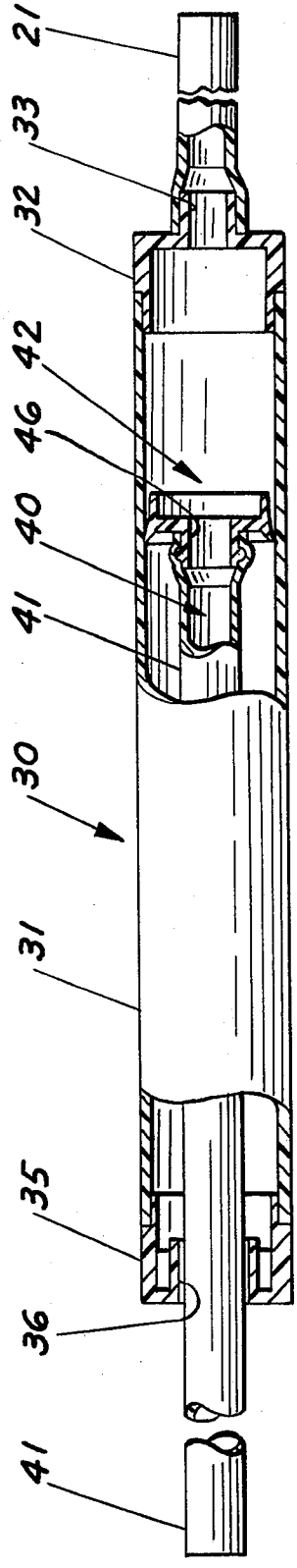


FIG. 2

FREE FLOW SIPHON PUMP AND ASSEMBLY

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a pump for use in a siphon assembly, for initiating flow of fluid through the siphon assembly, and to a siphon assembly.

A well known problem in connection with the use of siphons is the drawing of the fluid into the siphon conduit to effect the operation of the siphon. This is frequently accomplished by the user placing the discharge end of the siphon in his mouth and drawing on the conduit to create a partial vacuum. Frequently the fluid enters the mouth of the user, and this is at least distasteful where the liquid is unclean or unpalatable. This also could create a situation of some danger when the liquid is toxic or otherwise harmful, particularly should the user be unfortunate enough to swallow some of such liquid.

To obviate the necessity for creating the partial vacuum in this manner, it is desirable to provide some form of simple and reliable pump for a siphon conduit, or preferably a siphon assembly incorporating a pump for the purpose of creating the necessary partial vacuum to draw the liquid into the siphon, and to permit the flow of liquid through the siphon once flow is established.

A principal object of this invention is to provide a free flow vacuum pump for use with a suitable length of conduit to define a siphon assembly.

Another object of this invention is to provide such a free flow vacuum pump which is simple in construction, economic to manufacture, simple to use, and effective and reliable in operation.

Another object of this invention is to provide a siphon assembly of rugged durable construction, and which is suitable for use with many types of liquids, including gasoline and fuel oil.

For accomplishing these objects, a pump for a siphon comprises an elongated tubular housing which defines a pump cylinder. Nipple means is provided at one end for attaching an inlet conduit of smaller diameter than the housing and of any desired length. A pump actuator comprises a piston acting within the cylinder and having a central opening, and an attached elongated tubular conduit which communicates with the piston opening. The actuator conduit is substantially longer than the tubular housing so that it will always project from the housing. In greater detail, the housing is provided with a guide bushing at the end opposite the nipple means for guiding the movement of the tubular conduit relative to the cylinder, and for retaining the actuator piston within the cylinder.

The novel features and the advantages of the invention, as well as additional objects thereof, will be understood more fully from the following description, when read in connection with the accompanying drawing.

DRAWING

FIG. 1 is a diagrammatic view of an operating siphon including a pump according to the invention;

FIG. 2 is a side view, partially in section, of a pump according to the invention; and

FIG. 3 is an enlarged detail view, partially in full and partially in section, of the piston of the pump of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing, FIG. 1 illustrates a siphon assembly in operation between a supply container or tank **10** at the higher elevation, and a receiving container or tank **11.** The siphon assembly **20** includes an inlet hose **21** of desired length and a pump **30** including a discharge hose or nozzle **41.** The inlet hose may be fabricated of vinyl and polyvinylchloride, for example, and may have an ID of one-half inch for example.

Referring particularly to FIG. **2,** the pump **30** includes an elongated housing fabricated from a cylindrical sleeve **31,** an inlet end cap **32,** and a discharge and bushing **35.** The sleeve **31** may be fabricated from polyvinylchloride for example, and may have a length of about 9 inches, and an ID of about 1.125 inches for example. The inner surface of the sleeve may be coated with tetrafluroethylene, a material known for its self-lubricating properties.

The inlet end cap **32** is a cup-shaped member having an integral ½ inch nipple **33,** the end cap having an axial extension dimensioned to be received within one end of the sleeve **31** and to be cemented to the sleeve with a suitable cement. The inlet end cap may be fabricated from acrylonitrile butadiene styrene for example.

The discharge end bushing **35** may also be fabricated from acrylonitrile butadiene styrene, for example, and is also generally cup-shaped and provided with an axial extension dimensioned to be received within the sleeve **31** and to be cemented thereto. This bushing forms a central opening **36** defined by an internal wall for guiding the discharge hose or nozzle **41** as will be described.

An actuator **40** for the pump includes the above mentioned conduit or discharge nozzle **41,** of a length substantially greater than that of the pump housing, and a piston **42.** The discharge nozzle **41** may be a ½ inch ID hose fabricated of vinyl and polyvinylchloride for example. The discharge nozzle extends through the bushing opening **36;** and this opening has a diameter sufficiently large to permit easy sliding movement of the discharge nozzle through the bushing, with this opening also functioning as a vent for the discharge end of the pump housing.

The piston which is particularly illustrated in FIG. **3** is preferably fabricated from a plastic material which is flexible but fairly hard, such as a high density polyethylene. The piston has an outer cylindrical portion **43** having a circumference dimensioned for a sliding fit within the sleeve **31** to keep the piston square within the pump cylinder. At one end of this cylindrical portion **43** there is provided a diverging resilient sealing lip **44** having an OD of from 1.150 to 1.180 inches, for example, for a tight seal with the cylinder wall. The piston is also provided with a central ½ inch nipple **45** defining an opening **46** through the piston; and the nipple includes a rib **47** for retaining the discharge conduit **41** which is also cemented onto the nipple.

In operation the pump **30** is conditioned for pumping by moving the actuator toward the right, as viewed in FIG. **2** to position the piston **42** adjacent to or against the end cap **32;** and in this condition a sufficient length of the discharge nozzle **41** projects from the housing to be enclosed in the hand of the user. The siphon assembly is then positioned as illustrated in FIG. **1** with the free end of the inlet hose **21** disposed in the supply container **10** and the discharge nozzle **41** positioned adja-

cent to the receiving container **11.** To initiate liquid flow, the operator's thumb is placed over the free end of the discharge nozzle **41** and the pump actuator is given a sharp pull to move the actuator piston toward the discharge and bushing **35.** This produces a rapid enlargement of the chamber defined by the sleeve **31,** end cap **32** and piston **42** creating a partial vacuum which acts to draw liquid from the supply container into the inlet hose **21.** With liquid in the hose **21,** the thumb is released from the actuator nozzle and flow of the liquid will continue through normal siphoning action, through the pump chamber and discharging from the discharge nozzle.

It has been discovered that the rate of flow through this siphon assembly can be controlled by controlling the rate at which the actuator **40** is withdrawn from the pump housing to initiate flow. If the actuator is withdrawn relatively slowly, the resultant rate of siphon flow will be slow. By the same token, if the actuator is pulled quite sharply, the rate of flow will be the maximum permitted by the diameters of the inlet and discharge hoses.

What has been described is a simple, rugged and effective siphon assembly including a free flow pump. A particular feature of the assembly is that the flow of fluid is initiated by a single simple action of the pump actuator; and the flow will then continue indefinitely without further activity on the part of the user.

Another feature of the invention is that the parts are fabricated from plastic materials producing a rugged and durable structure which can be readily manufactured and which can be made of materials capable of use with most liquids for which there is a siphoning need. Because of the nature of the construction there is minimum wear and opportunity for breakage, resulting in a device which may be used many times over an extended period of time.

While the preferred embodiment of the invention has been illustrated and described, it will be understood by those skilled in the art that changes and modifications may be resorted to without departing from the spirit and scope of the invention.

What is claimed is:

1. A pump for a siphon comprising

a pump housing comprising an elongated cylindrical sleeve, fabricated from plastic tubing and provided with an interior coating of a tetrafluroethylene; an inlet end cap cemented to said sleeve in sealing relation, having an inlet hose nipple with an opening of a diameter smaller than that of said sleeve; a discharge end bushing cemented to said sleeve, having a central guide opening of a diameter smaller than that of said sleeve;

a pump actuator comprising an elongated tubular conduit and a piston fixed to one end thereof; said conduit being dimensioned to pass through said end bushing opening and being substantially longer than said housing; said piston being a unitary member molded from a resilient plastic material, having a peripheral cylindrical surface dimensioned for a sliding fit with said housing sleeve interior wall, and having a peripheral axial flange diverging outwardly from said cylindrical surface; said piston flange being flexible and having a normal maximum exterior diameter slightly larger than the interior diameter of said sleeve; said piston having a central opening of a diameter smaller than that of said sleeve, and having means for securing said actuator conduit to said piston in sealing relation with said piston opening;

said actuator conduit defining the discharge conduit for said pump and said sleeve, said inlet end cap and said piston defining a pumping chamber;

said bushing opening having a diameter slightly larger than that of said actuator conduit defining a vent for the chamber defined by said sleeve, said bushing and said pump actuator.

2. A pump as set forth in claim **1**

said piston comprising a member molded from high density polyethylene.

3. A pump as set forth in claim **2**

said polyethylene piston and said tetrafluroethylene coated sleeve coacting to minimize friction wear and to provide a tight long lasting piston-to-wall seal.

4. A pump as set forth in claim **1**

said actuator conduit being dimensioned sufficiently long to be gripped by the hand of the user when said piston is disposed adjacent to said inlet end cap; and the distal end of said actuator conduit adapted to be closed by the thumb of the user for preventing ingress of air to the pump chamber during withdrawal of said actuator conduit from said housing.

5. A pump as set forth in claim **1**

said inlet end cap and said bushing comprising respective unitary molded parts fabricated from a plastic material, and both being permanently cemented to said sleeve.

6. A pump as set forth in claim **5**

said sleeve being fabricated from polyvinylchloride; and said end cap and said bushing being fabricated from acrylonitrile butadiene styrene.

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