(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 182 398 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.06.2017 Bulletin 2017/25

(51) Int Cl.:
G09F 21/04 *(2006.01)* *G09F 7/12* *(2006.01)*
G09F 7/18 *(2006.01)*

(21) Application number: **15201212.6**

(22) Date of filing: **18.12.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(71) Applicant: **3M Innovative Properties Company**
St. Paul, MN 55133-3427 (US)

(72) Inventor: **BRADY, Liam Maurice**
Bracknell, Berkshire RG12 8HT (GB)

(74) Representative: **Gabriel, Kiroubagaranne**
3M Belgium B.V.B.A./S.P.R.L.
Hermeslaan 7
1831 Diegem (BE)

(54) **IDENTIFICATION PLATE**

(57) The present disclosure relates to an identification plate (1) comprising adhesive means for attaching the identification plate to a support, wherein the identification plate comprises at least two frangible portions (2a,2b) , wherein the adhesive means comprises at least one permanent adhesive tape (3) provided on at least a first one of the at least two frangible portions (2a,2b) and at least one heat-debondable adhesive tape (4) provided on at least a second, different one of the at least two frangible portions (2a,2b). The present disclosure also relates to a method of manufacturing such identification plate.

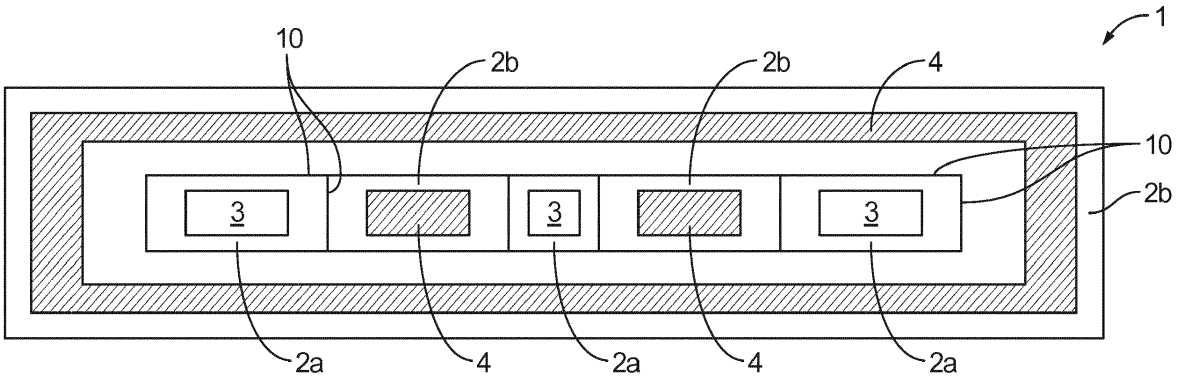

Fig. 4

EP 3 182 398 A1

Description

Technical Field

[0001] The present invention relates to an identification plate and to a method of manufacturing an identification plate.

Background

[0002] Theft of identification plates from vehicles have been a long-standing problem throughout many countries. Recently, there have been several proposals how to provide an identification plate which is, at least to a certain extent, temper-resistant or cannot be removed from a vehicle without destroying the identification plate.

[0003] For example, GB-A1-2 147 596 (Cordell et al.) describes a combination of an identification plate and a support. The support comprises a surface to which the identification plate is securable, wherein one of the surface and the identification plate comprises at least one wall upstanding therefrom to prevent or inhibit access between the surface and the facing surface of the identification plate secured thereto. At least one of the surface and facing surface of the identification plate has securing means located thereon to secure the plate to the surface of the support.

[0004] EP-A1-1 627 777 (Purvis) describes a registration display assembly for a vehicle. The assembly includes a registration code, a dividable element, a support element for supporting the dividable element, means for attaching the dividable element to the support element, and fixing means for fixing the assembly to a vehicle. The dividable element includes a separable portion that is arranged to deface the registration code when separated, and the fixing means includes means for fixing the separable portion to the vehicle, which is arranged to cause separation of the separable portion when the registration display assembly is removed from the vehicle.

[0005] EP-A2-1 925 505 (Purvis) discloses a further vehicle registration display assembly and a guard device therefor.

[0006] Without contesting the technical advantages associated with the solutions known in the art, there is still a need for a further optimized identification plate which fulfills several - partially conflicting - demands at the same time. The present invention, in particular, aims at an identification plate which allows for convenient and reliable bonding to a vehicle as well as for easy and fast removal under certain predetermined circumstances. At the same time, the identification plate of the present invention shall not be removable without destroying the identification plate or rendering it unusable. Other advantages of the adhesive compositions and methods of the disclosure will be apparent from the following description.

Summary

[0007] According to one aspect, the present disclosure relates to an identification plate comprising adhesive means for attaching the identification plate to a support, wherein the identification plate comprises at least two frangible portions, wherein the adhesive means comprises at least one permanent adhesive tape provided on at least a first one of the at least two frangible portions and at least one heat-debondable adhesive tape provided on at least a second, different one of the at least two frangible portions.

[0008] In another aspect, the present disclosure is directed to a method of manufacturing an identification plate, the method comprising the following steps:

a) providing an identification plate precursor comprising at least two frangible portions;
b) providing one or more permanent adhesive tapes;
c) providing one or more heat-debondable adhesive tapes;
d) applying the one or more permanent adhesive tapes onto one or more first frangible portions of the identification plate precursor; and
e) applying the one or more heat-debondable adhesive tapes onto one or more second, different frangible portions of the identification plate precursor.

Brief Description of the Figures

[0009]

Figure 1 schematically represents a top view of an identification plate according to one typical aspect of the present disclosure.
Figure 2 schematically represents a sectional view through the identification plate of Figure 1 along line A-A.
Figure 3 schematically represents a top view of an identification plate according to another typical aspect of the present disclosure.
Figure 4 schematically represents a top view of an identification plate according to still another typical aspect of the present disclosure.
Figure 5 schematically represents a top view of an identification plate according to still another typical aspect of the present disclosure.
Figure 6 schematically represents a top view of an identification plate according to still another typical aspect of the present disclosure.
Figure 7A schematically represents a top view of an identification plate according to still another typical aspect of the present disclosure.
Figures 7B to 7D are schematic series depicting how the identification plate of Figure 7A may be sequentially removed from a support.

Detailed description

[0010] According to a first aspect, the present disclosure relates to an identification plate comprising adhesive means for attaching the identification plate to a support, wherein the identification plate comprises at least two frangible portions, wherein the adhesive means comprises at least one permanent adhesive tape provided on at least a first one of the at least two frangible portions and at least one heat-debondable adhesive tape provided on at least a second, different one of the at least two frangible portions.

[0011] In the context of the present disclosure, it has been surprisingly found that this combination of features provides a number of advantages over the prior art. The use of at least one permanent adhesive tape provided on a first frangible portion ensures that at least said first frangible portion cannot be removed from the support (i.e., a vehicle) without destroying the identification plate or at least rendering it unusable. However, if the entire identification plate was covered with such a permanent adhesive tape it would be very difficult to remove the identification plate at all. In order to allow for an easier removal of the identification plate if needed (e.g., when the car is being sold), at least one heat-debondable adhesive tape is provided on a second, different frangible portion, which heat-debondable adhesive tape can be easily removed at high temperatures. Accordingly, a workshop which needs to remove the identification plate from a vehicle may simply apply sufficient heat to the adhesive tape in order to release the second frangible portions from the support (i.e., the vehicle). Nevertheless, even heating up the identification plate does not allow for a clean removal of the identification plate from the support due to the at least one permanent adhesive tape which will stick to the support even if heated up. Finally, if a thief tries to remove the identification plate from a vehicle (either in cold or in hot condition), the identification plate will break or otherwise become unusable due to the presence of at least two frangible portions.

[0012] In the context of the present disclosure, the expression "frangible portion" is meant to designate a portion of the identification plate which is easily or readily separated and/or broken from the rest of the identification plate by applying mechanical force. In particular, the frangible portion of the present invention is supposed to at least partially separate from the rest of the identification plate if a mechanical force is being applied, which is sufficient to remove said frangible portion from the support. In the context of the present invention, the frangible portion is preferably understood as a portion of the identification plate which is separated and/or broken from the rest of the identification plate when applying a mechanical pulling force of less than 100 N/cm and typically more than 10 N/cm, when measured at 23°C, and when the mechanical pulling force is applied at an angle of 90° from the plane formed by the identification plate.

[0013] The frangible portions of the present invention may have any size and/or shape suitable for this effect. For example, basically the entire identification plate may consist of two frangible portions (e.g., two halves of the identification plate). The identification plate may also consist of three, four, five, six or more frangible portions. Alternatively, the identification plate may comprise a frame-like structure, which is not considered to be frangible, and two or more smaller frangible portions provided within said frame-like structure. These frangible portions may be rectangular, quadratic, elliptical, circular, triangular, polygonal, or have any other shape. The surface area of the frangible portions is preferably larger than 50 cm^2, larger than 75 cm^2, or even larger than 100 cm^2. Alternatively or in addition, the surface area of the frangible portions is preferably smaller than 1000 cm^2, smaller than 750 cm^2, or even smaller than 500 cm^2.

[0014] At least one edge of each frangible portion is preferably defined by a predetermined breaking line. For example, the identification plate may consist of exactly two frangible portions whose adjacent edges form or define a predetermined breaking line. Alternatively, one or more frangible portions may be surrounded by predetermined breaking lines. The predetermined breaking line or area of weakness may be introduced by any techniques commonly known to those skilled in the art. These techniques include, but are not limited to, perforating the identification plate, by partially cutting and/or slitting the identification plate, by scoring the identification plate, by thinning the identification plate, by stretching the identification plate, by compressing the identification plate, by embedding fibers and/or wires within the identification plate, and any combination thereof.

[0015] In the context of the present invention, the expression "permanent adhesive tape" is meant to designate an adhesive tape which, under normal conditions, permanently adheres to a specific support. Preferably, the permanent adhesive tape has a 90° peel adhesion of at least 15 N/cm, at least 20 N/cm, or even at least 25 N/cm when measured at 23°C according to the test method, which is described in detail in the experimental section of the present disclosure. Preferably still, the permanent adhesive tape has a 90° peel adhesion of at least 15 N/cm, at least 20 N/cm, at least 25 N/cm, or even at least 30 N/cm, when measured on an adhesive tape heated at 120°C according to the test method described in detail in the experimental section of the invention.

[0016] The permanent adhesive tape of the adhesive means comprises at least a first adhesive surface facing away from the identification plate, which first adhesive surface is adapted for attaching the identification plate to a support. The 90° peel adhesion of the permanent adhesive tape refers to the peel adhesion of said first adhesive surface with respect to a standard support as defined in the detailed test method. However, the permanent adhesive tape of the adhesive means may be a double-sided adhesive tape comprising a first adhesive surface facing away from the identification plate and a second adhesive surface facing towards the identifica-

tion plate. In this case, the 90° peel adhesion preferably also applies to the peel adhesion of the second adhesive surface with respect to the standard plate. The skilled person may select the nature and the adhesive properties of the first and second adhesive surfaces depending on the targeted application and the nature of the support and the identification plate.

[0017] In the context of the present invention, the expression "heat-debondable adhesive tape" is meant to designate an adhesive tape which can be more easily removed at higher temperatures than at lower temperatures. Preferably, the heat-debondable adhesive tape has a 90° peel adhesion measured on an adhesive tape heated at 120°C, which is smaller than the 90° peel adhesion measured at 23°C. Preferably, the heat-debondable adhesive tape has a 90° peel adhesion of less than 10 N/cm, less than 5 N/cm, or even less than 3 N/cm, when measured on an adhesive tape heated at 120°C according to the test method described in detail in the experimental section of the disclosure. Preferably still, the heat-debondable adhesive tape has a 90° peel adhesion of at least 10 N/cm, at least 15 N/cm, at least 20 N/cm, or even at least 25 N/cm when measured at 23°C according to the test method, which is described in detail in the experimental section of the disclosure.

[0018] The heat-debondable adhesive tape of the adhesive means comprises at least a first adhesive surface facing away from the identification plate, which first adhesive surface is adapted for attaching the identification plate to a support. The 90° peel adhesion of the heat-debondable adhesive tape refers to the peel adhesion of said first adhesive surface with respect to a standard support as defined in the detailed test method. However, the heat-debondable adhesive tape of the adhesive means may be a double-sided adhesive tape comprising a first adhesive surface facing away from the identification plate and a second adhesive surface facing towards the identification plate. In this case, the 90° peel adhesion preferably also applies to the peel adhesion of the second adhesive surface with respect to the standard plate. The skilled person may select the nature and the adhesive properties of the first and second adhesive surfaces depending on the targeted application and the nature of the support and the identification plate.

[0019] Preferably, at least the first frangible portion provided with the permanent adhesive tape is adapted and arranged to break and/or deform when the identification plate is separated from the support. Preferably, at least the first frangible portion provided with the permanent adhesive tape is adapted and arranged to at least partially separate from and/or completely break away from the rest of the identification plate when the identification plate is separated from the support.

[0020] Preferably, at least the second frangible portion provided with the heat-debondable adhesive tape is adapted and arranged to break when the identification plate is separated from the support at a temperature smaller than 50° C. Preferably, at least the second frangible portion provided with the heat-debondable adhesive tape is adapted and arranged to at least partially separate and/or completely break away from the rest of the identification plate when the identification plate is separated from the support at a temperature of less than 50° C.

[0021] Preferably, at least one of the frangible portions provided with the heat-debondable adhesive tape is essentially free of permanent adhesive tape. More preferably, all of the frangible portions provided with the heat-debondable adhesive tape are essentially free of permanent adhesive tape. This allows for an easy removal of some or all of the second frangible portions if properly heated up.

[0022] Preferably, the permanent and/or heat-debondable adhesive tapes are provided in the form of adhesive foam tapes. An adhesive foam tape comprises at least one polymeric foam layer and at least one adhesive layer, in particular a pressure senstive adhesive layer. Suitable polymeric foam layers for use herein typically comprise a polymeric base material selected from the group consisting of polyacrylates, polyurethanes, polyolefins, polyamines, polyamides, polyesters, polyethers, polyisobutylene, polystyrenes, polyvinyls, polyvinylpyrrolidone, natural rubbers, synthetic rubbers, halogenated polymers, and any combinations or mixtures thereof.. According to a particular aspect, the polymeric base material for use herein is selected from the group consisting of polyacrylates, polyurethanes, and any combinations or mixtures thereof.

[0023] Preferably, the adhesive (foam) tape is a double-sided adhesive (foam) tape comprising first and second adhesive surfaces and, optionally, a foam layer. The first and second adhesive surfaces may comprise the same adhesive or different adhesive materials.

[0024] The heat-debondable adhesive tape preferably comprises a shape-memory polymer sheet having two opposing surfaces and first and second adhesive materials being provided on the two opposing surfaces of the polymer sheet. The first and second adhesive materials may be identical or different from one another. Preferably, the shape-memory polymer sheet has a strained temporary shape and an intrinsic shape, wherein the shape-memory polymer sheet, if heated to or above a transition temperature range, at least partially converts from its strained temporary shape to its intrinsic shape. The shape-memory polymer sheet may comprise a plurality of slits. Preferably, the heat-debondable adhesive tape is a heat-debondable adhesive article as described in detail in WO-A2-2013/012973 (Rule et al.), which is herewith incorporated by reference in its entirety. One preferred example of a shape-memory polymer sheet for use in the heat-debondable adhesive tape is CORTUFF 200, a 51 μm thick polyethylene shrink film available from Sealed Air Corporation, Duncan, SC.

[0025] The permanent adhesive tape preferably comprises a polymeric material with the polymer base material selected from the group consisting of polyacrylates,

polyurethanes, polyolefins, polyamines, polyamides, polyesters, polyethers, polyisobutylene, polystyrenes, polyvinyls, polyvinylpyrrolidone, natural rubbers, synthetic rubbers, and any combinations, copolymers or mixtures thereof, wherein the permanent adhesive tape preferably comprises an acrylic-based material.

[0026] The permanent adhesive tape may comprise any adhesive material which is permanent as understood in the present disclosure. The permanent adhesive tape may, for example, comprise a pressure-sensitive adhesive. Suitable pressure-sensitive adhesives for use herein are described, for example, in EP 0 213 737 A1 (Klingen et al.), EP 0 303 430 A1 (Martin et al.) and US 4,181,752 (Clemens et al.). Further adhesive materials that may be suitable for the permanent adhesive tape are described in WO 00/06637 A1 (Gehlsen et al.), US 4,303,485 (Levens) and US 5,695,837 (Everaerts et al.). The content of these documents is herewith fully incorporated by reference. Exemplary permanent adhesive tapes for use herein include, but are not limited to, 3M VHB Tapes, in particular 3M VHB Acrylic Foam Tape 5925 or 3M VHB Acrylic Foam Tape 5962, commercially available from 3M Company, St. Paul, MN/USA.

[0027] The identification plate has a surface to be mounted to a support, said surface having a first surface area. The one or more permanent adhesive tapes cover a second surface area and the one or more heat-debondable adhesive tapes cover a third surface area. Preferably, the ratio between the second surface area and the first surface area it at least 5%, at least 10%, or even at least 15%. Preferably, the ratio between the second surface area and the first surface area is at most 40%, at most 30%, or even at most 20%. Preferably, the ratio between the third surface area and the first surface area is at least 20%, at least 30%, or even at least 40%. Preferably, the ratio between the third surface area and the first surface area is at most 80%, at most 65%, or even at most 50%.

[0028] Preferably, the identification plate comprises more than two frangible portions. Preferably, the identification plate comprises at least two first frangible portions, each comprising at least one permanent adhesive tape provided thereon. Alternatively or in addition, the identification plate preferably comprises at least two second frangible portions, each comprising at least one heat-debondable adhesive tape provided thereon. The identification plate may also comprise one or more frangible portions without any adhesive tape being provided thereon. The identification plate may also comprise one or more frangible portions comprising both a permanent adhesive tape and a heat-debondable adhesive tape. Adjacent frangible portions are preferably separated from one another by one or more predetermined breaking lines. These predetermined breaking lines may be straight and/or curved, depending on the shape of the frangible portions.

[0029] According to an advantageous aspect of the identidfication plate according to the present disclosure, nibs or lips may be included at critical points of the identification plate, for example, at the corners of one or more of the frangible portions. Such a nib or lip may be manufactured when the metal plate is perforated or attached to a plastic perforation. This may beneficially prevent the identification plate to be removed in one piece by, e.g., a cheese wire. The nibs may, e.g., be positioned on the corners of one or more of the frangible portions, which would force the wire upwards and cause the identification plate to perforate.

[0030] In another aspect, the present disclosure relates to a method of manufacturing an identification plate. According to said method, an identification plate precursor comprising at least two frangible portions is provided. Moreover, one or more permanent adhesive tapes and one or more heat-debondable adhesive tapes are provided. The one or more permanent adhesive tapes are applied onto one or more first frangible portions of the identification plate precursor and the one or more heat-debondable adhesive tapes are applied onto one or more second, different frangible portions of the identification plate precursor. The identification plate may have any of the preferred features discussed above with respect to the identification plate of the present invention.

[0031] Preferably, the step of providing an identification plate precursor comprising at least two frangible portions comprises the step of introducing at least one predetermined breaking line. The predetermined breaking line is preferably introduced by one or more of the following techniques: perforating the identification plate precursor, partially cutting and/or slitting the identification plate precursor, scoring the identification plate precursor, thinning the identification plate precursor, stretching identification plate precursor, compressing identification plate precursor, embedding fibers and/or wires within the identification plate precursor.

[0032] The one or more permanent adhesive tapes and/or the one or more heat-debondable adhesive tapes are preferably double-sided adhesive tapes comprising first and second adhesive surfaces. In this case, the first adhesive surfaces of the permanent and/or heat-debondable adhesive tapes are adapted to adhere to a support and the second adhesive surfaces of the permanent and/or heat-debondable adhesive tapes are used for applying and adhering the tapes onto the first and/or second frangible portions of the identification plate precursor.

[0033] According to still another aspect of the present disclosure, it is provided a method of applying an identification plate to a support, in particular a car body, the method comprising: providing an identification plate as described above or manufacturing an identification plate in accordance with the method described above and adhesively attaching the identification plate to a support, in particular a car body, using the adhesive tapes.

[0034] Preferred features of the present invention will be elucidated with reference to the following Figures which show:

- Figure 1: a schematic top view of an identification plate according to one aspect of the present invention;
- Figure 2: a schematic sectional view through the identification plate of Figure 1 along line A-A;
- Figure 3: a schematic top view of another aspect of an identification plate according to the present disclosure;
- Figure 4: a schematic top view of an identification plate according to still another aspect of the present disclosure;
- Figure 5: a schematic top view of an identification plate according to still another aspect of the present disclosure;
- Figure 6: a schematic top view of an identification plate according to still another aspect of the present disclosure;
- Figure 7A: a schematic top view of an identification plate according to yet another aspect of the present disclosure; and
- Figures 7B to 7D: a schematic series showing how the identification plate of Figure 7A may be sequentially removed from a support.

[0035] Figure 1 shows a schematic top view onto an identification plate according to a preferred aspect of the present disclosure. The identification plate 1 comprises two frangible portions 2a and 2b separated by a predetermined breaking line 10. The identification plate 1 further comprises adhesive means for attaching the identification plate 1 to a support (e.g., a vehicle). Adhesive means in this preferred embodiment comprises two permanent adhesive tapes 3 provided on the first frangible portion 2a and two heat-debondable adhesive tapes 4 provided on the second frangible portion 2b. As may be taken from the sectional view of the identification plate 1 shown in Figure 2, the permanent adhesive tapes 3 and the heat-debondable adhesive tapes 4 may be double-sided adhesive tapes comprising a foam layer 6, 8 as well as first and second adhesive layers 5, 7a, 7b. The first and second adhesive layers may comprise different adhesive materials 7a and 7b as shown in case of the heat-debondable adhesive tape 4 or may comprise the same adhesive material 5 as shown in case of the permanent adhesive tape 3. A central layer of the permanent and heat-debondable adhesive tapes 3 and 4 may be identical or may comprise different materials such as a polymer foil in case of one of the tapes and a foam material in case of the other of the tapes. The adhesive tapes also need not be double-sided adhesive tapes, but could, instead, comprise a single layer of adhesive only. For example, the adhesive tape may comprise a polymeric foam layer and a backing layer with the polymeric foam layer or the backing layer being pressure senstive adhesive as such or a self adhesive material.

[0036] While the identification plate 1 is shown as being substantially rectangular in Figure 1, any shape suitable for an identification plate may be chosen for the identification plate 1. Moreover, the frangible portions 2a and 2b also need not be rectangular (as shown in case of Figure 1), but can have any shape. The predetermined breaking line 10 need also not separate the identification plate in two halves. Rather, the first frangible portion 2a may have a different size and/or shape than the second frangible portion 2b. Moreover, more than two frangible portions 2a and 2b may be provided, e.g., four frangible portions 2a and 2b may be provided as shown in the embodiment of Figure 3, where first and second frangible portions 2a and 2b are arranged in an alternating sequence.

[0037] In the particular aspect according to Figure 1, two permanent adhesive tapes 3 are provided on the first frangible portion 2a and two heat-debondable adhesive tapes 4 are provided on the second frangible portion 2b. Alternatively, each frangible portion may comprise only a single adhesive tape as shown in Figure 3 or more than two adhesive tapes may be provided on each of the frangible portions. The number of adhesive tapes per frangible portion may also vary between different frangible portions. The one or more adhesive tapes on a single frangible portion may cover only a certain percentage of the surface area of said frangible portion as shown in Figures 1 and 3 or may cover the entire surface of said frangible portion. Preferably, the adhesive tape(s) covers between 30% and 100%, between 40% and 90%, or even between 50% and 80% of the surface area of the frangible portion.

[0038] The adhesive tapes may have a certain distance from the predetermined breaking lines 10 as shown in Figures 1 and 3. It is, however, also preferred that at least one of the permanent adhesive tapes 4 is located adjacent to a predetermined breaking line 10. Thus, if the second frangible portion 2b (in case of the embodiment shown in Figure 1) comprising the heat-debondable adhesive tape 4 is peeled off from the support, the predetermined breaking line 10 will rupture more easily if the first frangible portion 2a just adjacent to the predetermined breaking line 10 is permanently fixed to the support. Preferably, the distance between at least one of the permanent adhesive tapes 3 and at least one of the predetermined breaking lines 10 is smaller than 10 mm, smaller than 5 mm, or even smaller than 3 mm.

[0039] However, the present disclosure is not that limited as not all of the frangible portions 2a and 2b need to extend to the edge of the identification plate as is the case in the embodiments shown in Figures 1 and 3. For example, three first frangible portions 2a and three second frangible portions 2b may be arranged in a more complex pattern as shown in Figure 4. In this embodiment, a frame-like second frangible portion 2b surrounds an alternating sequence of three first frangible portions 2a and two second frangible portions 2b, which are adjacent to each other and separated from one another by predetermined breaking lines 10. Moreover, the sequence of these five frangible portions is surrounded by further predetermined breaking lines 10, which separate

these five frangible portions 2a and 2b from the frame-like frangible portion 2b. Of course, Figure 4 merely depicts an exemplary embodiment. Other arrangement with more or less frangible portions arranged in similar or completely different patterns are envisaged as well.

[0040] For example, Figure 5 shows a schematic top view onto an identification plate according to another aspect of the present disclosure. The identification plate 1 shown in Figure 5 comprises five frangible portions 2a and 2b separated by four predetermined breaking lines 10. As may be taken from Figure 5, the predetermined breaking lines 10 need not extend all the way towards the edges of the identification plate 1. Nevertheless, predetermined breaking lines 10 such as those shown in Figure 5 are understood in the context of the present invention to "separate" the different frangible portions 2a and 2b from each other. If the predetermined breaking lines 10 do not extend all the way towards the edges of the identification plate (as shown, e.g., in Figures 1 and 3), the largest distance between the predetermined breaking lines 10 and the edges of the identification plate is preferably less than 15 mm, more preferably less than 10 mm and most preferably less than 5 mm.

[0041] The identification plate 1 of the embodiment shown in Figure 5 comprises two first frangible portions 2a each of which comprises one permanent adhesive tape 3 and two second frangible portions 2b each of which comprises one heat-debondable adhesive tape 4. In addition, the identification plate 1 comprises a third frangible portion 2b (in the center) which comprises two permanent adhesive tapes 3 and two heat-debondable adhesive tapes 4. As is evident from Figure 5, various shapes are envisaged for the adhesive tapes 3 and 4. For example, the adhesive tapes may be triangular or rectangular or they may consist of angled stripes. The permanent adhesive tapes 3 may have a different size and/or shape than the heat-debondable adhesive tapes 4. Moreover, several adhesive tapes 3 and 4 having different sizes and/or shapes may be provided on one and the same identification plate 1, as can be seen in Figure 5. The arrangement of the adhesive tapes 3 and 4 need also not be symmetric. For example, the permanent adhesive tapes 3 provided on the left side of the identification plate 1 may have a different shape than the permanent adhesive tapes 3 provided on the right side of the identification plate 1 as is the case in Figure 5. Moreover, the layout of the frangible portions 2a and 2b need also not be symmetric, even though a symmetric arrangement such as that shown in Figure 5 is preferred.

[0042] Figure 6 shows a schematic top view onto an identification plate according to a third aspect of the present invention. This identification plate 1 comprises two first frangible portions 2a each having four permanent adhesive tapes 3 provided thereon and four second frangible portions 2b each having a single heat-debondable adhesive tape 4 provided thereon. Similar to the embodiment shown in Figure 5, the frangible portions 2a and 2b are separated from each other by four predetermined breaking lines 10 which again do not extend all the way towards the edges of the identification plate 1.

[0043] Figure 7A shows a schematic top view onto an identification plate according to a further aspect of the present invention. The identification plate 1 shown in Figure 7A comprises a single first frangible portion 2a having five permanent adhesive tapes 3 provided thereon and three second frangible portions 2b each having a single heat dependable adhesive tape 4 provided thereon. The outermost second frangible portions 2b on the left and right side of the identification plate 1 are separated from the first frangible portion 2a by predetermined breaking lines 10. However, as also shown in Figure 7A, the various frangible portions need not be separated from each other by predetermined breaking lines 10. Rather, a first frangible portion 2a may also merge into a second frangible portion 2b such as the central second frangible portion 2b shown in Figure 7A. Even though a clear boundary may not be defined between these first and second frangible portions 2a and 2b, the person skilled in the art will understand that a portion of the identification plate 1 surrounding the rectangular heat-debondable adhesive tape 4 will define a second frangible portion 2b because such a portion may be more easily detached from the support than the parts of the identification plate 1 being in close proximity to the five permanent adhesive tapes 3.

[0044] Figures 7B to 7D depict the sequential removal of the identification plate of Figure 7A from a support.

Item 1 is an identification plate (1) comprising adhesive means for attaching the identification plate to a support, wherein the identification plate (1) comprises at least two frangible portions (2a, 2b), wherein the adhesive means comprises at least one permanent adhesive tape (3) provided on at least a first one (2a) of the at least two frangible portions (2a, 2b) and at least one heat-debondable adhesive tape (4) provided on at least a second, different one (2b) of the at least two frangible portions (2a, 2b).

Item 2 is the identification plate of item 1, wherein the permanent adhesive tape (3) has a 90° peel adhesion of at least 15 N/cm, preferably of at least 20 N/cm, more preferably of at least 25 N/cm, when measured at 23°C according to the test method described in the experimental section.

Item 3 is an identification plate according to any of item 1 or 2, wherein the heat-debondable adhesive tape (4) has a 90° peel adhesion of less than 10 N/cm, less than 5 N/cm, or even less than 3 N/cm, when measured on an adhesive tape heated at 120°C according to the test method described in the experimental section.

Item 4 is an identification plate according to any of the preceding items, wherein at least the first frangible portion (2a) provided with the permanent adhesive tape (3) is arranged to break when the identification plate is separated from the support.

Item 5 is an identification plate according to any of

the preceding items, wherein at least one of the frangible portions (2b) provided with the heat-debondable adhesive tape (4) is essentially free of permanent adhesive tape.

Item 6 is an identification plate according to any of the preceding items, wherein the permanent and/or heat-debondable adhesive tapes are provided in the form of adhesive foam tapes.

Item 7 is an identification plate according to item 6, wherein the adhesive tape or adhesive foam tape is a double-sided adhesive tape or adhesive foam tape.

Item 8 is an identification plate according to any of the preceding items wherein the heat-debondable adhesive tape (4) comprises a shape-memory polymer sheet (8) having two opposing surfaces and first and second adhesives (7a, 7b) being provided on both surfaces of the polymer sheet (8).

Item 9 is an identification plate according to item 8, wherein the shape-memory polymer sheet (8) has a strained temporary shape and an intrinsic shape and wherein the shape-memory polymer sheet, if heated to or above a transition temperature range, at least partially converts from its strained temporary shape to its intrinsic shape.

Item 10 is an identification plate according to item 8 or 9, wherein the shape-memory polymer sheet (8) comprises a plurality of slits.

Item 11 is an identification plate according to any of the preceding items, wherein the permanent adhesive tape comprises a polymeric material with the polymer base material selected from the group consisting of polyacrylates, polyurethanes, polyolefins, polyamines, polyamides, polyesters, polyethers, polyisobutylene, polystyrenes, polyvinyls, polyvinylpyrrolidone, natural rubbers, synthetic rubbers, and any combinations, copolymers or mixtures thereof, wherein the permanent adhesive tape preferably comprises an acrylic-based material.

Item 12 is an identification plate according to any of the preceding items, wherein the identification plate has a surface (9) to be mounted to a support, said surface having a first surface area, wherein the one or more permanent adhesive tapes cover a second surface area and wherein the one or more heat-debondable adhesive tapes cover a third surface area.

Item 13 is an identification plate according to item 12, wherein the ratio between the second surface area and the first surface area is at least 5%, at least 10%, or even at least 15%.

Item 14 is an identification plate according to item 12 or 13, wherein the ratio between the second surface area and the first surface area is at most 70%, at most 60%, or even at most 50%.

Item 15 is an identification plate according to any of items 12 to 14, wherein the ratio between the third surface area and the first surface area is at least 20%, at least 30%, or even at least 40%.

Item 16 is an identification plate according to any of items 12 to 15, wherein the ratio between the third surface area and the first surface area is at most 90%, at most 85%, or even at most 80%.

Item 17 is an identification plate according to any of the preceding items, wherein the identification plate comprises at least four frangible portions (2a, 2b) separated from one another by at least three predetermined breaking lines (10) and wherein the adhesive means comprises at least two permanent adhesive tapes (3) and at least two heat-debondable adhesive tapes (4).

Item 18 is a method of manufacturing an identification plate, preferably an identification plate according to any of the preceding claims, the method comprising the following steps:

a) providing an identification plate precursor comprising at least two frangible portions;
b) providing one or more permanent adhesive tapes;
c) providing one or more heat-debondable adhesive tapes;
d) applying the one or more permanent adhesive tapes onto one or more first frangible portions of the identification plate precursor; and
e) applying the one or more heat-debondable adhesive tapes onto one or more second, different frangible portions of the identification plate precursor.

Item 19 is a method according to item 18, wherein step a) comprises the step of dividing the identification plate precursor into at least two frangible portions by introducing at least one predetermined breaking line.

Item 20 is a method according to item 19, wherein the predetermined breaking line is introduced by one or more of the following techniques: perforating the identification plate precursor, partially cutting and/or slitting the identification plate precursor, scoring the identification plate precursor, thinning the identification plate precursor, stretching identification plate precursor, compressing identification plate precursor, embedding fibers and/or wires within the identification plate precursor.

Item 21 is a method of applying an identification plate to a support, in particular a car body, the method comprising: providing an identification plate according to any of items 1 to 17 or manufacturing an identification plate in accordance with the method according to any of items 18 to 20 and adhesively attaching the identification plate to a support, in particular a car body, using the adhesive tapes.

EXAMPLES

[0045] The present disclosure is further illustrated by

the following examples. These examples are merely for illustrative purposes only and are not meant to be limiting on the scope of the appended claims.

Test methods and procedures:

90°-Peel-test at 300 mm/min (according to Test Method AFERA 5001)

[0046] Adhesive strips having a width of 13 mm and a length > 175 mm are cut out in the machine direction from the sample material.

[0047] For test sample preparation the liner is first removed from the one adhesive side and placed on an aluminum strip having the following dimension 22 x 1.6 cm. Then, the adhesive coated side of each adhesive strip is placed, after the liner is removed, with its adhesive side down on a clean test panel using light finger pressure. Next, the test samples are rolled twice in each direction with a standard FINAT test roller (weight 6.8 kg) at a speed of approximately 10 mm per second to obtain intimate contact between the adhesive mass and the surface. After applying the adhesive strips to the test panel, the test samples are allowed to dwell 20 minutes (23°C +/- 2°C, 50% relative humidity +/-5%) prior to testing.

[0048] For peel testing the test samples are in a first step clamped in the lower movable jaw of a Zwick tensile tester (Model Z020 commercially available from Zwick/Roell GmbH, Ulm, Germany). The adhesive strips are folded back at an angle of 90° and their free ends grasped in the upper jaw of the tensile tester in a configuration commonly utilized for 90° peel measurements. The tensile tester is set at 300 mm per minute jaw separation rate. Test results are expressed in Newton per 10 mm (N/10 mm). The quoted peel values are the average of two 90°-peel measurements.

[0049] For peel tests performed on adhesive strips heated at 120°C, the adhesive strips are placed into a conventional oven at 120°C immediately prior to testing as described above.

Test panels/substrates used for testing:

[0050] Aluminum test panels in accordance with ASTM B211 having a dimension of 50 mm x 25 mm x 1 mm. Prior to the preparation of a test assembly, the aluminium panels are roughened using ScotchBrite 4774 (commercially available by 3M) and afterwards wiped once with isopropyl alcohol. Drying is done using a paper tissue.

Preparation of an exemplary identification plate and method of using:

[0051] In the following, an exemplary process for manufacturing an identification plate according to the present disclosure (and as represented in Figure 7A), for attaching the identification plate to a vehicle bumper panel and for again removing the identification plate from the vehicle bumper panel will be described. The dimensions of the identification plate are 112 mm x 524 mm.

[0052] In order to manufacture an identification plate according to the present disclosure, a conventional European plastic back plate having a thickness of 3 mm is used. The dimensions of the plastic back plate correspond to those of the chosen identification plate to be manufactured. The plastic back plate, which is considered to be an identification plate precursor, is then divided into four frangible portions (a single first frangible portion 2a and three second frangible portions 2b) by introducing four predetermined breaking lines 10 according to the configuration represented in Figure 7A. The four predetermined breaking lines are introduced by full perforation through the plastic back plate using appropriate laser equipment. Subsequently, a white reflective sheet is laminated to the plastic back plate. The identification number and the blue Euro marking are applied to the visible surface of the reflective sheet by laser print. A protective transparent PET film layer having a thickness of 75 microns is adhesively attached on top of the print and the marking using a conventional pressure sensitive adhesive.

[0053] Subsequently, three heat-debondable adhesive tapes and five permanent adhesive tapes are provided and applied onto the respective frangible portions of the identification plate precursor according to the specific configuration, shapes and dimensions represented in Figure 7A. The five permanent adhesive tapes 3 are formed using 3M VHB Acrylic Foam Tape 5962, commercially available from 3M Company, St. Paul, MN/USA. The three heat-debondable adhesive tapes 4 are formed using a heat-debondable adhesive tape obtained as described in detail in WO-A2-2013/012973 (Rule et al.), and using CorTuff® 200 (available from Sealed Air Corporation, Duncan, SC) as a shape-memory polymer sheet. The one or more permanent adhesive tapes and the one or more heat-debondable adhesive tapes are then used to attach the identification plate to a vehicle bumper panel.

[0054] Due to the presence of the different adhesive tapes on the different frangible portions (2a and 2b) and due to the presence of the predetermined breaking lines 10, it is not possible to remove the identification plate from the vehicle without destroying the identification plate or rendering it unusable. In particular, at least the first frangible portion 2a provided with the permanent adhesive tapes 3 is adapted and arranged to break when the identification plate is separated from the vehicle. However, the identification plate may again be removed if heat is applied by using suitable heating equipment such as e.g. a heat gun.

[0055] Once the identification plate and, in particular, the heat-debondable adhesive tapes have been heated up to a temperature of about 130° C using a hand held heat gun, the left and right second frangible portions 2b having the heat-debondable adhesive tapes 4 are easily removed as is shown in the sequence of Figures 7B

through 7D. Alternatively, the right frangible portion 2b may be removed first. Since the heat-debondable adhesive tape preferably has a 90° peel adhesion of less than 10 N/cm, when measured on the adhesive tape heated at 120°C according to the test method described in the experimental section, the outermost second frangible portions 2b may be easily peeled off from the vehicle by hand (i.e., without employing a tool) using manual force only. Using a suitable tool such as a nipper may obviously facilitate the peeling off process.

[0056] However, since the first frangible portion 2a adjacent to the two outermost second frangible portions 2b is attached to the vehicle by means of five permanent adhesive tapes 3 and since these permanent adhesive tapes preferably have a 90° peel adhesion of at least 15 N/cm, when measured on an adhesive tape heated at 120°C according to the test method described in the experimental section, peeling off the outermost second frangible portions 2b does not lead to removal of the first frangible portion 2a.

[0057] In a similar manner, the central frangible portion 2b is removed from the vehicle bumper panel as shown in the sequence of Figures 7C and 7D. In a last step, the remaining first frangible portion 2a is detached from the vehicle by applying a larger force than during the removal of the second frangible portions 2b, typically by using a suitable tool such as a nipper.

Claims

1. Identification plate (1) comprising adhesive means for attaching the identification plate to a support, wherein the identification plate (1) comprises at least two frangible portions (2a, 2b), wherein the adhesive means comprises at least one permanent adhesive tape (3) provided on at least a first one (2a) of the at least two frangible portions (2a, 2b) and at least one heat-debondable adhesive tape (4) provided on at least a second, different one (2b) of the at least two frangible portions (2a, 2b).

2. Identification plate according to claim 1, wherein the permanent adhesive tape (3) has a 90° peel adhesion of at least 15 N/cm, at least 20 N/cm, or even at least 25 N/cm, when measured at 23°C according to the test method described in the experimental section.

3. Identification plate according to claim 1 or 2, wherein the heat-debondable adhesive tape (4) has a 90° peel adhesion of less than 10 N/cm, less than 5 N/cm, or even less than 3 N/cm, when measured on an adhesive tape heated at 120°C according to the test method described in the experimental section.

4. Identification plate according to any of the preceding claims, wherein at least the first frangible portion (2a) provided with the permanent adhesive tape (3) is arranged to break when the identification plate is separated from the support.

5. Identification plate according to any of the preceding claims, wherein at least one of the frangible portions (2b) provided with the heat-debondable adhesive tape (4) is essentially free of permanent adhesive tape.

6. Identification plate according to any of the preceding claims, wherein the permanent and/or heat-debondable adhesive tapes are provided in the form of adhesive foam tapes.

7. Identification plate according to claim 6, wherein the adhesive tape or adhesive foam tape is a double-sided adhesive tape or adhesive foam tape.

8. Identification plate according to any of the preceding claims wherein the heat-debondable adhesive tape (4) comprises a shape-memory polymer sheet (8) having two opposing surfaces and first and second adhesives (7a, 7b) being provided on both surfaces of the polymer sheet (8).

9. Identification plate according to claim 8, wherein the shape-memory polymer sheet (8) has a strained temporary shape and an intrinsic shape and wherein the shape-memory polymer sheet, if heated to or above a transition temperature range, at least partially converts from its strained temporary shape to its intrinsic shape.

10. Identification plate according to claim 8 or 9, wherein the shape-memory polymer sheet (8) comprises a plurality of slits.

11. Identification plate according to any of the preceding claims, wherein the permanent adhesive tape comprises a polymeric material with the polymer base material selected from the group consisting of polyacrylates, polyurethanes, polyolefins, polyamines, polyamides, polyesters, polyethers, polyisobutylene, polystyrenes, polyvinyls, polyvinylpyrrolidone, natural rubbers, synthetic rubbers, and any combinations, copolymers or mixtures thereof, wherein the permanent adhesive tape preferably comprises an acrylic-based material.

12. Identification plate according to any of the preceding claims, wherein the identification plate has a surface (9) to be mounted to a support, said surface having a first surface area, wherein the one or more permanent adhesive tapes cover a second surface area and wherein the one or more heat-debondable adhesive tapes cover a third surface area.

13. Method of manufacturing an identification plate, preferably an identification plate according to any of the preceding claims, the method comprising the following steps:

a) providing an identification plate precursor comprising at least two frangible portions;
b) providing one or more permanent adhesive tapes;
c) providing one or more heat-debondable adhesive tapes;
d) applying the one or more permanent adhesive tapes onto one or more first frangible portions of the identification plate precursor;
e) applying the one or more heat-debondable adhesive tapes onto one or more second, different frangible portions of the identification plate precursor.

14. Method according to claim 13, wherein step a) comprises the step of dividing the identification plate precursor into at least two frangible portions by introducing at least one predetermined breaking line.

15. Method according to claim 14, wherein the predetermined breaking line is introduced by one or more of the following techniques: perforating the identification plate precursor, partially cutting and/or slitting the identification plate precursor, scoring the identification plate precursor, thinning the identification plate precursor, stretching identification plate precursor, compressing identification plate precursor, embedding fibers and/or wires within the identification plate precursor.

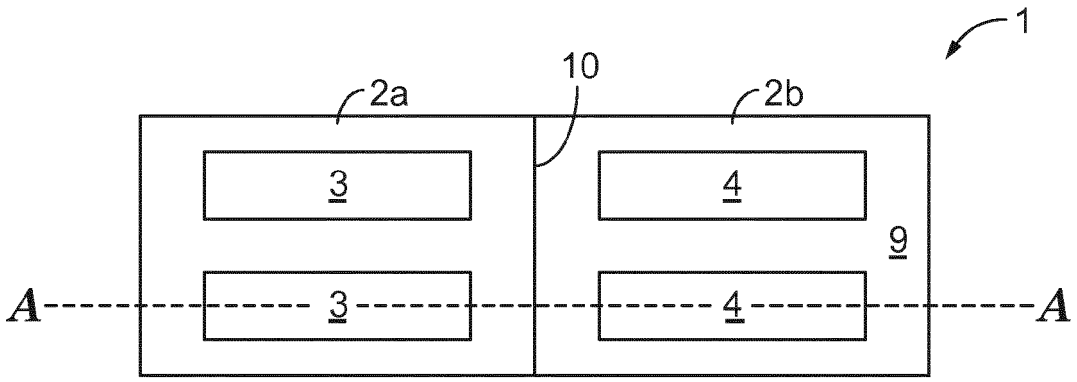

Fig. 1

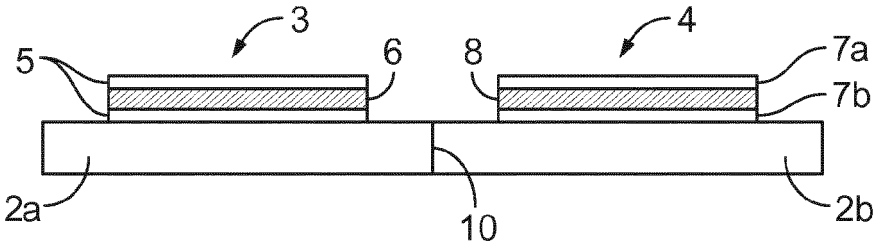

Fig. 2

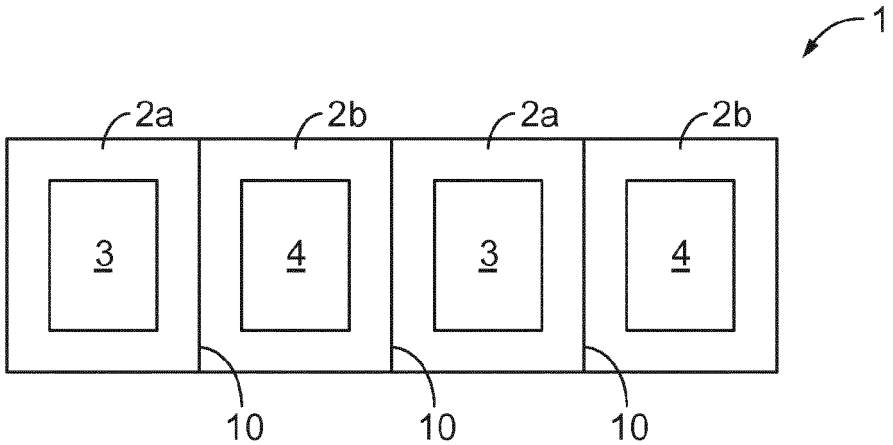

Fig. 3

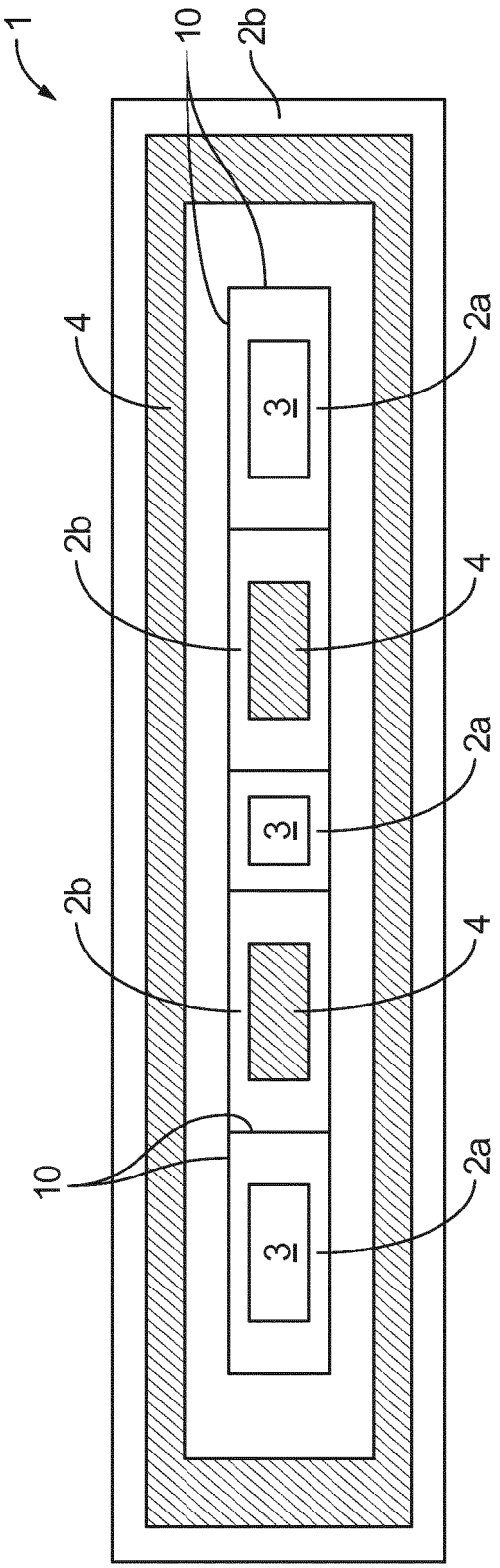

Fig. 4

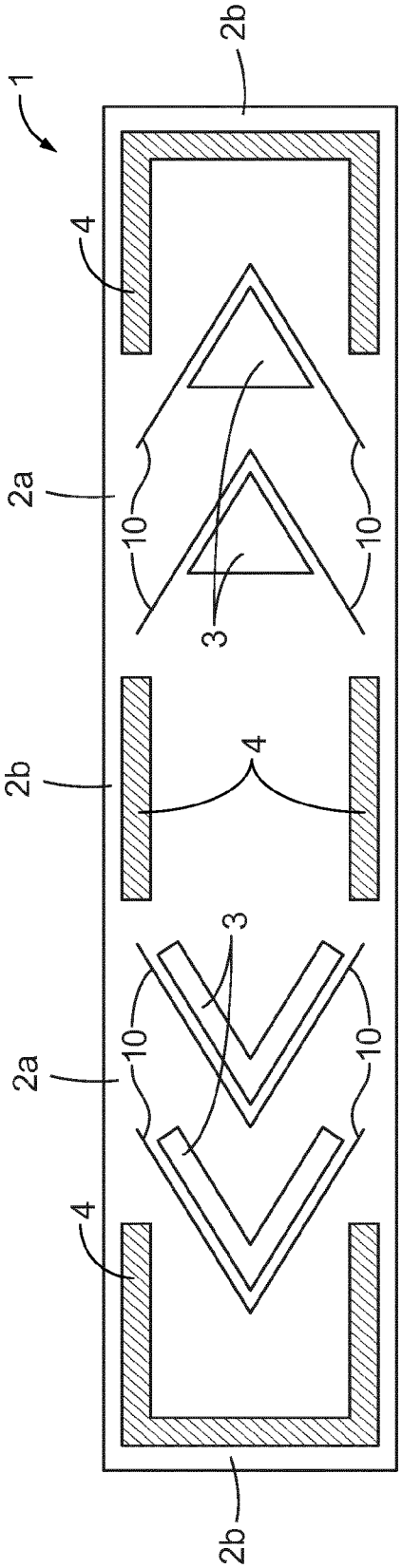
1
2b
4
2a
10
3
10
2b
4
3
2a
10
10
4
2b

Fig. 5

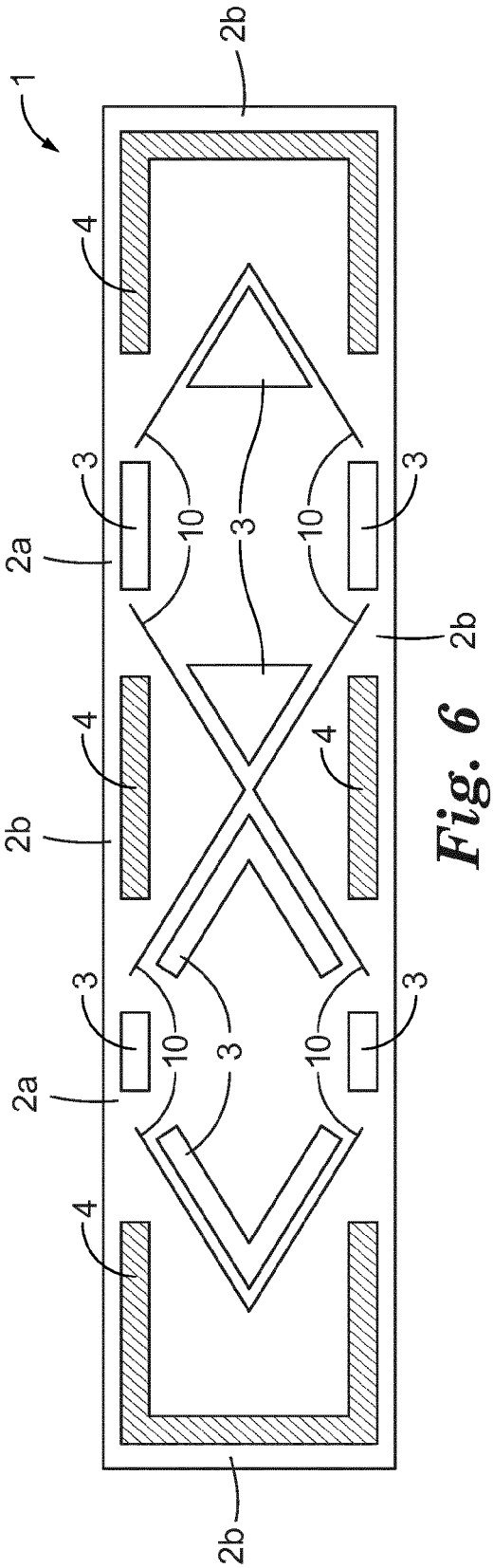
1
2b
4
3
2a
10
3
10
3
2b
4
4
2b
3
3
2a
10
3
10
4
2b

Fig. 6

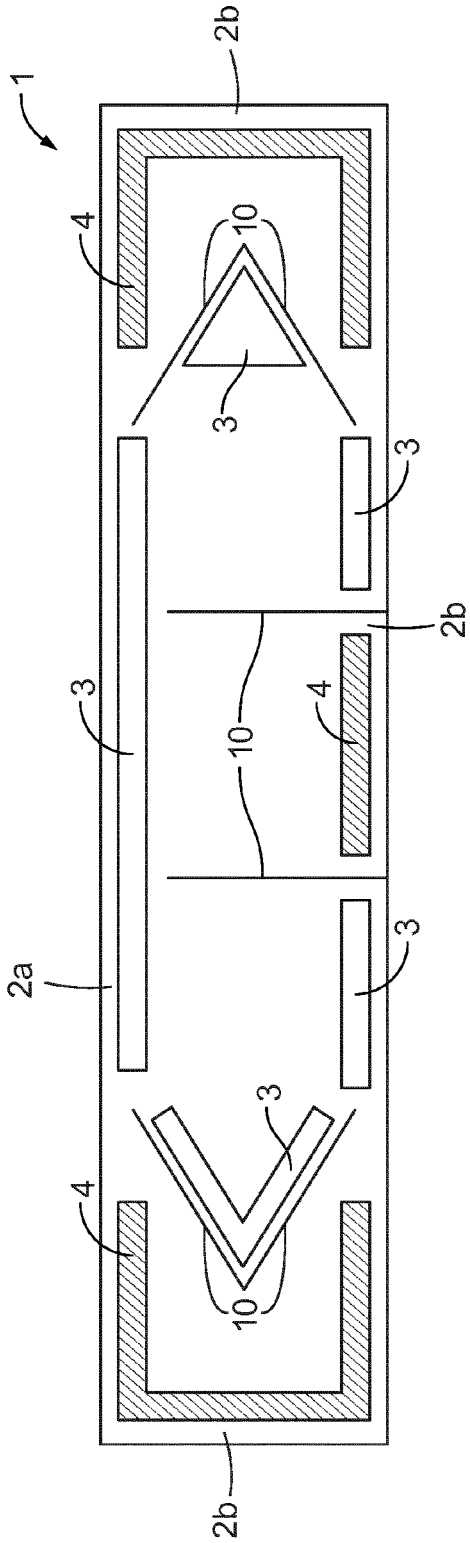

Fig. 7A

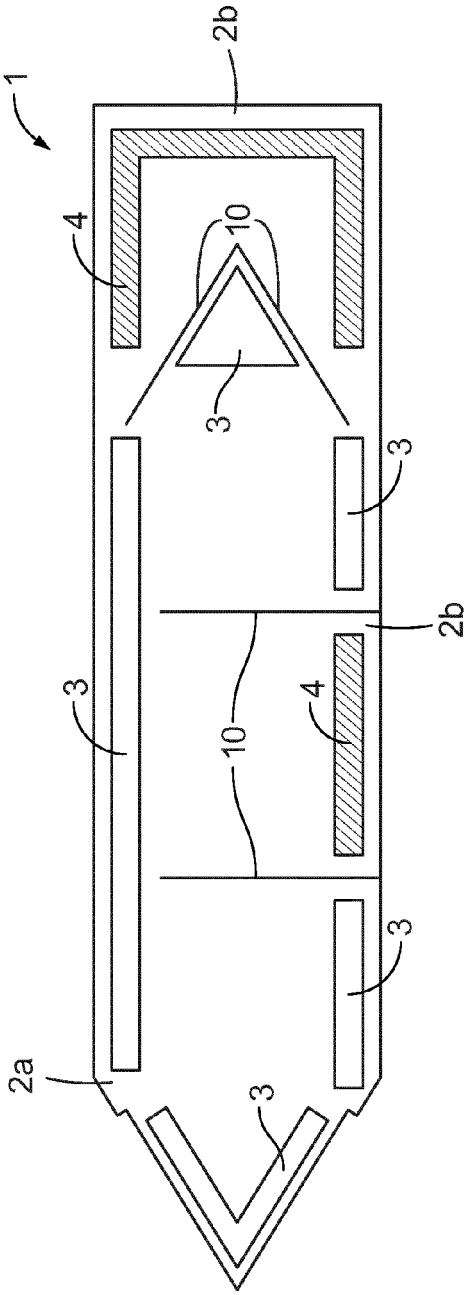

Fig. 7B

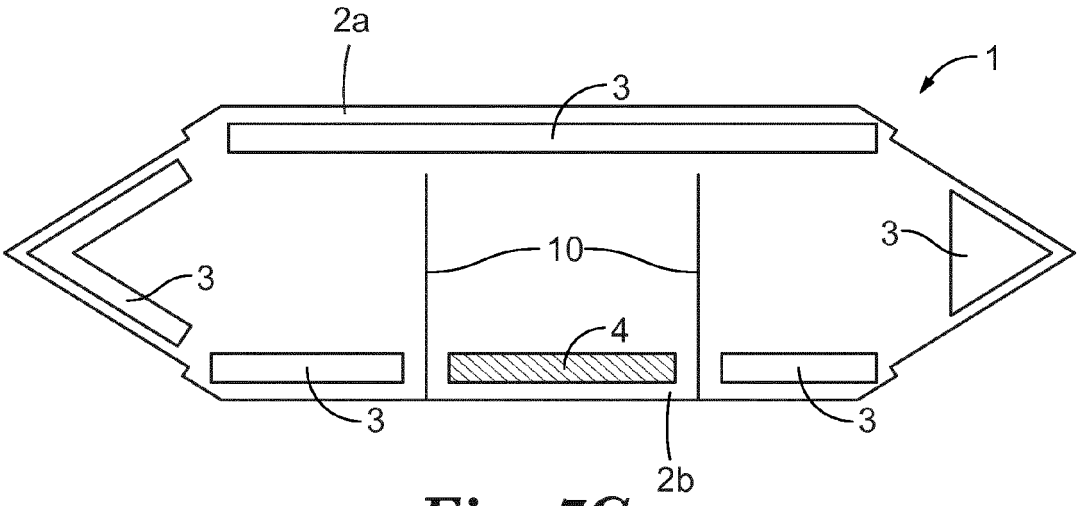

Fig. 7C

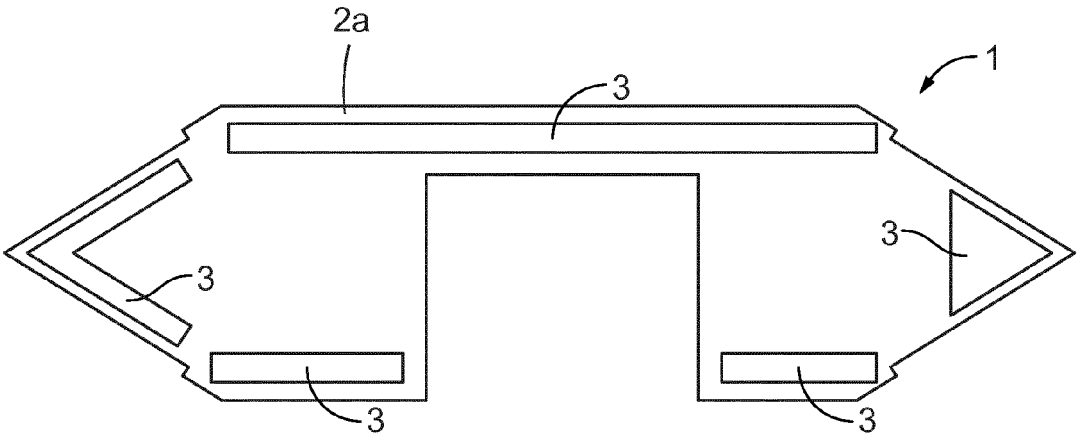

Fig. 7D

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 15 20 1212

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y,D	GB 2 417 596 A (HILLS NUMBERPLATES LTD [GB]; HILLS NUMBERPLATE HOLDINGS PLC [GB]) 1 March 2006 (2006-03-01) * page 1, line 1 - line 5 * * page 5, line 16 - page 6, line 21 * * page 7, line 4 - page 8, line 8 * * figure 1 *	1-15	INV. G09F21/04 ADD. G09F7/12 G09F7/18
Y,D	WO 2013/012973 A2 (3M INNOVATIVE PROPERTIES CO [US]; RULE JOSEPH D [US]; BEHLING ROSS E []) 24 January 2013 (2013-01-24) * page 1, line 10 - line 18 * * page 7, line 6 - page 8, line 26 * * figures 1-6 *	1-15	
A	WO 2006/136847 A2 (HILLS NUMBERPLATE HOLDINGS PLC [GB]; CORDELL MICHAEL [GB]; TAFFINDER R) 28 December 2006 (2006-12-28) * page 50, line 1 - page 52, line 25 * * figures 26-29 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) G09F B60R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 May 2016	Pantoja Conde, Ana

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 20 1212

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-05-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2417596 A	01-03-2006	NONE	
WO 2013012973 A2	24-01-2013	CN 103998549 A	20-08-2014
		EP 2734595 A2	28-05-2014
		JP 2014520950 A	25-08-2014
		KR 20140061407 A	21-05-2014
		US 2014150962 A1	05-06-2014
		WO 2013012973 A2	24-01-2013
WO 2006136847 A2	28-12-2006	AT 484423 T	15-10-2010
		AU 2006260667 A1	28-12-2006
		CA 2613324 A1	28-12-2006
		EP 1893447 A2	05-03-2008
		EP 2272719 A1	12-01-2011
		JP 2008543672 A	04-12-2008
		KR 20080038304 A	06-05-2008
		US 2009193694 A1	06-08-2009
		WO 2006136847 A2	28-12-2006

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- GB 2147596 A1, Cordell **[0003]**
- EP 1627777 A1, Purvis **[0004]**
- EP 1925505 A2, Purvis **[0005]**
- WO 2013012973 A2, Rule **[0024] [0053]**
- EP 0213737 A1, Klingen **[0026]**
- EP 0303430 A1, Martin **[0026]**
- US 4181752 A, Clemens **[0026]**
- WO 0006637 A1, Gehlsen **[0026]**
- US 4303485 A, Levens **[0026]**
- US 5695837 A, Everaerts **[0026]**