Aug. 6, 1935. A. E. HINE 2,010,363

LIQUID FEEDING APPARATUS

Filed May 25, 1932

Fig. 1.

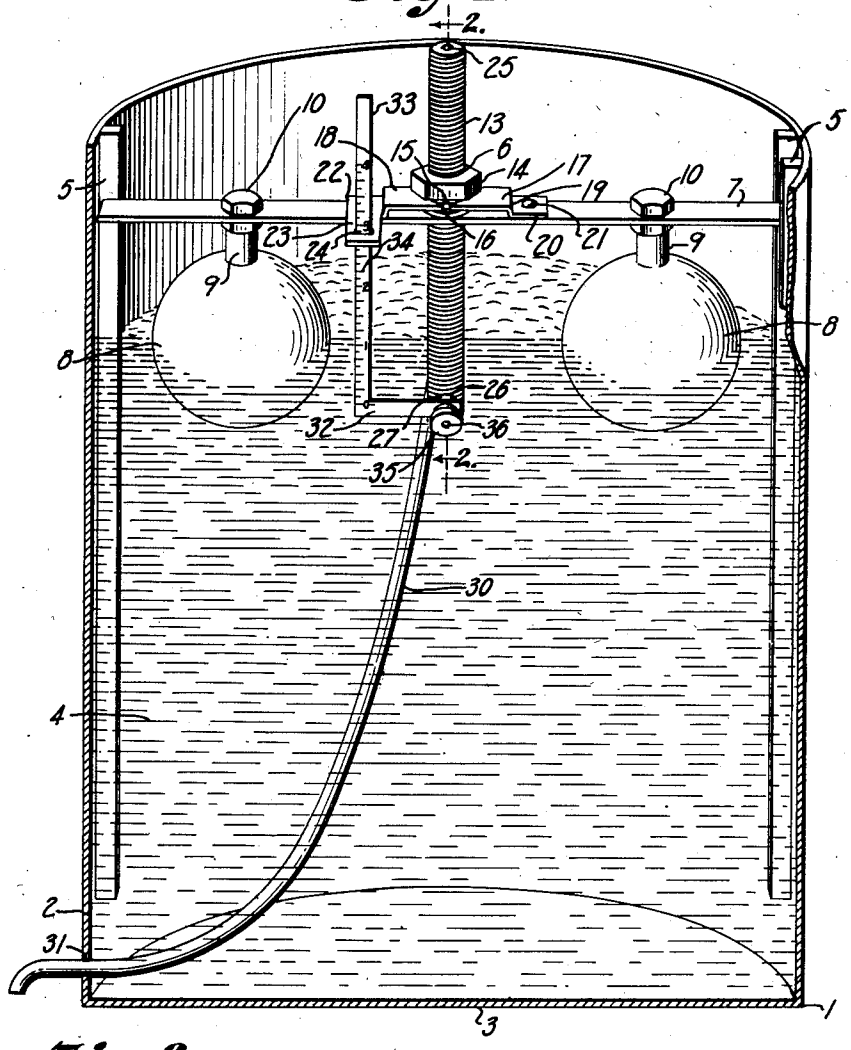


Fig. 2.

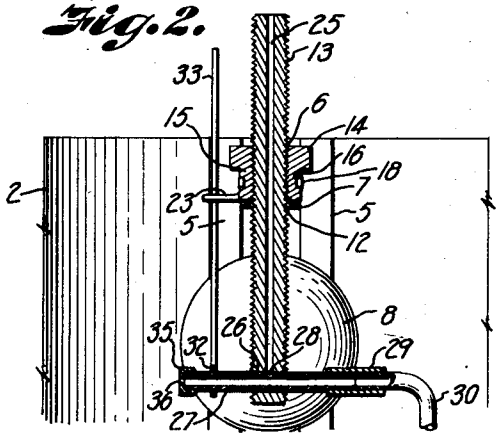
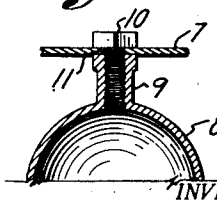


Fig. 3.



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2,010,363

LIQUID FEEDING APPARATUS

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6 Claims. (Cl. 137—21)

My invention relates to feeding or dispensing apparatus and more particularly to apparatus of that character for feeding liquids from a reservoir.

The common method of feeding liquids, particularly chemicals, from the bottom of a reservoir is unsatisfactory for the reason that the hydrostatic head of the liquid varies in direct proportion to the height of liquid in the reservoir and consequently the chemicals will be discharged under greater pressures when the reservoir is full than after the surface of the liquid has fallen to a lower level.

Under conditions where the chemicals are dispensed simultaneously with ingredients fed from other containers into a common mixing chamber it is especially desirable that the liquids be fed under a constant pressure to produce a mixture having a maximum degree of uniformity.

The principal objects of my invention are, therefore, to provide means for feeding such liquids from a reservoir under constant hydrostatic pressure regardless of the height of the liquid in the reservoir; to provide mechanism for adjusting the mouth of the discharge conduit in vertical relation to the surface of the liquid; to embody means in the feeding device for indicating the relative spacing of the discharge mouth below the surface of the liquid; and to provide a vent in communication with the discharge outlet to prevent formation of a vacuum in the discharge conduit.

In accomplishing these and other objects of my invention I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of feeding apparatus embodying my invention and operably mounted in a reservoir shown in central section.

Fig. 2 is a section on the line 2—2 Fig. 1, particularly illustrating the manner of venting the discharge conduit.

Fig. 3 is a fragmentary cross sectional view of the upper end of a float member illustrating its mounting on a supporting bar.

Referring more in detail to the drawing:

1 designates a reservoir, shown as having a cylindrical wall 2 closed at its lower end by a bottom 3, although any suitably shaped container may be used that is adapted to hold a body of liquid 4.

Fixed to the inner face of the cylindrical wall at diametrically opposed points are pairs of spaced guide rails 5 for guiding a feeding device generally designated 6 in its vertical movements in the reservoir.

The feeding device includes a supporting bar 7 slidably mounted between the guide rails and carried on a pair of spaced floats 8 having internally threaded stem portions 9 for receiving cap screw 10 extended through openings 11 in the bar and threaded into the necks for securely mounting the bar on the floats.

At its center the bar is provided with an opening 12 for slidably receiving a stem 13 threaded externally throughout its length to permit adjusting of the stem in vertical relation to the bar, a nut 14 being threaded on the stem for this purpose and having a collar portion 15 provided with an annular recess 16 to admit the arcuately recessed ends of cooperating anchor plates 17 and 18 for operably connecting the nut to the bar.

The plate 17 is offset as at 19 and terminates in an ear 20 fixed by a rivet 21 or the like to the bar, and the plate 18 is similarly secured to the bar, but its ear 22 is provided with a lateral extension 23 having an opening 24 for a purpose presently described.

As is particularly shown in Fig. 2, the stem is provided with a longitudinal duct 25 opening through the upper end of the stem and terminating at its lower end in a transverse opening 26 adapted to receive a conduit section 27 preferably formed of rubber and having a port 28 communicating with the duct and through the duct with atmospheric pressure above the liquid surface, thereby avoiding the possibility of creating a siphoning effect on the liquid.

One end of the conduit section is suitably connected by a coupling 29 to a flexible discharge conduit 30 of rubber or the like leading from the reservoir through an opening 31 provided in the cylindrical wall adjacent its lower end, and sleeved over the opposite or open end of the conduit section is a lateral arm 32 of a gauge 33 slidably extended through the opening 24 of the plate extension 23.

While I have shown the flexible discharge conduit snugly engaging the opening 31 and such construction is satisfactory for small containers, suitable packing may obviously be provided for additionally sealing the conduit in the opening.

The gauge is preferably provided with graduations 34 to indicate the position of the conduit section in relation to the surface of the liquid.

A cap 35, provided with an orifice 36, may be mounted over the mouth or open end of the conduit section to restrict to a desired extent

the flow of liquid through the discharge conduit.

Assuming a feeding device, constructed as described, to be mounted on a body of liquid in a reservoir with the ends of the supporting bar slidably confined by the guide rails the operation of the device would be as follows:

As soon as the feeding apparatus has been lowered in the reservoir to the extent that the conduit section becomes submerged the liquid will flow through the discharge conduit and may be led from the discharge conduit to any desired receptacle or mixing tank.

Thereafter the floats serve to support the device at a constant height with relation to the surface of the liquid, thereby insuring a uniform hydrostatic head or pressure for dispensing the liquid from the reservoir.

Because of the continuous communication of the conduit section with atmospheric pressure through the duct in the stem, formation of a vacuum in the discharge conduit is prevented.

To vary the pressure head on the out-flowing liquid it is merely necessary to thread the adjusting nut upwardly or downwardly on the stem, the indicia on the gauge indicating the pressures proportionate to varying depths at which the mouth of the conduit is submerged in the liquid.

The cap **35** may be readily replaced by one having a larger or smaller orifice when it is desired to dispense the liquid more quickly or slowly from the reservoir.

It is, therefore, possible with my invention to feed liquid from a reservoir under constant hydrostatic pressure irrespective of the height of the liquid in the tank, and to quickly and easily increase or decrease this pressure by manipulating the adjusting nut.

Although I have shown and described a plurality of floats for supporting the feeding apparatus on the body of liquid, it will be apparent that a single float, as for example one of annular form, could be used for this purpose. It should, therefore, be understood that the general design of the apparatus shown and described is only for the purpose of illustrating the principle involved.

What I claim and desire to secure by Letters Patent is:

1. An apparatus of the character described including a liquid container, a float member carried upon the surface of the liquid in the container, a stem supported by the float member and having an end depending into the liquid and provided with an air inlet channel, a liquid discharge conduit having an inlet end supported in submergence by the lower end of the stem and communicating with said air channel whereby atmospheric pressure is maintained in said conduit for gravitational flow of liquid from the container, and an orifice member secured to the inlet end of the discharge conduit and having an orifice located below the communication points of said channel with the discharge conduit for regulating amount of liquid admitted to said conduit.

2. An apparatus of the character described including a liquid container, a float member carried upon the surface of the liquid in the container, a stem supported by the float member and having an end depending into the liquid and provided with an air inlet channel, a liquid discharge conduit having an inlet end supported in submergence by the lower end of the stem and communicating with said air channel whereby atmospheric pressure is maintained in said conduit for gravitational flow of liquid from the container, an orifice member secured to the inlet end of the discharge conduit and having an orifice located below the communication point of said channel with the discharge conduit for regulating amount of liquid admitted to said conduit, and means adjustably mounting the stem in the float member for supporting the orifice member at a selective predetermined depth below the surface of liquid in the container to maintain a constant hydrostatic head above the orifice member whereby velocity flow through the orifice is constant.

3. An apparatus of the character described including a liquid container, a float member carried upon the surface of the liquid in the container, a stem supported by the float member and having an end depending into the liquid and provided with an air inlet channel, a liquid discharge conduit having an inlet end supported in submergence by the lower end of the stem and communicating with said air channel whereby atmospheric pressure is maintained in said conduit for gravitational flow of liquid from the container, an orifice member secured to the inlet end of the discharge conduit and having an orifice located below the point of communication of said channel with the discharge conduit for regulating amount of liquid admitted to said conduit, means adjustably mounting the stem in the float member for supporting the orifice member at a selective predetermined depth below the surface of liquid in the container to maintain a constant hydrostatic head above the orifice member whereby velocity of flow through the orifice is constant, and a vertical scale member having its lower end fixed relatively to said stem and its upper end slidable in said float member to gauge said hydrostatic head.

4. An apparatus of the character described including a liquid container, a float member carried upon the surface of the liquid in the container, means for guiding the float member for vertical movement in the container, a stem adjustably supported by the float member and having an end depending into the liquid and provided with an air inlet channel, a liquid discharge conduit section supported in submergence by the lower end of the stem and having its axis extending in parallel relation to the surface of the liquid in the container and having communication with said air channel whereby atmospheric pressure is maintained in said conduit for gravitational flow of liquid from the container, an orifice member secured to the discharge conduit and having an orifice located below said channel for regulating amount of fluid admitted to said conduit, and a flexible tube fixed to the conduit section and having a discharge end extending through the container.

5. An apparatus of the character described including a liquid container, guides in the container, a carrying member movable on said guides, a float fixed to said carrying member and supported upon the surface of liquid in the container, a threaded stem adjustably carried by said carrying member and having an end depending into the liquid and having an air inlet channel, a liquid discharge conduit supported by the lower end of the stem and communicating with said air channel whereby atmospheric pressure is maintained in said conduit for gravitational flow of liquid from the container, and an orifice member secured to the discharge conduit and having

an orifice located below said channel for regulating amount of fluid admitted to said conduit.

6. An apparatus of the character described including a liquid container, guides in the container, a carrying member movable on said guides, a float fixed to the carrying member and supported upon the surface of liquid in the container, a threaded stem having an end depending into the liquid and having an air inlet channel, an adjusting member threaded on said stem and rotatably mounted in said carrying member to support said stem, a liquid discharge conduit supported by the lower end of the stem and communicating with said air channel whereby atmospheric pressure is maintained in said conduit for gravitational flow of liquid from the container, and an orifice member secured to the discharge conduit and having an orifice located below said channel for regulating amount of fluid admitted to said conduit.

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