Oct. 7, 1952 F. DE ENCISO Y CARNERERO 2,612,903

DOUBLE SIPHON

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Fig. 1.

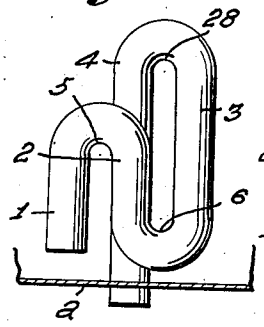


Fig. 2.

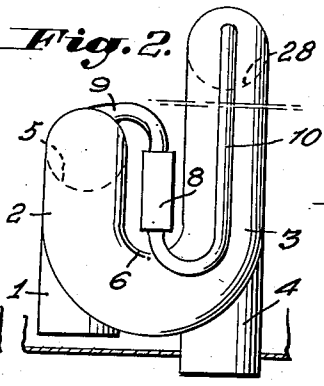


Fig. 3.

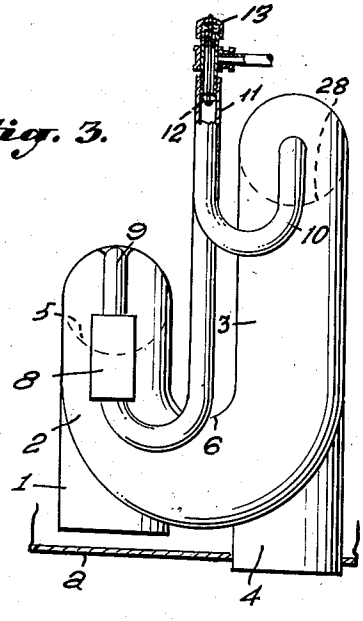


Fig. 4.

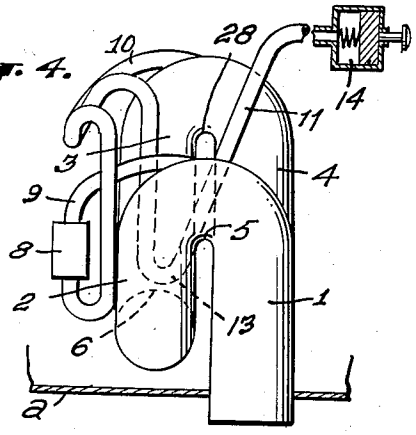


Fig. 5.

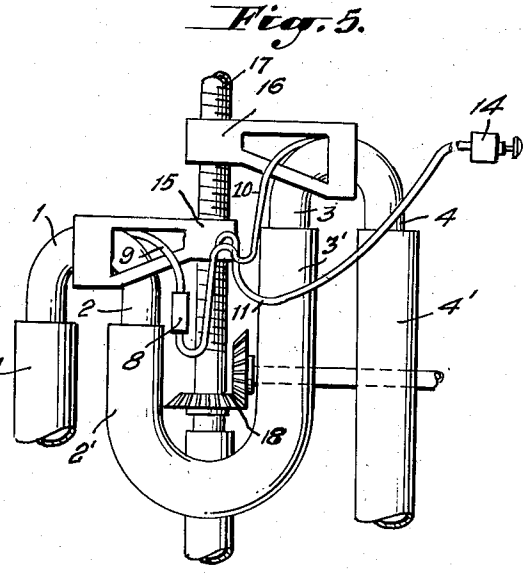


Fig. 6.

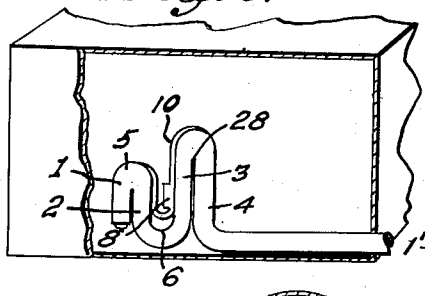
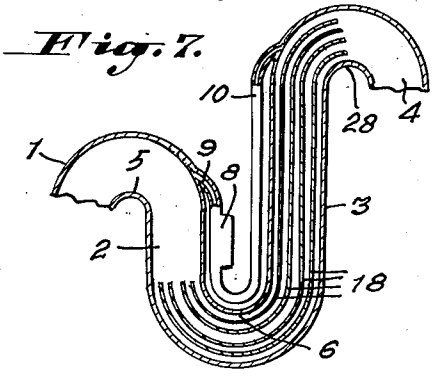


Fig. 7.



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DOUBLE SIPHON

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9 Claims. (Cl. 137—133)

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This invention relates to compound siphons, particularly to siphons for flushing purposes, of the kind in which two siphons are connected in series by a bend which joins the outlet of the inlet siphon with the inlet of the discharge siphon, and a ventilation tube is provided which connects the bend at the top of the inlet siphon with the bend at the top of the discharge siphon.

In known siphons of this type it is hardly possible to avoid the occurrence of a period of irregular although progressive discharge, which, though not being of much significance for flushing purposes, should be classified as a defect if the siphon is intended for other uses.

According to the invention this disadvantage is obviated by providing an enlargement or container at an intermediate point of the ventilation tube.

Moreover known compound siphons are actuated by means of an air-outlet valve, i. e., a device adapted to allow the escape of the compressed air separating two partial columns of liquid in the siphon. However, the drawbacks of such outlet valves are well known, and one object of the present invention is to provide a system operating by means of a pressure producing plunger, for example, a device which causes the escape of the said compressed air through the siphon itself by forcing into the ventilation tube of the siphon a suitable amount of air, no special measures for sealing the control device being then necessary.

The accompanying drawings illustrate several embodiments of the invention, by means of which the above drawbacks are eliminated. In the drawings:

Figure 1 shows a fundamental embodiment of a siphon according to the invention for intermittent and automatic discharge;

Figure 2 shows the improved siphon including a ventilation tube which extends between the upper bends of the compound siphon;

Figure 3 shows in elevation an embodiment which includes an air-outlet valve;

Figure 4 shows an embodiment of the compound siphon with an air pressure producing plunger;

Figure 5 shows in elevation an embodiment of a compound siphon modified to provide adjustable discharge;

Figure 6 shows the siphon according to the invention embedded in the wall of a tank; and

Figure 7 illustrates a siphon for the handling of viscous liquids.

With reference to the drawings, and particularly to Figure 1, it will be seen that the compound siphon consists of the usual four parallel branches or legs 1, 2, 3 and 4, with the branches 3 and 4 of greater vertical extent than branches 1 and 2. The inlet end of the siphon is the open end of the branch 1, and the discharge end is the open end of the branch 4. The branch 2 is the one adapted to house the air plug which stops the flow of the liquid. A ventilation tube adapted to cause the abrupt expulsion of the said air plug is connected at one end to the highest point of the housing of the air plug and at the other end to a suitable point of the last branch 4 of the siphon. Thus Figure 2 shows the ventilation tube 9, 10 connected at one end to the bend 5 joining the branches 1 and 2 and at the other end to the bend 28 joining the branches 3 and 4.

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According to the invention the ventilation tube 9, 10 has an enlargement or container 8 of suitable dimensions corresponding to the dimensions of the siphon. From opposite ends of this enlargement or container 8 start the two branches 9 and 10 of the ventilation tube, which connect the said container with the bends 5 and 28 respectively of the siphon as may be seen in the drawing.

The operation of the compound siphon just described is such that when the pressure of the air plug in the branch 2 has attained the prescribed value which responds to the characteristics of the equipment, the liquid contained in the enlargement 8 flows out through the tube 10 to the corresponding bend 28 and at a given subsequent time the said tube 10, upon becoming entirely devoid of liquid, allows the quick and automatic exhausting of the air plug through the tube 9 of the container and through the said tube 10. At this point, the liquid columns of the branches 1 and 3 become united by the action of gravity, thus forming a single stream, without discontinuity, which discharges through the branch 4 of the siphon.

This feature of the invention obviates the necessity for the arrangement of double ventilation tubes which were necessary according to the prior art, and permits the discharge to occur automatically and at full stream without becoming turbid and without vortex motion.

Figure 3 illustrates a compound siphon which makes use of an air-outlet valve 12. This arrangement allows the discharge at will of the liquid contained in a tank or the like by the actuation of the said valve 12, when once the necessary conditions of water level in the tank have been attained. As before, the enlargement

8 is connected by the tube 9 with the bend 5 connecting the inlet branch 1 with the second branch 2, and by the tube 10 with the bend 28 connecting the branch 3 with the discharge branch 4. In this embodiment, however, there is a further tube 11 extending upwards from a point in an arch-like inflection in the tube 10. The top of this tube 11 is normally closed by a valve 12, which can be opened at will by any convenient means such as by depressing the spring-biased push button 13. The operation of this arrangement is such that when the pressure of the gaseous plug has reached a predetermined value, the space within the enlargement 8 and the outward tube 10 as far as the aforesaid arch-like inflection is completely free from liquid. If the valve 12 is then opened, the siphon is primed as before. So long as the valve 12 is not opened the siphon remains ready to operate, or will in due course discharge automatically when the appropriate conditions arise.

The embodiment illustrated in Figure 4 is distinguished from that of Figures 2 and 3 by the fact that it makes use of an air-pressure producing device 14, for example, a device substantially consisting of a cylinder connected to the third branch 11 of the ventilation tube and containing a spring-controlled piston, adapted to be actuated at will, which compresses a predetermined amount of air into the said branch 11 of the ventilation tube, the characteristics of which may be appreciated from said figures.

This third branch 11 is shaped with an angle bend of suitable dimensions, and is permanently fed with a predetermined volume of liquid, communication between the container 8 and the outside being prevented by the air valve 14.

The structure of this bend and of the connection to the pressure producing device 14 will be evident if it is borne in mind that the piston of the latter transmits the energy of its movement by translation of the gaseous mass existing between the liquid of the bent respiration tube and the said piston. As a consequence of this translation a twin movement of the said liquid towards the container 8 is produced, which, acting upon the gaseous mass contained in the latter, causes the exhausting of the residual liquid in the tube 10 joining the said container with the bend 28 connecting the branches 3 and 4 of the siphon, thus connecting the air plug with the outside through the said branch 4.

If the piston of the device 14 is not actuated, this form of the device, like that of Figure 2, would operate automatically in the manner described with respect to the fundamental embodiment of Figure 1.

Figure 5 shows diagrammatically a siphon in which the volume of the discharge can be modified by varying the height of the branches 1, 2, 3, 4.

To this end, each of the branches is made in two parts, one of which fits tightly into the other.

As shown in Figure 5, the height of the branches can be adjusted vertically since clamps 15 and 16 respectively secured to the branches 1, 2 and 3, 4 are threaded on a screw rod 17 which can be rotated by the bevel gear arrangement 18. The rotation of the screw rod effects sliding movement of the branches 1, 2, 3 and 4 in the tubular parts 1', 2', 3', and 4'. In this modification as shown, the ventilation tubes and control device 14 are utilized, and to permit the sliding movement of the parts as the tubes 9, 10 and 11 are flexible tubes.

Figure 6 represents a specific embodiment of the siphon according to the invention, particularly according to Figure 2, in which the whole of the siphon is cast in the wall of the tank to be controlled. This embodiment might offer special advantages, even allowing the suppression of gate vanes in hydraulic dams.

Figure 7 shows a modification in which the interior of the siphon is provided with a bundle of blades or tubes 18 so spaced from each other as to produce a capillary effect. This embodiment is especially suited for viscous liquids, and enables them to be handled without difficulty.

It is to be particularly noted that all the modifications of the ventilation tube already described may also utilize the blades or tubes of this embodiment.

The invention attains the objects listed at the beginning of this specification, thus providing a compound siphon of simpler construction and operating more reliably than those according to the prior art.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In a liquid control device, four parallel vertical tubes, the lower end of one of said tubes constituting a liquid inlet and the lower end of another of said tubes constituting a liquid outlet, and upper and lower elbows establishing communication between the remaining ends of the tubes and connecting said tubes in series from the liquid inlet to the liquid outlet, the upper elbow nearest adjacent the liquid outlet being disposed at a higher elevation than the upper elbow nearest adjacent the liquid inlet, and a valve controlled tube connected with the second mentioned pipe.

2. A compound siphon comprising two siphons connected in series and each including spaced parallel vertical legs and an upper bend, the second siphon having legs of greater vertical extent than and parallel to the legs of the first siphon, the bend of the second siphon being disposed at a higher level than the bend of the first siphon, a tube providing communication between the upper bends of the siphons, said tube having an enlarged portion therein adjacent the first siphon constituting a chamber parallel to the legs thereof, said tube further including a portion extending downwardly from said chamber, a reverse bend, and a portion extending upwardly therefrom toward the bend of the second siphon and communicating therewith at a point above the upper portion of the first siphon, said tube and enlarged portion therein constituting a vent tube eliminating intermittent leakage and permitting rapid exhaustion of the entrapped air plug lying between the siphons.

3. A compound siphon as defined in and by claim 2 wherein the upper bend portions constitute respective integral units of inverted U-shape form and wherein parallel open ended pipes constitute the legs of the siphons, the said bend portions being telescopically received within the leg portions, and means for adjusting the height of the bends relative to the legs to vary the discharge volume including a vertically disposed screw, plural clamp means threaded on the screw and respectively connected to each of the upper bend portions, and means for rotating the screw to displace the clamp means vertically to vary the position of the bends relative to the upper ends of the legs.

4. A compound siphon as defined in and by

claim 3, wherein the tube providing communication between the bend portions is flexible.

5. A compound siphon comprising two siphons connected in series and each including spaced parallel vertical legs and an upper bend, the second siphon having legs of greater vertical extent than and parallel to the legs of the first siphon, the bend of the second siphon being disposed at a higher level than the bend of the first siphon, a tube providing communication between the upper bends of the siphons, said tube having an enlarged portion therein adjacent the first siphon constituting a chamber parallel to the legs thereof, said tube further including a portion extending downwardly from said chamber, a reverse bend, a portion extending upwardly therefrom toward the bend of the second siphon, and an arched portion including another reverse bend communicating with the bend of the second siphon, a priming tube extending from the said arched portion, and priming means closing the end of said priming tube.

6. A compound siphon as defined in and by claim 5, wherein said priming tube extends vertically and said priming means comprises a manually operable valve closing the same.

7. A compound siphon as defined in and by claim 5, wherein said priming tube includes a portion extending arcuately from the arched portion, a portion extending vertically downwardly from the arcuate portion and disposed parallel to said legs and reaching a point disposed in a plane passing through the bottom portion of said chamber, a reverse bend extending from this point, an upwardly directed angularly extended portion continuing from said last mentioned reverse bend, and priming means connected to said angular portion including a manually controlled variable air pressure chamber closing the same.

8. In a liquid control device, four parallel vertical tubes, the lower end of one of said tubes constituting a liquid inlet, and the lower end of another of said tubes constituting a liquid outlet and upper and lower elbows establishing communication between the remaining ends of the tubes and connecting said tubes in series from the liquid inlet to the liquid outlet, the upper elbow nearest adjacent the liquid outlet being

disposed at a higher elevation than the upper elbow nearest adjacent the liquid inlet, a manometrical control including a chamber, a pipe of small diameter connecting the upper end of the chamber with the second mentioned upper elbow, a pipe corresponding in diameter to the first pipe connecting the lower end of the chamber with the first mentioned upper elbow and a plurality of capillary elements located in the tube lying between the first mentioned upper elbow and the lower elbow.

9. In combination, walls defining a tank, a liquid control device comprising four parallel vertical tubes, the lower end of one of said tubes constituting a liquid inlet, and the lower end of another of said tubes constituting a liquid outlet and upper and lower elbows establishing communication between the remaining ends of the tubes and connecting said tubes in series from the liquid inlet to the liquid outlet, the upper elbow nearest adjacent the liquid outlet being disposed at a higher elevation than the upper elbow nearest adjacent the liquid inlet, a manometrical control including a chamber, a pipe of small diameter connecting the upper end of the chamber with the second mentioned upper elbow, a pipe corresponding in diameter to the first pipe connecting the lower end of the chamber with the first mentioned upper elbow, and said tubes and elbows being embedded in a wall of the tank with the liquid inlet in communication with the interior of the tank and the liquid outlet located externally of the tank.

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