July 7, 1936. L. EDELMANN 2,046,776

NOZZLE TIP FOR HYDROMETER BARRELS

Filed July 21, 1933

Fig. 1.

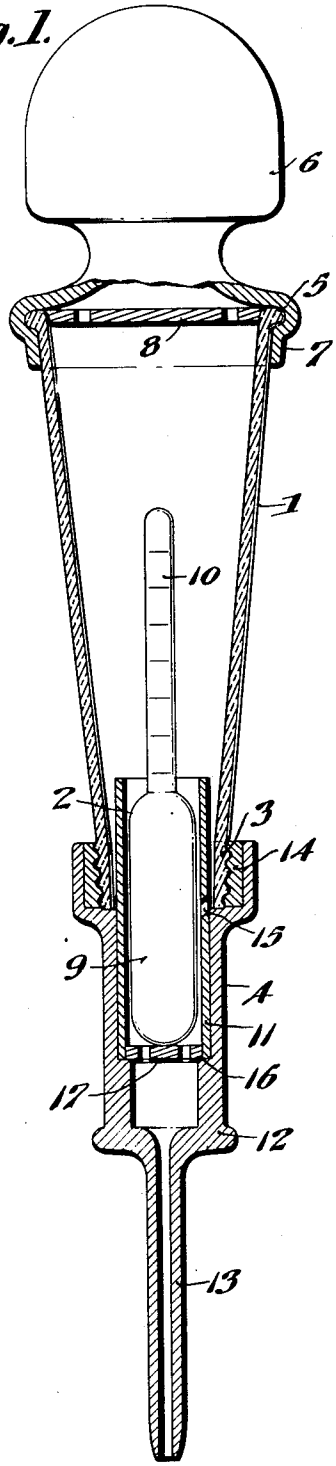


Fig. 2.

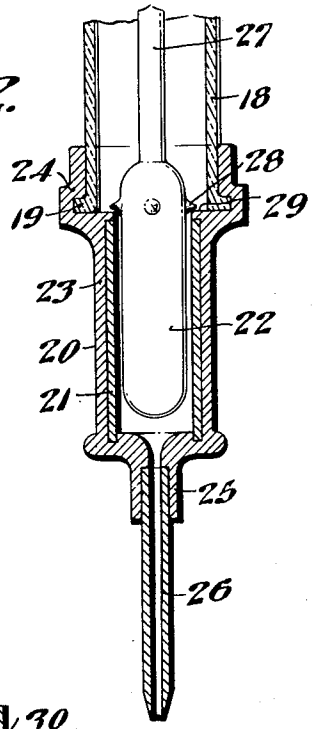
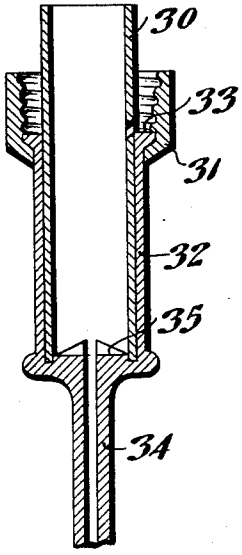


Fig. 3.



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NOZZLE TIP FOR HYDROMETER BARRELS

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6 Claims. (Cl. 265—45)

My invention relates to tips for hydrometers, and more particularly to a syringe type of hydrometer such as illustrated in Patents No. 1,245,449 of November 6, 1917 and No. 1,262,478 of April 9, 1918, upon which the present invention is an improvement.

An object is to provide a tip for hydrometers comprising a rigid member to hold the form thereof having cushioning material permanently associated therewith to absorb shocks.

Another object is to provide a hydrometer structure including a nozzle tip portion and a transparent liquid and float barrel, of glass or other suitable material, with attaching means formed as part of the tip member and so constructed that a rigid and yet cushioned connection is accomplished between the barrel and the tip member.

Still another object is to provide a hydrometer structure, including a glass barrel and a tip portion associated therewith, with a hydrometer float element movable within the barrel and tip, and to so construct the parts that the float receiving barrel need not be held within close limits in the internal diameter of its body portion, whereas the readily formed tip portion has a sleeve to guide and hold the float element against lateral tilting or shifting, which guide or sleeve portion is held to very close limits and clearance with facility during ordinary manufacturing processes.

Yet another object is to provide a syringe hydrometer structure including an elongated tip portion to serve as a housing for the float bulb of a hydrometer element and guide the float element to prevent lateral tilting and twisting when in use, which tip portion comprises an inner sleeve member of rigid material readily held to close limits in commercial manufacturing processes and an outer cushioning material welded to or otherwise integrally associated with the inner member.

Still another object is to so construct and associate the parts that all portions are effectively sealed and cushioned to prevent leakage of liquid in the use of the instrument, and to absorb shocks and prevent breakage with the ordinary handling of use.

With the above and other objects in view which will be apparent to those skilled in the art, my invention includes certain novel features of construction and combinations of parts which will be hereinafter set forth in connection with the drawing and then pointed out in the claims.

In the drawing:

Figure 1 is a view in longitudinal section through a hydrometer constructed in accordance with my invention.

Fig. 2 is a fragmentary view in section illustrating one possible modification.

Fig. 3 is a view similar to Fig. 2 showing still another modification.

As set forth above, my present invention is an improvement upon the character of hydrometer as identified, and while the drawing shows embodiments of the invention in only certain specific forms, these are intended merely as illustrative of possible embodiments, and it is to be understood that the present invention can be embodied in a thermohydrometer having thermally affected means, or thermometer, associated with the float element or independently mounted in various manners.

It is well established that, to obtain accurate readings of a hydrometer of this type, the float element must float in substantially perpendicular relation during the test, with the stem out of contact with the sidewall of the liquid and float barrel, and various attempts have been made to embody constructions in hydrometers to prevent lateral tilting or twisting of the float element. Ordinarily this has been accomplished by holding the inside diameter of the transparent glass liquid barrel to close limits of clearance so that the float bulb of the hydrometer float element will be guided thereby to positively prevent lateral tilting or twisting. However, this has meant that ordinarily such glass liquid barrels must be formed from tubing carefully selected as to its internal diameter, and then carefully blown and hand worked to form an attaching bead or thread. This has required expert manipulation and working of the glass and has precluded the possibility of machine manufacture of liquid barrels for hydrometers, as the machine operations cannot be expeditiously held to the close limits required.

With this in mind, it is a purpose of my present invention to provide a float receiving and protecting housing serving all of the purposes as set forth in the above identified patents and further including a readily and permanently formed sleeve portion to guide and properly position the hydrometer float element, thus obviating the necessity for such close limits of tolerance in the inside diameter of the liquid barrel, and making it possible to use machine made glass barrels, if desired.

The barrel 1 and float 2 are ordinarily of glass, and being readily frangible must be protected against contacts and shocks. In the present in-

stance I have illustrated the glass barrel 1 as being of truncated-cone shape, with a screw threaded portion 3 at the restricted end for attachment of the tip, generally indicated at 4, and a bead 5 at the flared end to receive and hold a suction bulb 6. This flared form of liquid barrel can be readily formed and manufactured by machine, and as the inside diameter of the barrel need not be held to close limits of variation, the ordinary product secured by commercial manufacture in a machine is suitable, and these barrels can be produced at a much less cost than where glass tubing of selected size must be cut and blown to a desired shape.

The bulb 6 can be of any desired form and construction, and is preferably provided with a sleeve 7 to fit over the beaded end of the glass barrel 1 and hold the bulb securely in place thereon. It is preferable that a perforated disk 8, of rubber or other suitable cushion material, be mounted adjacent to the bulb 6 within the barrel 1, or that other suitable stop means be provided to limit movement of the float element 2 upwardly when the instrument is in use.

In the present instance, the float element 2 is shown with the bulb portion 9 made of substantially uniform diameter throughout its length, and with the reduced float scale stem 10 also of substantially usual construction. Where such a float is employed, it is necessary that it be maintained with its stem out of contact with the wall of the liquid barrel, and it is preferable that the guiding means be substantially submerged so that the hydrometer element will float free and out of frictional contact therewith to thus insure accurate readings.

The tip, generally indicated at 4, is provided with an inner tubular housing 11, of hard rubber or other suitable material readily made and held to very accurate inside diameter limits during manufacture, and this tubular sleeve 11 is encased in a cushioning material, as indicated at 12, which cushioning material is, in Figure 1, illustrated as formed into a nozzle 13 projecting as substantially an extension of the sleeve 11, and in full direct communication therewith. An internally threaded sleeve 14, of hard rubber of other suitable material, is shaped to fit upon the threaded portion 3 of the glass barrel 1, and this threaded sleeve 14 is held by the cushion material 12 in substantially the position illustrated in Figure 1, where it is spaced from and mounted concentrically around the upper portion of the sleeve 11. The cushion material 12, which can be of soft rubber, or other suitable material, is exposed between the sleeve 14 and the tubular sleeve 11, so that the end of the screw threaded portion 3 of the glass barrel 1, when turned into the threaded sleeve 14, will engage with the soft rubber to thus establish a liquid tight joint between the barrel and the tip.

In the present instance I have illustrated the upper end of the tubular housing sleeve 11 as extending up into the threaded end of the glass barrel 1 to thus form a complete housing and guide for the float element 2, and it will be appreciated that this housing sleeve can be extended to any length, just so it is not sufficiently long to obscure the scale stem 10 when the hydrometer element is floating. To allow free drainage back for complete emptying of the barrel 1, it may be found desirable to form vent openings 15 through the sleeve portion 11. The tubular housing sleeve 11 can be extended entirely through the length of the tip portion 4, or can be stopped slightly short of the recess therein, in which instance a shoulder 16 is provided at the inner end of the sleeve 11 to receive a perforated disk 17 by which the float element is supported and is held out of the upper end of the passage through the nozzle 13. In the manufacture of this tip and nozzle structure, I have found that the housing sleeve 11 and the threaded sleeve 14 can be made of hard cured rubber, and that the cushion portion 12 of partly cured rubber can be assembled or moulded thereon, following which the entire assembly is further treated or cured so that the more rigid portions 11 and 14 are welded, fused, or otherwise caused to adhere permanently and integrally in proper mounting within the cushion material and portions 12.

With the form of the device as illustrated in Fig. 2, the liquid barrel 18, of glass or other suitable transparent material, has a bead 19 at its lower end, and a suction bulb can be mounted in any desired manner at the upper end of the liquid and float barrel 18. A tip member, generally indicated at 20, has a substantially rigid guide sleeve 21 to receive and serve as a housing and guide for the float bulb 22 of the float element. This guide sleeve has a cushion covering 23 thereon to absorb shocks, and the cushion covering is extended into a sleeve 24 to receive and hold snugly upon the beaded end of the barrel 18. A collar 25 is provided to receive and hold a nozzle tip 26, preferably made of hard rubber or other substantially rigid tubing, and as this collar 25 is of yielding cushion material, the rigid nozzle 26 can be bent to one side for more ready insertion in the filler opening of a battery cell or other receptacle from which a quantity of liquid to be tested is to be drawn.

With this construction of the parts the hydrometer float bulb 22 has the usual gauge stem 27 extending therefrom, and the guide and housing sleeve 21 is made of such corresponding inside diameter that the bulb portion 22 of the float element can move freely endwise therein but is at the same time held against tilting or lateral twisting to such extent that the stem 27 can contact with the wall of the barrel 18. The float barrel 18 can be made in any desired shape and the inside diameter need not be held to strict and close limits, as the float element will be guided by the housing sleeve 21. However, in some instances it may be found desirable to provide the tips or beads 28 to project laterally on the upper part of the float portion 22 and further guard against and relieve frictional contact of any portion of the float with the barrel 18, which might disturb and render inaccurate readings taken on the float stem 27. Where the float 22 has such projections or beads 28 thereon, or any projection, the upper portion of the tip 20 at the top of the housing sleeve 21 can be made to serve as a support to engage with these projections 28 and limit movement of the float bulb 22 into the housing, so that the entire float element is suspended substantially as illustrated in Fig. 2 in position to avoid closing the opening through the nozzle. Under these circumstances, it is preferable that the cushion material 23 be extended over the upper end of the substantially rigid sleeve 21, as shown at 29, so that a cushioned shoulder is formed. With this embodiment, it is of course to be understood that the substantially rigid housing member 21 and the portion 23 will be permanently associated to be substantially integral.

With the adaptation as shown in Fig. 3, the

housing sleeve 30 is made of tubular form with an inside diameter such that it will allow free movement of a float element and will yet properly guide and hold the float element against tilting or twisting. This housing sleeve 30 is preferably of material that will be substantially rigid in the completed article, and a screw threaded sleeve 31, also of rigid material can be provided to receive a correspondingly shaped end of the liquid and float barrel. The housing sleeve 30 has a covering 32 of cushion material thereon formed between and around the ring 31 to mount the parts in permanent relation, and the cushion material is extended to form a cushion or packing gasket or seat 33 against which the end of the barrel closes to establish a liquid tight joint. A nozzle 34 can be provided to give any form and construction. As the sleeve 30 is of substantially the same diameter throughout the entire length of the housing portion, when the instrument is emptied of liquid the float element will ordinarily rest against the cushion material closing the end of housing sleeve 30 adjacent to nozzle 34, and it may be found desirable to provide projections or ribs 35, or to groove the supporting face of the cushion material at this end, to prevent the float element entering the opening of the nozzle 34 sufficiently to prevent free discharge of the liquid therethrough.

As stated above, it has been found that tips according to my present invention can be advantageously and readily manufactured to be entirely of rubber, with the rigid portions of harder consistency, or more thoroughly and completely cured than the cushion portions, and as the parts are finally shaped and treated in moulds, the internal diameter of the housing sleeve can, in each instance, be held to very close limits, to give just the proper clearance for the float bulb of the hydrometer element. As the hydrometer element must necessarily be made of tubing selected for uniform external diameter, my present invention tends for greater accuracy with correspondingly possible reductions in the cost of hydrometers, and makes possible the manufacture of certain parts by machine operations, where heretofore extreme accuracy has required very careful selection of materials and expert hand operations in the manufacture.

In the present disclosures no attempt has been made to show all possible forms, for it will be appreciated that the various possible designs and constructions are multitudinous and that this invention adapts itself to embodiment and construction as a thermo-hydrometer as well. Where a thermo-hydrometer is desired, the temperature influenced portions can be embodied with the float element, or can be assembled with the remaining portions, in any desired manner.

While I have herein shown and described only certain specific embodiments of my invention and have suggested only certain possible modifications, it will be appreciated that changes and variations can be made in the form, construction, and assembly, and in the method of constructing or manufacturing and assembling the parts, without departing from the spirit and scope of my invention.

I claim:

1. A tip for hydrometers employing a liquid barrel comprising, a separate nozzle portion having an internal substantially rigid sleeve-like float housing, and a soft rubber covering on and unitarily associated with the rigid housing having portions fitted to the liquid barrel to pack the tip portion in liquid tight association therewith.

2. A tip for hydrometers embodying a liquid barrel comprising, a separate hard rubber float housing sleeve and a soft rubber covering unitarily secured concentrically on said hard rubber sleeve formed at one end to provide a flexible nozzle portion and at the other end of the sleeve to be fitted at one end of a liquid barrel of a hydrometer in liquid tight association therewith.

3. A tip for hydrometers embodying a liquid barrel comprising, a separate substantially rigid tubular sleeve-like float housing, a substantially rigid sleeve to be fitted and to hold upon the nozzle end of the liquid barrel, and a soft rubber connection between the housing and the sleeve and permanently associating said housing and sleeve as a unit for attachment to the liquid barrel.

4. A tip for hydrometers embodying a liquid barrel having one end thereof threaded which comprises, a substantially rigid tubular sleeve-like housing to be mounted as an extension of the liquid barrel, a substantially rigid threaded sleeve to fit upon the threaded end of the barrel, and a soft rubber covering on said sleeve-like housing permanently and unitarily connecting the threaded sleeve therewith and presenting a portion of the soft rubber material to be fitted to the threaded end of the liquid barrel in liquid tight association.

5. A tip for hydrometers embodying a liquid barrel having one end thereof screwthreaded which comprises, a hard rubber tubular sleeve-like housing to be fitted substantially as an extension of the liquid barrel, a hard rubber threaded sleeve to fit upon the threaded end of the liquid barrel, and a soft rubber covering on said sleeve-like housing permanently and unitarily connected with said housing and the threaded sleeve and having a portion thereof presented to be engaged by the threaded end of the liquid barrel to establish a liquid tight connection.

6. A tip for hydrometers including a liquid barrel threaded at one end which comprises, a hard rubber tubular sleeve-like housing, a hard rubber threaded sleeve fitted around and spaced from said sleeve-like housing, and a soft rubber covering vulcanized upon the outer side of the sleeve-like housing and also permanently secured to the threaded sleeve to hold the parts in permanent unitary assembly, said soft rubber covering being extended between the hard rubber portions to present a packing surface engageable with the liquid barrel to establish a liquid tight association and being formed at the other end of the sleeve-like housing to present a flexible nozzle.

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