May 16, 1933. V. C. KLINE 1,909,836

LIQUID SUPPLY DEVICE

Filed May 31, 1930

Fig 1

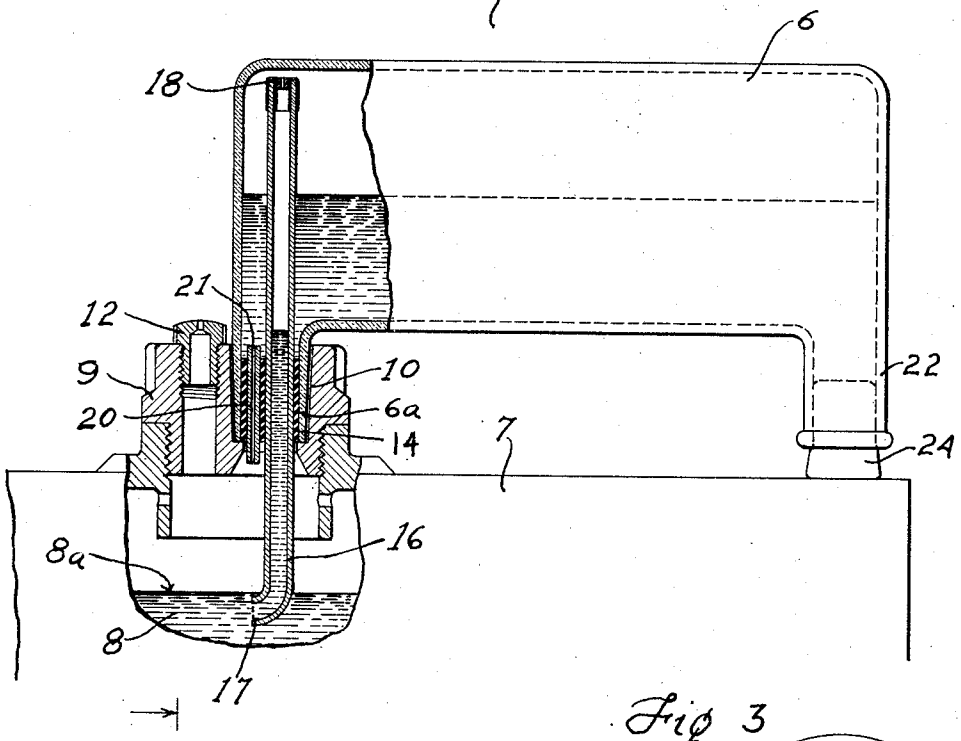


Fig 2

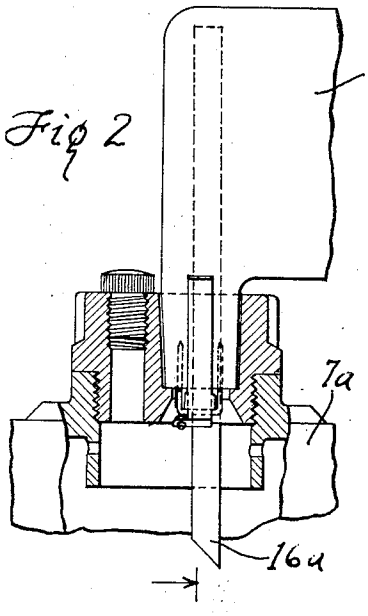


Fig 4

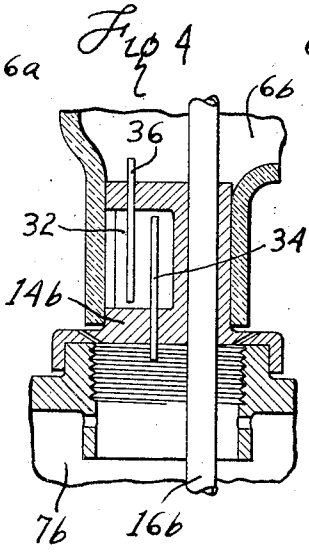
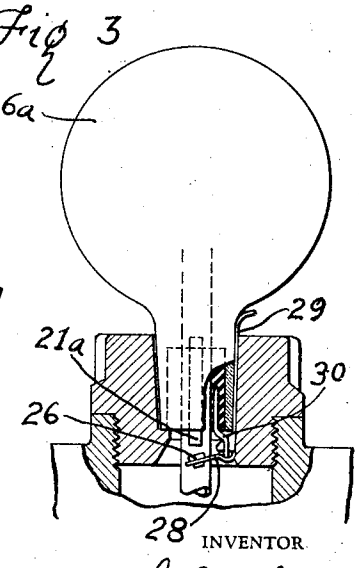


Fig 3



INVENTOR

Virgil C. Kline

Patented May 16, 1933 1,909,836

UNITED STATES PATENT OFFICE

VIRGIL C. KLINE, OF FLORAL PARK, NEW YORK

LIQUID SUPPLY DEVICE

Application filed May 31, 1930. Serial No. 458,822.

This invention relates to a supply device for supplying additional liquid to a body of liquid to maintain a constant level in the latter.

It is a primary object of the invention to provide a device of this character which will avoid any mixing of the liquid to be added and the liquid constituting the body to be maintained at substantially constant level.

It is a further object to provide, if desired as additional refinements, in devices of this character, mechanism for accommodating changes in temperature without the addition of liquid and for closing the outlet in case the supply reservoir is removed from its position adjacent the body of liquid.

The above and other objects will appear more fully from the following description when considered in connection with the drawing in which:

Fig. 1 is a vertical sectional view parts being in elevation showing one form of my invention.

Figs. 2 and 3 are detail views of a slight modification thereof.

Fig. 4 is a similar view in section of a further modification.

I have shown my invention as applied to a typical wet battery for maintaining the liquid therein at a substantially constant level. The devices employed include a supply reservoir 6 for adding liquid to a battery 7 which normally has a liquid 8 containing acid and water maintained substantially at the level 8*a*.

In adapting my invention to the battery 7 the usual filling plug is removed and the plug 9 substituted. This plug includes an opening 10 for receiving the neck 6*a* of the bottle or reservoir 6. If desired an additional opening and plug 12 may be provided for testing the battery and to provide an opening to permit the escape of gas from the battery.

The reservoir 6 is initially filled with a supply of distilled water to be added to the battery. The devices for discharging the water into the battery include a closure 14 in which is mounted a controlling tube 16 and a discharge tube 20. The tube 16 is formed with an internal diameter such that air which enters the lower end of the tube can pass the liquid standing in the tube. This diameter should be not less than approximately two-tenths of an inch, a tube having a bore of approximately 35/100 of an inch having been found to be entirely satisfactory. This tube has its lower end 17 positioned at substantially the level 8*a* of the liquid in the battery and may be turned as shown or otherwise formed to prevent air bubbles from passing upwardly through the same. The upper end of the tubular member 16 is provided with a restricted opening as indicated at 18. As shown this opening is formed by pressing a fabric or rubber plug into the upper end of the member 16 in the presence of varnish so as to secure it in place. When the tube 16 is placed in its operative position the restricted opening 18 is positioned adjacent the upper portion of the reservoir 6 as shown. The discharge tube 20 has a relatively small bore such that the meniscus formed therein prevents liquid and air passing one another in the tube. The tube 20 extends from a point 21 adjacent the bottom of the reservoir 6 to a point within the vacant space of the battery well above the normal liquid level thereof, the tube 20 serving to discharge liquid from the reservoir 6 into the battery whenever the suction in the upper portion of the reservoir is reduced.

If desired an additional filling neck 22 and closure 24 may be provided to facilitate adding water to the reservoir without disturbing the connections adjacent the stopper 14. It will be understood that the reservoir 6 may be of any desired shape, size and material although it is preferred to employ a glass bottle of novel design as shown which will contain a substantial quantity of water but without requiring an extreme vertical height for the bottle.

In the use of my apparatus the bottle 6 is filled and placed in inverted position on the battery as shown.

If the level of liquid 8 in the battery is below the opening 17 air passes upwardly through a tube 16 thus permitting water to pass downwardly through the tube 20 until the opening 17 is covered. Thereafter a slight

reduction of pressure is present in the reservoir 6 which prevents liquid passing through the member 20. Whenever the opening 17 is uncovered a bubble of air passes upwardly through the liquid in the member 16 thus permitting this same quantity of water to pass downwardly through the tube 20. The restricted opening 18 prevents a sudden upward passage of liquid from the tube 16 out of the upper portion thereof where it would become commingled with the water in the reservoir 6.

In Figs. 2 and 3 the reservoir 6*a*, battery 7*a*, tubular member 16*a*, etc. are substantially the same as in the first form of the invention. In these figures however I have shown a closure 26 mounted on a support 28 pivoted on a yoke 30 and formed with an arm 29 extending upwardly along the neck of the bottle. When the bottle is removed from the battery the closure 26 closes the opening in the discharge member 21*a* and prevents the water from being wasted.

In Fig. 4 the plug 14*b* is formed with a recess 32 for receiving the two sections 34 and 36 into which the discharge tube is divided section 34 extending from the upper portion of the chamber 32 to a point beneath the closure 14*b* the section 36 extending from a point adjacent the bottom of the reservoir 6*b* to a point near the bottom of the chamber 32. The control tube 16*b*, battery 7*b* etc., are substantially the same as in the first form of the invention. The apparatus shown in Fig. 4 is particularly useful where the apparatus is to be subjected to wide temperature changes. The apparatus operates the same as the first form of the invention except that contraction and expansion of the air in the upper portion of the reservoir 6*b* may occur and no liquid be discharged from the reservoir into the main body of liquid at 8. During the contraction of air in the reservoir 6*b* air is drawn upwardly through the section 34 of the discharge tube and into the chamber 32, any liquid in this chamber being drawn upwardly through the section 36 into the reservoir 6*b*. As the air again expands in the reservoir a certain quantity of liquid is passed downwardly through the tubular section 36 into the chamber 32 and the air in the chamber 32 passes outwardly through the tubular section 34. This contraction and expansion of the air in the chamber 6*b* may take place repeatedly without causing any liquid to be discharged from the reservoir into the lower body of liquid.

Having now described my invention I claim:

1. In a liquid supply device for supplying liquid to a main body of liquid, a reservoir for additional liquid, discharge means for said reservoir communicating with the lower portion of said reservoir and extending to a point above and spaced from said main body of liquid, controlling means for said device comprising a tubular member extending from a point within said reservoir above the normal liquid level therein to a point without said liquid adjacent said main body of liquid and means associated with said discharge tube for compensating for temperature changes to prevent repeated normal changes of temperature from causing liquid to be discharged from said reservoir.

2. In a liquid supply device, a reservoir for liquid, discharge means for said liquid comprising a plurality of tubular members communicating with the interior of said reservoir and with the space without said reservoir, one of said tubular members having a capillary bore another of said tubular members having a relatively larger bore whereby air may pass upwardly through the liquid therein, said first named tubular member opening at a point without said reservoir on a higher level than the opening of said second named tubular member without said reservoir and opening in the interior of said reservoir on a lower level than does said second named tubular member.

3. In a liquid supply device, a reservoir for liquid, discharge means for said liquid comprising a plurality of tubular members communicating with the interior of said reservoir and with the space without said reservoir, one of said tubular members having a relatively small bore whereby the meniscus formed therein prevents air passing the liquid therein, another of said tubular members having a relatively larger bore whereby air may pass upwardly through the liquid therein, said first named tubular member opening at a point without said reservoir on a higher level than the opening of said second named tubular member without said reservoir and opening in the interior of said reservoir on a lower level than does said second named tubular member and a plug formed with a restricted opening secured in the upper end of said larger tubular member.

4. In a liquid supply device, a reservoir for liquid, means for discharging the liquid therefrom into a lower body of liquid and comprising a plurality of tubular members, one of said members extending from a point within said reservoir near the upper portion of the same to a point without said reservoir and near the upper level of said lower body of liquid, said member having an internal bore such that air may pass upwardly through any liquid therein and a second tubular member having a relatively small, meniscus forming, bore and extending from a point near the bottom of said reservoir to a point without the same and substantially above the upper surface of said lower body of liquid said smaller tubular member being formed in sections one of which opens into the interior of said reservoir and the other of which opens

without said reservoir and a chamber into which said sections extend, the first of said sections having an opening near the bottom of said chamber and the second of said sections having an opening near the upper portion of said chamber.

5. In a liquid supply device, a reservoir for liquid, means for discharging the liquid therefrom into a lower body of liquid and comprising a plurality of tubular members, one of said members extending from a point within said reservoir near the upper portion of the same to a point without said reservoir and near the upper level of said lower body of liquid, said member having an internal bore such that air may pass upwardly through any liquid therein and a second tubular member having a relatively small, meniscus forming, bore and extending from a point near the bottom of said reservoir to a point without the same and substantially above the upper surface of said lower body of liquid, means for supporting said tubular members on said reservoir, said means including a hollow chamber, said smaller tubular member being formed in sections one of which extends from the interior of said reservoir to the lower portion of said chamber and the other of which extends from the upper portion of said chamber to a point without said reservoir.

Signed at New York in the county of New York and State of New York this 29th day of May A. D. 1930.

VIRGIL C. KLINE.