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WITH REDUCED CORROSION RISK

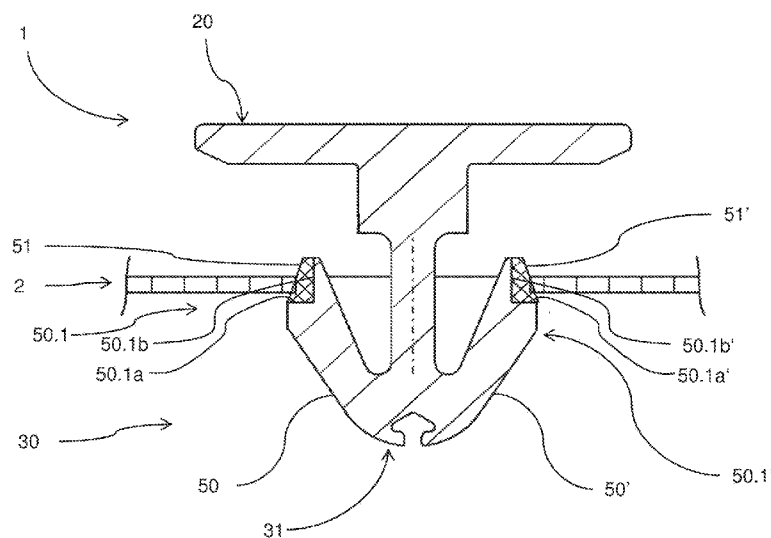


Fig. 1

(57) Abstract: A fastener (1) for fastening an element to be fastened to a carrier part (2) of a vehicle, includes a head portion (20), configured for being fastened to the element to be fastened, a foot portion (30), configured for being fastened to the carrier part (2), - at least one wing (50) connected to the foot portion (30) via a coupling portion (31) of the foot portion (30); the wing (50) includes a decoupling element (51), pre-mounted to the foot portion (30) and covering at least a portion of the wing (50), such that when the foot portion (30) is fastened to the carrier part (2) the decoupling element (51) contacts the carrier part (2), wherein the decoupling element (51) is made of a material softer than at least the material of the portion of the wing (50) covered by the decoupling element (51).

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**FASTENER FOR FASTENING AN ELEMENT, WHICH IS TO BE FASTENED,
TO A CARRIER PART OF A VEHICLE WITH REDUCED CORROSION RISK**

[0001] This invention relates to a fastener for fastening an element to be fastened, in particular a trim or a panel or a wire harness, to a carrier part of a vehicle, preferably a car body.

[0002] According to prior art WO 2014/110301, a fastener comprises a foot and a head comprising a plate to which said foot is linked, a wedge and a shank connecting said plate to said wedge, which comprises a back-plate, a rim and flexible arms connecting said rim to said back-plate.

[0003] It is perceived as disadvantageous that in some cases when using the fastener according to the prior art, in particular in the outer vehicle region, there could be a risk of corrosion. The object of the invention therefore was to reduce the risk of corrosion when using such a fastener for fastening an element to be fastened to a carrier part of the vehicle. This object is achieved by the subject matter of the independent claims; preferred embodiments are specified by the dependent claims.

[0004] Particularly, this object is achieved by a fastener for fastening an element to be fastened, preferably a trim or wire harness, to a carrier part of a vehicle, preferably a car body, wherein the fastener comprises:

- a head portion, which is configured for being fastened to the trim;
- a foot portion, which is configured for being fastened to the carrier part, preferably through a hole or a rail in the carrier part;
- at least one wing connected to the foot portion via a coupling portion of the foot portion; wherein said wing comprises a decoupling element, preferably decoupling coating, which is pre-mounted to the foot portion and which is covering at least a, preferably radially outer, portion of the wing, such that when the foot portion is fastened to the carrier part the decoupling element is contacting the carrier part, wherein the decoupling element is made of a material softer than at least the material of the portion of the wing covered by the decoupling element.

[0005] The object of the invention is also particularly achieved by a method for manufacturing a fastener for fastening an element to be fastened, preferably a trim or wire harness, to a carrier part of a vehicle, preferably a car body, whereby the method comprises:

- manufacturing, preferably molding, a head portion, which is configured for being fastened to the element to be fastened, and a foot portion, which is configured for being fastened to the carrier part, preferably through a hole or rail in the carrier part, and at least one wing connected to the foot portion via a coupling portion of the foot portion, wherein the method comprises additionally a
- creating and fixing, the fixing taking place before mounting the fastener to the carrier part, of a decoupling element, preferably decoupling coating, preferably by over-molding, to at least a, preferably radially outer, portion of the wing, such that when the foot portion is fastened to the carrier part the decoupling element is contacting the carrier part and wherein the decoupling element is manufactured, preferably molded, out of a material softer than at least the material of the portion of the wing covered by the decoupling element.

[0006] By this decoupling element covering the wing(s) of the fastener, the hole of the carrier part is protected from damages, in particular damages of its corrosion protection coating, and the risk of corrosion is hence reduced. It was found that during car life hard contacts between the wing and the carrier part may lead to such damages of the carrier part due to ongoing vibrations during driving and that therefore the the risk of corrosion is increased. The decoupling element on the one hand is damping such vibrations and therefore damping/decoupling relative movements between the wing and the carrier part and serves on the other hand as a protective, soft surface, not able to damage the carrier part or its coating easily. Indeed, the decoupling element preferably prevents all or most (preferably more than 50%, particularly preferably more than 80%) of the contacts between the hard material of the fastener wing(s) and the carrier part, e.g. the car body surrounding the hole. Preferably all or most (preferably more than 50%, particularly preferably more than 80%) of the contacts between the fastener via the wing(s) and the carrier part, e.g. car body, exist via the soft material of the decoupling element. At the same time, the mounting of the fastener to the carrier part is not complicated as the decoupling element is already fixed to the wing before such mounting.

[0007] The fastener may be, for example, produced out of one or more of the following materials: metal, plastic. Any molding mentioned with respect to this fastener is preferably an injection molding, particularly preferably a plastic injection molding.

[0008] The head portion serves for connecting the trim to the element to be fastened. Different fastening principles could be used, e.g. a clip or a flange that is slid into a rail of the trim.

[0009] The foot portion may include more than one wing, preferably two or three or four wings. The foot portion and the head portion are preferably connected via an axial shaft of the fastener.

[0010] The decoupling coating is pre-mounted to the foot portion which is preferably to be understood as the decoupling element having been fixed to the foot portion before the fastener is or was fastened to the carrier part. Thereby, a simple mounting to the carrier part is achieved. The decoupling element could, e.g., be a protection sleeve put on or put over the wing(s), particularly preferred an over molded decoupling coating.

[0011] The one or more wings preferably comprise a free end and the decoupling element is located at or close to the free end or it is surrounding preferably completely the free end or a radially outer portion of the free end. Preferably at least two wings are facing each other so that the hole or the rail of the carrier part is contacted on two opposing sides and the fastener is fastening the element to be fastened to the carrier part in a more efficient way. Most preferably, in case where the foot portion includes more than one wing, each wing, preferably at its free end and preferably at a radial outer portion of the wing, is covered at least partially, preferably completely, by the one or a further decoupling element, so that the surface or corrosion protection coating around the hole or rail of the carrier part is well protected from scratches. The fixing of the decoupling element may be accomplished by manual or automatic mounting before mounting the fastener to the carrier part and particularly preferably while creating the decoupling element, e.g., preferably via overmolding of or molding onto the at least one, preferably radially outer, portion of the wing.

[0012] The wing is preferably flexible such that the wing is brought closer to the rest of the fastener while inserting the fastener into the hole or the rail and then extending again.

[0013] The softer material is preferably one of the following: thermoplastic elastomer (TPE), thermoplastic starch (TPS), ethylene propylene diene monomer rubber (EPDM).

[0014] Preferably the one or more wings, the foot portion and head portion, if existing the shaft, are all made of the harder material, whereas the wings are at least partially covered by the soft material. The harder material is preferably one of the following: all commonly used plastics for fasteners is automotive industry as well as property enhancing modifications/variants (e.g., glass fiber reinforced), metals and alloys.

[0015] In a further preferred embodiment according to the present invention, the decoupling element is a decoupling coating applied onto the portion of the wing. In a further preferred method according to the present invention the decoupling element is created and fixed to the at least one portion of the wing as a decoupling coating, preferably by overmolding on the at least one portion of the wing.

[0016] Hereby, a particularly well to manufacture and easy to handle fastener is provided. Preferably the free end of the wing comprises a step forming a radial shoulder and an axial collar and the decoupling coating is coating the upper part of the radial shoulder and or the radially outer part of the axial collar. Such a step provides a particularly good adhesion of the decoupling coating.

[0017] In a further preferred embodiment according to the present invention, the fastener has a flange between the foot portion and the head portion. In a further preferred method according to the present invention a flange between the foot portion and the head portion is manufactured, preferably formed by molding.

[0018] With that said flange, a stop plate is provided for limiting the insertion of the foot portion into the carrier part. Preferably, the flange has a shape larger than the shape of the hole or rail of the carrier part so that only the wing of the foot portion is pushed into the hole or rail.

[0019] It is preferred that the flange is manufactured, preferably molded, during the same manufacturing, preferably molding, step than the head portion and the foot portion with the same material.

[0020] In a further preferred embodiment according to the present invention, the flange has a sealing lip, which is preferably overmolded or manually or automatically mounted before the fastening of the fastener to the carrier part, for sealing the flange against a surface of the carrier part around the hole or rail of the carrier part. In a further preferred method according to the present invention, a sealing lip is fixed or formed on the flange, preferably before the mounting of the fastener to the carrier part, preferably by manually or automatically mounting before fastening the fastener to the carrier part or by forming by molding, particularly preferably overmolding of the flange or molding onto the flange.

[0021] Hereby, corrosion risk is further reduced. The sealing lip is preferably in contact with the carrier part so that it also permits to avoid scratches of the carrier part. The sealing lip is preferably covering the edge of the flange, preferably all around, such that it is sealing the flange against the surface around the hole or rail of the carrier part. The sealing lip is preferably located at the side of the flange facing the foot portion.

[0022] In a further preferred embodiment according to the present invention, the sealing lip and the decoupling element are of the same material. In a further preferred method according to the invention the sealing lip and the decoupling element are formed, preferably molded, out of the same material.

[0023] Hereby, the production can be made efficient, e.g. via 2K injection molding.

[0024] In a further preferred embodiment of the present invention the sealing lip and the decoupling element are connected or have been connected via a bridge. In a further preferred method according to the invention the decoupling element and the sealing lip are molded and the material used for the decoupling element and the sealing lip is running from the sealing lip to the decoupling element or vice-versa from the decoupling element to the sealing lip forming a bridge.

[0025] Hereby the sealing lip and the decoupling element can both be formed in one molding step with an injection point or injection points only on one of the sealing lip and the decoupling element. The material then runs to the other of the sealing lip and the decoupling element via the bridge. Hence, the bridge is indicating that the preferred method has been applied.

[0026] In a further preferred method according to the present invention the sealing lip and the decoupling element are both formed during the same manufacturing step, preferably molding step.

[0027] Hereby time is saved. Preferably, for decoupling element and sealing lip, in the case of the preferred molding, separate injection points are used; alternatively, an injection point or injections are only used for one of the sealing lip and the decoupling element, as just described above.

[0028] This molding step is preferably different than a molding step of the head portion and the foot portion. Preferably, during the molding step of the sealing lip and the decoupling element the same mold is used to form the sealing lip and the decoupling element. Preferably a bridge is thereby created by the material injected. This material bridge may be cut away afterwards.

[0029] In another preferred method according to the present invention, the sealing lip and the decoupling element are formed during different manufacturing steps, preferably molding steps.

[0030] Hereby, it is possible (but not necessary) to conveniently use different materials for sealing lip and decoupling element.

[0031] In a further preferred embodiment according to the present invention, the wing comprises a free end and the material used for the decoupling element is also covering the wing throughout between the coupling portion and the decoupling element, such that a connection made of the material (type) used for the decoupling element connects the coupling portion with the decoupling element.

[0032] Such a fastener is easy to manufacture as the injection point for the material used for the decoupling element can be located at a convenient position, preferably at the coupling portion of the foot portion, as described directly in the following.

[0033] A free end of the wing may preferably be understood as a radially outermost point of the wing which is able to be pressed in the direction towards the fastener axis. It is pref-

erably an area of the wing which is, in fixed state, braced with a certain tension in the hole or rail of the carrier part. In the broadest sense even such a radially outer extreme point is to be understood as a free end, which is connected to the shaft of the fastener over several ridges of the wing (for example one axially up and one down), i.e. which is not completely free or a true end, but it is comparatively freely moveable.

[0034] In another preferred method according to the present invention the manufacturing, preferably molding, of the foot portion comprises

- manufacturing, preferably molding a free end of the wing and

wherein the decoupling element created by molding, wherein material used for the decoupling element is injected on the coupling portion and guided along the wing, when it is liquid, from the coupling portion towards the free end.

[0035] This convenient location of the injection point results in a less complex tool design. At the location where the material is guided along the wing, when the material is liquid, preferably said connection covering the wing throughout, i.e. without interruption, between the coupling portion and the decoupling element is formed. The connection (see above) is therefore indicating that this preferred method has been applied.

[0036] In another preferred embodiment according to the present invention, the fastener comprises a further wing which is connected to the foot portion via the coupling portion of the foot portion and which is comprising a further decoupling element, and wherein the material used for the decoupling elements is also covering the further wing throughout between the coupling portion and the further decoupling element, such that a further connection built of the material (type) used for the further decoupling element connects the coupling portion with the further decoupling element.

[0037] Such a fastener is particularly well to manufacture by injection molding, as a common injection point for the material used for the decoupling elements can be used, as described directly in the following

[0038] In another preferred method according to the invention a further wing is manufactured, preferably molded, which is connected to the foot portion via the coupling portion of the foot portion, and wherein, when the decoupling element is molded, also a further de-

coupling element of the further wing is molded and wherein the material for the decoupling elements is injected, preferably on the coupling portion, via a common injection point, common to both decoupling elements.

[0039] Hereby, the tool for molding the decoupling elements can be made even less complex. Preferably, the common injection point is located in the middle between two wings, preferably at one side of the wings, preferably at one side of the coupling portion. Preferably two decoupling elements are symmetrically arranged and the injection point is on the axis of symmetry. Preferably, the sealing lip and the decoupling element are formed separately so that no material bridge is formed between them.

[0040] Embodiments of the present invention will now be described - by way of example only - with reference to the accompanying drawings, whereby

[0041] Fig. 1 is a conceptual overview of a fastener with two wings according to the invention;

[0042] Fig. 2A is a conceptual overview of the fastener of Figure 1, whereby the fastener further comprises a flange with sealing lip and bridges between the sealing lip and the decoupling coatings;

[0043] Fig. 2C is a perspective explosion view of the fastener of Figures 2A, 2B, whereby the sealing lip, the bridges and the decoupling coatings are shown in perspective;

[0044] Fig. 2B is a perspective side view of the fastener of Figure 2A;

[0045] Fig. 3A is a conceptual overview of a variant of the fastener of Figures 2A-C, whereby the sealing lip and the decoupling coatings are not linked together by bridges;

[0046] Fig. 3B is a perspective overview of the fastener of Figure 3A, whereby the wings are each covered by a connection;

[0047] Fig. 3C is a perspective explosion view of the fastener of Figures 3A, B, whereby the sealing lip, the decoupling coatings and the connections are shown in perspective.

[0048] **Figure 1** shows a conceptual overview of a fastener 1 according to the invention with preferred two wings 50, 50'. The fastener 1 comprises a head portion 20 configured for being fastened to element to be fastened and a foot portion 30 configured for being fastened to the carrier part 2 of the vehicle. The fastener 1 comprises preferably at least two wings 50, 50' connected to the foot portion 30 via a coupling portion 31 of the foot portion 30 wherein said wings 50, 50' comprise each a decoupling element 51, 51'. The decoupling elements 51, 51' are pre-mounted on the foot portion 30 and made of a material softer than at least the material of the portion of the wings 50, 50' covered by the decoupling element 51, 51'. The decoupling elements 51, 51' are covering at least a portion of the wings 50, 50', such that when the foot portion 30 is fastened to the car body 2 the decoupling elements 51, 51' are in contact with the car body 2.

[0049] Furthermore, the fastener 1 comprises the following preferred features: the decoupling elements 51, 51' are decoupling coatings 51, 51' and are molded on the wings 50, 50'; the carrier part 2 is a car body 2 and the foot portion 30 is configured to be fastened via a hole in the car body 2; the wings 50, 50' comprise each a free end 50.1, 50.1' and the decoupling coatings 51, 51' are located at or close to the free ends 50.1, 50.1' at a radially outer portion of the free end; the wings 50, 50' are facing each other so that the hole of the car body 2 is contacted on two opposing sides; the free ends 50.1, 50.1' of the wings 50, 50' comprise a step forming a radial shoulder 50.1a, 50.1a' and an axial collar 50.1b, 50.1b' and the decoupling coatings 51, 52' are coating the upper (i.e. facing the head portion 20) part of the radial shoulders 50.1a, 50.1a' and the radially outer part of the axial collars 50.1b, 50.1b' – the shoulder and collar configuration is also present in the drawings Fig. 2A-c and 3A-c however, not specifically referenced by referenced numerals; the head portion 20 serves for connecting the trim to the fastener by sliding it into a rail or groove of the trim.

[0050] **Figure 2A** shows a conceptual overview of the fastener 1 based on Figure 1, whereby the fastener 1 has a flange 40 with a sealing lip 41 wherein the sealing lip 41 has a shape or diameter larger than the shape or diameter of the hole of the car body 2 so that it is sealing the flange 40 against the surface around the hole of the car body 2. The decoupling coatings 51, 51' and the sealing lip 41 are of the same soft material. The decoupling coat-

ings 51, 51' and the sealing lip 41 are each connected via a bridge 80, 80'. The bridges 80, 80' may be cut afterwards.

[0051] The sealing lip 41 and the decoupling coatings 51, 51' are formed by molding during the same molding step, such that the same tools are used for molding them. For example, soft material is injected to an injection point at the flange 40 for forming the sealing lip 41 and two (open) channels in the tool are guiding the material further to the free ends 50.1, 50.1' of the wings 50, 50' for forming the respective decoupling coating 51, 51' and resulting in the bridges 80, 80'.

[0052] **Figure 2B** shows a perspective overview of the fastener 1 of Figure 2A. The bridges 80, 80' between the sealing lip 41 and the decoupling coatings 51, 51' are hidden by the shape of the sealing lip 41.

[0053] **Figure 2C** shows a perspective explosion view of the fastener 1 of Figure 2A and 2B, whereby the soft material is shown in perspective so that the sealing lip 41, the decoupling coatings 51, 51' and the bridges 80, 80' are well visible. The radial outer portions at the free ends 50.1, 50.1' of the wings 50, 50', where the wings 50, 50' are overmolded by the decoupling coatings 51, 51', are well visible. Likewise, the flange 40 is shown without its sealing lip 41.

[0054] **Figure 3A** shows a conceptual overview of a variant of the fastener 1 based on Figure 2A-C, whereby the sealing lip 41 and the decoupling coatings 51, 51' are not linked together by bridges 80, 80'.

[0055] The sealing lip 41 and the decoupling coatings 51, 51' are of the same material. The sealing lip 41 and the decoupling coatings 51, 51' are formed by molding. They may be formed at the same time (preferred) but separately via separate injection points or they may be formed during different molding steps.

[0056] **Figure 3B** shows a perspective overview of the fastener 1 of Figure 3A, whereby material used for the decoupling coatings 51, 51' is also covering the wings 50, 50' throughout between the coupling portion 31 and the decoupling coatings 51, 51', such that

a respective connection 52, 52' made of the material used for the decoupling coatings 51, 51' connects the coupling portion 31 with the decoupling coatings 51, 51'.

[0057] The material for molding the decoupling coatings 51, 51' is injected through the common injection point 33 on the coupling portion 31 and is, when it is liquid, guided along the wings 50, 50' from the coupling portion 31 towards the decoupling coatings 51, 51' at the free ends 50.1, 50.1'.

[0058] **Figure 3C** shows a perspective explosion view of the fastener 1 of Figure 3A and 3B, whereby the soft material is shown in perspective so that the sealing lip 41, the connections 52, 52' and the common injection point 32 are well visible.

Reference signs

1	Fastener	50.1'	Free end
2	Carrier part	50.1a	Radial shoulder
20	Head portion	50.1a'	Radial shoulder
30	Foot portion	50.1b	Axial collar
31	Coupling portion	50.1b'	Axial collar
32	Common injection point	51	Decoupling element
40	Flange	51'	Decoupling element
41	Sealing lip	52	Connection
50	Wing	52'	Connection
50'	Wing	80	Bridge
50.1	Free end	80'	Bridge

Claims

1. A fastener (1) for fastening an element to be fastened to a carrier part (2) of a vehicle, whereby the fastener (1) comprises:
 - a head portion (20), which is configured for being fastened to the element to be fastened,
 - a foot portion (30), which is configured for being fastened to the carrier part (2),
 - at least one wing (50) connected to the foot portion (30) via a coupling portion (31) of the foot portion (30);**characterized in that** said wing (50) comprises a decoupling element (51), which is pre-mounted to the foot portion (30) and which is covering at least a portion of the wing (50), such that when the foot portion (30) is fastened to the carrier part (2) the decoupling element (51) is contacting the carrier part (2), wherein the decoupling element (51) is made of a material softer than at least the material of the portion of the wing (50) covered by the decoupling element (51).
2. A fastener (1) according to claim 1, wherein the decoupling element (51) is a decoupling coating applied onto the portion of the wing (50).
3. A fastener (1) according to claim 1 or 2, wherein the fastener has a flange (40) between the foot portion (30) and the head portion (20).
4. A fastener (1) according to claim 3, wherein the flange (40) has a sealing lip (41) for sealing the flange (40) against a surface of the carrier part (2).
5. A fastener (1) according to claim 4, wherein the decoupling element (51) and the sealing lip (41) are of the same material.
6. A fastener (1) according to claim 5, wherein the decoupling element (51) and the sealing lip (41) are connected or have been connected via a bridge (80).
7. A fastener (1) according to one of claims 1 to 5, wherein the wing (50) comprises a free end (50.1), and wherein the material used for the decoupling element (51) is also covering the wing (50) throughout between the coupling portion (31) and the decoupling element

(51), such that a connection (52) made of the material used for the decoupling element (51) connects the coupling portion (31) with the decoupling element (51).

8. A fastener (1) according to claim 7, wherein the foot portion (30) comprises a further wing (50') connected to the foot portion (30) via the coupling portion (31) of the foot portion (30) and comprising a further decoupling element (51'), wherein the material used for the decoupling elements (51, 51') is also covering the further wing (50') throughout between the coupling portion (31) and the further decoupling element (51'), such that a further connection (52') built of the material used for the further decoupling element (51') connects the coupling portion (31) with the further decoupling element (51').

9. A method for manufacturing a fastener (1) for fastening an element to be fastened to a carrier part (2) of a vehicle, whereby the method comprises:

- manufacturing a head portion (20), which is configured for being fastened to the element to be fastened, and a foot portion (30), which is configured for being fastened to the carrier part (2), and at least one wing (50) connected to the foot portion (30) via a coupling portion (31) of the foot portion (30),

characterized in that the method comprises additionally:

- creating and fixing, the fixing taking place before mounting the fastener (1) to the carrier part, a decoupling element (51) to at least a portion of the wing (50), such that when the foot portion (30) is fastened to the carrier part (2) the decoupling element (51) is contacting the carrier part (2) and wherein the decoupling element (51) is manufactured out of a material softer than at least the material of the portion of the wing (50) covered by the decoupling element (51).

10. A method according to claim 9, wherein the decoupling element (51) is created and fixed to the at least one portion of the wing (50) as a decoupling coating.

11. A method according to claim 9 or 10, wherein a flange (40) of the fastener (1) is formed between the foot portion (30) and the head portion (20).

12. A method according to claim 11, wherein a sealing lip (41) is fixed or formed on the flange (40).

13. A method according to claim 12, wherein the sealing lip (41) and the decoupling element (51) are both formed during the same manufacturing step.

14. A method according to claim 12 or 13, wherein the sealing lip (41) and the decoupling element (51) are formed out of the same material.

15. A fastener (1) according to claim 13 and 14, wherein the decoupling element (51) and the sealing lip (41) are created by molding and the material used for the decoupling element (51) and the sealing lip (41) is running from the sealing lip (41) to the decoupling element (51) or vice-versa from the decoupling element (51) to the sealing lip (41) forming a bridge (80).

16. A method according to one of the claims 9 to 14, wherein manufacturing of the foot portion (30) comprises

- Manufacturing a free end (50.1) of the wing (50) and

wherein the decoupling element (51) is created by molding, wherein the material used for the decoupling element (51) is injected on the coupling portion (31) and guided along the wing (50), when it is liquid, from the coupling portion (31) towards the free end (50.1).

17. A method according to claim 16, wherein a further wing (50') is manufactured which is connected to the foot portion (30) via the coupling portion (31) of the foot portion (30), and wherein, when the decoupling element (51) is molded, also a further decoupling element (51') of the further wing (50') is molded and wherein the material for the decoupling elements (51, 51') is injected via a common injection point (32), common to both decoupling elements (51, 51').

18. A fastener (1) fastening an element to a carrier part (2) of a vehicle, the fastener (1) comprising:

- a head portion (20) fastened to the element;

- a foot portion (30) fastened to the carrier part (2);

- at least one wing (50) connected to the foot portion (30) via a coupling portion (31) of the foot portion (30), wherein said wing (50) comprises a decoupling element (51) mounted to the foot portion (30) and covering at least a portion of the wing (50), such that the decoupling element (51) is in contact with the carrier part (2), wherein the decoupling element

(51) is made of a material that is softer than a material of the portion of the wing (50) covered by the decoupling element (51).

19. A fastener (1) according to claim 18, wherein:

the decoupling element (51) is a decoupling coating applied onto the portion of the wing (50);

and/or

the fastener has a flange (40) between the foot portion (30) and the head portion (20);

and/or

the flange (40) has a sealing lip (41) that seals the flange (40) against a surface of the carrier part (2);

and/or

the decoupling element (51) and the sealing lip (41) are of the same material;

and/or

the decoupling element (51) and the sealing lip (41) are connected via a bridge (80);

and/or

the wing (50) comprises a free end (50.1), wherein the material used for the decoupling element (51) also covers the wing (50) from the free end all the way to the coupling portion (31), such that a connection (52) made of the material used for the decoupling element (51) connects or runs from the coupling portion (31) along the wing to the decoupling element (51) at the free end;

and/or

the foot portion (30) comprises a further wing (50') connected to the foot portion (30) via the coupling portion (31) of the foot portion (30) and comprising a further decoupling element (51'), wherein the material used for the decoupling elements (51, 51') also covers the further wing (50') from a free end (50.1') all the way to the coupling portion (31), such that a further connection (52') made of the material used for the further decoupling element (51') connects or runs from the coupling portion (31) along the further wing (50') to the further decoupling element (51') at the free end (50.1').

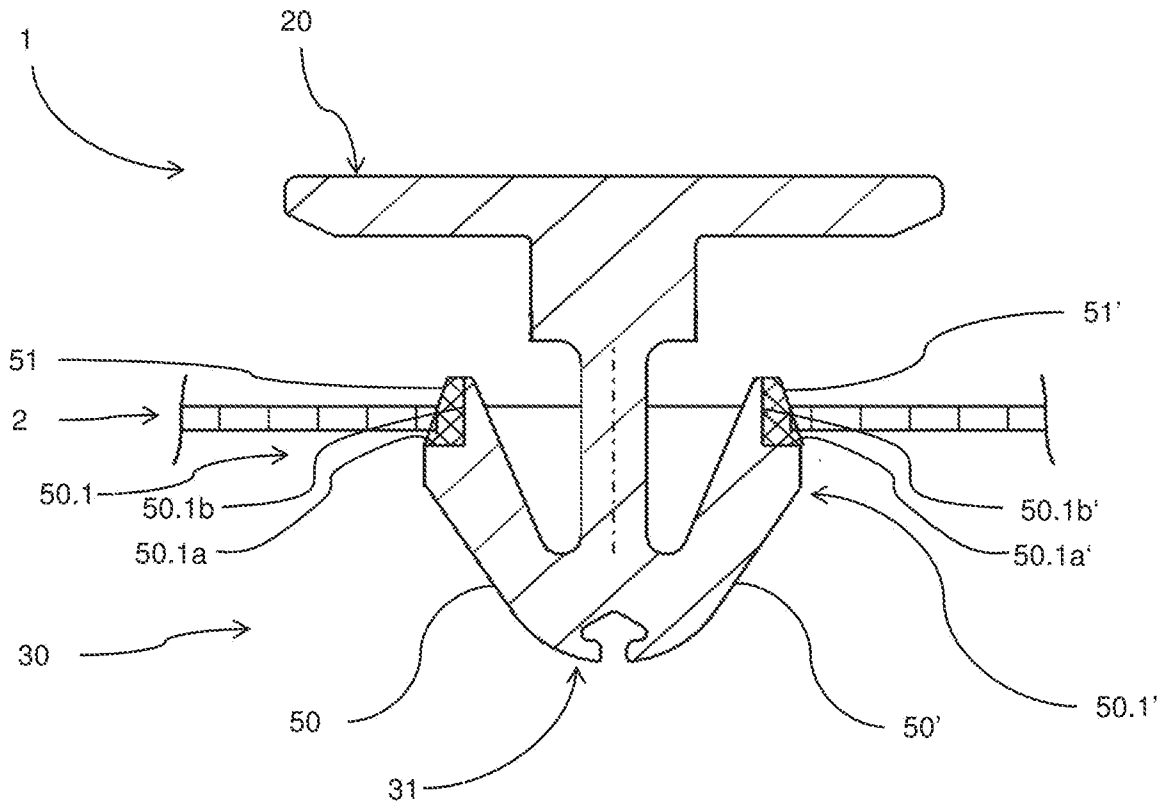


Fig. 1

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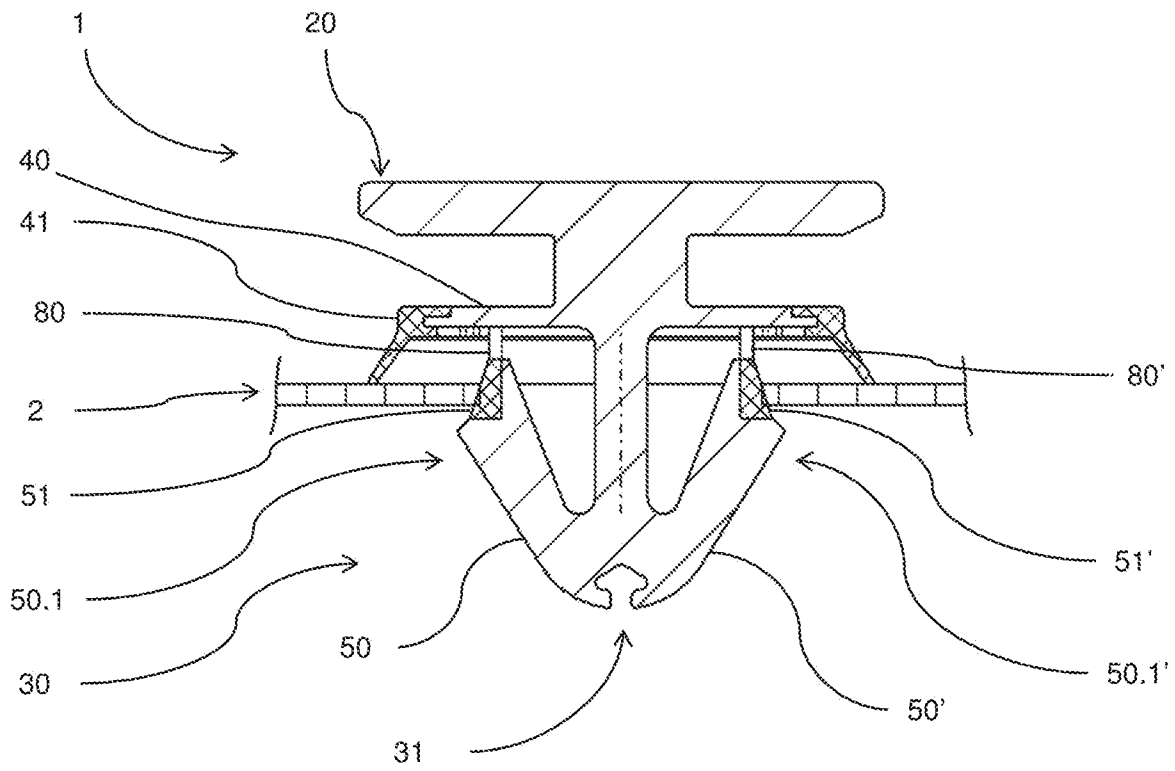


Fig. 2A

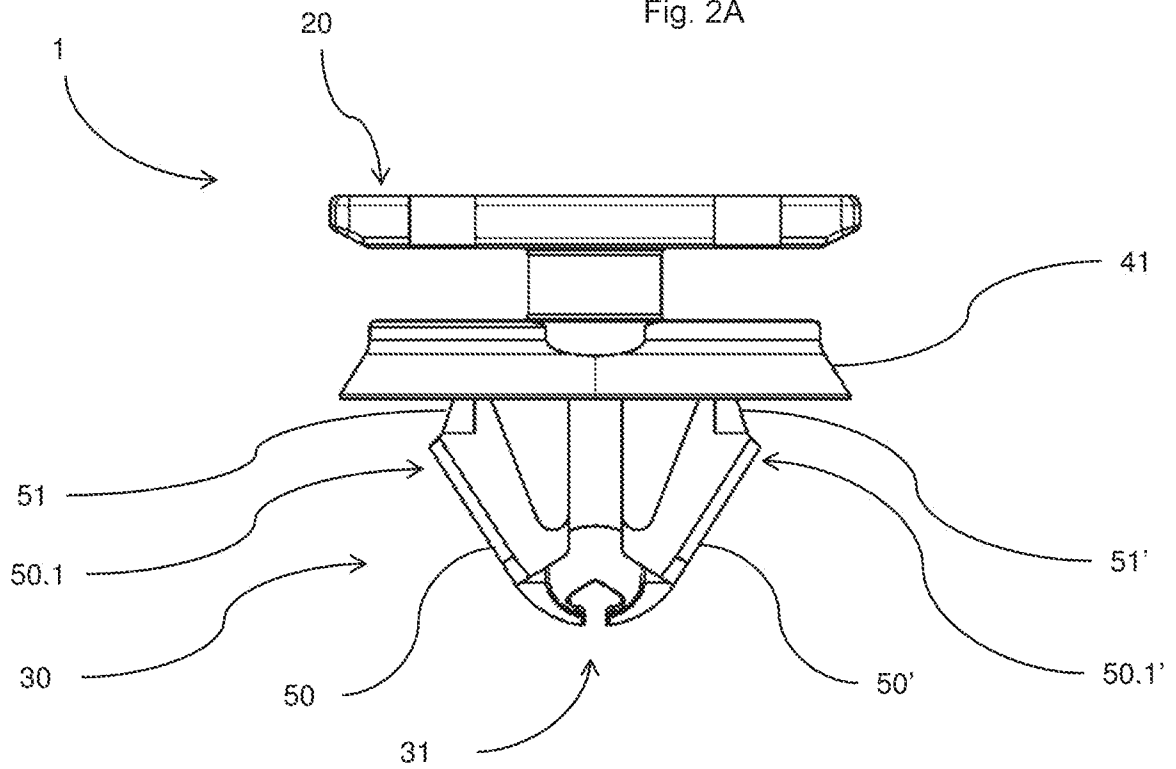
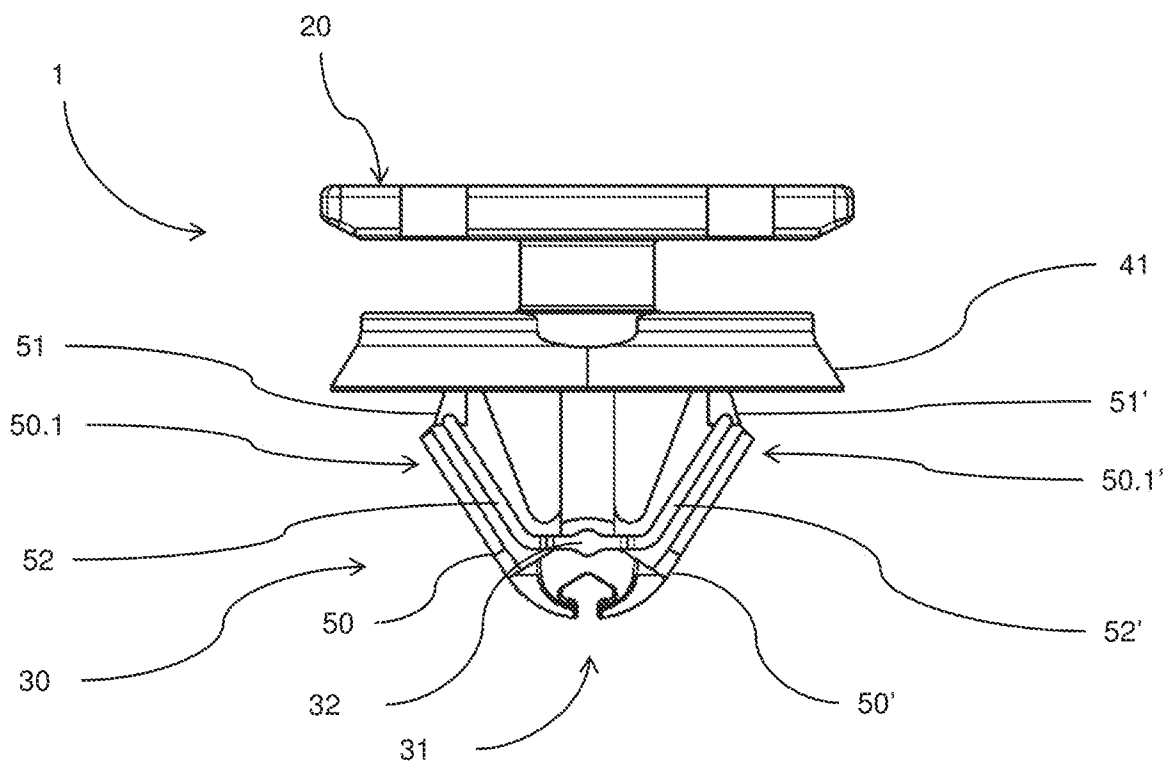
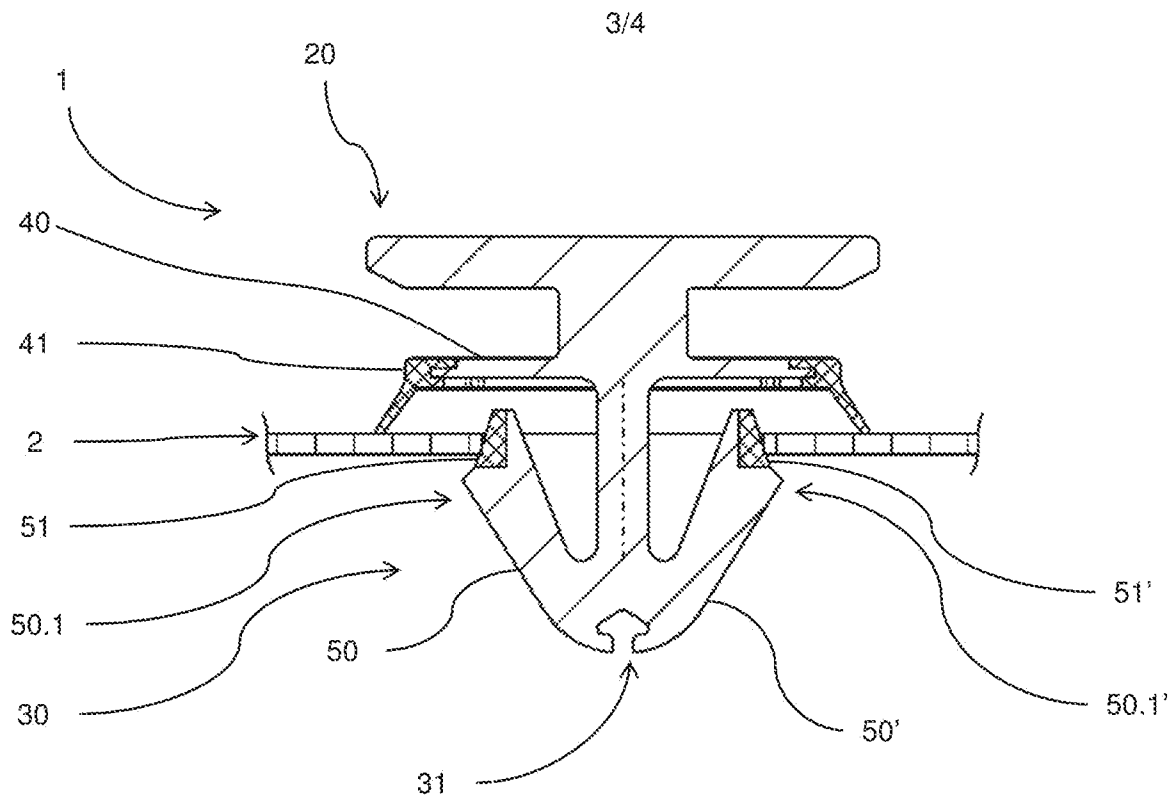


Fig. 2B



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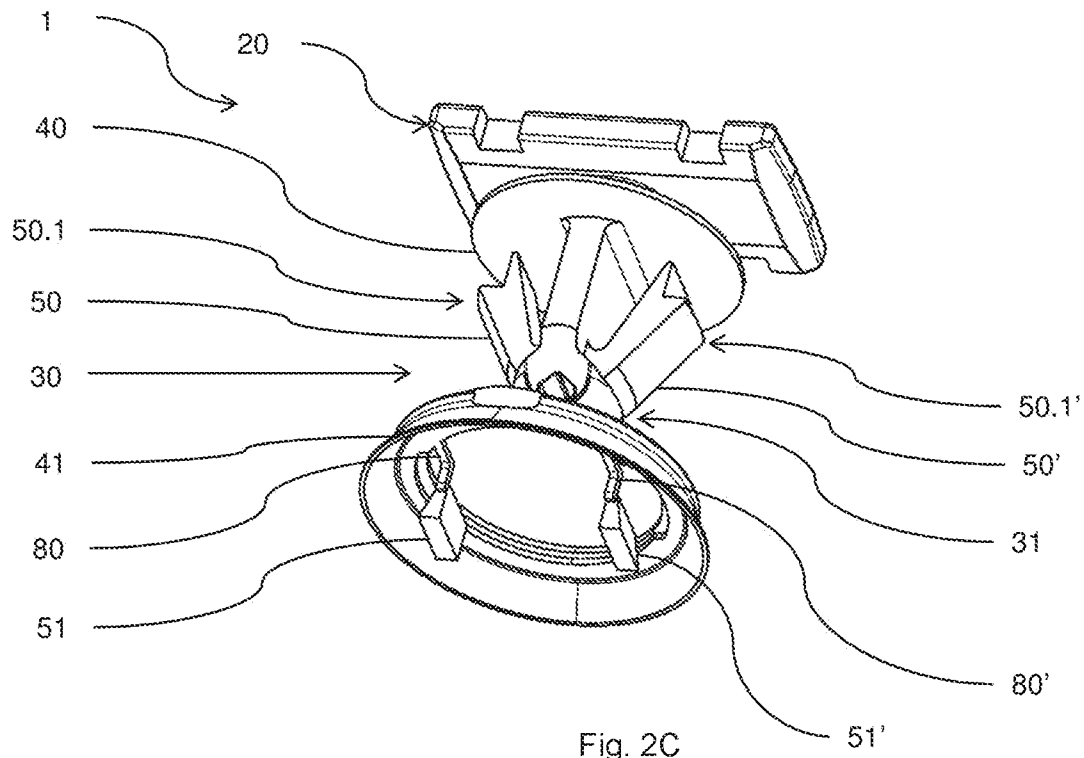


Fig. 2C

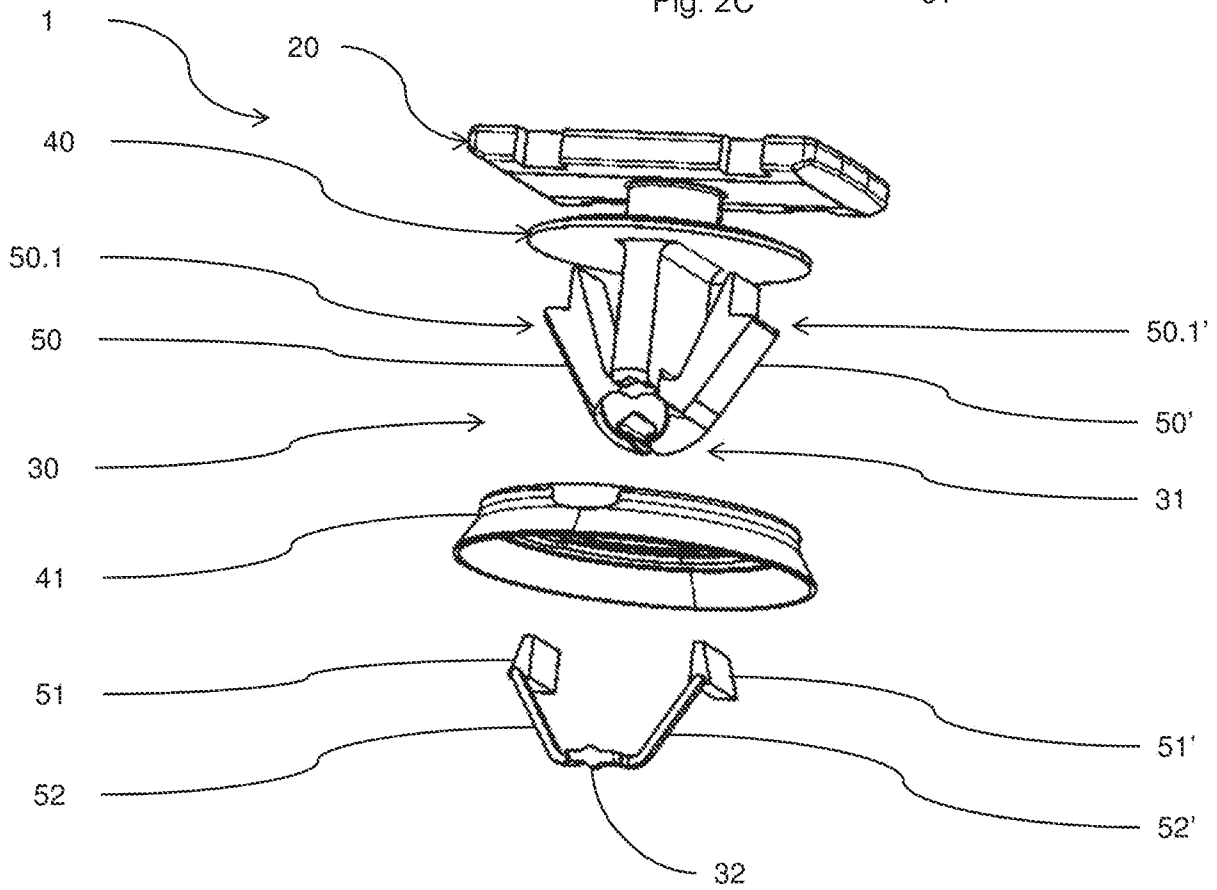


Fig. 3C

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/030967

A. CLASSIFICATION OF SUBJECT MATTER
INV. F16B21/08 F16B5/06 B60R13/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F16B B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2015/322985 A1 (SCROGGIE DEREK [US] ET AL) 12 November 2015 (2015-11-12) paragraphs [0002], [0024]; figures 2,3 -----	1-19
Y	US 2010/026028 A1 (SMITH MICHAEL WALTER [US] ET AL) 4 February 2010 (2010-02-04) paragraphs [0002], [0050] -----	1-19
A	US 2002/066166 A1 (GRAMSS RAINER [DE]) 6 June 2002 (2002-06-06) paragraphs [0002], [0008], [0010], [0013] -----	1-19
A	WO 2013/142559 A2 (ILLINOIS TOOL WORKS [US]) 26 September 2013 (2013-09-26) claims 12-15 -----	1-19



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

28 July 2017

Date of mailing of the international search report

23/08/2017

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Authorized officer

Garmendia, Ion

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/030967

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