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2,845,874

METERING PUMP

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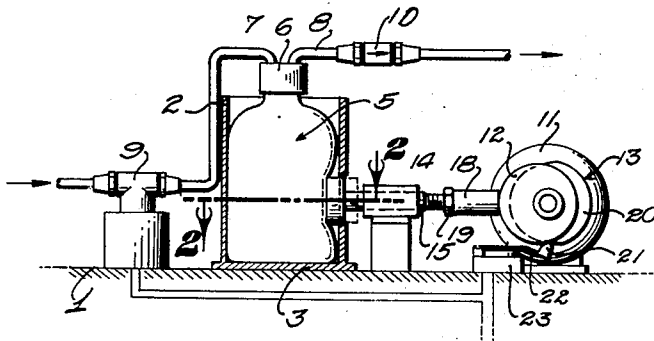


FIG. 1

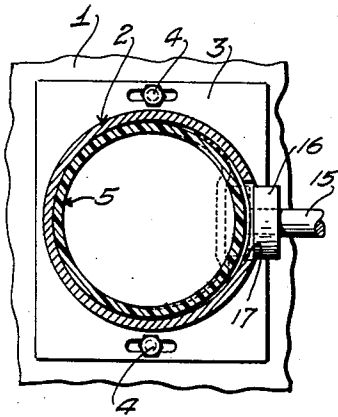


FIG. 2

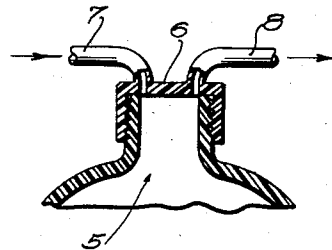


FIG. 3

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2,845,874

METERING PUMP

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1 Claim. (Cl. 103—148)

This invention relates to metering pumps, that is, to pumps intended to meter or feed small quantities of a liquid, such as employed to feed water-conditioning chemicals into a water circulating system of a heat exchanger or air conditioner. Included in the objects of this invention are:

First, to provide a metering pump which is particularly simple and inexpensive of construction, yet dependably operable.

Second, to provide a metering pump which utilizes a liquid-filled plastic bottle, and means for periodically squeezing the bottle as a variable displacement pump.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawings in which:

Figure 1 is a diagrammatical view, partially in section, showing the metering pump and its mode of operation;

Fig. 2 is a sectional view through 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view, showing the mouth end of the pump bottle.

The metering pump is mounted on a suitable base 1 and includes a cylindrical container shell 2 open at its upper end and having a bottom plate 3, secured to the base 1 by bolts 4 so that if desired the position of the shell may be adjusted on the base.

Set within the shell 2 is a pump bottle 5 formed of yieldable plastic material, such as polyethylene. The pump bottle 5 is closed by a cap 6 in which is sealed an intake line 7 and a discharge line 8, which also may be formed of plastic material. Interposed in the intake line 7 is a solenoid valve 9 and interposed in the discharge line 8 is a check valve 10.

Mounted on the base 1 at one side of the shell 2 is a motor 11 which drives a pair of cams 12 and 13. The cam 12 is an eccentric.

Between the shell 2 and the motor 11 is a bearing 14 which slidably supports a rod 15. One end of the rod is provided with a head 16 which is movable through an aperture 17 in the side of the shell 2 to engage the side of the pump bottle 5. The other end of the rod 15 is screw-threaded to receive a cam follower 18, the position of which may be locked by a lock nut 19. The extended end of the cam follower 18 is positioned for engagement by the eccentric cam 12.

The cam 13 is provided with a raised portion 20 and a roller 21 at the end of a spring arm 22 which rides on the cam 13. The spring arm 22 operates a switch 23 which controls the solenoid valve 9.

Operation of the metering pump is as follows:

Rotation of the motor 11, which may include a gear reduction means, not shown, rotates the cams 12 and 13. The eccentric cam 12 periodically pushes the cam follower 18 and rod 15 so that the head 16 presses inwardly against the bottle 5, as indicated by solid lines in Fig. 1 and by dotted lines in Fig. 2. A spring, not shown, may be used for return movement of the rod 15. However, this is not necessary, for the elasticity of the bottle 5 itself is sufficient to return the bottle to its normal contour as the head 16 is retracted and to effect return movement of the rod 15.

By adjustment of the screw-threaded connection between the cam follower 18 and rod 15, the effective stroke of the head 16 is adjusted. The effective stroke can also be adjusted by changing the position of the shell 2 by means of the bolts 4.

The raised portion 20 of the cam 13 is so oriented with

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respect to the cam 12 that the solenoid switch is opened during the return stroke of the head 16 so that as the bottle 5 expands to normal position liquid may be drawn in through the intake line 7. The solenoid valve 9 closes during the forward stroke of the head 16 so that a portion of the liquid contained in the bottle 5 is forced through the discharge line 8 and check valve 10.

Prior to operation, the pump is completely filled with the liquid to be pumped and the intake line 7, as well as the discharge line 8, is also completely filled with liquid so that there is no air or gas volume to alter the effective capacity of the pump bottle 5. Under these conditions the effective capacity of the pump bottle 5 is determined by the extent of the compression of the pump bottle by the head 16.

It will thus be seen that the pump may be arranged to deliver a wide range of volumes of liquid, and in particular that small volumes may be delivered, for example, only a few cubic centimeters per hour. The metering pump is therefore particularly useful for the purpose of pumping small amounts of liquid chemicals into a water circulating system; for example, a water-softening agent to counteract liming conditions, or various algae or bacteria inhibitors, all of which are preferably added at a very slow rate.

It will be observed that the pump bottle 5 itself is expendable. It will be observed also that the pump bottle constitutes a positive displacement pump, the capacity of which is relatively unaffected by changes in the pressure of the supply liquid, so that the supply liquid may be contained in a relatively large tank without change in the head of such liquid affecting the operation of the metering pump, thereby permitting the pump to perform its service for long periods of time without attention.

While a particular embodiment of this invention has been shown and described, it is not intended to limit the same to the exact details of the construction set forth, and it embraces such changes, modifications, and equivalents of the parts and their formation and arrangement as come within the purview of the appended claim.

What is claimed is:

A pump for metering small quantities of liquid, comprising: a cylindrical container having an open upper end and a side wall aperture; a deformable bottle formed of plastic material tending after deformation to recover to its initial shape, said bottle being fitted within said container; a supply line and a discharge line connected with said bottle; valves for said lines, said bottle being adapted to be liquid filled whereby on periodic distorting of said bottle liquid is pumped from said supply line to said discharge line; a guide bearing mounted externally of said container in registry with said aperture; a rod slidably mounted in said guide bearing; a head on one end of said rod movable through said aperture for engagement with said bottle; a cam follower at the other end of said rod; a cam periodically engageable with said rod to cause said head to engage and distort and compress said bottle periodically, thereby to cause said bottle to pump liquid from said supply line to said discharge line.

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