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(54) Title: AIR SEAL FOR AN AUTOMOTIVE HEAT EXCHANGER

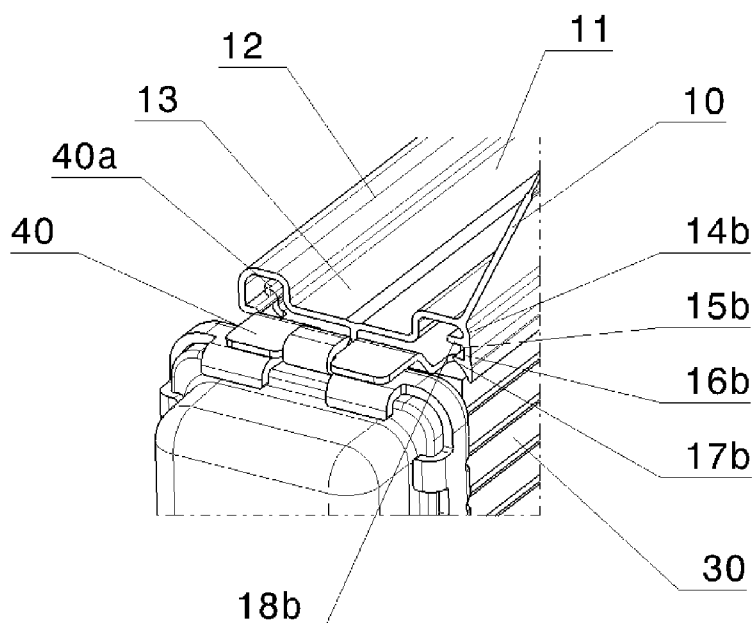


FIG. 5

(57) Abstract: The invention relates to an air seal (11) for an automotive heat exchanger which heat exchanger has a core (30) and a sideplate (40) mounted on the core (30) and having a first and a second longitudinal side edges (40a, 40b), which air seal (11) has an elongate shape and comprises a profiled base (12) for connecting with the side plate (40). The profiled base (12) comprises a longitudinal flat middle section (13), a first and a second longitudinal edges (14a, 14b) bent towards the sideplate (40) during mounting and forming a longitudinal hook (15a) on the first edge (14a) and a longitudinal lock (15b) on the second longitudinal edge (14b). Said lock (15b) of the second longitudinal edge (14b) comprises a longitudinal blocking lip (18b) located at a distance from the end wall (17b) of the lock (15b) and protruding from the inner side of a middle wall (16b) to such a distance that, between said blocking lip (18b), said middle wall (16b) and said end wall (17b), there is defined a cavity for receiving and blocking said second longitudinal edge (40b) of the sideplate



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Air Seal for an Automotive Heat Exchanger

THE FIELD OF THE INVENTION

5 [0001] The invention relates to an air seal for an automotive heat exchanger which is used in an automotive heat exchanger comprising a core and a sideplate in order to better seal airflow, and which is attached to the sideplate.

PRIOR ART

10 [0002] There are known seals of this type for use in a heat exchanger of a vehicle and which are connected with the sideplate of the heat exchanger core. Such a known and used air seal is presented in the attached Figures 1 - 4, wherein Fig. 1 shows a perspective view of a fragment of a heat exchanger 20 with an air seal 1 mounted on a sideplate 40 of the heat exchanger 20; Fig. 2 shows a perspective
15 view of an enlarged detail "A" from Fig. 1; Fig. 3 shows a front view of the air seal 1 in the correct position on the sideplate 40; and Fig. 4 shows a front view of the air seal in an incorrect position on the sideplate 40. This known air seal 1 has an elongate shape and comprises a profiled base 2 for connecting with the sideplate 40 of the heat exchanger 20 and for sealing thereof; the profiled base 2 has an longitudinal flat
20 middle section 3 and first and second longitudinal edges 4a, 4b, bent towards that side of the air seal 1 which faces the side plate 40 after mounting. On the first longitudinal edge 4a there is formed a hook 5a for engaging the air seal on the first longitudinal edge 40a of the sideplate 40, and on the second longitudinal edge 4b there is formed a lock 5b for blocking the air seal 1 on the second longitudinal edge
25 40b of the sideplate 40. The hook 5a and the lock 5b have respectively bent middle walls 6a, 6b and end walls 7a, 7b.

[0003] The air seal 1 is adapted to be attached on the sideplate 40 of the core of the heat exchanger 20 in such a way that, first, the first longitudinal edge 40a of the sideplate 40 is surrounded with the first longitudinal edge 4a and subsequently
30 the opposite longitudinal edge 40b of the side plate 40 is surrounded the second

longitudinal edge 4b of the air seal 1, and the lock 5b of the air seal 1 is blocked on said second longitudinal edge 40b of the sideplate 40. When the air seal 1 has been correctly mounted on the longitudinal edges 40a, 40b of the sideplate 40 of the heat exchanger 20, as shown in Fig. 3, the flat section 3 of the air seal 1 is positioned approximately parallel to the surface of the sideplate 40, and the bent edges 4a, 4b of the air seal 1 surround the longitudinal edges 40a, 40b of the side plate and are at a distance from the core 30 of the heat exchanger 20. However, when mounting the air seal 1, in particular when clamping the lock 5b on the longitudinal edge 40b of the sideplate and after that operation, elements of the heat exchanger core (fins, tubes, etc.) are frequently damaged because inside the area delimited by the curved second longitudinal edge 4b of the air seal 1 there is a zone allowing considerable dislocation of said longitudinal edge 4b towards the core 30, which exerts pressure on the core 30 of the heat exchanger 20 (Fig. 4). Even if the air seal is correctly positioned during mounting, its second longitudinal edge 4b may be dislocated relative to the longitudinal edge 40b of the sideplate 40 during use, which may also cause damage of the core

[0004] The purpose of the present invention is to provide an air seal for a heat exchanger which, on the one hand, is easy to mount on the sideplate of a heat exchanger, and on the other hand, ensures that the fins and other elements of the exchanger are protected against damage during mounting thereof.

[0005] The purpose of the present invention is also to provide an air seal that allows protection against damage of the heat exchanger core and at the same time is easy to be made in one extrusion process.

25 SUMMARY OF THE INVENTION

[0006] The purposes of the invention are fulfilled by an air seal presented in the independent claim no. 1.

[0007] Additional features of the invention are presented in the dependent claims.

30 [0008] The air seal according to the invention can be precisely and securely mounted on the heat exchanger sideplate, especially relative to the heat exchanger

core, allowing preventing undesired and damaging dislocation of the air seal relative to the core during the mounting and use.

BRIEF DESCRIPTION OF THE FIGURES

5 [0009] The invention is explained in the following description with reference to the attached drawings wherein:

Fig. 5 shows a perspective view of a fragment of a heat exchanger with the air seal according to the invention placed thereon;

Fig. 6 shows a perspective view of the air seal according to the invention;

10 Fig. 7 shows a front view of the air seal according to the invention mounted on the sideplate of a heat exchanger;

Fig. 8 shows a front view of the air seal according to the invention mounted on the sideplate of a heat exchanger, during use.

15 DESCRIPTION OF PREFERRED EMBODIMENTS

[0010] In the present description the term „elongate” defines the shape which has one dimension considerably longer than the other one, whereas the term „longitudinal” relating to individual elements defines the direction in which those elements are situated i.e. extending along the longer dimension.

20 [0011] Here below, in reference to elements of the air seal according to the invention which are the same as those indicated above in the air seal from the state of the art, analogous reference numbers increased by 10 are used.

[0012] Referring to Fig. 5, it shows a fragment of an automotive heat exchanger 20 comprising a core 30 and a sideplate 40 attached thereto, which has
25 first and second edges 40a, 40b extending outwards and approximately parallel to the middle surface of the sideplate 40. The sideplate 40 of the heat exchanger 20 is sealed by means of an air seal 11 according to the invention, connected therewith.

[0013] The air seal 11 according to the invention, as presented in more detail in Figs. 6 – 8, has an elongate shape and comprises a profiled base 12 for connecting with the sideplate 40 of the heat exchanger 20 and for sealing with other component parts of a vehicle. The profiled base 12 has a longitudinal flat middle section 13 and, extending on the sides thereof, a first longitudinal edge 14a and a second longitudinal edge 14b. The longitudinal edges 14a, 14b are bent to that side of the air seal 11 which, after mounting, faces the sideplate 40 of the heat exchanger 20 and is further bent to the middle of the profiled base 12 in such a way that a longitudinal hook 15a adjusted to engage with the first longitudinal edge 40a of the side plate 40 is formed on the first longitudinal edge 14a of the air seal 11, whereas, on second longitudinal edge 14b of the sideplate 11, there is formed a longitudinal lock 15b adjusted to block the second longitudinal edge 40b of the sideplate 40 when mounting the air seal 11 on the sideplate 40.

[0014] As shown in Figs. 6 – 8, each of the hook 15a and the lock 15b has a middle wall 16a, 16b, respectively, approximately perpendicular to the flat middle section 13 of the air seal 11 and an end wall 17a, 17b, respectively, extending from the middle wall 16a, 16b, respectively, towards the middle of the flat section 13 of the profiled base 12.

[0015] In order to precisely and securely fix the position of the air seal 11 on the heat exchanger sideplate 40, especially relative to the heat exchanger core 30 and prevent undesired and damaging dislocation of the air seal 11 relative to the core 30 during the mounting and use thereof, according to the invention, the lock 15b is equipped with a longitudinal blocking lip 18b which is formed on the inner side of the middle wall 16b of the lock 15b.

[0016] The blocking lip 18b extends at a distance D1 from the end wall 17b of the lock 15b and protrudes from the inner side of said middle wall 16b to such a distance D2 that, between said blocking lip 18b, said end wall 17b and said middle wall 16b of the lock 15b there is defined a cavity 19 for receiving and blocking the second longitudinal edge 40b of the heat exchanger sideplate 40 when mounting the air seal 11 on the sideplate 40.

[0017] The distance D1 between the blocking lip 18b and the end wall 17b of the lock 15b and the distance D2 to which the blocking lip 18b protrudes from the

middle wall 17b, are selected such that, when mounting the air seal 11 on the sideplate 40 of the heat exchanger 20 and using thereof, the end wall 17b of the lock 15b is located at a distance from the core 30 of the heat exchanger 20 when the side edge 40b of the sideplate 40 abuts said blocking lip 18b. Consequently, the core 30 is secured against damage that could be caused by pressing the air seal 11 against the core 30.

[0018] Thus, the profile of the air seal 11 for a heat exchanger 20 as modified according to the invention effectively prevents or at least limits the dislocation of said air seal towards the core 30 of the heat exchanger 20.

10 [0019] The air seal 11 may also comprise at least one longitudinal wing 10 protruding away from the profiled base 12 in the direction opposite to the surface directed to the sideplate 40. Such a longitudinal wing 10 is intended to seal with other component parts of a vehicle.

15 [0020] The air seal 11 may also comprise at least one longitudinal repelling rib 10a, extending away from the surface of the profiled base flat section 13 intended to face the sideplate 40 when mounted. The repelling lip 10a maintains the position of the air seal 11 relative to the sideplate 40 and ensures correct blocking of the second longitudinal edge 40b of the sideplate 40 in the lock 15b of the air seal 11.

20 [0021] The entire air seal 11 with a modified profile according to the invention may be easily made in the process of extrusion of plastic, which ensures resilient properties. The method of mounting the seal 11 according to the invention on the sideplate 40 is the same as described in relation to the air seal 1 of the prior art described in the beginning, but when surrounding the second longitudinal edge 40b of the sideplate 40 with the second longitudinal edge 14b of the air seal 11, 25 according to the invention, the second longitudinal edge 40b of the sideplate 40 is placed in the cavity 19 formed in the lock 15b of the air seal 11. The blocking lip 18b limits dislocation of the second longitudinal edge 40b from the top and prevents the air seal 11 from exerting pressure on the core 30.

Claims

1. An air seal (11) for an automotive heat exchanger (20), which heat exchanger
5 (20) has a core (30) and a sideplate (40) mounted on the core (30) and having longitudinal side edges (40a, 40b); said air seal (11) having an elongate shape and comprising a profiled base (12) for connecting with the side plate (40) of the heat exchanger (20); the profiled base (12) comprising:
- a longitudinal flat middle section (13),
 - 10 • a first longitudinal edge (14a) bent to the side facing the sideplate (40) during mounting and forming a longitudinal hook (15a) for engaging with the longitudinal edge (40a) of the sideplate (40);
 - a second longitudinal edge (14b) bent towards the sideplate (40) during mounting and forming a longitudinal lock (15b) for blocking with the second
15 longitudinal edge (40b) of the sideplate (40) and having a middle wall (16b) approximately perpendicular to said flat middle section (13) and an end wall (17b) extending from the middle wall (16b) towards the centre of the flat middle section (13),

characterized in that

- 20 said lock (15b) of the second longitudinal edge (14b) comprises a longitudinal blocking lip (18b) located at a distance (D1) from said end wall (17b) of the lock (15b) and protruding from the inner side of said middle wall (16b) to such a distance (D2) that, between said blocking lip (18b), said middle wall (16b) and
25 said end wall (17b) there is defined a cavity (19) for receiving and blocking said second longitudinal edge (40b) of the sideplate (40) of the heat exchanger (20) when mounting the air seal (11) on the sideplate (40).
2. The air seal (11) according to claim 1, wherein the distance (D1) between said blocking lip (18b) and said end wall (17b) of the lock (15b) is selected such that, when mounting the air seal (11) on the sideplate (40) of the heat exchanger (20)
30 and using it, the end wall (17b) of the lock (15b) is spaced from the core (30) of

the heat exchanger (20) while the side edge (40b) of the sideplate (40) abuts said blocking lip (18b).

3. The air seal (11) according to claim 1 or 2, wherein it comprises a longitudinal wing (10) protruding from the profiled base (12) in the direction opposite to the surface intended to face the sideplate (40) when mounted.
4. The air seal (11) according to claims 1-3, wherein it comprises a longitudinal repelling rib (10a) extending away from the surface of the profiled base flat section (13) intended to face the sideplate (40) when mounted.
5. The air seal (11) according to claims 1-4, wherein it is entirely made in one process of extrusion.

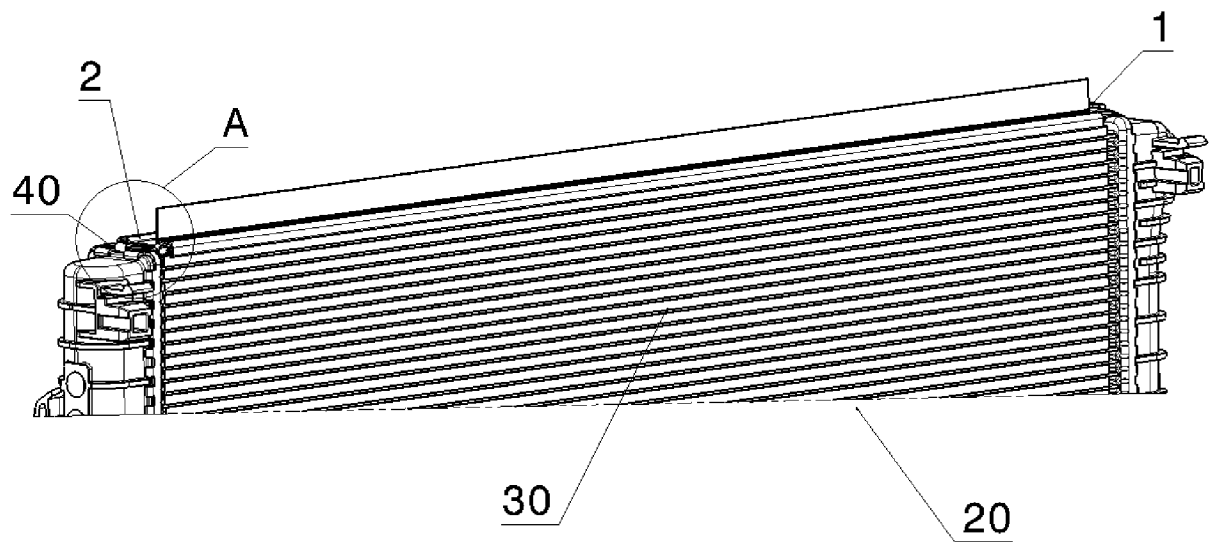


FIG. 1

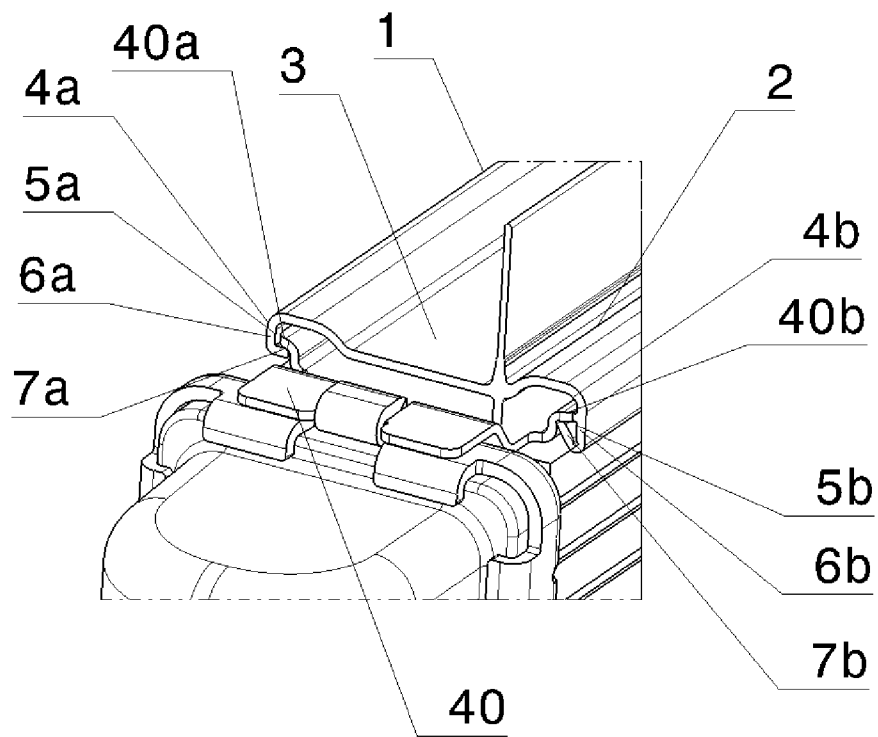
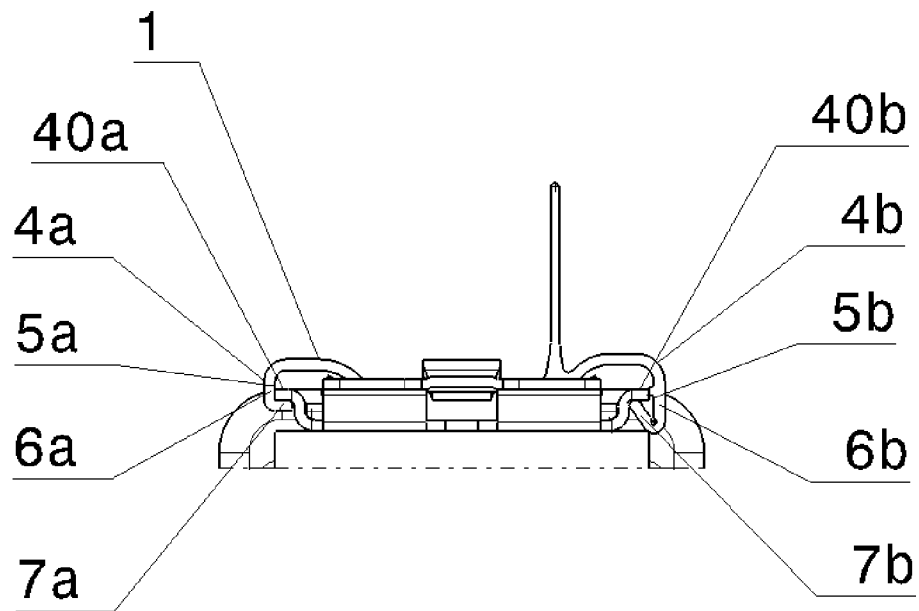
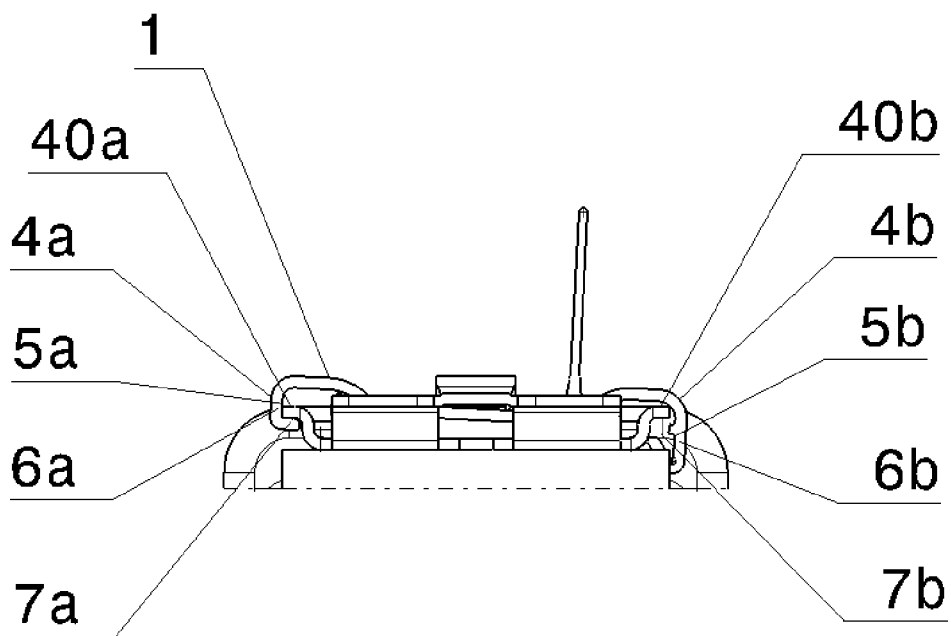


FIG. 2

FIG. 3FIG. 4

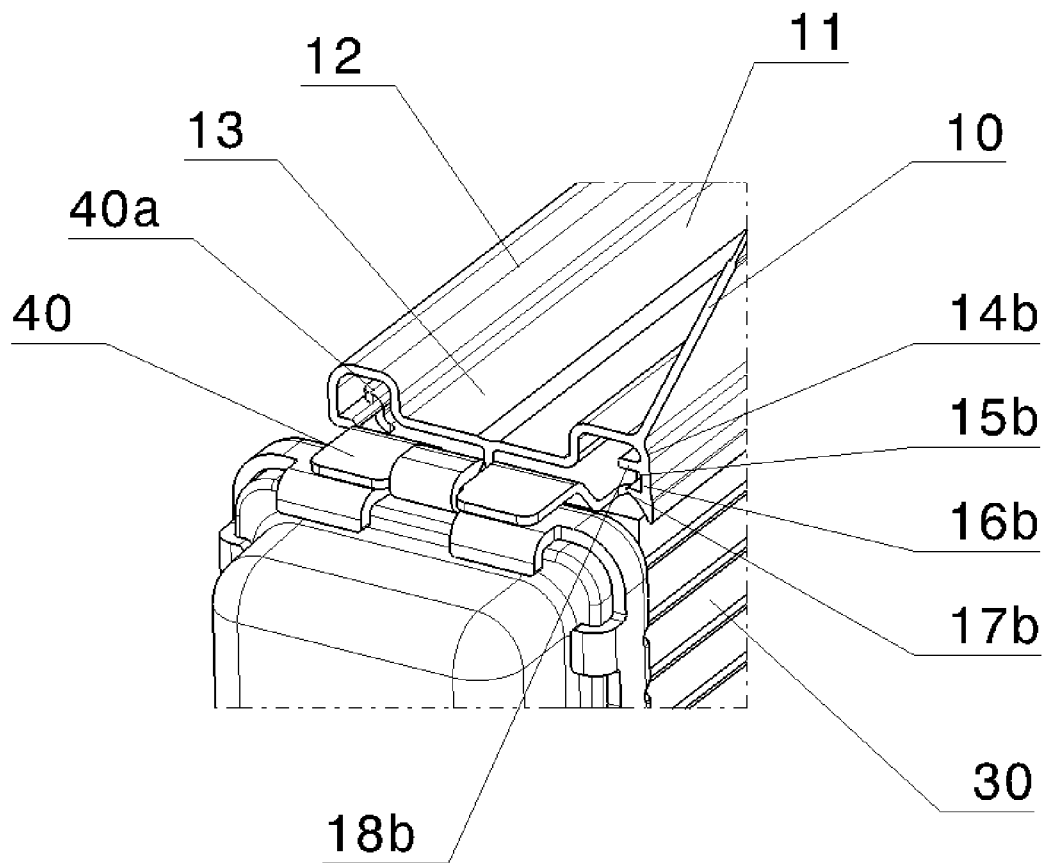


FIG. 5

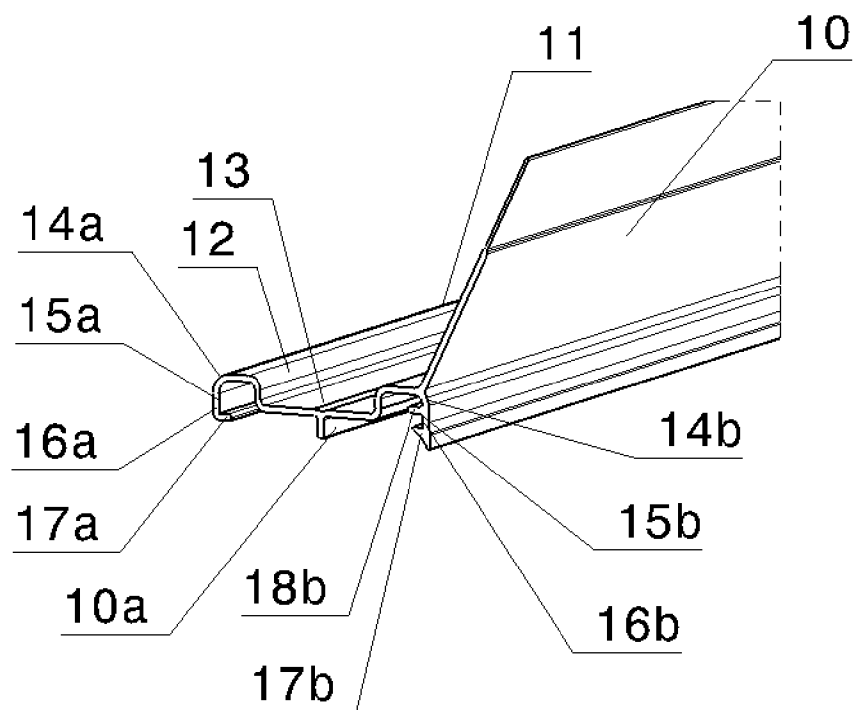


FIG. 6

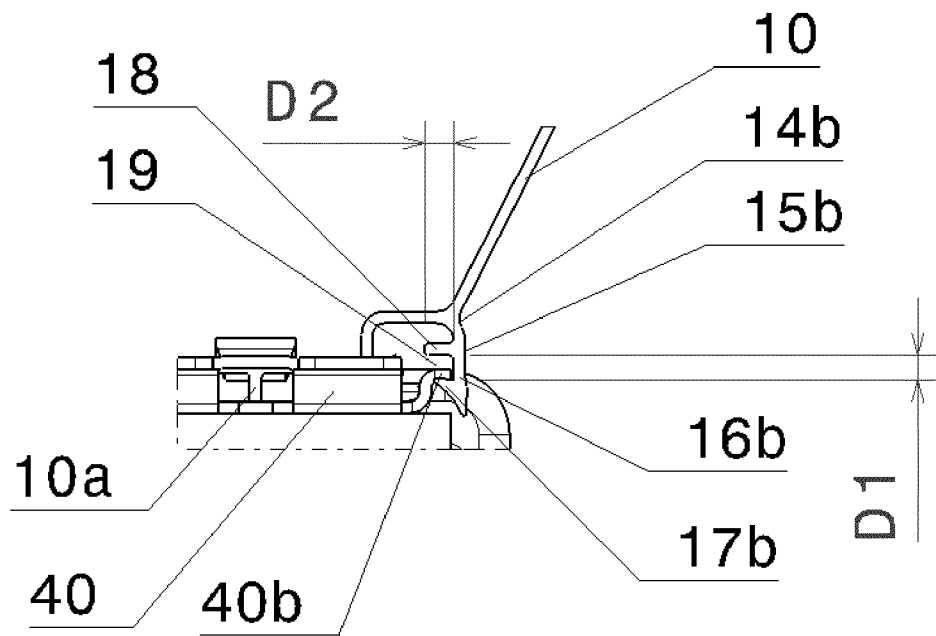


FIG. 7

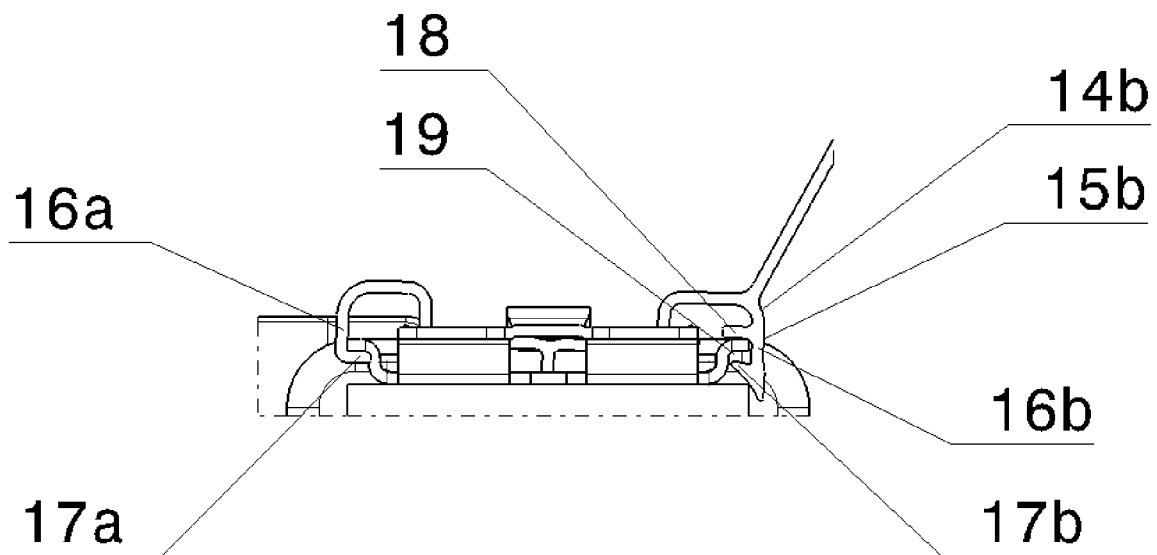


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/077682

A. CLASSIFICATION OF SUBJECT MATTER INV. F28F9/02 F28D1/053 B60K11/04 B60H1/00 F01P3/18 F01P11/10 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) F28F B23K F28D B60K B60H F01P F16J B60J 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																	
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category*</th> <th style="width: 70%;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width: 20%;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td>DE 10 2004 017339 A1 (BEHR GMBH & CO KG [DE]) 27 October 2005 (2005-10-27) abstract; figure 2 -----</td> <td style="text-align: center;">1-5</td> </tr> <tr> <td style="text-align: center;">A</td> <td>US 6 182 745 B1 (POTIER MICHEL [FR]) 6 February 2001 (2001-02-06) column 2, line 66 - column 4, line 11; figures 1-3 -----</td> <td style="text-align: center;">1-5</td> </tr> <tr> <td style="text-align: center;">A</td> <td>DE 299 11 505 U1 (BEHR GMBH & CO [DE]) 16 September 1999 (1999-09-16) abstract; figures 1-3 page 4, line 11 - page 5, line 8 -----</td> <td style="text-align: center;">1-5</td> </tr> <tr> <td style="text-align: center;">A</td> <td>FR 2 991 245 A1 (PEUGEOT CITROEN AUTOMOBILES SA [FR]) 6 December 2013 (2013-12-06) figures 2,3 ----- -/-</td> <td style="text-align: center;">1-5</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	DE 10 2004 017339 A1 (BEHR GMBH & CO KG [DE]) 27 October 2005 (2005-10-27) abstract; figure 2 -----	1-5	A	US 6 182 745 B1 (POTIER MICHEL [FR]) 6 February 2001 (2001-02-06) column 2, line 66 - column 4, line 11; figures 1-3 -----	1-5	A	DE 299 11 505 U1 (BEHR GMBH & CO [DE]) 16 September 1999 (1999-09-16) abstract; figures 1-3 page 4, line 11 - page 5, line 8 -----	1-5	A	FR 2 991 245 A1 (PEUGEOT CITROEN AUTOMOBILES SA [FR]) 6 December 2013 (2013-12-06) figures 2,3 ----- -/-	1-5
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INTERNATIONAL SEARCH REPORT

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