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R. H. COLLEY ET AL

3,417,730

SIGHT GAUGES

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3 Sheets-Sheet 1

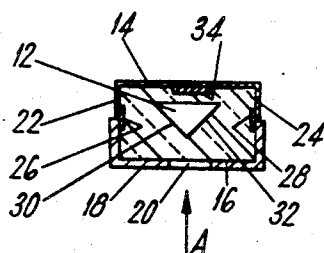


FIG. 2

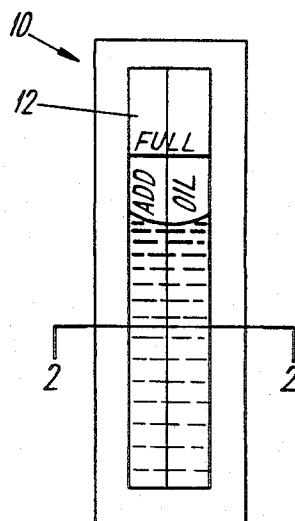


FIG. 1

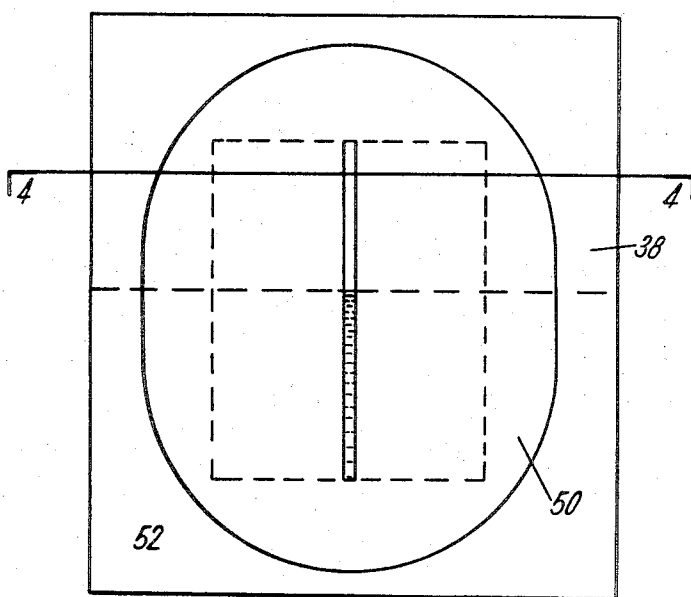


FIG. 3

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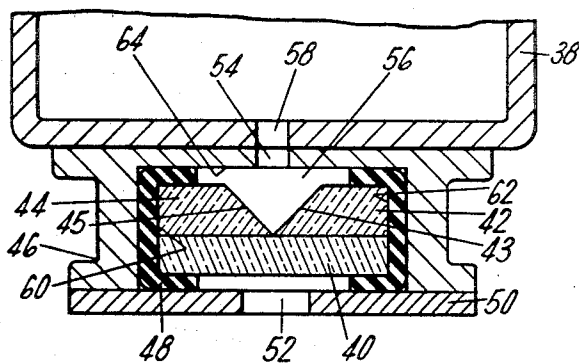


FIG. 4

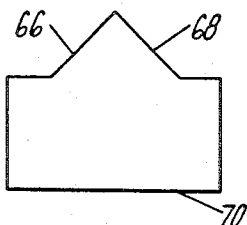


FIG. 5

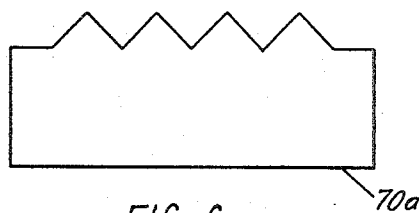


FIG. 6

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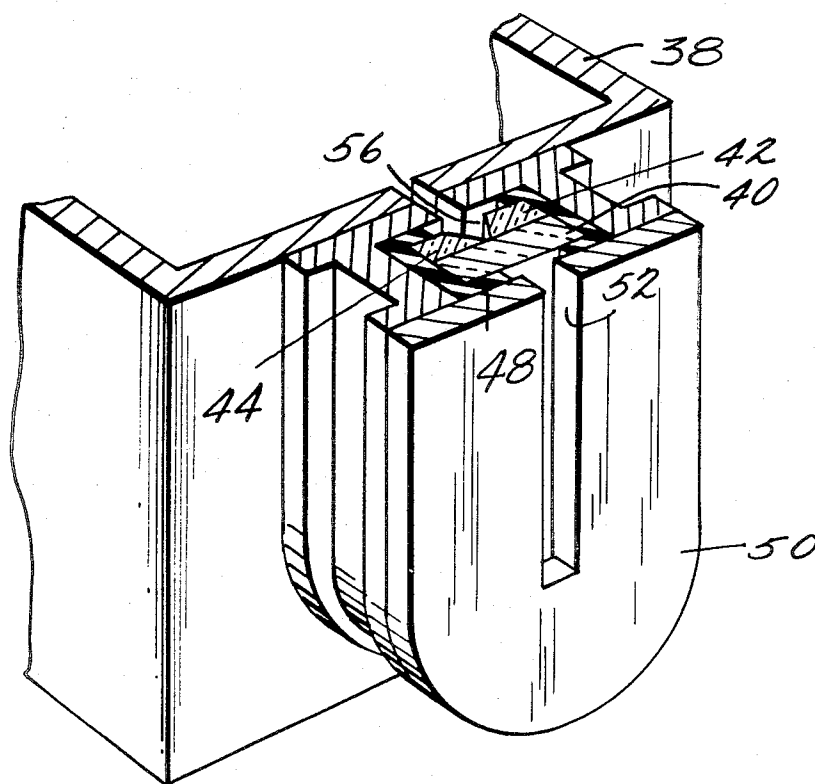


FIG. 7.

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## SIGHT GAUGES

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4 Claims. (Cl. 116—118)

### ABSTRACT OF THE DISCLOSURE

A sight gauge for indicating liquid level is provided with a transparent body having a liquid contacting surface which is angled with respect to a viewing surface so that an image of indicating means positioned along the sides of the transparent body is internally reflected off from the angled surface and to the viewing surface when there is no liquid in contact with the liquid contacting surface. Further indicating means may be provided in line with the viewing surface for viewing only when liquid contacts the contacting surface of the gauge.

This invention relates to sight gauges such as are used to provide an indication of the level of liquid in a sump or container.

Such gauges usually comprise a transparent tube adapted to be connected to a liquid container or sump and provided with markings. The disadvantage of such an arrangement is that when a transparent or very clear liquid is in the tube, it is difficult to locate the upper surface of the liquid in the tube.

According to the present invention a sight gauge for providing an indication of the level of liquid in a container comprises a body having at least a transparent portion which has a similar refractive index to that of the liquid, and has a viewing surface and at least one liquid contacting surface which is arranged at such an angle to the viewing surface that when the liquid contacting surface is in contact with a liquid light passes from the liquid through the transparent portion in a direction substantially perpendicular to the viewing surface, and when the liquid contacting surface is not in contact with a liquid total internal reflection occurs and light passing towards that surface in a direction substantially perpendicular to the viewing surface is reflected off the liquid contacting surface.

The liquid contacting surface or surfaces and the viewing surface are preferably arranged on opposite sides of the body, but alternatively several liquid contacting surfaces may form the sides of a bore through the body.

The body may be provided with means for producing a visual indication of the quantity of liquid in the container, the indicating means being disposed so as to be reflected on the liquid contacting surface or surfaces which is or are at an angle to the viewing surface.

Further indicating means may be provided which are disposed so as to be visible through the or each contacting surface.

The indicating means are preferably detachably secured to the body by detachable shields, masks or the like.

The body may consist wholly of transparent material, in which case an apertured mask may be provided around the body.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a front elevation of a gauge constructed in accordance with the invention.

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FIG. 2 is a sectional view of the gauge along line 2—2 in FIG. 1.

FIG. 3 is a front elevation of a gauge having an alternative construction.

FIG. 4 is a sectional view along line 4—4 in FIG. 3.

FIGS. 5 and 6 are sectional views of further alternative shapes which may be used for the body and

FIG. 7 is a sectional elevation view of the FIG. 3 embodiment, as seen in perspective with a section taken at line 4—4 of FIG. 3.

Referring to the drawings, 10 indicates a rectangular block of transparent plastics material provided with a bore 12 which is triangular in cross-section as shown in FIG. 2, and extends lengthwise of the block.

Preferably the triangle is an equilateral triangle.

As can be seen from FIG. 2 of the drawings, the base of the triangle is arranged parallel to one side 14 of the block 10, whereby the apex of the triangle is directed towards the viewing side 16 which is parallel to the side 14. A mask 18 having an opening 20 is mounted on the viewing side 16, the opening 20 being so arranged that only the bore 12 is visible when the block is viewed in the direction of arrow A in FIG. 2.

The two remaining sides 22 and 24 of the block 10 each support a strip 26 and 28 respectively, each strip bearing a sign, signal or wording.

For example in this particular construction the strip 26 bears the word "ADD" and above it the letters "FU," whilst the strip 28 bears the word "OIL" and above it the letters "LL." In all cases reversed (or "mirror image") lettering is used.

Thus when no liquid is present in the bore 12, the word "ADD" will be reflected on the face 30 of the bore and the word "OIL" will be reflected on the face 32 of the bore as total internal reflection will occur.

In addition the word "FULL" will appear above the words "ADD OIL" because of the combination of the letters "FU" appearing on the face 30 and the letters "LL." A further strip 34 is supported on the side 14 of the block 10 and bears the words "OVERFULL," in normal lettering, which words are in line with the word "FULL."

When the above described device is in use, the block is connected to a sump or other liquid container so that the bore 10 is in communication with the sump or interior of the container in such a way that as the level of liquid in the sump or container rises or falls, the level of liquid in the bore also rises or falls accordingly.

It is also an essential feature of the present invention that the refractive index of liquid and the transparent plastic material should be substantially the same.

Assuming that the sump or container is empty, then as previously described the words "ADD OIL" will be visible on the faces 30 and 32 of the bore 10 whilst immediately above these words, the word "FULL" will be visible.

As the sump or container is filled with liquid, the liquid will rise in the bore 12, and since the liquid has the same refractive index as the block 10, the interface between air and the plastic of the body on the faces 30 and 32 which serve as a reflection for the strips 28 and 30 respectively is broken down and the words are no longer reflected on the surfaces 30 and 32, and thus no longer visible.

It will thus be seen that when the upper surface of the liquid in the bore reaches, or passes the level of the words "ADD OIL," these words will disappear leaving only the word "FULL" visible.

Continued filling of the sump or container then prevents reflection of the word "FULL" in the manner described above with the result that the words "OVER FULL" become visible.

It will thus be appreciated that the above described gauge will avoid a sump or container being overfilled since it provides a distinct and visible indication of the quantity of the liquid in the container which does not rely on the upper surface of the liquid being aligned with a mark on the exterior of a tube or other member containing a bore.

Such an arrangement has already been found deficient where transparent or nearly transparent liquids are concerned and overfilling of a sump or container has resulted.

It will also be appreciated that instead of words appearing on the strips any other symbol, sign or the like may be employed.

Alternatively, instead of the bore being triangular it may have more than three sides, for example it may be diamond shaped with an apex directed to the opening 20 in the mask 18.

FIG. 3 and FIG. 4 illustrate an alternative form of gauge constructed in accordance with the invention mounted on a container 38. The gauge comprises three pieces 40, 42 and 44 of transparent plastics material arranged longitudinally within a housing 46. The pieces 42 and 44 each have one edge 43 and 45 cut away at an angle of approximately 45° and they are cemented to the piece 40 to form a block with a V-shaped notch along one side and a viewing surface on the opposite side. The block is surrounded by a rubber mask 48 and held in the housing 46 by a plate 50 which has a longitudinal slot 52 through which the viewing side may be viewed.

The housing 46 is provided adjacent to each end of its back surface with a hole 54 communicating with the passage 56 formed by the V-shaped notch in the transparent block, and the container 38 is provided with two holes 58 which align with the holes 54 in the housing 46 when the housing is secured to the container.

Thus when liquid is admitted to the container 38 the liquid will pass into the passage 56 in the gauge, and the surface of the liquid in the passage will be at the same level as the surface of the liquid in the container.

When there is no liquid in the passage light passing from the passage in a direction perpendicular to the front of the transparent block is reflected off one of the edges 43 or 45. The only light which passes through the slot 52 comes from the inside of the transparent block and is reflected off the edges 43 and 45. Thus when there is no liquid in the passage 56 images of the sides 60 and 62 only may be seen through the slot 52. When there is liquid in the passage 56 however, as the refractive index of the transparent block is substantially the same as the refractive index of the liquid light passing from the passage 56 in a direction perpendicular to the front of the transparent block passes through the edges 43 and 45, and thus the back face 64 of the passage may be seen through the slot 52. In this embodiment the sides 60 and 62 are coloured differently from the face 64 and thus the level of oil in the passage 56 is indicated by a distinct change of colour in the slot 52.

FIGS. 5 and 6 are cross-sectional views of different shapes of transparent block which may be used with the above described gauge.

Referring to FIG. 5, when there is no liquid in contact with the surfaces 66 and 68, a person viewing the gauge on the viewing surface 70 will see a reflection of himself, and when the liquid is in contact with the surfaces 66 and 68 the viewer will be able to see through the surfaces 66 and 68 to the back of the passage 56. A similar result will be achieved when the block illustrated in FIG. 6 is used.

We claim:

1. In a sight gauge which has a transparent body member which can be positioned relative to a container to

provide indications of the level of liquid in the container, the improvement in the transparent body member comprising:

means defining front, back, and side wall portions for said transparent body member, and said transparent body member being manufactured from a transparent material which has a refractive index similar to the refractive index of whatever liquid is to be viewed,

means forming a front viewing surface at the front wall portion of said transparent body member so that indications of liquid level can be seen by looking through the front viewing surface and towards the back wall portion of the transparent body member, a first indicating means positioned along at least one side wall portion of said transparent body member, a second indicating means positioned along the back wall portion of said transparent body member and in line with the front viewing surface of the transparent body member,

means forming at least one liquid contacting surface in said transparent body member in a position between said front viewing surface and said back side wall portion of the transparent body member, said liquid contacting surface being at a sufficiently acute angle to said front viewing surface to internally reflect an image of said first indicating means to the front viewing surface only when there is no liquid in contact with said liquid contacting surface, and said second indicating means being visible only when there is liquid in contact with said liquid contacting surface.

2. A sight gauge as claimed in claim 1 wherein the said indicating means are detachably secured to the transparent body member by detachable shields, masks or the like.

3. The improvement of claim 1 wherein an open bore is formed through said transparent body member so as to pass behind said front wall portion and in front of said back wall portion to provide a flow path for liquid from said container, and wherein said liquid contacting surface is formed as a part of said open bore in a position which is between the front viewing surface and the position of liquid within said open bore.

4. The improvement of claim 1 wherein said liquid contacting surface extends to the back wall portion of the transparent body member.

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U.S. Cl. X.R.

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