

A Hand-Held Digital Level

Background and Field of the Invention

5 This invention relates to a hand-held digital level.

Levelling devices, commonly known as "levels" are used in the building or construction industry to measure inclination or deviation from a horizontal or vertical plane. A very common type of level is a "spirit" or "fluid" level having a rigid body and at least one straight edge and a bubble vial. To measure whether
10 a desired horizontal or vertical inclination is reached, the straight edge is placed on a surface to be measured and the position of the bubble observed through the vial and if the bubble is within certain markings, the surface is considered to be aligned with a horizontal or vertical plane. Such a level is simple and easy to use. However, it has its problems and one of them is accuracy. A fluid level
15 relies on a user to observe the position of the bubble, and quite easily parallax errors can be introduced making the measurement inaccurate. Also, the fluid level measures a level condition but is not useful for measuring an angle (other than perhaps 45 or 180 degrees).

20

To address the above disadvantage, a digital level has been proposed which normally includes a level transducer to measure an angle of inclination up to decimal point accuracy and displaying the angle on a digital display. It is also known to incorporate a digital level together with a fluid level as a unitary
25 levelling device, and this provides alternative visual indications of the inclination.

It is an object of the present invention to provide an alternative hand-held digital level which provides the public with a useful choice.

5 Summary of the Invention

The invention provides a hand-held digital level comprising a digital display for displaying an angle of inclination, and attachment means for releasably attaching the digital level to another article.

10

By providing the attachment means, this allows the digital level to be mounted to another device, such as a fluid or spirit level, which requires the alternative digital reading, as and when a need arises. This provides greater flexibility and convenience. Further, a digital level comprises sensitive electronic circuitry to perform the inclination measurement and may not be as impact resistant as a fluid level. Thus, the digital level can be kept when it is not required and attached to the fluid level when desired.

15

Advantageously, the attachment means is adapted to be releasably attached to a fluid level, and this provides alternative level readings/measurements. It is smaller in size and thus easier to be carried and kept for travelling.

20

Preferably, the digital level is integrally formed with the attachment means to form an unitary structure.

25

The attachment means may comprise a bracket, may be magnetic, or may comprise adhesive. The attachment means may comprise a clamp.

Brief Description of the Drawings

5

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which,

Figure 1 is a hand-held digital level comprising attachment means according to
10 a preferred embodiment of the present invention;

Figure 2 is a back view of the digital level of Figure 1; and

Figure 3 shows the hand-held digital level of Figure 1 being mounted to another article.

15 Detailed Description of the Preferred Embodiment

A hand-held digital level 100 of a preferred embodiment of the invention is shown in Figures 1 and 2. The digital level 100 includes a housing 102 enclosing circuitry for measuring an angle of inclination or deviation from the
20 horizontal or vertical, and a digital display 104 for displaying the measurement depending on the step accuracy for example 01, 05 or 0.01 degree steps. The circuitry of the digital level 100 is known in the art and will not be elaborated in detail.

Unlike known digital levels, the digital level 100 includes attachment means comprising a bracket 106 for releasably attaching the digital level 100 to another article. The bracket 106 is made from plastic and integrally formed with the housing 102 of the digital level 100 and has an extension member 108
5 extending rearwardly from the housing 104 and adjoining two clamping arms 110. Each of the two clamping arms 110 is arcuate in shape with an abutment surface 112 for clamping to the article (not shown). In this embodiment, the bracket 106 is specifically adapted for attaching to a rigid body of a fluid or spirit level (not shown).

10

In use, to attach the digital level 100 to a fluid level 200, the slightly flexible clamping arms 110 are flexed or expanded to receive a part of the rigid body of the fluid level until the rigid body touches the inside wall of the extension member 108. The clamping arms 110 are then released so that they clamp onto
15 the rigid body as shown in Figure 3 thus forming a compact levelling device, which can be used in the usual way to provide both fluid reading as well as digital angle measurement. It should be mentioned that the bubble vials of the fluid level 200 are not shown in Figure 3.

20 The described embodiment should not be construed as limitative. For example, instead of a bracket 106, the attachment means may be magnetic for attaching the digital device 100 to a metallic surface to measure an angle of inclination, or adhesives could be used for attaching the back of the digital level 100 onto a flat surface. Also, the attachment means may be a clamp, such as a F or G
25 clamp for releasably clamping the digital device to another article. It is also

envisaged that the attachment means may be a combination of the above features and also other suitable means.

In the described embodiment, the bracket 106 is made of plastic material but
5 other material, such as metal, is envisaged. Also, although preferred, it is envisaged that the digital level 100 need not be integrally formed with the bracket. If formed separately, then the bracket 106 may be assembled with the housing 102 of the digital level 100 using screws or other suitable attachment means.

10

The digital level 100 may be adapted to be attached to other articles, not necessary a fluid level, that requires a digital read-out of the angle of inclination or deviation from the horizontal or vertical.

15 Having now fully described the invention, it should be apparent to one of ordinary skill in the art that many modifications can be made hereto without departing from the scope as claimed.

CLAIMS

1. A hand-held digital level comprising a digital display for displaying an angle of inclination, and attachment means for releasably attaching the digital level to another article.
5
2. A hand-held digital level according to claim 1, wherein the attachment means is adapted to be releasably attached to a fluid level.
- 10 3. A hand-held digital level according to claim 1 or 2, wherein the digital level is integrally formed with the attachment means to form an unitary structure.
4. A hand-held digital level according to any preceding claim, wherein the attachment means comprises a bracket.
15
5. A hand-held digital level according to any preceding claim, wherein the attachment means is magnetic.
- 20 6. A hand-held digital level according to any preceding claim, wherein the attachment means comprises an adhesive.
7. A hand-held digital level according to any preceding claim, wherein the attachment means comprises a clamp.

8. In combination, a hand-held digital device according to any preceding claim and a fluid level, the hand-held digital device being releasably attached to the fluid level.