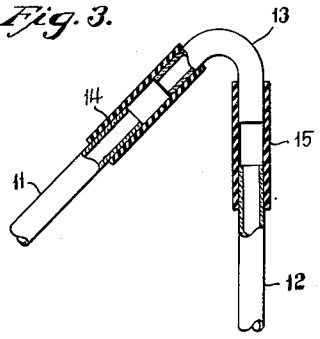
Jan. 16, 1951 W. T. MATHIS 2,538,695

RESILIENT BULB CONTROLLED LIQUID-MEASURING DISPENSER

Filed Sept. 29, 1948

Fig. 3.



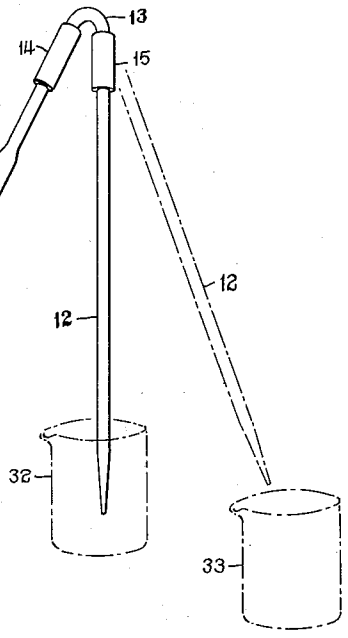


Fig. 1.

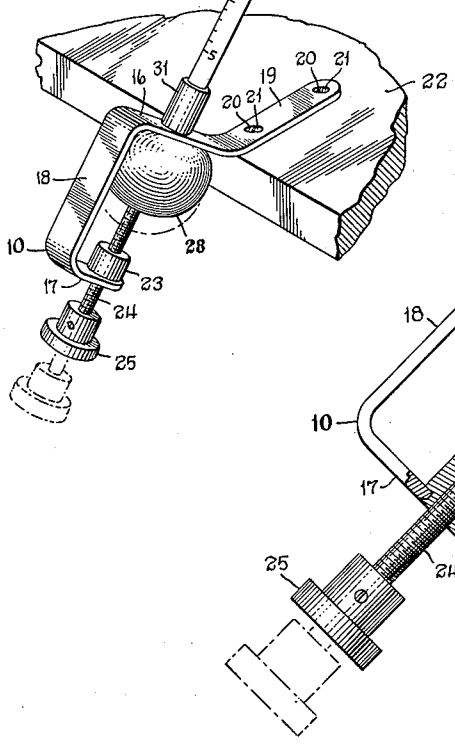
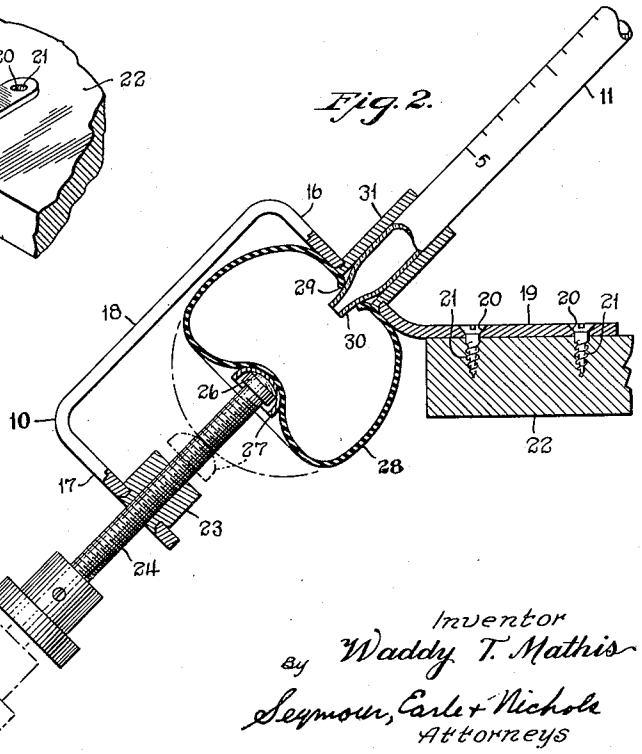


Fig. 2.



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Patented Jan. 16, 1951 2,538,695

UNITED STATES PATENT OFFICE

2,538,695

RESILIENT BULB CONTROLLED LIQUID-MEASURING DISPENSER

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Application September 29, 1948, Serial No. 51,751

3 Claims. (Cl. 222—180)

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The present invention relates to improvements in liquid-measuring dispensers and relates more particularly to liquid-measuring dispensers which may be charged with the desired amount of liquid by suction and which are adapted to discharge such liquid upon the relaxation of such suction. Such dispensers are mainly used by chemists, bacteriologists and other scientists.

One of the main objects of the present invention is to provide a superior liquid-measuring dispenser of the character referred to and which may be produced at a low cost for manufacture and which combines reliability and accuracy of operation.

Another object of the present invention is to provide a superior liquid-measuring dispenser of the character referred to which may be conveniently fixed to a laboratory bench or the like and have its combined intake-and-dispensing member capable of being readily shifted between a liquid-supply vessel and a liquid-receiving vessel.

A further object of the present invention is to provide a superior dispenser of the character referred to and having a liquid-measuring tube and a liquid-holding tube both separable one from the other and separable as a unit from the remainder of the device, to thus permit the employment of such tubes having different capacities or graduations in various combinations.

Still another object of the present invention is to provide a superior liquid-measuring dispenser having a liquid-measuring tube of the character above referred to and constructed and arranged so that the graduations upon the said tube may be more conveniently observed.

Other objects and advantages will be apparent to those skilled in the art from the following, considered in conjunction with the accompanying drawings.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a perspective view of a preferred form of liquid-measuring dispenser embodying the present invention and shown as attached to a laboratory bench;

Fig. 2 is a broken view partly in central-longitudinal section and partly in side elevation of the lower portion of the dispenser but on a larger scale than Fig. 1; and

Fig. 3 is a broken view, partly in side elevation and partly in central-longitudinal section, of the elbow, coupling-tubes and adjacent portions of the liquid-measuring tube and liquid-holding tube.

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The particular liquid-measuring dispenser illustrated in the accompanying drawings for purposes of making clear a preferred form of the present invention, includes a bracket-like mounting-member generally designated by the reference character 10, a liquid-measuring tube 11, a liquid-holding tube 12, a tubular elbow 13 and two flexible coupling-tubes respectively designated by the reference characters 14 and 15.

The mounting-member 10 above referred to may be conveniently formed of a strip of metal bent into substantially U-shaped form to provide two spaced-apart parallel arms 16 and 17 integrally interconnected by a reach 18 extending in substantial parallelism with the liquid-measuring tube 11 before referred to. Integral with and projecting from the upper arm 16 of the mounting-member 10 in a direction away from the reach 18 thereof, is a mounting-finger 19. In the instance shown, the said mounting-finger extends at an angle intermediate the plane of the arm 16 and the central-longitudinal axis of the tube 11, so as to support the latter (in a manner as will hereinafter appear) in an inclined position. The mounting-finger 19 just referred to is provided with two (more or less) countersunk apertures 20—20 respectively adapted to receive one of two screws 21—21. The screws just referred to may serve to secure the mounting-finger 19 to the surface of a laboratory bench 22 or the like in such manner as to enable the mounting-member 10 to support the liquid-measuring tube 11 in the inclined position previously referred to.

Rigidly secured in the arm 17 of the mounting-member 10 is an internally-threaded bushing 23 projecting toward the arm 16 and threadedly receiving an operating-screw 24 arranged to rotate about an axis which is coaxial with the axis of the liquid-measuring tube 11, as is especially well indicated in Fig. 2. At its lower end, the operating-screw 24 has attached to it a finger-piece 25 by means of which the said operating-screw may be conveniently manually rotated. At its end nearer the liquid-measuring tube 11, the operating-screw 24 is formed with a head 26 having a convex end-surface and fitting within an inverted cup-shaped bulb-compressing member 27, in the manner shown in Fig. 2.

The bulb-compressing member 27 above referred to is adapted to be actuated by the operating-screw 24 so as to squeeze or compress a bulb 28 normally located intermediate the underface of the arm 16 of the mounting-member 10 and the said member 27, though conveniently

removable therefrom in a manner as will hereinafter appear.

The bulb 28 above referred to may be formed of rubber or other suitable elastic material, and is so molded (in a manner common in the art) as to normally tend to resume its fully-expanded or spherical form when relieved of compressive forces. At a point axially in line with the tube 11 and the operating-screw 24, the bulb 28 is provided with an aperture 29 into which is adapted to be forced with a fluid-tight fit, the tapering inner terminal 30 of the liquid-measuring tube 11. The portion of the liquid-measuring tube 11 adjacent its terminal 30 is adapted to fit with freedom for removal and replacement, in a bushing 31 rigidly mounted in the arm 16 of the mounting-member 10 and extending away from the bulb 28.

The liquid-measuring tube 11 may be an ordinary transparent glass pipette and in the instance shown may be provided with graduations indicating any desired units of volume.

The upper end of the liquid-measuring tube 11 has slipped over it the lower portion of the flexible coupling-tube 14, which latter, in turn, has its upper portion fitted over the adjacent arm of the elbow 13 so as to connect the latter and the tube 11 with freedom for relative movement. The remaining arm of the elbow 13 has slipped over it the upper end of the flexible coupling-tube 15, which latter has its lower portion slipped over the open upper end of the liquid-holding tube 12, to thus further provide articulation. The said tube 12 may be in the form of an ordinary transparent glass pipette.

The elbow 13 and its associated features are so constructed and arranged that the liquid-holding tube 12, in effect, extends downwardly from the upper terminal-end of the liquid-measuring tube 11.

Normally, the bulb 28 is filled with a suitable fluid such, for instance, as colored water, mercury or the like, which fluid may be forced upwardly into the liquid-measuring tube 11 by compressing the bulb 28, all in the manner and for purposes as will more fully hereinafter appear.

Operation

For purposes of description, it may be assumed that the operating-screw 24 has been turned to compress the bulb 28 and thereby cause the liquid contained therein to rise to the zero marking (or other desired marking) on the liquid-measuring tube 11. It may further be assumed that the end of the liquid-holding tube 12 is immersed in a fluid contained in a liquid-supply vessel, which latter is indicated by the broken lines 32 in Fig. 1, and which is located adjacent a liquid-receiving vessel indicated by the broken lines 33 in the same figure.

Now with the lower end of the liquid-holding tube 12 immersed in the desired liquid contained in the liquid-supply vessel 32, the operating-screw 24 may be reversed or retired, to thereby permit the bulb 28 to expand under its own inherent resiliency. The expansion of the bulb 28 will draw the liquid in the liquid-measuring tube 11 downward, thereby creating a suction or partial vacuum within the upper end of the said tube 11 and, similarly, in the connected liquid-holding tube 12. The suction or vacuum referred to will cause the liquid from the vessel 32 to rise up into the liquid-holding tube 12 in volume corresponding to the volume represented by the degree to which the liquid in the liquid-measuring tube 11 has been retired downwardly by the expansion of the bulb 28. When the liquid in the liquid-measuring tube 11 has been lowered to the desired graduation, it will represent to a very accurate degree the amount of liquid which has risen into the liquid-holding tube 12 from the liquid-supply vessel 32, despite the fact that the tube 12 may have different internal-diameter characteristics from the similar characteristics of the liquid-measuring tube 11.

After the liquid in the liquid-measuring tube 11 has been lowered to the desired graduation, the retirement of the operating-screw 24 will be halted and the vessel 32 moved away from the lower end of the flexibly-mounted or articulated liquid-holding tube, following which the lower end of the said tube may be swung over into registry with the liquid-receiving vessel 33.

The operating-screw 24 may now be advanced to compress the bulb 28 and thereby again raise the liquid level in the liquid-measuring tube 11. The raising of the liquid level just referred to will cause the commensurate discharge of the contents of the liquid-holding tube 12 into the liquid-receiving vessel 33.

If desired, the bulb 28 may be contracted and subsequently expanded to substantially fill the liquid-holding tube 12 so that the latter will contain an amount of liquid over and beyond that which it is desired to dispense. The user may take note of the level at which the liquid is in the tube 11 and may then advance the operating-screw 24 to compress the bulb 28 and thus cause the said liquid level to rise in the tube 11 to the desired graduation, thereby expelling the desired volume of liquid (though not necessarily all) from the liquid-holding tube 12 into any desired liquid-receiving vessel such, for instance, as 33. The volume thus expelled from the tube 12 will correspond to the volume represented by the degree to which the liquid in the tube 11 has been moved upwardly.

The charging of the liquid-holding tube 12 with the desired liquid does not cause such liquid to flow over into the liquid-measuring tube 11 nor, conversely, does compressing of the bulb 28 cause the liquid contained in the liquid-measuring tube 11, to move over into the interior of the liquid-holding tube 12 or its equivalent.

The liquid-holding tube 12 may be removed for cleansing or for being replaced with a different size liquid-holding tube, by merely slipping the upper end of the said holding-tube out of the flexible coupling-tube 15.

In the event of the breakage of the liquid-measuring tube 11, or in the event that it is desired to replace the same with another liquid-measuring tube having different capacities and/or different graduations, the said tube 11 may be readily withdrawn from the bushing 31 and the aperture 29 in the bulb 28 preferably after the said bulb has been fully expanded to thereby draw into itself substantially all of the measuring liquid. The elbow 13 may be readily disconnected from the upper end of the liquid-measuring tube 11 by withdrawing the latter from the lower end of the flexible coupling-tube 14.

It is to be noted that the mounting-member 10 is so constructed and arranged as to hold the liquid-measuring tube 11 or its equivalent at an angle inclined intermediate the vertical and horizontal, thus enabling the articulated liquid-holding tube to be readily entered into and removed from various vessels or containers. By holding the liquid-measuring tube 11 in the inclined po-

sition shown, the reading of the graduations is greatly facilitated and accuracy is preserved, since the inclination of the said tube 11 does not change from one part of a given measuring operation to another.

The bulb 28 may be readily removed when desired by first withdrawing the terminal 30 of the tube 11 from the aperture 29 and then laterally shifting the said bulb out from between the underface of the arm 16 and the upper surface of the bulb-compressing member 27.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A liquid-measuring dispenser, including in combination: a substantially U-shaped mounting-member having an upper arm and a substantially-parallel lower arm both connected together by a reach to provide the substantially U-shaped form referred to, the said upper arm having an opening and provided with a tubular tube-receiving portion projecting therefrom in registration with the said opening, the said lower arm having a threaded passage in substantial axial alignment with the tube-receiving portion of the said upper arm, and one of the said arms being extended in a direction away from the said reach to provide a mounting-finger extending therefrom at an angle intermediate the general plane of said arm of which it forms a part and the longitudinal axis of the said tube-receiving portion to thus dispose the latter axis in a direction intermediate the vertical and horizontal when the said mounting-arm is secured to a bench or the like; an operating-screw extending through the lower arm of the said mounting-member and threadedly engaged with the threaded passage therein; a resilient bulb located intermediate the upper end of the said operating-screw and the underface of the said upper arm and provided with an aperture registering with the opening in the said upper arm; an inclined liquid-measuring tube having its lower end extended downwardly through the tube-receiving portion of the said upper arm and into the aperture in the said bulb; and a fluid-holding tube depending from the upper end of the said liquid-measuring tube.

2. A liquid-measuring dispenser, including in combination: a substantially U-shaped mounting-member having an upper arm and a substantially-parallel lower arm both connected together by a reach to provide the substantially U-shaped form referred to, the said upper arm having an opening and being provided with a tubular tube-receiving portion projecting therefrom in registration with the said opening, the said lower arm having a threaded passage in substantial axial alignment with the tube-receiving portion of the said upper arm, and the said upper arm being extended in a direction away from the said reach to provide a mounting-finger extending therefrom at an angle intermediate the general plane of the said upper arm and the longitudinal axis of the said tube-receiving portion to thus dispose the latter axis in a direction intermediate the vertical and horizontal when the said mounting-arm is secured to a bench or the like; an operating-screw extending through the lower arm of the said mounting-member and threadedly engaged with the threaded passage therein; a resilient bulb located intermediate the upper end of the said operating-screw and the underface of the said upper arm and provided with an aperture registering with the opening in the said upper arm; an inclined liquid-measuring tube having its lower end extended downwardly through the tube-receiving portion of the said upper arm and into the aperture in the said bulb; and a fluid-holding tube depending from the upper end of the said liquid-measuring tube.

3. A liquid-measuring dispenser, including in combination: a substantially U-shaped mounting-member having an upper arm and a substantially-parallel lower arm both connected together by a reach to provide the substantially U-shaped form referred to, the said upper arm having an opening and being provided with a tube-receiving bushing projecting upwardly therefrom and secured in the said opening, the said lower arm having an opening and a threaded bushing secured therein, the said bushing projecting upwardly from the said lower arm with its axis parallel with and in substantial axial alignment with the said tube-receiving bushing, and the said upper arm being extended in a direction away from the said reach to provide a mounting-finger extending therefrom at an angle intermediate the general plane of the said upper arm and the longitudinal axis of the said tube-receiving bushing to thus dispose the latter axis in a direction intermediate the vertical and horizontal when the said mounting-arm is secured to a bench or the like; an operating-screw extending through the lower arm of the said mounting-member and threadedly engaged with the threaded bushing therein; a resilient bulb located intermediate the upper end of the said operating-screw and the underface of the said upper arm and provided with an aperture registering with the opening in the tube-receiving bushing; an inclined liquid-measuring tube having its lower end extended downwardly through the tube-receiving bushing of the said upper arm and into the aperture in the said bulb; and a fluid-holding tube depending from and articulately connected to the upper end of the said liquid-measuring tube.

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