United States Patent

[11] 3,561,505

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[54] **LIQUID CONTROL DEVICE FOR CONTAINERS**
11 Claims, 15 Drawing Figs.

[52] **U.S. Cl.** **141/237,** 136/162; 137/260
[51] **Int. Cl.** **B65b 3/04,** H01m 33/00, E03b 11/00
[50] **Field of Search** ..... 141/234, 237; 137/260, 261; 136/162, 162.1, 162.3, 162.4, 162.5, 162.05, 162.41, 177.6, 177(19)

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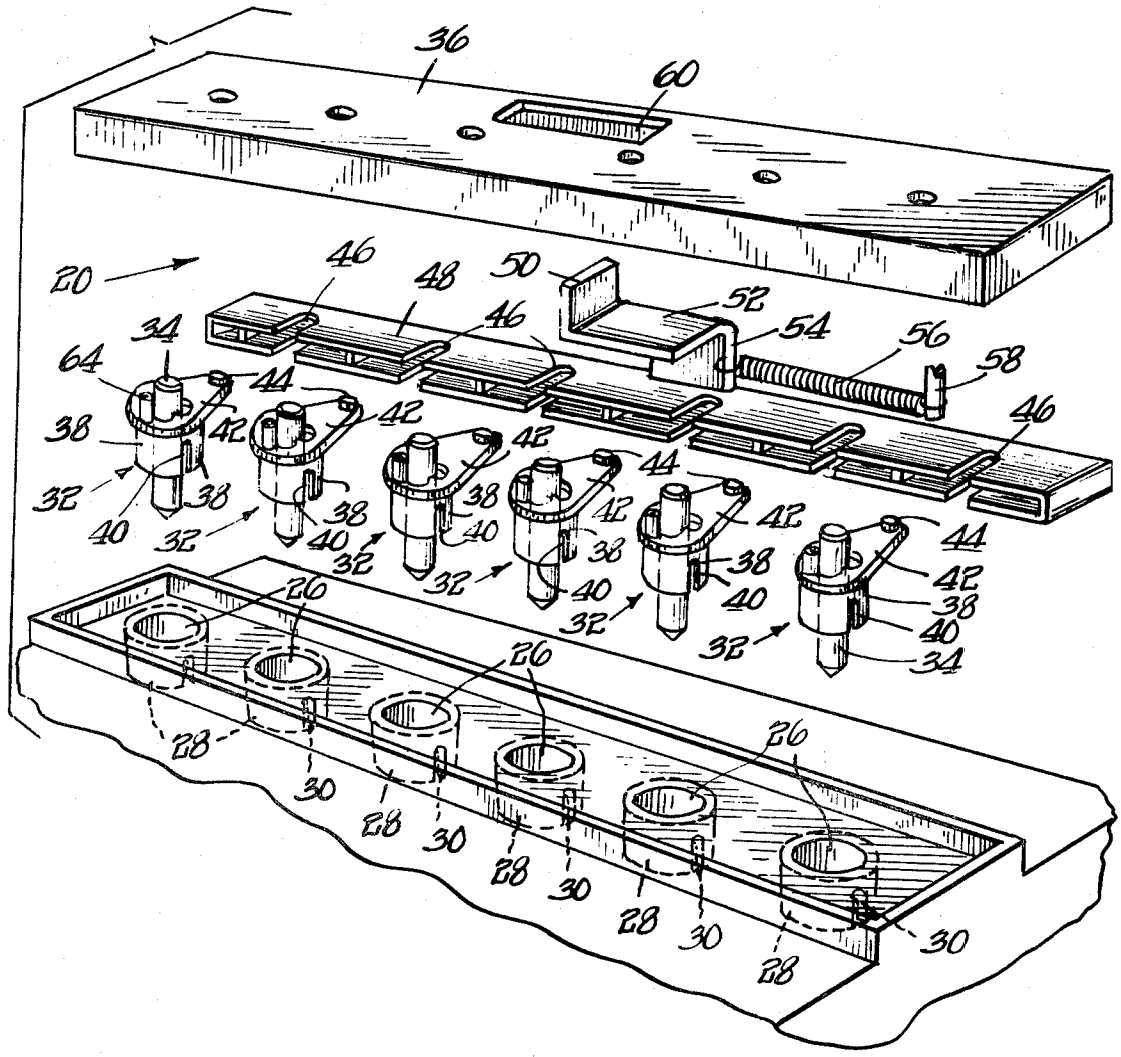
ABSTRACT: This invention relates generally to devices for controlling the delivery of liquid to a container and more particularly to liquid controlling devices adapted for use with storage batteries and the like. The devices herein illustrated contemplate a container cover having, in association therewith, a plurality of laterally spaced, elongate, liquid level indicators for association with conventional battery apertures. The number of level indicators employed with each container or battery is determined by the number of container sections or cells with which they are to be used. A liquid conduit or tray serves to direct liquid received from an external source contemporaneously to the plurality of areas in the vicinity of the indicators, and manually shiftable closure means serves to selectively open and close external communication of said conduit or tray with an associated container.



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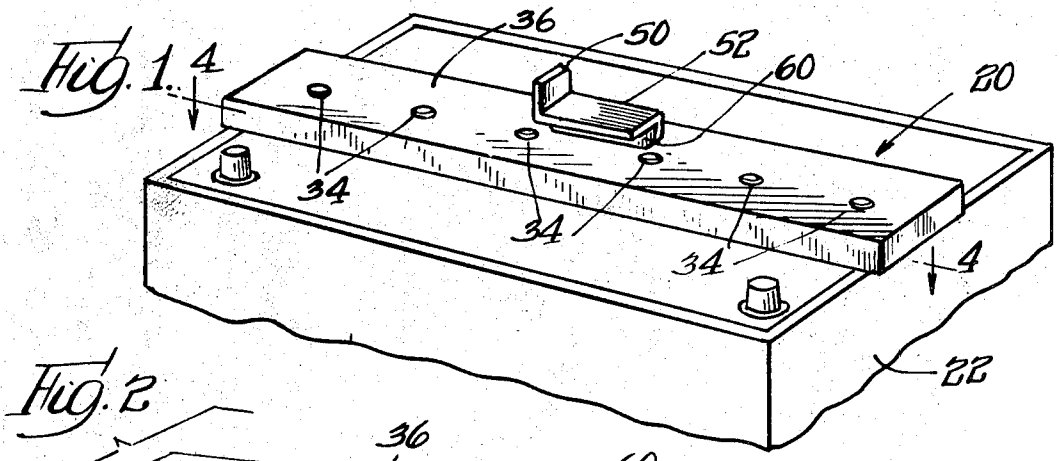
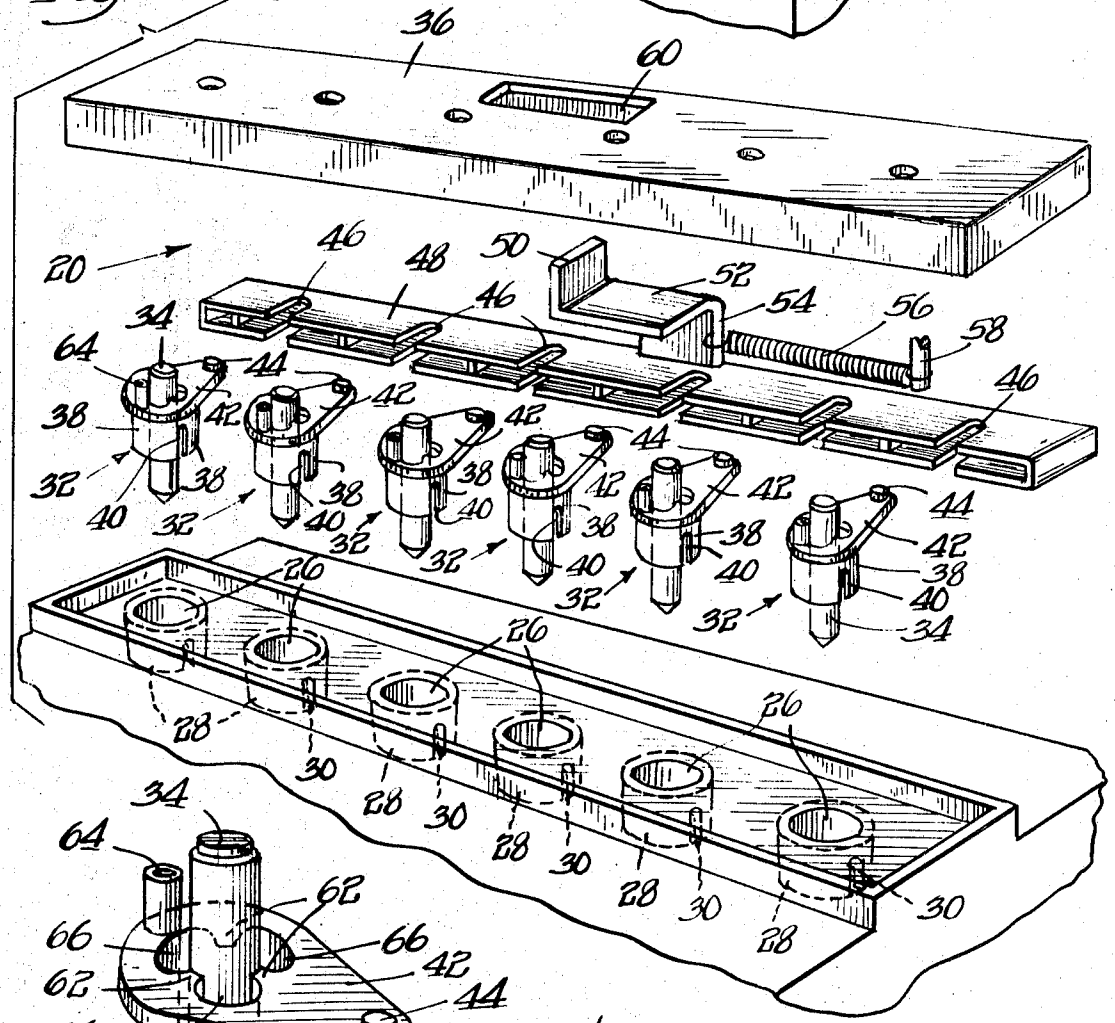


Fig. 2



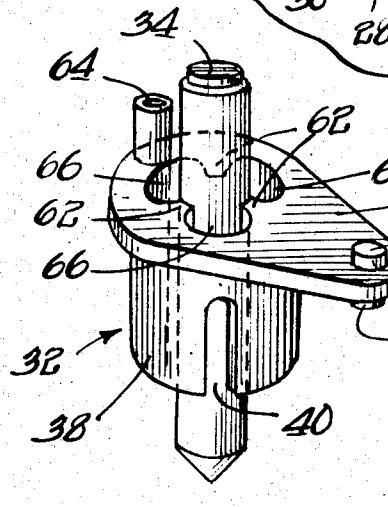


Fig. 3.

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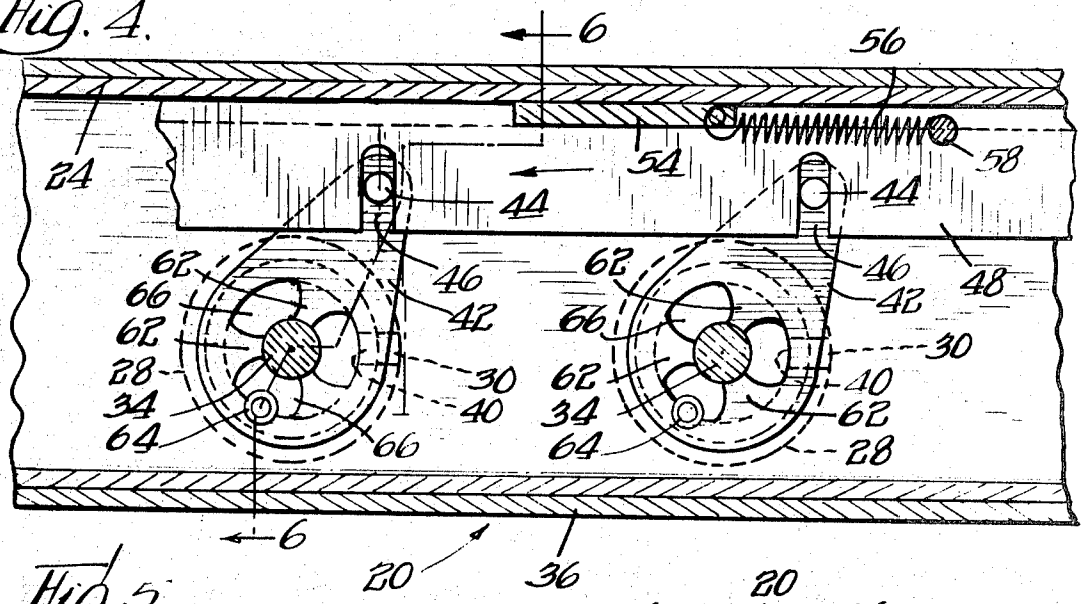
Fig. 4.



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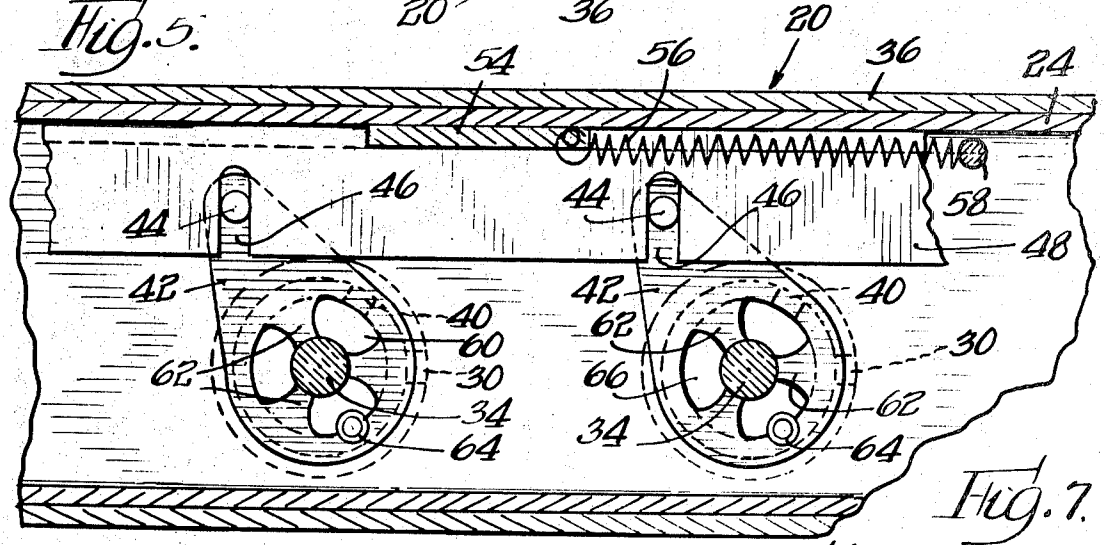

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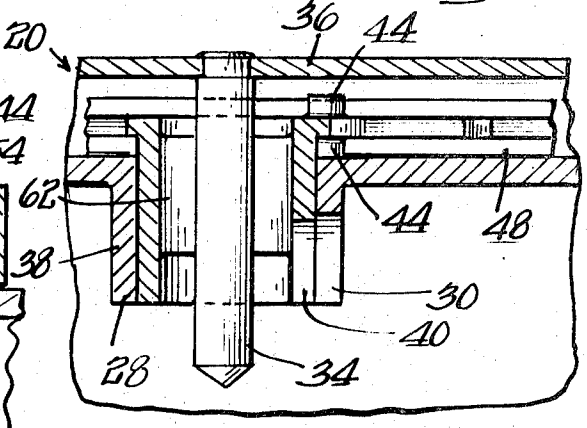

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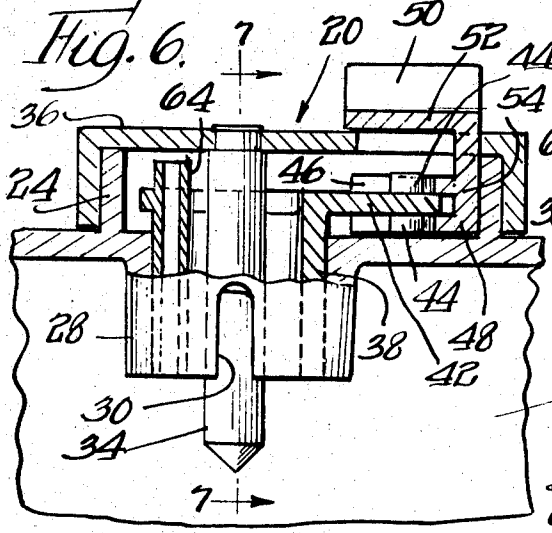

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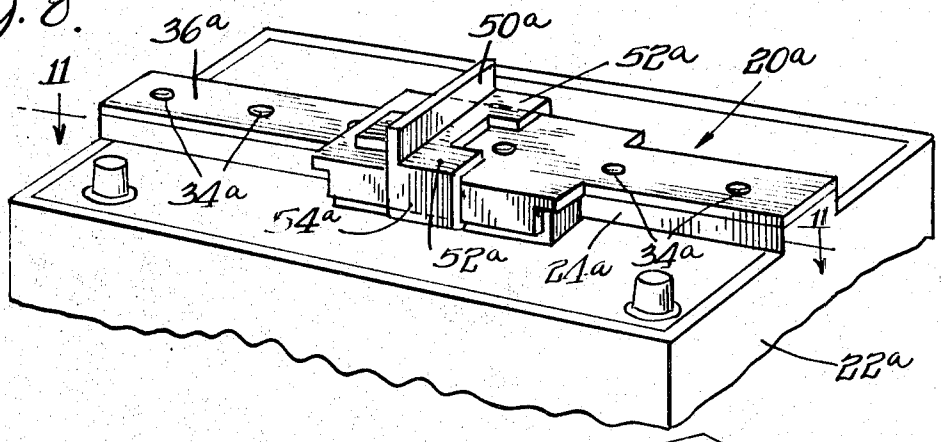
Fig. 8.



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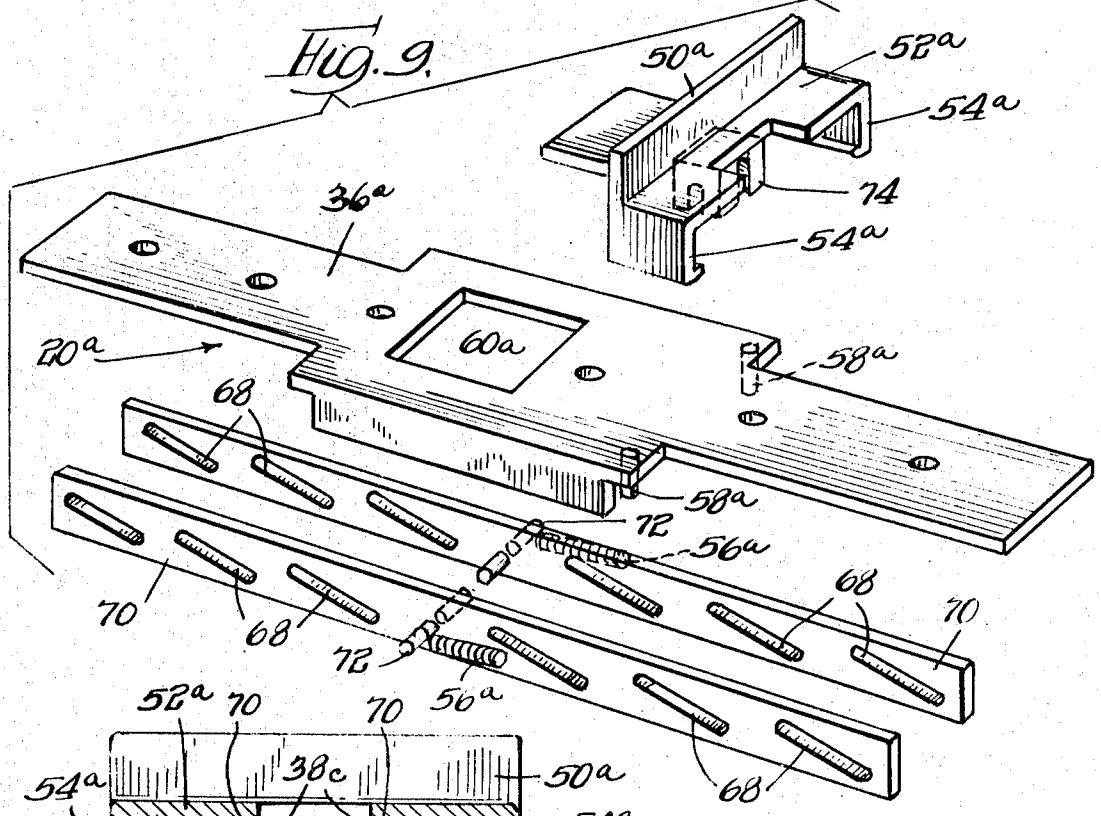

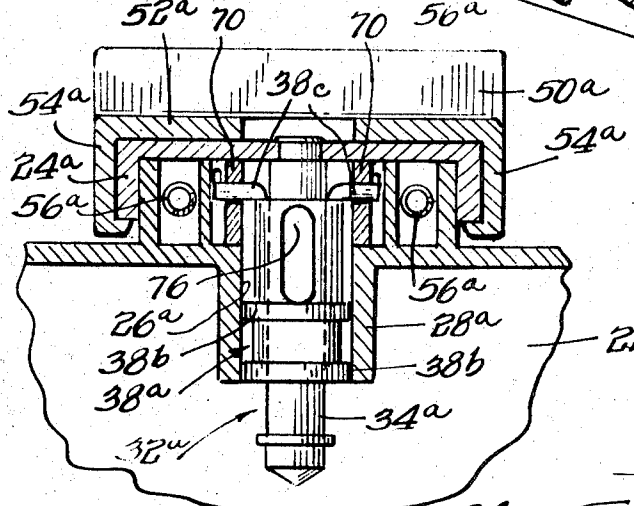

Fig. 10.

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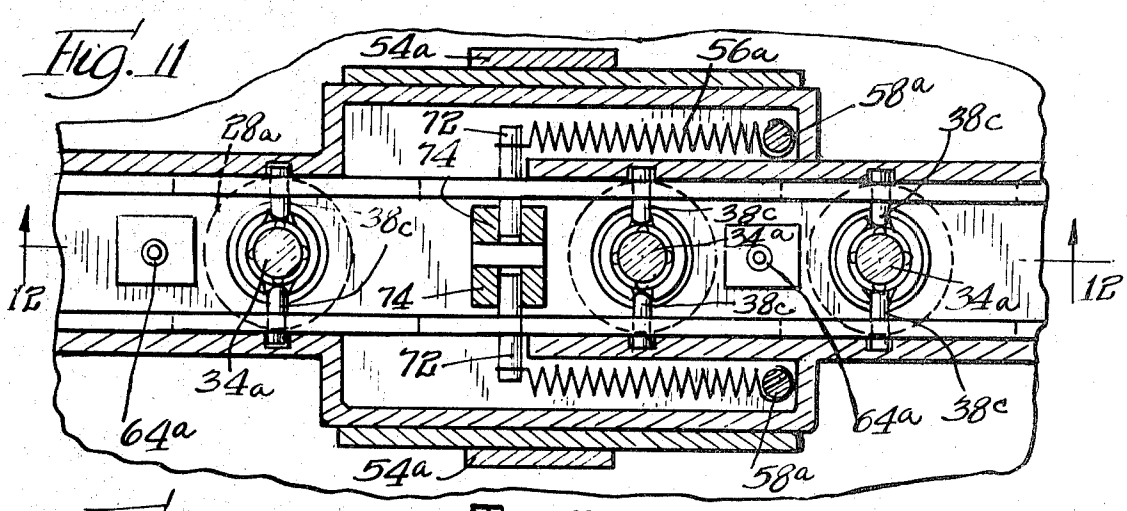
Fig. 11



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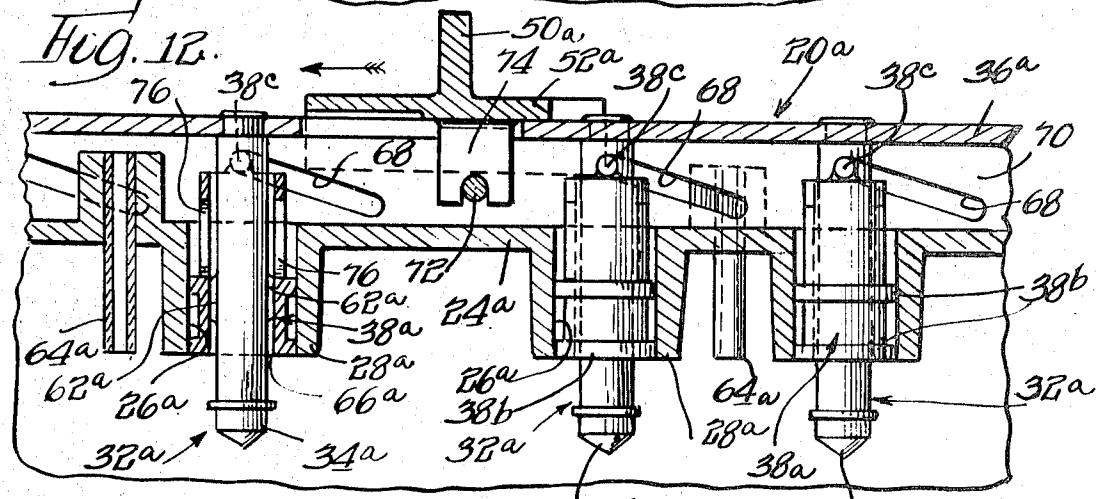

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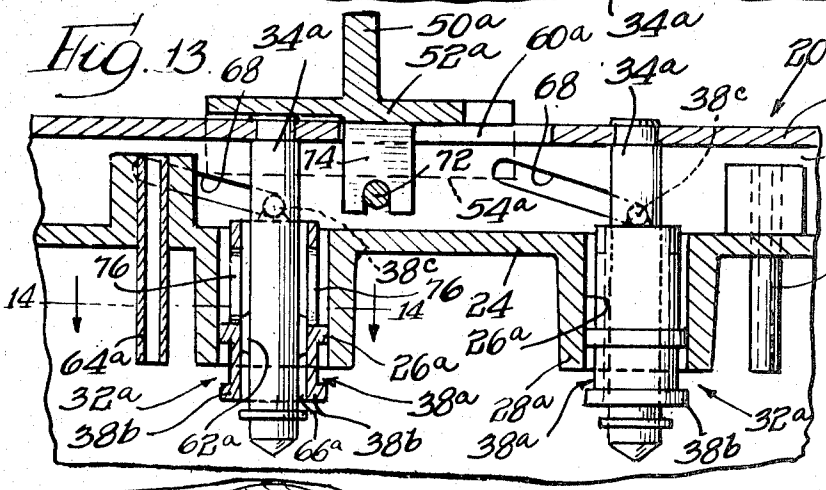
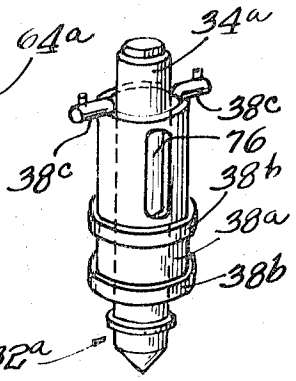


Fig. 15.



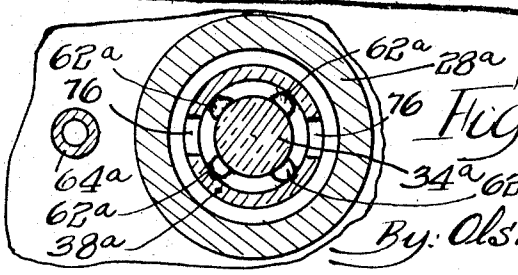


Fig. 14.

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LIQUID CONTROL DEVICE FOR CONTAINERS

BRIEF SUMMARY OF INVENTION

Service station attendants are frequently called upon to examine storage batteries for determining the adequacy of water in the battery cells. Normally this requires that the attendant remove the cap from each cell in order to determine which, if any, may require additional water.

It is one of the important objects of the present invention to provide a device which will enable a service station attendant to observe at a glance which, if any, of the battery cells need water replenishment and to avoid the necessity of removing the conventional caps of the battery to subsequently replenish the battery cells with water.

Another important object of the present invention is to provide a liquid controlling device of the type set forth above which is so constructed as to prevent the overflow of liquid delivered to each a battery cell when water is directed to the battery from an external source.

A further object of the present invention is to provide a very simple, yet practical, manually operable control device for selectively opening and closing external communication with a container or battery cell at a given location, from which location liquid may be introduced for contemporaneous delivery to all of the battery cells.

Still more specifically, the present invention comtemplates a liquid control device of the type referred to above which is so constructed as to employ the entrapment of air at he upper portion of a container to assure against the possibility of liquid overflow.

The foregoing and other objects and advantages will be more apparent from the following detailed description when considered in connection with the accompanying drawings, wherein:

FIG. 1 is a fragmentary perspective view of the upper portion of a storage battery equipped with a liquid controlling device which is representative of one embodiment of the present invention;

FIG. 2 is an exploded view of the liquid controlling device shown in FIG. 1;

FIG. 3 is an enlarged perspective view of one of the elongate liquid level indicators and the rotary valve member associated therewith;

FIG. 4 is an enlarged fragmentary o horizontal sectional view of the intermediate portion of the liquid receiving conduit or tray device and parts associated therewith, such section being taken substantially along the line 4–4 of FIG. l;

FIG. 5 is a fragmentary horizontal sectional view similar to FIG. 4 disclosing to the actuating bar shifted to the left from the position shown in FIG. 4, so as to effect counterclockwise movement of the valve actuating crank arms coupled with the aforesaid actuating bar;

FIG. 6 is a fragmentary vertical sectional view taken substantially along the line 6–6 of FIG. 4, the lower portion of the outer valve sleeve member being shown in elevation, more clearly to illustrate the peripheral valve port in said sleeve;

FIG. 7 is a vertical sectional view taken substantially along the line 7–7 of FIG. 6, which illustrates the registration of the valve ports of the inner and outer valve sleeve member;

FIG. 8 is a perspective view of the upper portion of a container or storage battery equipped with a modified form of liquid controlling device contemplated by the present invention;

FIG. 9 is an exploded view of the liquid controlling device shown in FIG. 8;

FIG. 10 is a fragmentary detail vertical sectional view taken substantially along the the line 10–10 of FIG. 8;

FIG. 11 is a fragmentary horizontal sectional view of the intermediate portion of the liquid controlling device shown in FIG. 8, said view being taken substantially along the line 11–11 of FIG. 8;

FIG. 12 is a vertical sectional view taken substantially along the line 12–12 of FIG. 11, with the manually shiftable closure

device shown in a position shutting off external communication with the liquid accommodating conduit or tray;

FIG. 13 is a view similar to FIG. 12 showing the manually operable closure member shifted to the left of the position shown in FIG. 12 so as to open external communication with the liquid accommodating tray;

FIG. 14 is a horizontal sectional view taken substantially along the line 14–14 of FIG. 13; and

FIG. 15 is a perspective view of the combined vertically shiftable control sleeve and the elongate liquid level indicator device associated therewith.

Referring now to the drawings more in detail, wherein like numerals have been employed to designate similar parts throughout the various FIGS., it will be seen that one structural embodiment of the present invention is disclosed in FIGS. 1—7, inclusive. The liquid control device as disclosed in FIGS. 1 and 2 is s designated a generally by the numeral 20. The liquid control mechanism 20 is shown in operative association with the upper portion of a conventional storage battery 22. The device 20 includes an elongated conduit or tray 24, FIG. 2, which in the enclosed embodiment is indicated as being formed integral with the top of the housing of the battery 22. Obviously in instances where it is deemed desirable, the tray 24 could be applied as a separate unit to the top of a conventional battery.

The liquid conduit or tray 24 communicates with a series of spaced apertures 26, which are the equivalent of cap accommodating apertures now used in conventional batteries. Each of the apertures 26 is defined by a sleeve or collar 28 formed integral with and depending downwardly from the underside of the tray 24. In instances where the tray with its depending sleeves 28 is to be applied to the top of a conventional battery, the sleeves are of such size as to permit insertion thereof within the filling apertures of the battery. These apertures 26 are so arranged that in applications where the liquid control device of the present invention is not employed, battery caps may be used in the conventional manner to close these openings. Particular attention is directed to the provision of a valve port or slot 30 in each of the depending sleeves 28. In fact, each of the sleeve members 28 actually form the part of a valve mechanism later to be described.

Each of the apertures 26 accommodates a unit designated generally by the numeral 32 in FIGS. 2 and 3. These units 32 each consist of a central elongate liquid level indicator 34, formed of suitable plastic material such as Lucite or the like. The lower extremity of the liquid level indicators 34 is conically shaped so as to reflect light to the upper exposed extremity of the indicator member. When the lower extremity of the members 34 are immersed within the liquid of the battery, no light rays are reflected and hence the upper extremity of the members 34 appear dark. As shown more clearly in FIGS. 6 and 7, the upper extremities of the depending indicators 34 are secured within complementary apertures provided in the cover member 36. Each of the units 32 also include a sleeve or valve member 38 having a peripheral port 40.

The sleeve valve member 38 are snugly accommodated by the companion sleeve or valve member 28 and are adapted to rotate within given limits the member 28. Formed integral with and extending laterally from the upper extremity of each sleeve 38 is a flange or crank arm 42. Each crank or actuating arm 42 supports a pair of oppositely disposed protuberances 44, adapted to be received within complementary slots 46 of a longitudinally shiftable actuating bar 48. The actuating bar 48 is formed of upper and lower sections adapted to superimpose opposed sides of the actuating arms 42 as clearly shown.

It will be apparent from the foregoing that longitudinal shifting of the bar 48 will cause limited rotation of the valve sleeve 38. Actuation of the bar 48 is accomplished by a manually engageable, shiftable flange 50 formed integral and projecting upwardly from the horizontal cover section 52. The section 52 extends laterally from a vertical section 54, connected with the actuating bar 48. A suitable coil spring 56 extends between the vertical section 54 and a pin 58 secured in a fixed

position to the underside of the cover member 36. The coil spring 56 continually urges the manually engageable flange 50 to the right, FIGS. 1 and 2, and in this shifted position the cover section 52 closes a cutout or aperture portion 60 in the cover member 46, FIGS. 1 and 2. Movement of the flange 50 to the left in opposition to the action of the coil spring 56 causes the cover member 52 to expose a portion of the aperture 60. This exposed portion of the aperture 60 is sufficient to permit water to be directed into the conduit or tray 24.

It will be noted that the flange or actuating arm 42 is also provided with the three equally spaced lugs 62, FIG. 3, which cooperate to maintain axial parallelism of the rotary-shiftable sleeve member 38 and the elongate liquid level indicator 34. Formed integral with the sleeve 38 and actuator flange 42 is a vertical vent member 64, which enables escape of displaced air as the battery 22 is being filled.

The lugs 62 divide the interior of the sleeve 38 into three equally spaced passageways 66, FIGS. 4 and 5. The passageways 66 in each unit 32 permit liquid flow downwardly from the conduit or tray 24 contemporaneously into all of the battery cells. With the flange 50 manually shifted to its open position, the valve sleeves 28 and 38 will occupy the positions shown in FIG. 5. In this position, the valve ports 30 and 40 are out of registration. As the liquid directed into the conduit or tray 24 will flow downwardly through all of the passageways 66, the vent 64 permits displaced air to escape from beneath until he the level of the liquid reaches the plane coincident with the lower extremities of the sleeves 28 and 38. When the level of the liquid reaches the undersurface of the combined valve members 28 and 38, air will become trapped above this point within the battery cells but the tray may be filled to its upper level. When this has been accomplished, the flange 50 may be released thereby causing the valve sleeves 30 to rotate from the position of FIG. 5 to the position of FIG. 4, bringing the ports 30 and 40 into registration (FIG. 7). The liquid from the conduit or tray 24 may drain downwardly now through the passageways 66 and the registering valve ports 30 and 40, into the battery cells. Obviously the amount of liquid thus drained from the tray 24 would be much less than would be required to completely fill the space previously trapped above the liquid level in the battery cells. At this time all of the liquid level indicators would show that the battery was sufficiently filled with liquid because the lower extremities of all these indicators would be immersed within the liquid and the upper extremities of the indicators would be dark in color.

From the foregoing, it will be apparent that he present invention comtemplates a liquid controlling device for containers as for example a plurality of cells in a conventional storage battery, such device including container means in the form of the tray or conduit means 24 together with its cover member 36. As previously mentioned, the described embodiment contemplates the tray 24 as being formed integral with the top structure of a battery 22. Obviously in such instances the cover means might be said to include both the tray and the remaining cover structure of the battery. In other applications, where the invention is to be applied to the top of a conventional battery, the container covering means would constitute the tray 24 and its cover 36. It will also be noted that when the manually shiftable cover section 52 is moved so as to provide an opening for the introduction of liquid into the tray 24, such liquid will flow contemporaneously to all of the passageways 66 spaced along the tray. When the tray 24 has been completely filled with liquid as may be observed through the exposed portion of the opening 60, the cover section 52 is released and is automatically urged to its closed position through the agency of the coil spring 56, and the valve member or sleeve 40 is rotated so as to bring the peripheral port 30 thereof into registration with the peripheral port 40 in the depending valve sleeve 28. This permits any trapped air at the upper part of the battery cells to be released and the liquid from the tray 24 flows freely into the battery cell.

In FIGS. 8—15, inclusive, a modified form of the liquid control device is shown. Certain structural elements of the device shown in FIGS. 8—15 inclusive which bear functional relationship to similar devices previously described in connection with the structure shown in FIGS. 1—7 inclusive are given corresponding numbers bearing the suffix *a*.

A liquid control device 20*a* is associated with the upper surface of a battery 22*a* and this liquid control device includes a liquid accommodating conduit or tray 24*a*. This tray 24*a* may be formed integral with the upper structure or cover portion of the battery 22*a* as shown in the drawings, or it may be formed as a separate unit adapted to be placed upon the top surface of a conventional storage battery, as previously mentioned in the description of the tray 24. A series of six apertures 26*a* at the bottom or floor of the tray 24*a* are defined by complementary depending sleeve members 28*a*. Telescopically associated with each of the apertures 26*a* is a control unit designated generally by the numeral 32*a*. Each of the units 32*a* includes an elongate liquid level indicator 34*a* of the type previously described. These liquid level indicators 34*a* depend from and are secured at their upper extremities to a cover section 36*a*. The section 36*a* serves as a cover for the tray 24*a*, see FIG. 8.

Each of the control units 32*a* includes a sleeve member 38*a* which is vertically shiftable within and guided by its companion or complementary sleeve member 28*a*. Axially spaced, annular flanges 38*b* of the sleeve members 38*a* have close fitting contact with the inner periphery of its companion sleeve member 28*a*. In certain instances O-rings (not shown) have been inserted between the peripheral flanges 38*b*, but in most applications it has been found unnecessary to use any auxiliary annular sealing devices. The upper extremity of each sleeve member 38*a* is formed with a pair of integral, oppositely disposed cam follower members 38*c*. The follower members 38*c* extend into companion, inclined cam slots 68 provided within a pair of spaced parallel bars 70 FIGS. (FIG. 9). These bars 70 extend longitudinally and slidably rest edgewise upon the bottom of the tray 24*a*. The bars 70 are also longitudinally shiftable within predetermined limits within the tray 24*a*. The cam bars 70, at their intermediate portions, carry pins 72 which completely traverse the bars as clearly shown in FIG. 11. The inner extremities of the pins 72 interlock with complementary recesses formed at the lower extremity of a member 74 formed integral with and depends from a manually shiftable device for selectively opening and closing external communication with the interior of the tray 24*a*. The member 74 is formed integral with and depends from a cover plate 52*a* which functions similarly to the cover plate or section 52 previously described. Extending upwardly from the plate 52*a* is a flange 50*a* adapted for convenient manual engagement to cause the cover section 52*a*and depending element 74 to be shifted as a unit. Extending downwardly from opposite margins of the plate section 52*a* is a pair of sections 54*a* which embrace the sidewalls of the cover member 36*a* as clearly shown in FIG. 10. In this manner the integral parts 50*a*, 52*a*, 54*a* and the depending member or lug 74, may be shifted as a unit along the cover 36*a*.

When the manually engageable flange 50*a*occupies the position shown in FIGS. 8, 11 and 12, the cover aperture 60*a* is completely superimposed by the plate or cover section 52*a* so as to prevent access to the interior of the tray 24*a*. In this position the follower members 38*c* connected with the sleeve 38*a* are located in the upper extremities of the cam slots 68. As the flange member 50*a* is shifted to the left from the position shown in FIGS. 8, 11 and 12, to the position shown in FIG. 13, the bars 70 are moved longitudinally so as to cause the follower members 38*c*, and consequently the sleeves 38associated therewith, to shift downwardly from the position shown in FIG. 12 to the position shown in FIG. 13. In this position, the cover opening 60*a* is exposed sufficiently to permit the introduction of liquid into the tray 24*a*. Liquid thus introduced into the tray 24*a* will be dispersed along the tray and will flow downwardly through an annular area or space 66*a* a surrounding each of the liquid level indicators 34*a*. When the liquid completely fills the tray 24*a*, the flange 50*a* may be

released and the coil springs **56***a* will automatically urge the cam bars **70** to the right as viewed in FIGS. **11** and **12**. This will restore the sleeve members **38***a* to their original upward position, and in this position, oppositely disposed longitudinal recessed **76** provide an air vent and permit liquid in the tray **24** to completely drain into the annular areas **66***a* and thence into the main body of the liquid within the battery cell.

Particular attention is directed to the fact that when the level of the liquid within the battery reaches the plane coincident with the bottom of the sleeve **28**, during the initial filling operation, air above this plane becomes trapped within the battery cell above said level. In this manner the filling of the battery cells is accomplished without any overflow of the liquid, providing no additional liquid is added after the tray has been initially filled. During the filling operation, the vents **64***a* have the same function as the vents **64** previously described.

The amount of liquid draining back into the battery cells from the tray **24***a* is relatively small and under no circumstances would it completely fill the cells. The liquid level indicators **34***a* function similarly to the previously described indicators **34** in causing a reflection of light to the upper exposed extremity of each indicator pin, providing the lower extremity of the indicator pin is not immersed in the liquid. Each liquid level indicator **34***a* is preferably provided with a splash ring or flange **34***b*, which serves to prevent liquid in the battery from splashing back up through the annular spaces **66***a*. Also each liquid level indicator **34***a* is provided with equally spaced, circumferentially disposed protuberances **62***a* which serves to maintain axial parallelism of the indicator pins and their complimentary sleeves **38***a*. These protuberances **62***a*serve the same purpose as the previously described protuberances **62** illustrated in FIGS. **1—7**, inclusive.

From the foregoing, it will be apparent that the present invention contemplates a very unique, practical and economically feasible liquid control device for storage batteries and the like, whereby liquid replacement may be accomplished by directing liquid through a plurality of openings contemporaneously. The novel disposition of liquid level indicators in association with valve control units makes it possible to fill a container such as a battery with liquid without overflowing. Also, an attendant in a service station, may at a glance, preliminarily determine whether any replenishment of liquid for the battery is necessary by merely glancing at the upper exposed extremities of the liquid level indicators. This avoids the time-consuming procedure of removing each cap to ascertain whether or not liquid replenishment is required. If liquid replenishment of the battery is indicated, it is only necessary to shift the manually operable cover member sufficiently to establish external communication with the interior of the tray or conduit. Such shifting automatically conditions the control valve device for admitting liquid into the battery cell and ultimately causing air to be trapped above he liquid level within the battery cell so as to preclude any possibility of overfilling the cell. In other words, even though the tray is filled to its upper limits, the area within the battery cell represented by the trapped air is more than sufficient to permit the liquid in the tray to drain into the battery cell when the shiftable control member is released and the coil spring automatically shifts in to its closed position.

The structural design of the liquid controlling mechanism herein described is such as to permit all of the parts with the exception of the coil springs to be produced by practicing conventional molding methods.

I claim:

1. A liquid controlling device for containers such for example as storage batteries and the like, including container covering means, a plurality of elongate, laterally spaced, and substantially vertically disposed liquid level indicating members associated with said covering means, the upper extremities of said indicator members being normally exposed for observation, conduit means forming a part of said covering means for receiving liquid from an external source and for directing such liquid contemporaneously to the plurality of areas in the vicinity of said indicating members, liquid conducting means for directing liquid from said conduit means into an associated container, manually shiftable closure means for selectively opening and closing external communication with said conduit means and means for trapping air below said container covering means when liquid in an associated container has reached a predetermined level.

2. A liquid controlling device for containers as set forth in claim **1**, wherein said means for trapping air includes rotatably shiftable valve members operable in response to the shifting of said closure means for controlling communication between said conduit means the the interior of an associated container.

3. A liquid controlling device for containers as set forth in claim **1**, wherein said means for trapping air includes longitudinally shiftable valve members operable in response to he shifting of said closure means for controlling communication between said conduit means and the interior of an associated container.

4. A liquid controlling device for containers as set forth in claim **1**, wherein said means for trapping air below said container covering means includes sleeve members depending from said covering means.

5. A liquid controlling device for containers as set forth in claim **4**, wherein said control sleeve members are shiftable and operable in response to the shifting of said closure means for controlling communication between said conduit means the and the interior of an associated container.

6. A liquid controlling device for containers as set forth in claim **1**, wherein the conduit means comprises a common tray structure communicating with all liquid conducting means for temporarily retaining a given quantity liquid during initial introduction of said liquid from an external source of supply.

7. A liquid controlling device for containers as set forth in claim **6**, including a plurality of liquid control valve means communicating with said tray structure and adapted contemporaneously to receive liquid from said tray structure, said plurality of valve means being interposed between said tray structure, and the interior of an associated container.

8. A liquid controlling device for containers as set forth in claim **7**, wherein each of said valve means includes a shiftable valve element which is movable as an incident to the manual shifting said closure means.

9. A liquid controlling device for containers as set forth in claim **7**, wherein shiftable actuating means is provided for controlling the functioning of said valve means.

10. A liquid controlling device for containers as set froth in claim **7**, wherein a shiftable elongated actuating member is coupled with said plurality of valve means whereby to cause simultaneous functioning thereof.

11. In combination with a storage battery having a plurality of spaced liquid receiving apertures along the upper wall thereof for accommodating conventional closure caps, an elongate, substantially vertically disposed liquid level indicating member within each of said apertures, the upper extremity of said indicating members being normally exposed for observation from above the battery, and the lower extremity extending into the liquid container portion or cell of the battery, conduit means associated with the upper wall of the battery for receiving liquid from an external source and for directing such liquid contemporaneously to the plurality of areas in the vicinity of said liquid level indicating members, means for directing liquid from said conduit means into the interior of the battery, shiftable closure means for selectively opening and closing external communication with said conduit means and a sleeve member telescopically associated with each of said battery apertures and means associated with each said sleeve member for controlling the flow of liquid from the conduit means into the interior of the battery.