Feb. 18, 1936. F. ALTMAYER 2,031,025

HYDROMETER SYRINGE

Filed March 27, 1931

Fig. 1.

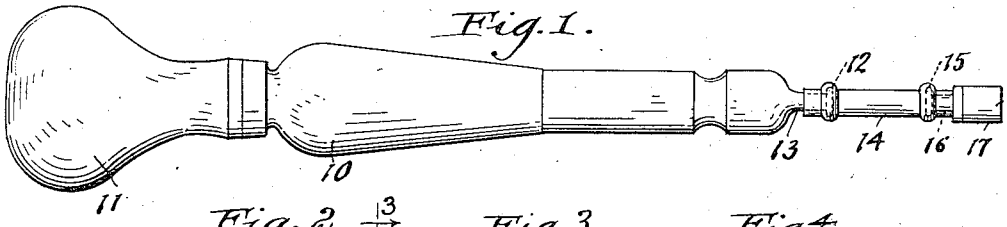


Fig. 2.

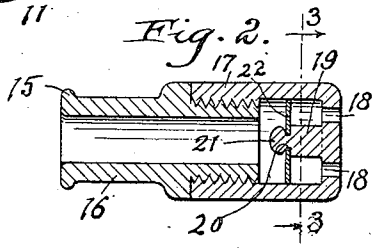


Fig. 3.

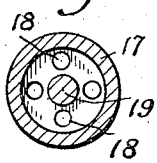


Fig. 4.

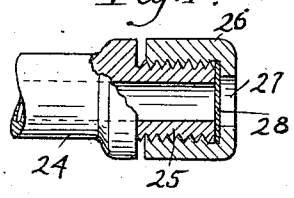


Fig. 5. Fig. 6. Fig. 7. Fig. 8. Fig. 9. Fig. 10. Fig. 11.

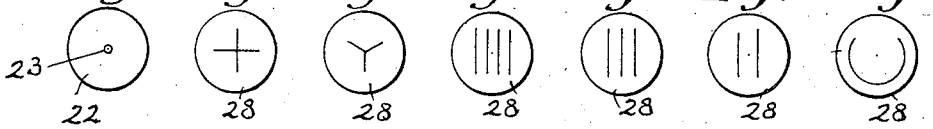


Fig. 12.

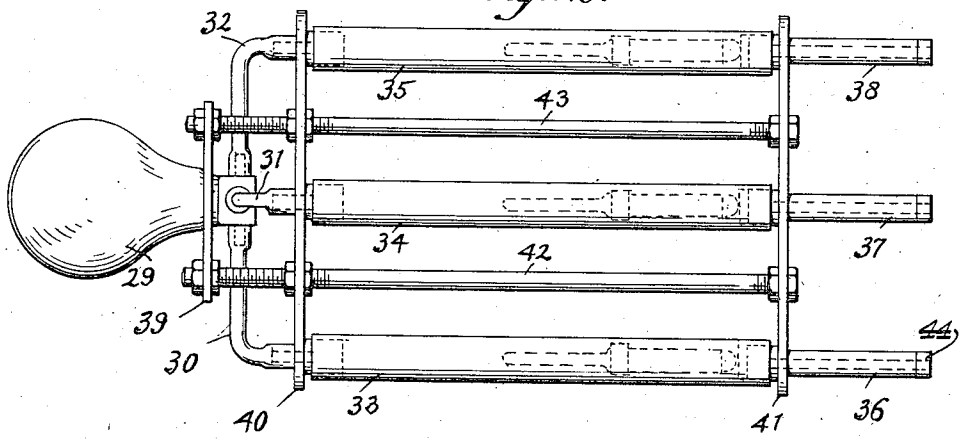
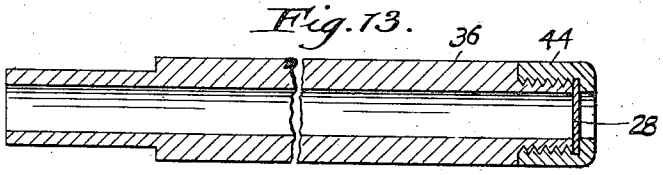


Fig. 13.



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HYDROMETER SYRINGE

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Application March 27, 1931, Serial No. 525,744

5 Claims. (Cl. 265—45)

This invention relates to improvements in hydrometer syringes, and relates particularly to means for preventing drip from the open end of the syringe when it is being moved about from one place to another.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawing, in which

Figure 1 is a plan or elevational view of a hydrometer syringe embodying the invention.

Fig. 2 is a central longitudinal sectional view on a larger scale illustrating a tip within which the drip preventing element is located.

Fig. 3 is a cross sectional view taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a fragmental elevational view partly in central longitudinal section showing a modified form of tip.

Fig. 5 is a detail side view of a disc-shaped rubber member employed in that form of the invention illustrated in Figs. 2 and 3.

Figs. 6 to 11 inclusive are elevational views of different soft rubber members which may be utilized in connection with that form of the invention illustrated in Fig. 4.

Fig. 12 is a plan view of a triple hydrometer embodying the present invention, and

Fig. 13 is a central longitudinal sectional view of one of the hydrometer tips shown in Fig. 12.

The glass barrel of an ordinary hydrometer is illustrated at 10 in Fig. 1. On one extremity of this barrel there is mounted a rubber bulb 11 of the usual character. On its opposite end the barrel 10 has a rim or collar 12 at the end of a neck portion 13. When the hydrometer is assembled a piece of soft rubber tubing 14 is pushed over the rim and neck 12 and 13, and into the other end of this same piece of tubing there is projected the rim and neck 15 and 16 respectively of a connector, which may be constructed of any suitable material adapted to withstand the deleterious effects of the acid in storage batteries. The outer end of this connector is reduced and threaded to receive the inner threaded end of a tip 17 which, at its outer end is closed, except for a plurality of ports or openings 18. Extending inwardly from the end wall of the tip 17 is an axially located boss 19, which has a necked-in portion 20 and a rounded knob or button 21 on its inner extremity. In this form of the invention the drip preventer takes the form of a relatively thin soft rubber disc 22 which is provided with a central opening 23 of small size. Before the tip 17 is screwed onto the connector 15 the rubber disc 22 is forced over the button end of the boss 19, and the portion about the hole 23 slips into the necked-in portion 20 of the boss 19, making a snug water-tight fit between the rubber disc and the boss. However the valve piece is very readily removed and a new one put in its place when servicing of the hydrometer becomes necessary.

In the modification of Fig. 4 the soft rubber tubing 14 is omitted, and the end of the hydrometer is a rigid tubular element 24 of hard rubber or the like with a threaded end portion 25 for the reception of an internally threaded tip 26 having a central passage 27 in its end wall. In this casing a soft rubber disc-shaped member 28 is mounted at its perimeter between the end of the threaded end portion 25 and the end wall of the tip 26 outside the passage 27. In this member 28 I form one or more slits. When the member is subjected to fluid pressure on either face thereof the rubber on opposite sides of the slit or slits is deflected and a path for the flow of fluid through the valve is thereby opened up. At other times the rubber lips on opposite sides of the slits come together closely and prevent the passage of liquid therethrough. The slits in the member 28 may take various forms, as for instance those illustrated in Figs. 6 to 11 inclusive.

Either type of tip, that is 17 or 26, with the corresponding barrier or restrainer members, may be screwed upon the detachable end 16 when the latter is used upon a soft rubber tubing, or either of them may be screwed onto the hard rubber member 24 of Fig. 4.

In Fig. 12 I have illustrated a triple hydrometer comprising a bulb 29 connected to three conduits 30, 31 and 32 leading to the upper ends of three hydrometer barrels 33, 34 and 35 which at their lower ends have projecting tubular members 36, 37 and 38 formed of some rigid material. For definitely positioning and bracing the various parts there may be employed cross bars 39, 40 and 41 connected by longitudinal rods 42 and 43. The tubular members 36, 37 and 38 at their extremities are constricted and threaded to receive internally threaded tips 44, similar in form to the tips 26. The barriers 28 are mounted between the extremities of the tubular members 36, 37 and 38 and the end walls of the tips 44 in a manner similar to that shown in Fig. 4.

In the use of a hydrometer equipped with my drip-preventing means, the end or tip of the hydrometer is inserted into the battery solution and

the rubber bulb 11 operated to draw the liquid up into the barrel 10 in which the hydrometer float is located. When the bulb is permitted to expand after being compressed a vacuum tends to form above the liquid and atmospheric pressure is exerted to force the liquid upwardly into the barrel to overcome the vacuum. In the case of the modification shown in Fig. 2 this pressure flexes the disc 22 forcing the rim of the latter inwardly away from the walls of the tip whereby a passage for the liquid is opened up. After the hydrometer has been used the operator compresses the bulb 11 to force the liquid out of the hydrometer back into the storage battery, flexing the disc 22 in the opposite direction. When pressure on the bulb 11 is relieved it expands and air again enters the hydrometer. When an equilibrium is reached the disc 22 again engages the side walls of the tip 17. Gradually any liquid which is left in the hydrometer flows downwardly onto the inner surface of the disc 22, but its close engagement with the walls of the tip prevents any of this liquid from passing the disc and dripping out of the holes 18 in the end of the tip. A similar action occurs in the use of a hydrometer equipped with a tip like that illustrated in Fig. 4, except of course that the fluid passes through the slits in the barrier 28 instead of around the rim thereof.

In the foregoing description I have necessarily gone somewhat into detail in order to explain fully the particular embodiments of the invention herein illustrated, but I desire it to be understood that such detailed disclosures are not to be construed as amounting to limitations, except as they may be included in the appended claims. The word rubber as used throughout the claims which form a part of this specification is intended to mean rubber or any material which has the characteristics of rubber, such as the rubber substitutes, etc.

Having thus described my invention, I claim:

1. In a hydrometer, a liquid receiving barrel, a bulb and a discharge tube associated with said barrel, said tube having a passage therethrough, and restrainer means including a rubber disc positioned in the discharge passage and normally closing the same, said rubber disc being adapted to flex under pressure and afford a passage for liquid when flexed in either direction and prevent the flow of liquid when the pressure is removed.

2. In a hydrometer, a liquid receiving barrel, a bulb and a discharge tube associated with said barrel, said discharge tube having a passage therethrough, and restrainer means positioned in the discharge passage, said restrainer means including a rubber disc mounted at its center in the discharge passage and contacting at its perimeter with the walls of said passage to normally prevent the flow of liquid through said passage, said disc being adapted to flex and afford a passage for fluid in response to fluid pressure in either direction along said passage.

3. In a hydrometer, a liquid receiving barrel, a bulb and a discharge tube associated with said barrel, said tube having a passage therethrough, and restrainer means positioned in the discharge passage, said means including a rubber disc mounted at its periphery in said passage, said disc having a slit therethrough adapted to open under fluid pressure exerted against either side of the disc, said disc preventing the passage of liquid therethrough at other times.

4. In a syringe provided with a liquid receiving chamber and an aperture communicating with said chamber, the combination of means for increasing and decreasing the air pressure within said chamber, and flexible means for closing said aperture located adjacent the outer extremity of the same, said last mentioned means being responsive to changes of air pressure within said chamber for opening said aperture either for filling or emptying said chamber.

5. In a hydrometer syringe, the combination of a tubular member forming a liquid receiving chamber and provided with an aperture in one end thereof, a flexible bulb secured at one end of said tubular member adapted to increase or decrease the pressure within said chamber, and flexible means for closing said aperture, said last mentioned means being responsive to changes of pressure within said chamber for opening said aperture.

FRANK ALTMAYER.