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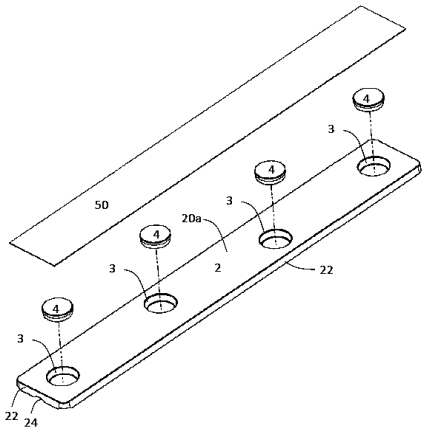
(54) Title **NON-INTRUSIVE SURFACE MOUNTABLE TAG**

(57) Abstract

A non-intrusive surface mountable tag (1) comprising a frame (2) in non-magnetic material with opposite upper and s (20a, 20b), wherein the frame (2) has two or more holes (3) defined by retaining walls (30) and bottoms (31), wherein the tag (1) further comprises two or more magnetic elements (4) configured to be arranged in the two or more holes (3), respectively, wherein a cross section, an upper inner diameter (ID2) of the two or more holes (3) is larger than a lower inner diameter (ID1).



NON-INTRUSIVE SURFACE MOUNTABLE TAG

TECHNICAL FIELD

[0001] The present invention relates to non-intrusive surface mountable tags for mounting on metal bodies or structures where fastening by means of intrusion, such as boring, screwing or welding, is not possible or desirable.

BACKGROUND

[0002] Constructions for e.g. housing and infrastructure are usually subject to various environmental related requirements for noise, impact on birds life, flight visibility, etc. In order to comply with these regulations, it is sometimes necessary to affix additional objects, such as sensors or indicators to the constructions.

[0003] However, for many of the constructions mentioned, especially in unfriendly environments, these additional objects cannot be mounted to the constructions with typical fastening means, such as welding, boring, screwing etc., since this would potentially deteriorate the surface of the construction.

[0004] Many of the constructions in question are made at least partly of steel, such as different types of towers and bridges. The steel must be surface treated to resist corrosion. Different types of surface treatments are used, such as e.g. painting, plastic coating or galvanizing. Hot-dip galvanizing tends to be the method most used for towers and bridges.

[0005] Regulations for reflective marking of transmission towers have already been introduced in some countries. Such towers are usually galvanized, and to fulfil the regulations, large areas of the truss has to be marked with reflective surface. There has been attempts to obtain a reflective surface by painting. The painting process is difficult to control in the type of environment where the constructions are located, and becomes labor intensive for a truss structure. Other attempts have been to clamp reflective objects onto the truss. This requires both reflective objects, clamps and tools to be brought up in the tower, as well as a complex fastening operation for fixing the object to the truss structure.

[0006] Thus, there is a need for a non-intrusive surface mountable tag that is wear-resistant in harsh environments, lightweight, and easy to produce and to mount.

SHORT SUMMARY

[0007] The invention is a surface mountable tag as sett out in independent claim 1, solving the problem identified above.

[0008] The tag has one or more of the following advantages over prior art.

[0009] First of all, the surface mountable tag is non-intrusive, meaning that the object or construction that the tag is mounted to does not deteriorate when the product is mounted, or later, as a result of the mounting. Since it is crucial to maintain the full strength of the construction over a long time period, this is in some cases an absolute requirement.

[0010] The tag has a long lifetime even in harsh and unfriendly environments with changing temperatures, wind and snow. It stays in position even during the strong wind and when suffering from icing. Further due to the slick profile, it does not generate additional noise when subject to strong winds.

[0011] The tag is easy both to mount to a construction and to remove without any tools, even after it's intended lifetime. Further, it is lightweight, meaning that the tagging operation can be more efficient than for prior art. A person responsible for marking may be able to carry numerous tags and mark an object in a short time. If e.g. the object is a truss tower, the workers may have to climb the tower to do the tagging. Light weight and easy mounting is priceless for this type of operation.

[0012] One of the main problems when using strong magnets, is that the tags may be difficult to remove without breaking, since the magnetic forces may be stronger than the strength of the material holding the magnets. The tag of the invention does not break when removed and may therefore be moved to adjust its position or re-used.

[0013] Further, there is a security aspect in using light weight tags in public areas, since they will not cause much harm even in the unlikely scenario they should fall down.

[0014] There are no moving parts in the tag of the invention, and consequently no tools or fastening operation needed for mounting, other than arranging the tag in the right place. The small number of fixed components allows streamlining of the manufacturing process and reduced costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Fig. 1a, 1b, 1c, 1d, and 1e illustrate a surface mountable tag (1) according to an embodiment of the invention. In this embodiment the tag (1) is made for an upright arrangement with an upper and lower end as indicated in Fig. 1c.

[0016] However, in other embodiments the arrangement may be different, in the drawings viewing directions refer to the tag being arranged on a flat surface. Fig. 1a illustrates the tag (1) from above, Fig. 1b from a longitudinal side, Fig. 1c, from the bottom, and fig. 1d and 1e from the ends.

[0017] Fig. 1e in this case, illustrates drainage recesses (24) in the end intended to be the lower end in when the tag is fixed to a metallic object.

[0018] Fig. 2 illustrates the tag (1) of the embodiment in Fig. 1, in an exploded view. Frustoconical magnetic elements (4) are placed in holes (3) in the frame (2) and kept in place by a top layer (50), in this case an adhesive foil, on top of the frame (2).

[0019] Fig. 3a, 3b and 3c illustrate more details of the embodiment of the tag (1) in Fig. 1 and 2 in section views.

[0020] In Fig. 3a, the cut is vertical, through a longitudinal axis. The holes (3) can be seen.

[0021] Fig. 3b illustrates a detail of the hole (3) of Fig. 3a, as indicated by the circle. The retaining wall (30) has a frustoconical shape with an angle (A) of 100 degree, the thickness (T) of the bottom (31) is 1mm and the thickness (T2) of the plate shaped upper side (20a) is 2mm. The total height (H) of the frame (2) is 8 mm.

[0022] Fig. 3c illustrates a magnetic element (4) arranged in the hole (30).

EMBODIMENTS OF THE INVENTION

[0023] In the following description, various examples and embodiments of the invention are set forth in order to provide the skilled person with a more thorough understanding of the invention. The specific details described in the context of the various embodiments and with reference to the attached drawings are not intended to be construed as limitations. Rather, the scope of the invention is defined in the appended claims.

[0024] The embodiments described below are numbered. In addition, dependent embodiments defined in relation to the numbered embodiments are described. Unless otherwise specified, any embodiment that can be combined with one or more numbered embodiments may also be combined directly with any of the dependent embodiments of the numbered embodiment(s) referred to.

[0025] In a first tag embodiment the invention is a non-intrusive surface mountable tag (1) comprising a frame (2) in non-magnetic material with opposite upper and s (20a, 20b), wherein the frame (2) has one or more holes (3) defined by retaining walls (30) and bottoms (31), wherein the tag (1) further comprises one or more magnetic elements (4) configured to be arranged in the one or more holes (3), respectively, wherein a cross section, an upper inner diameter (ID2) of the one or more holes (3) is larger than a lower inner diameter (ID1).

[0026] In a first dependent embodiment, at least a part of the retaining wall (30) has a frustoconical shape.

[0027] In a second dependent embodiment, that may be combined with the first dependent embodiment, the wall (30) has an angle (A) of at least 95 degree with regard to the bottom (31). The angle (A) has been illustrated in Fig. 3b.

[0028] In a third dependent embodiment, that may be combined with any of the dependent embodiments, a thickness (T1) of the bottom (31) is less than 1.5 mm or 1.2 mm.

[0029] In a fourth dependent embodiment, that may be combined with any of the dependent embodiments, the upper side (20a) is formed as a plate with a plate thickness (T2) of less than 2.5 mm or 2.2 mm.

[0030] In a fifth dependent embodiment, that may be combined with any of the dependent embodiments, the upper side (20a) has a uniform surface between the one or more holes (3).

[0031] In a sixth dependent embodiment, that may be combined with any of the dependent embodiments, the frame (2) has two or more holes (3) defined by retaining walls (30) and bottoms (31), wherein the tag (1) further comprises two or more magnetic elements (4) configured to be arranged in the two or more holes (3).

[0032] In a second tag embodiment that may be combined with the first tag embodiment above, and any of its dependent embodiments, the frame (2) comprises a side wall (22) extending downward around the circumference of the frame (2), with an open space (25) inside the side wall (22). This has been illustrated e.g. in the embodiment of Fig. 2.

[0033] In a first dependent embodiment, a lower end of the side wall (22) is flush with the lower side of the bottom (31).

[0034] In a third dependent embodiment, that may be combined with any of the dependent embodiments, the side wall (22) comprises, in an end of the frame (2), a drainage recess or hole (24) in the side wall (22).

[0035] In a third tag embodiment, that may be combined with the second tag embodiment above, the frame (2) comprises longitudinal support elements (26) arranged in the open space (25), interconnecting the one or more retaining walls (30) and the upper side (20a).

[0036] In a first dependent embodiment, the support elements (26) are arranged above a plane defined by the lower part of the bottoms (31). This allows ventilation and any

humidity to drain freely below the support elements (26) when the tag (1) is mounted to an object.

[0037] In a second dependent embodiment, that may be combined with the first dependent embodiment, the retaining walls (31) are connected to at least three support elements (26).

[0038] The support elements (26) may be formed as ribs integrated with the upper side.

[0039] The frame (2) may be manufactured in a thermoplastic material, such as Acrylonitrile styrene acrylate (ASA).

[0040] The side wall (22) and/or the support elements (26) may have a release angle of 1 to 3 degrees, narrowing towards the bottom of the frame (2).

[0041] In a fourth tag embodiment, the magnetic elements (4) have a directed magnetic field, directed downwards.

[0042] In a first dependent embodiment, a lower inner diameter of the magnetic elements (4) is larger than an upper inner diameter of the magnetic elements (4).

[0043] In a second dependent embodiment, that may be combined with the first dependent embodiment, the lower inner diameter of the magnetic elements (4) is equal to the lower inner diameter of the holes (3).

[0044] In a third dependent embodiment, that may be combined with any of the dependent embodiments, the magnetic elements (4) have a frustoconical shape.

[0045] In a fourth dependent embodiment, that may be combined with any of the dependent embodiments, the magnetic elements (4) comprises Neodynium magnets.

[0046] In a fifth dependent embodiment, that may be combined with any of the dependent embodiments above, the magnetic elements (4) comprises a steel housing enclosing the Neodynium magnets upper part sides.

[0047] In a fifth dependent embodiment, that may be combined with any of the dependent embodiments above, the magnetic elements are coated. The coating could be e.g. Nickel, Zink, Epoxy etc.

[0048] In a sixth dependent embodiment, that may be combined with any of the dependent embodiments above, the magnetic elements (4) are arranged with centres on opposite sides of a longitudinal center line (L) of the frame (2). An implementation where this

arrangement has been used, is shown in Fig. 1c. This arrangement improves the stability of the tag.

[0049] In a fifth tag embodiment that may be combined with any of the embodiments above, the tag (1) comprises a top layer (50), arranged to be affixed to the upper side (20a) of the frame (2) and lock the magnets (4) in the holes. The top layer may be fixed to the frame by e.g. gluing, viscoelasticity etc. This may reduce the assembly time considerably. Further, the top layer adds very little weight and volume to the final tag.

[0050] The top layer may have a double function. In addition to locking the magnets in the holes, it may also act as a label or indicator or a base for any other application specific purposes. One example is to use reflective tape or foil as the top layer. In this case the tags become reflective non-intrusive surface mountable tags that may e.g. be used to mark power towers as described initially.

[0051] In the exemplary embodiments, various features and details are shown in combination. The fact that several features are described with respect to a particular example should not be construed as implying that those features by necessity have to be included together in all embodiments of the invention. Conversely, features that are described with reference to different embodiments should not be construed as mutually exclusive. As those with skill in the art will readily understand, embodiments that incorporate any subset of features described herein and that are not expressly interdependent have been contemplated by the inventor and are part of the intended disclosure. However, explicit description of all such embodiments would not contribute to the understanding of the principles of the invention, and consequently some permutations of features have been omitted for the sake of simplicity or brevity.

CLAIMS

1. A non-intrusive surface mountable tag (1) comprising a frame (2) in non-magnetic material with opposite upper and s (20a, 20b), wherein the frame (2) has two or more holes (3) defined by retaining walls (30) and bottoms (31), wherein the tag (1) further comprises two or more magnetic elements (4) configured to be arranged in the two or more holes (3), respectively, wherein a cross section, an upper inner diameter (ID2) of the two or more holes (3) is larger than a lower inner diameter (ID1).

2. The non-intrusive surface mountable tag (1) according to claim 1, wherein the retaining wall (30) has a frustoconical shape.

3. The non-intrusive surface mountable tag (1) according to claim 1 or 2, wherein a thickness (T1) of the bottom (31) is less than 1.5 mm.

4. The non-intrusive surface mountable tag (1) of any of the claims above, wherein the frame (2) comprises a side wall (22) extending downward around the circumference of the frame (2), with an open space (25) inside the side wall (22).

5. The non-intrusive surface mountable tag (1) of any of the claims above, wherein a lower end of the side wall (22) is flush with the lower side of the bottom (31).

6. The non-intrusive surface mountable tag (1) of claim 4 or 5, the side wall (22) comprises, in an end of the frame (2), a drainage recess or hole (24) in the side wall (22).

7. The non-intrusive surface mountable tag (1) of any of claim 4 to 6, wherein the frame (2) comprises longitudinal support elements (26) arranged in the open space (25), interconnecting the one or more retaining walls (30) and the upper side (20a).

8. The non-intrusive surface mountable tag (1) of any the claims above, wherein the magnetic elements (4) have a directed magnetic field, wherein the field is directed downwards.

9. The non-intrusive surface mountable tag (1) of any the claims above, wherein a lower inner diameter of the magnetic elements (4) is equal to the lower inner diameter of the holes (3), the magnetic elements (4) have a frustoconical shape and comprises Neodynium magnets in a steel housing.

10. The non-intrusive surface mountable tag (1) of any the claims above, comprising a top layer (50), arranged to be affixed to the upper side (20a) of the frame (2) and lock the magnets (4) in the holes.

Fig. 1a

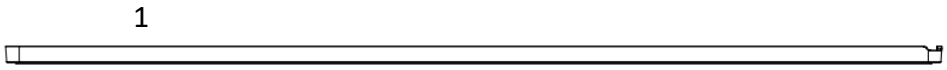


Fig. 1b

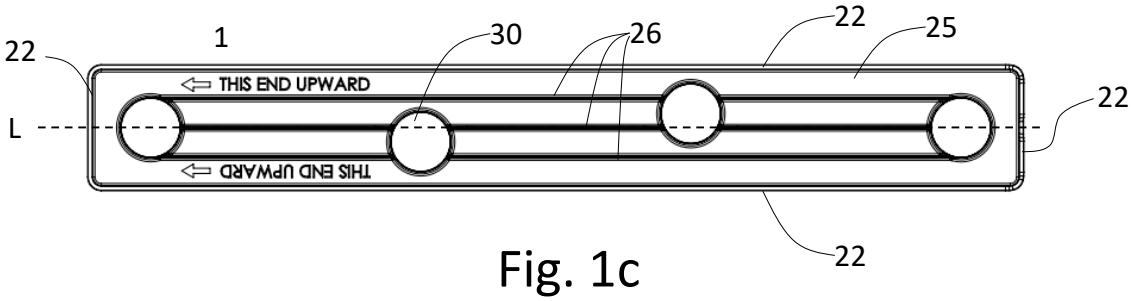


Fig. 1c

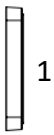


Fig. 1d

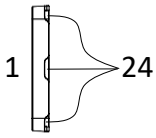


Fig. 1e

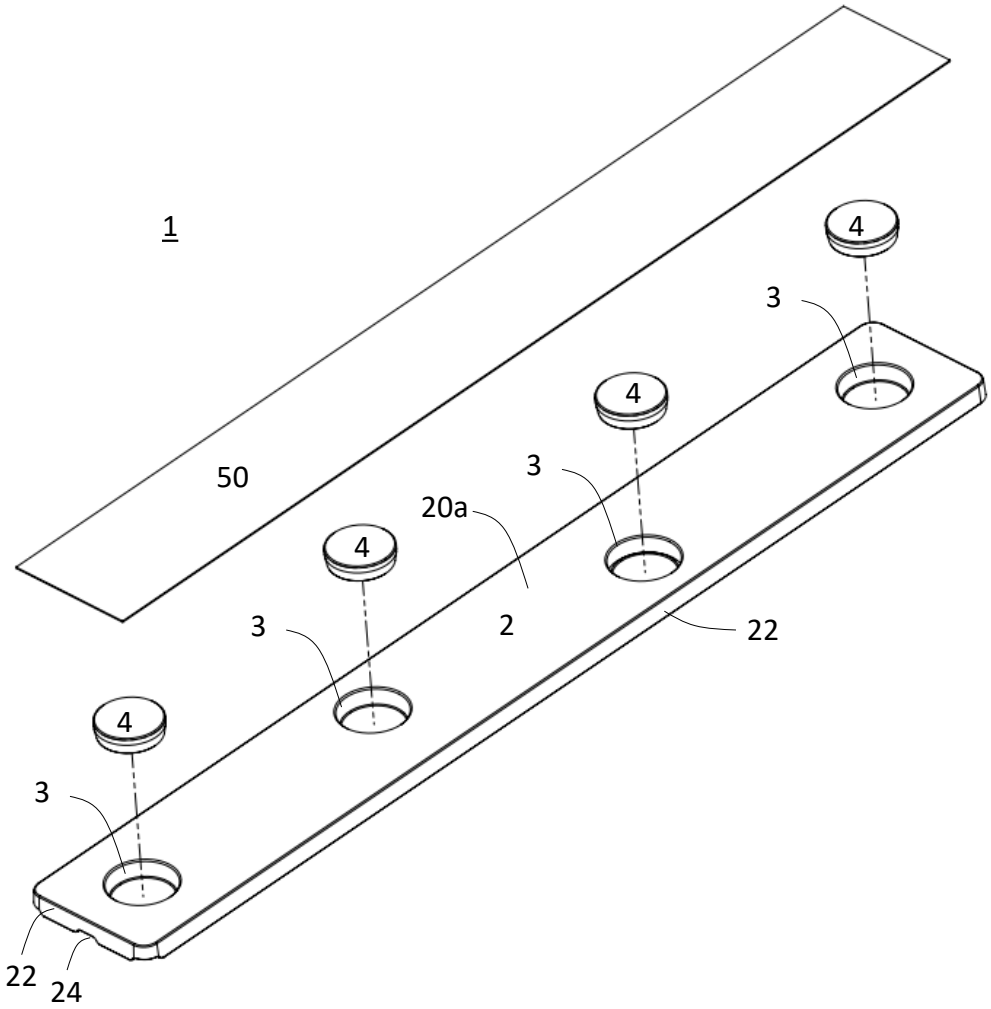


Fig. 2

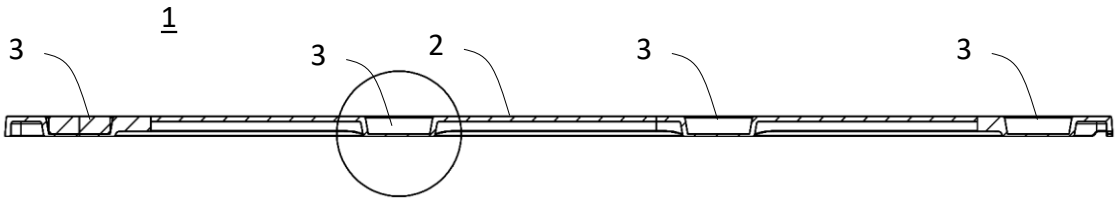


Fig. 3a

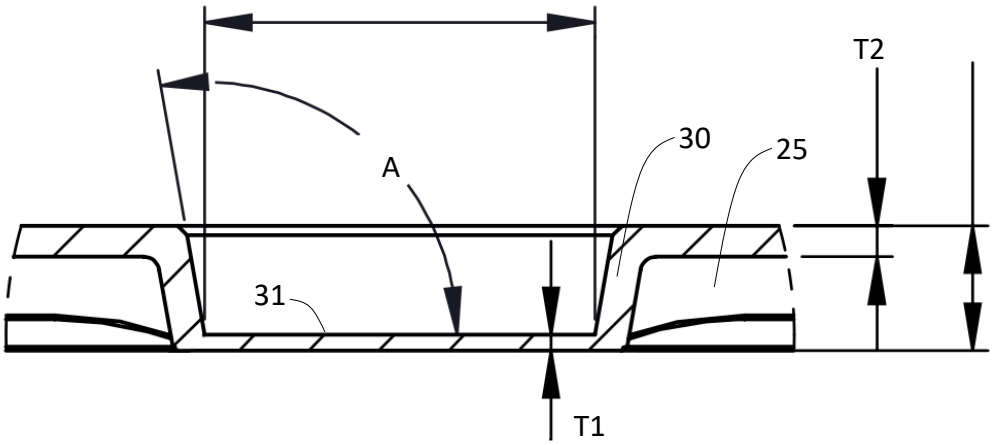


Fig. 3b

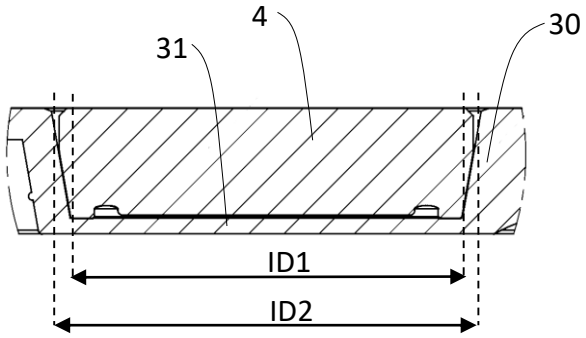


Fig. 3c