(54) Title of the Invention: A liquid level indicator device
Abstract Title: A liquid level indicator device

(57) A liquid level indicator device adapted to mount onto the upper surface or lid of a liquid container such as a water butt comprises a float stick having a scale and a float at its base which floats on the liquid in the container, a support indicator column adapted to be mounted on the upper surface and through which the float stick extends substantially vertically, and having a pointer means to indicate on the scale the level or volume of liquid in the container.
A liquid level indicator device

Field of the Invention

The present invention relates to indicator devices for liquid levels within containers.

Background

Indicator means are known for the level of liquid within a container, using the principle of an indicator rod or stick attached to a float supported on the liquid, extending vertically through the top of the container. Prior art devices have drawbacks that they are in general not adapted for use in common situations where a simple, lost cost device is needed, such as for example to indicate the level of water in a rainwater tank or butt, and are not adapted for retrofit to such a butt by an amateur user. They also have a potential functional drawback in that they provide only limited stabilisation of the indicator rod against wind or other forces when fully extended, i.e. when the tank is full, so there is a risk of damage or inaccurate indication. The invention provides an improved, simple device that aims to overcome these drawbacks.

Prior Art

Accordingly a number of patent applications have been filed in an attempt to resolve the problem or similar, including the following:

WO200679144 discloses a tank gauge for indicating the amount of liquid within a tank, the gauge including a float adapted to lie within the tank so as to float on the liquid therein, an indicating rod connected to the float to extend above the float, and a guide for the rod to orientate the rod substantially vertically such that the rod extends via the guide to a position above the top of the tank, the rod being freely movable in a vertical direction with the float such that the amount of liquid within the tank is indicated by the length of rod extending above the top of the tank.

This device uses a short cylindrical guide for the rod that extends through the top of the tank, and has the disadvantages that a large aperture is needed in the top, which makes it unsuitable for amateur retrofit into a domestic container, such as a water
butt; also there is little lateral support for the rod, which makes the device weak and liable to high friction and poor sensitivity to changes in level when the tank is full and a long length of rod extends from the top of the tank.

GB2343513 discloses an indicator for the level of fluid e.g. water in a butt that comprises a float 4 slidably linked to, or housed within a substantially vertical guide 5 secured or securable to the interior or exterior of the butt. In use, the float 4 can move in a substantially vertical direction in accordance with the level of fluid in the butt. An indicator responsive to movements of the float e.g. a graduated rod 7 provides a visual indication outside of the butt of the level of fluid in the butt. Alternatively, a light may be actuated by a float operated switch. An external guide, transparent, may contain the float.

This device uses a long vertical guide inside the butt.

WO9502805 discloses a liquid level indicating device that consists of a buoyant vertical graduated rod. The device includes mounting means for mounting the rod retractably and vertically in an aperture in a tank containing liquid. The rod projects upwardly through the aperture in the roof of the tank to visually indicate the level of liquid in the tank. As the liquid level falls, the extent to which the rod projects reduces accordingly. A seal is provided to prevent rainwater from flowing down the rod into the tank. The device is particularly useful in monitoring the consumption of home heating oil.

This device shares the disadvantages of the first above, having a single guidance means and little if any lateral stabilisation of the indicator rod.

Summary of the Invention

According to a first aspect of the present invention there is provided a liquid level indicator device arranged in use to be located on an upper surface of a liquid container, in which the indicator device comprises an elongate float stick having a distal end and a proximal end, wherein the proximal end comprises an indicator scale and the distal end comprises a floatation means; and
a support column arranged to support said float stick;
wherein the floatation means is arranged to alter vertical height of said distal end of
the float stick according to a level of liquid in the container, and said proximal end of
the float stick progresses, according to vertical height of the distal end, to provide
progressive indication on said scale.

In this way the support column typically comprises a fixed point against which the
indication scale on the stick is measured, and accordingly said column is fixed in
relation to said container. In preferred embodiments the column allows progressively
movement along a fixed path, wherein the path is delineated or bounded in use. For
example in some embodiments the column may comprise an elongate collar or
sheath, wherein the stick floats freely within said sheath. In such embodiments the
floatation means may be intermediate the ends or otherwise dispersed about the
stick, so as to enable a stick substantially of equal width.

In some embodiments the device is arranged on a horizontal or angled indication
scale, for example wherein vertical movement of the distal end is translated to
horizontal or angled movement by gearing or elbows or joints.

The device may be adapted to be located on an upper surface of a liquid container,
and comprises:

a float stick having a bottom end and a top end and comprising an indicator
scale on a first surface of the float stick;

a float means attached to the bottom end of the float stick; and

a support indicator column comprising a lower and an upper collar means
spaced apart through which the float stick may extend substantially vertically and a
base adapted to mount on the upper surface of the liquid container.

In one embodiment the support indicator column comprises an upright member
extending upwards from the base and the lower collar means comprises an aperture
through the base and the upper collar means comprises an aperture through an
upper guide member at the upper end of the upright member.

In one embodiment the float means comprises a hollow float detachable from the
bottom end of the float stick, for example by means of a male screw fitting provided
on one of the float stick and the float and a matching threaded recess provided on
the other of the two.

In this way the float stick is supported and guided by the support indicator column at
the base and at the upper collar means, so providing stable support against a
bending tendency for example from wind or other forces. The float stick is thereby
support such that it can move freely through the collar means and to give an accurate
indication. It is improved over prior art devices in that it is simpler and more reliable,
and does not require a large hole to be formed in the upper surface of the container
to place a guide means through the upper surface into the container.

By liquid container is meant for example a water container such as a water tank or
water butt, in one case being adapted to catch rainwater; or a liquid container in
general having a base, a sidewall and a lid or upper wall. While the invention will be
described herein at times in a specific form and application for use with a rainwater
butt, the device is not limited to any one application or type of liquid.

The device is adapted primarily for measurement of liquids, for example aqueous or
non-aqueous liquids such as oil, but may in some embodiments may be used or
adapted for use with flowable solids such as powders, granules or grains, and the
use of the term liquid herein encompasses such flowable solids.

By upper surface is meant an upper wall, lid or cover positioned above the liquid in
the container, the lid or cover being removable in some cases.

In a preferred embodiment the support indicator column comprises a pointer means
adapted to indicate a given indicator scale marking on the float stick.

In a preferred embodiment the float stick comprises a rectangular member having an
indicator scale marking on a major surface of member.

The scale markings are preferably in terms of liquid volume within the container. In
some embodiments a scale in terms of depth or height of the liquid within the
container is provided. In some embodiments a scale defined in terms of a weight of
liquid may be provided.
In a preferred embodiment the float stick comprises a stop means at its lower end adapted to stop upwards movement of the float stick at a given point. Preferably the stop means comprises a widening of a cross-sectional dimension of the float stick.

In this way the float stick cannot be removed upwards from the support indicator column, and cannot be displaced from the support indicator column by rising liquid level. Therefore in use the container may become filled above the flotation level of the float while the indicator maintains a 'full' reading, and the float stick is not ejected from the support indicator column.

In preferred embodiments the base comprises fixing means adapted to fix the base to an upper surface of the container. In a preferred embodiment the fixing means comprises one or more holes through the base such that the base can be bolted to the upper surface.

In one embodiment the device is provided for use with a specified container with an indicator scale appropriate for that container. The device may be provided in a range of versions adapted for use with different diameters and heights of container.

In some embodiments the device is adapted to be able to be calibrated.

In one embodiment the device may comprise means to adjust the positioning of the scale markers so as to calibrate the device.

In one embodiment the device may comprise means to adjust the position of the pointer means on the support indicator column so as to calibrate the device.

According to a further aspect the invention, there is provided a kit of parts adapted to be assembled into a liquid level indicator device, in which the kit comprises:

- a float stick having a bottom end and a top end and comprising an indicator scale on a first surface of the float stick;
- a float means attachable to the bottom end of the float stick; and
- a support indicator column comprising a lower and an upper collar means spaced apart through which the float stick may extend substantially vertically and a base adapted to mount on the upper surface of the liquid container.
According to a further aspect the invention, there is provided a liquid container having a liquid level indicator, the container comprising:

- a container having an internal volume and an upper closed surface; and
- a liquid level indicator device as described herein mounted on the upper surface and extending through an aperture in the upper surface such that the float floats on the liquid within the container and the float stick indicates the liquid level in the container.

According to a further aspect the invention provides a means to indicate the liquid level within a container comprising the steps of providing a liquid level indicator device as described herein mounted or located on an upper surface of a liquid container and extending into the container such that the float floats on liquid within the container, and reading the liquid level by means of a scale provided on a surface of the float stick.

In a preferred embodiment the method comprises the further step of calibrating the indicator device using a known volume of liquid within the container.

The invention has been described by way of examples only and it will be appreciated that variation may be made to the above-mentioned embodiments without departing from the scope of invention.

With respect to the above description then, it is to be realised that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

**Brief Description of Figures**
Figure 1 shows a side view of an embodiment of a device according to the invention.
Figure 2 shows a top view of the embodiment shown in figure 1.
Figure 3 shows a bottom view of the embodiment shown in figure 1.
Figure 4 shows an isometric view of the embodiment shown in figure 1.
Figure 5 shows an exploded isometric view of the embodiment as shown in figure 4.

**Detailed Description of Figures**

10 Referring to figures 1 to 5, an embodiment 10 of liquid level indicator device according to the invention comprises a float stick 14 having a bottom end 22 and a top end 24 and comprising an indicator scale 20 on a first surface 16 of the float stick, a float means 12 associated with the bottom end of the float stick, a support indicator column 30 comprising a lower collar means 42 and an upper collar means 52 through which the float stick may pass and a base 32 adapted to mount on the upper surface of the liquid container.

The support indicator column 30 comprises an upright member 34 extending upwards from the base 32 and the lower collar means comprises an aperture 42 through the base and the upper collar means comprises an aperture 52 through an upper guide member 50 at the upper end 36 of the upright member.

In one embodiment the float means comprises a hollow float 12 detachable from the bottom end of the float stick, for example by means of a male screw fitting 64 provided on the float stick and a matching threaded recess 62 provided on the float.

In this way the float stick is supported and guided by the support indicator column at the base and at the upper collar means, so providing stable support against a bending tendency for example from wind or other forces. The float stick is thereby supported such that it can move freely through the collar means and to give an accurate indication. It is improved over prior art devices in that it is simpler and more reliable, and does not require a large hole to be formed in the upper surface of the container to place a guide means through the upper surface into the container.

35 The support indicator column 30 comprises a pointer means 38 adapted to indicate a given indicator scale marking on the float stick.
The float stick comprises a rectangular member having an indicator scale 20 marking on a major surface 16 of member, and comprises a stop means 66 at its lower end 22 adapted to stop upwards movement of the float stick at a given point.

The base 32 comprises fixing means adapted to fix the base to an upper surface of the container, comprising holes 44 through the base such that the base can be bolted to the upper surface of the container using bolts and nuts 46, 48. The base preferably comprises feet 68 to enable it mount stably on an irregular surface.

In an example of use, to fit the liquid indicator device to a water container such as a water butt the lid of the butt is drilled to fit the float stick and the two fixing holes; the support indicator column is then bolted to the lid; the float stick is then inserted through the hole in the lid and through the bottom and top collar means, in this embodiment the apertures 42 and 52, top end 24 first; the float 12 is then fitted to the float stick and the lid is replaced, lowering the float into the container. The float stick is then supported by the float on the liquid and the pointer means indicates the liquid level in the container.

The device may be made from an engineering polymer as known in the art. Preferably the scale markings 20 are moulded into the surface 16 of the float stick for durability.
Claims

1. A liquid level indicator device arranged in use to be located on an upper surface of a liquid container, in which the indicator device comprises an elongate float stick having a distal end and a proximal end, wherein the proximal end comprises an indicator scale and the distal end comprises a floatation means; and a support column arranged to support said float stick; wherein the floatation means is arranged to alter vertical height of said distal end of the float stick according to a level of liquid in the container, and said proximal end of the float stick progresses, according to vertical height of the distal end, to provide progressive indication on said scale.

2. A device as claimed in claim 1 wherein the float means comprises a hollow float detachable from the bottom end of the float stick.

3. A device as claimed in any claim above wherein the support indicator column comprises a pointer means adapted to indicate a given indicator scale marking on the float stick.

4. A device as claimed in any claim above wherein the float stick comprises a rectangular member having an indicator scale marking on a major surface of member.

5. A device as claimed in any claim above wherein the float stick comprises a stop means at its lower end adapted to stop upwards movement of the float stick at a given point.

6. A device as claimed in any claim above wherein the support column comprises a lower and an upper collar means spaced apart through which the float stick may extend substantially vertically and a base adapted to mount on the upper surface of the liquid container.

7. A device as claimed claim 6 wherein the support indicator column comprises an upright member extending upwards from the base and the
lower collar means comprises an aperture through the base and the upper collar means comprises an aperture through an upper guide member at the upper end of the upright member.

8. A device as claimed in any claim above wherein the device is adapted to be calibrated.

9. A device as claimed in claim 8 wherein the device comprises means to adjust the positioning of the scale markers so as to calibrate the device.

10. A device as claimed in claim 8 wherein the device comprises means to adjust the position of the pointer means on the support indicator column so as to calibrate the device.

11. A kit of parts adapted to be assembled into a liquid level indicator device, the kit comprising:
   a float stick having a bottom end and a top end and comprising an indicator scale on a first surface of the float stick
   a float means attachable to the bottom end of the float stick, and
   a support indicator column comprising a lower and an upper collar means spaced apart through which the float stick may extend substantially vertically and a base adapted to mount on the upper surface of the liquid container.

12. A liquid container having a liquid level indicator, comprising:
   a container having an internal volume and an upper closed surface, and
   a liquid level indicator device as described herein mounted on the upper surface and extending through an aperture in the upper surface such that the float floats on the liquid within the container and the float stick indicates the liquid level in the container.

13. A method to indicate the liquid level within a container comprising the steps of providing a liquid level indicator device as claimed in any one of claims 1 to 10 mounted or located on an upper surface of a liquid container and extending into the container such that the float floats on liquid within the
container, and reading the liquid level by means of a scale provided on a
surface of the float stick.

14. A method as claimed in claim 13 comprising the further step of calibrating
the indicator device using a known volume of liquid within the container.

15. A liquid level indicator device with reference to the figures.
**Patents Act 1977: Search Report under Section 17**

Documents considered to be relevant:

<table>
<thead>
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<th>Category</th>
<th>Relevant to claims</th>
<th>Identity of document and passage or figure of particular relevance</th>
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<td>X</td>
<td>1, 12, 13 at least.</td>
<td>GB191114248 A (BRANDT LEO) See abstract and figs at least.</td>
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<td>CN202372233 U (BAOSTEEL GROUP XINJIANG BAYI) See abstract and figs.</td>
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<td>X</td>
<td>1 at least</td>
<td>US5551290 A (SPIEGEL BILL) See abstract and figs.</td>
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<td>X</td>
<td>1 at least</td>
<td>US4715966 A (INGENUITY UNLIMITED INC) See abstract and figs.</td>
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<td>US4182157 A (FINK RICHARD E) See abstract and figs.</td>
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<td>CN201221969 Y (GUIYANG ALUMINIUM MAGNESIUM) See abstract and figs.</td>
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| E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC:

X
Worldwide search of patent documents classified in the IPC

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<th>Subclass</th>
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<td>G01F</td>
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<td>01/01/2006</td>
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The following online and other databases have been used in the preparation of this search report:

WPI, EPODOC