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(54)	Title	Fastening device and tool for fastening a heater cable to a mesh structure
(57)	Abstract	

The present invention relates to a fastener (1) for fastening of a heater cable (HC) to a mesh structure (MS). The fastener (1) comprises a first leg member (2) with a first mesh structure interface (3) and a second leg member (4) with a second mesh structure interface (5) and a cross member (6) connecting the first leg member (2) and the second leg member (4). The first and second mesh structure interfaces (3, 5) are aligned with each other along a mesh structure interface line (MSIL). The present invention also relates to a tool (100) for fastening of a heater cable (HC) to a mesh structure (MS) by means of a fastener (1).

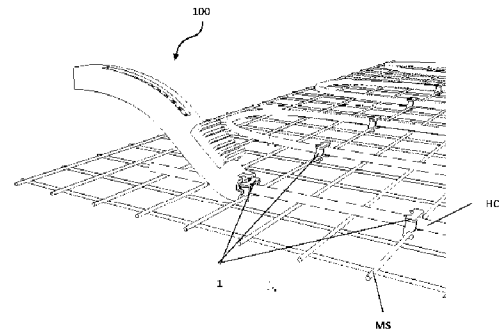


Fig. 1

FIELD OF THE INVENTION

The present invention relates to fastening of a cable, preferably a heater cable, to a mesh reinforcement structure. In particular, the present invention relates to a fastener, a tool for applying the fastener and a method for fastening a cable to a mesh structure.

BACKGROUND OF THE INVENTION

When a heater cable is cast into a concrete floor, several requirements must be fulfilled. First, if the material below the concrete floor is a wooden material or another inflammable material, there must be a distance between the heater cable and the inflammable material. Second, the distance between adjacent loops or sections of the heater cable is too short, the heater cable may overheat, causing the heater cable to be damaged.

Hence, to fulfil the above requirements, a mesh structure is typically laid out on the floor. The mesh structure may be laid directly on the floor. Alternatively, spacers may be used between the mesh structure and the floor, to increase the distance between the mesh structure and the floor. The mesh structure may be chicken wire or a reinforcement mesh or other types of structures. The mesh structure is typically made of metal.

Then, the heater cable is distributed in loops above the mesh structure. Due to the mesh structure alone, or the spacers together with the mesh structure, sufficient distance between the heater cable and the floor below the concrete floor is provided. In addition, the heater cable is secured to the mesh structure to ensure that the distance between adjacent loops or sections of the heater cable is sufficient.

Then, in a final step, concrete or cement slab is poured out and the mesh structure and heater cable become incorporated into the concrete or cement.

ØS Varme AS is marketing a first plastic type of clip for fastening of a heater cable to a reinforcement mesh by hand. ØS Varme AS is marketing a second metal ring type of clip for fastening of a heater cable to a chicken net by means of plier or tong. They are described in a data sheet called "Datablad Tilbehør"¹.

These clips are cumbersome to use, in particular the first type, where hands are used. The second type is also cumbersome and is also difficult to release, should it

¹ <https://www.osvarme.no/produkter/varme/tilbehor/tilbehorklips-for-leggetang-1825-stk-article15072-48847.html>

be necessary to move the heater cable to increase the distance between adjacent loops or sections of the cable.

Hence, one object of the present invention is to provide a fastener for securing a heater cable to a mesh structure which are easy and effective to use, and which also can be easily released.

One object is also to provide a tool for effectively applying the fastener to the mesh structure.

SUMMARY OF THE INVENTION

The present invention relates to a fastener for fastening of a heater cable to a mesh structure, wherein the fastener comprises:

- a first leg member with a first mesh structure interface;
 - a second leg member with a second mesh structure interface;
 - a cross member connecting the first leg member and the second leg member, the cross member being arranged at a distance from the first and second mesh structure interfaces,
- wherein the first and second mesh structure interfaces are aligned with each other along a mesh structure interface line.

In one aspect, the first leg member, the second leg member and the cross member together form a substantially U-shape.

In one aspect, an angle between respective leg members and the cross member is $45^\circ - 90^\circ$, preferably $60^\circ - 90^\circ$, even more preferred ca 80° .

In one aspect, the distance between the leg members is shorter proximal to the cross member than distal from the cross member.

In one aspect, the fastener further comprises:

- a first guiding member protruding in a direction away from the first leg member and
- a second guiding member protruding in a direction away from the second leg member.

In one aspect, the first guiding member and the second guiding member are provided as elongated parts of the cross member. Hence, the guiding members are provided in the same plane as the cross member. Consequently, the fastener is substantially π -shaped.

Alternatively, the first and/or second guiding member may be provided as a recess or groove in the cross member and/or in the leg members.

In one aspect, the first guiding member and the second guiding member are protruding in a direction substantially in parallel with the mesh structure interface line.

5 In one aspect, the distance between the cross member and the first and second mesh structure interfaces are substantially equal to a heater cable diameter.

In one aspect, the fastener comprises a connection element for connection to an adjacent fastener.

10 In one aspect, the connection element is a tear-off type of connection element. In one aspect, the connection element is provided on one side of the cross member and is being connected to an opposite side of the adjacent fastener. Hence, the mesh structure interface line of the adjacent fastener is parallel to the mesh structure interface line of the fastener.

15 In one aspect, the connection element is allowing relative movement between the fastener and the adjacent fastener. In one aspect, the connection element comprises two, spaced apart tear-off type of connection elements. Here, the connection element is allowing a bending movement between the fastener and the adjacent fastener.

20 In one aspect, the fastener is made of a plastic material. In one aspect, the fastener is made as one single body. In one aspect, a plurality of adjacent fasteners are made as one single body.

In one aspect, the distance between the first and second mesh structure interfaces are larger than the heater cable diameter.

25 In one aspect shown in Fig 2a, the first and second mesh structure interfaces comprise snap-on hooks. In one aspect, the first and second mesh structure interfaces comprise a U-shaped recess adapted to be applied around a section of the mesh structure.

Hence, the fastener will typically be manufactured in different sizes with regard to different heater cable diameters and different mesh structure wire diameters.

30 The present invention also relates to a tool for fastening of a heater cable to a mesh structure by means of a fastener, wherein the tool comprises a housing and an actuator movably connected to the housing;
wherein the housing comprises:

- a space configured to contain a plurality of fasteners;
- a supply opening for supplying fasteners from the space;
- 35 - a refill opening for refilling fasteners into the space;
- a handle located adjacent to the actuator;

wherein the actuator is configured to move the plurality of fasteners in a direction from the refill opening towards the supply opening.

In one aspect, the space is configured to contain a plurality of interconnected fasteners.

- 5 In one aspect, the supply opening is configured to supply one fastener at a time from the supply opening by actuation of the actuator.

In one aspect, the actuator is located between the supply opening and the refill opening.

- 10 In one aspect, the handle is provided as an area of the outer surface of the housing itself. The handle may be formed or integrated as a part of the housing. The handle may be formed by a straight or curved section of the housing.

In one aspect, the space comprises a guide for guiding the fastener within the space from the refill opening to the supply opening.

- 15 In one aspect, the guide comprises grooves in which guiding members of the fastener are slidingly engaged.

In one aspect, the housing comprises a first barb protruding into the space, wherein the first barb is allowing movement of fasteners from the refill opening to the supply opening, while preventing movement of fasteners from the supply opening to the refill opening.

- 20 In one aspect, the first barb is configured to support the one fastener being located in the supply opening.

- 25 In one aspect, the housing comprises a second barb protruding into the space, wherein the second barb is allowing movement of fasteners from the refill opening to the supply opening, while preventing movement of fasteners from the supply opening to the refill opening.

In one aspect, the second barb is protruding into the space adjacent to the actuator.

In one aspect, the housing comprises an actuator connection interface for movably connecting the actuator to the housing, wherein the actuator connection interface comprises:

- 30 - an opening in the housing providing access to fasteners within the space;
- an actuator guide configured to guide the actuator;

wherein the actuator further comprises:

- a flexible tongue protruding through the opening into the space;
wherein the flexible tongue is configured to push the plurality of fasteners towards
35 the supply opening when moved in a first direction; and

wherein the flexible tongue is moved relative to the plurality of fasteners when moved in a second, opposite direction.

In one aspect, the actuator guide is configured to guide the actuator in parallel with the direction in which the fasteners are moved through the space of the housing. The
5 actuator guide comprises a recess in which a protrusion of the actuator is engaged.

In one aspect, the actuator is movable between a first position and a second position relative to the housing.

In one aspect, the actuator is thumb-actuated.

In one aspect, the housing comprises an observation window for observation of the
10 number of remaining fasteners in the space.

In one aspect, the plurality of fasteners is of the type defined above.

DETAILED DESCRIPTION

In the following, specific embodiments of the invention will be described in more detail with reference to the drawings. However, the invention is not limited to the
15 embodiments and illustrations contained herein. It is specifically intended that the invention includes modified forms of the embodiments, including portions of the embodiments and combinations of elements of different embodiments. It should be appreciated that in the development of any actual implementation, as in any engineering or design project, specific decisions must be made to achieve the
20 developer's specific goals, such as compliance with system and/or business-related constraints. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of design, fabrication and manufacture for the skilled person having the benefit of this disclosure.

25 Fig. 1 shows the tool during fastening of a fastener to the mesh structure;
Fig. 2a illustrates a perspective view of the fastener;
Fig. 2b illustrates a side view of the fastener;
Fig. 2c illustrates a top view of the fastener;
Fig. 2d illustrates a front view of the fastener;
30 Fig. 3 illustrates two fasteners connected to each other;
Fig. 4 illustrates a side view of the tool, wherein the tool side is partially transparent;
Fig. 5 illustrates a front view of the tool;
Fig. 6 illustrates how the tool is moved to snap of the connection between two
35 fasteners;
Fig. 7 illustrates the tool from below;

Fig. 8a is an enlarged view of the dashed box DB of fig. 4, where the actuator is in the first position;

Fig. 8b corresponds to fig. 8a, where the actuator is in the second position;

Fig. 9 illustrates the actuator separated from the actuator connection interface of the housing.

Fig. 1-7 show a first embodiment of a fastener 1 for fastening of a heater cable HC to a mesh structure MS and a first embodiment of a tool 100 for fastening a heater cable to a mesh structure by means of a fastener 1.

First, a detailed description of an embodiment of the fastener 1 for fastening a heater cable will be provided. Then a detailed description of a tool 100 for fastening a heater cable to a mesh structure MS and the interaction between the fastener 1 and the tool 100 will be provided.

The fastener

As shown in Fig. 1, an embodiment of a fastener 1 for fastening a heater cable HC to a mesh structure MS is provided. The fastener 1 is designed to secure the heater cable HC to the mesh structure MS. When the heater cable HC is distributed in loops above the mesh structure MS, fasteners 1 are used for fastening the heater cable HC to the mesh structure MS at intervals along the length of the heater cable HC.

As shown in Fig 2a, the fastener 1 comprises a first leg member 2 with a first mesh structure interface 3 and a second leg member 4 with a second mesh structure interface 5. The fastener 1 further comprises a cross member 6, which connects the first leg member 2 and the second leg member 4. The cross member 6 is arranged at a distance d from the first and second mesh structure interfaces 3, 5. The cross member 6 is arranged at the distal end of the leg first and second leg members 2, 4 with regards to the first and second mesh structure interfaces 3, 5.

The mesh structure interfaces 3, 5 are configured to interact with the mesh structure MS to form a secure connection. The mesh structure interfaces 3, 5 are for example configured as snap on hooks configured to engage the mesh structure MS. In another configuration the mesh structure interfaces 3, 5 comprise a U-shaped recess adapted to be applied around a section of the mesh structure. In fig. 2a, a front side FS of the fastener has been indicated as the side of the fastener that must be faced towards the mesh structure MS for the mesh structure interfaces 3, 5 to engage the mesh structure MS. Hence, the front side FS is the side where the openings of the U-shaped recesses are provided. The opposite side of the front side FS is referred to as a rear side RS.

The mesh structure interfaces 3, 5 are aligned with each other along a mesh structure interface line MSIL. The mesh structure interface line MSIL is a line that extends between the mesh structure interfaces 3, 5. The mesh structure interface line MSIL is preferably parallel to the cross member 6, meaning that the leg members 2, 4 are of equal length, providing stability for the fastener 1 when engaged with the mesh structure MS.

As shown in Fig 2d, when fastening the heating cable HC to the mesh structure MS, a section of the heater cable HC is located within the space set up by the mesh structure MS, the leg members 2, 4 and the cross member 6.

The distance d may be adapted to the diameter of the heater cable HC such that the engagement of the mesh structure interfaces 3, 5 exerts a force via the leg members 2, 4 and the cross member 6 onto the heater cable HC to push the heater cable HC against the mesh structure MS to fasten the heater cable HC to the mesh structure MS. Alternatively, there may be a small gap between the heater cable and the fastener 1 when secured to the mesh structure MS. As is apparent from the introduction above, the purpose is to hold the heater cable HC stationary with respect to the mesh structure MS while concrete or cement slab is poured out and during the curing of the concrete or cement.

The distance between the points where leg member 2 and leg member 4 are joined to the cross member 6 is also adapted to the diameter of the heater cable HC. In general, fasteners 1 of different size are used for different heater cable diameters.

The fastener 1 is configured such that the leg members 2, 4 extends from the cross member 6 in the same direction, giving the fastener 1 substantially a U-shape. Several shapes may be envisaged, including such as where the transitions between the leg members 2, 4 and the cross member 6 is smooth and curved or where said transitions are at a sharp angle.

As best shown in Fig. 2d, the fastener 1 according to one embodiment of the present invention has an angle α between the respective leg members 2, 4 and the cross member 6 between $45^\circ - 90^\circ$. In a preferred embodiment the angle α is preferably $60^\circ - 90^\circ$. In one even more preferred embodiment of the present invention the angle α is ca 80° .

In one aspect of the present invention as shown in Fig 2d, the distance between the leg members 2, 4 is shorter proximal to the cross member 6 than distal from the cross member 6.

Fig 2a and fig. 2d further show that the fastener 1 comprises a first guiding member 7 that protrudes in a direction away from the first leg member 2 and a second guiding member 8 protruding in a direction away from the second leg member 4.

The guiding members 7, 8 are preferably provided in the same plane as the cross member 6, said guiding member 7, 8 are provided as elongated parts of the cross member 6. The fastener 1 thus resembles the shape of the symbol π .

Fig 2a shows the fastener with the guiding members 7, 8 as protruding parts extending perpendicular from leg members 2, 4.

Fig 2a, Fig. 2d shows the fastener 1 with the guiding members 7, 8 protruding in a direction that is parallel to the mesh structure interface line MSIL. The purpose of the guiding members 7, 8 is to interact with guides 117, 118 on a tool 100, as is shown in fig. 5. This will be described in detail below.

Fig.3 shows one desirable configuration of the fastener 1, where the fastener 1 comprises two spaced apart connection elements 9 suitable for connecting to an adjacent fastener 1. The adjacent fastener 1 also has two spaced apart connecting elements 9 suitable for connecting to a third adjacent fastener 1 (not shown).

The connection elements 9 are in the present embodiment provided on the rear side RS of the cross member 6, connecting the rear side RS of one fastener 9 to a front side FS of the cross member 6 of the adjacent fastener 1. The connection elements 9 are also forming a gap G between each of the fasteners, the connection elements 9 bridging the gap G.

This configuration allows for a plurality of fasteners 1 to be stored, supplied and loaded into a tool 100 for use as one interconnected chain of fasteners 1. The tool 100 is described in further detail below.

The configuration shown in Fig. 3 shows the connection element 9 as a tear-off type of connection element. The configuration shown in Fig. 3 with two spaced apart tear-off type connection elements allows for bending movement between the individual fasteners 1 when a plurality of fasteners 1 are interconnected.

It should be noted that when the connection elements 9 between two adjacent fasteners 1 have been torn off, it does not matter if the connection elements 9 are stuck on the rear side RS (as shown in the drawings), or if the connection elements 9 are stuck on the front side FS – the connection elements 9 do not have any function after it has been torn off. Hence, it may also be the case that parts of the connection elements 9 are stuck on the rear side RS while other parts of the connection elements 9 are stuck on the front side FS.

In one non-limiting example the fastener 1 is manufactured of a plastic material and is manufactured as one single body. In a preferred example a plurality of fasteners 1 are manufactured as a single body.

The tool

Fig 4 shows a side view of a tool 100 for fastening a heater cable HC to a mesh structure MS by means of a fastener 1. The tool 100 comprises a housing 101 that defines a space 110 suitable for holding a plurality of fasteners 1. In one end of the housing 101 there is a supply opening 111 for supplying fasteners from the space 110 which is holding the fasteners 1. The supply opening 111 is configured to deliver one fastener 1 at a time. The housing 101 comprises a distal end from the supply opening 111 where a refill opening 112 for refilling fasteners into the space 110 is located. A handle 103 for grabbing and holding the tool 100 is located adjacent to an actuator 130. The actuator 130 comprises ribs 131 for contact with the users thumb.

The space 110 may be a closed space except from the supply opening 111 and the refill opening 112. However, the space 11 may also be a partially open space 110. In fig. 7, it is shown that the side of the housing 101 facing towards the mesh structure MS is open, hence, the cross sectional shape of the housing 101 is generally U-shaped. One reason for having a partially open space 110 is to enable easy removal of a fastener 1 should it become stuck within the space 110.

Fig. 4 and Fig. 5 shows the tool 100 comprising the actuator 130 which is movably connected to the outside of the housing 101. The actuator 130 is located between the supply opening 111 and the refill opening 112 and is used to move the fasteners 1 from the refill opening 112 along line A1 to the supply opening 111.

As best shown in Fig. 5 the space 110 comprises a guide 117, 118 that is configured to interact with the guiding members 7, 8 of the fastener 1. The guide 117, 118 extends throughout the length set up by the space 110, and guides the fasteners during their movement from the refill opening 112 to the supply opening 111. The guides also prevent the fasteners from falling out from the partially open space 110. The guiding members 7, 8 of the fastener 1 engages with the guides 117, 118 and is able to slide while engaged to the guides 117, 118 from the refill opening 112 to the supply opening 111.

Now referring to figure 7, the housing 101 comprises a first barb 125 that is protruding into the space 110 at both sides of the housing. The first barb 125 is configured to allow movement of the fasteners 1 from the refill opening 112 to the supply opening 111.

The first barb 125 is located at the supply opening 111 and is configured to support the one fastener 1 that is located in the supply opening 111. The first barb 125 allows a fastener to move in the direction A1, but prevents movement in the opposite direction of A1. The first barb 125 is configured to support the one fastener 1 being located in the supply opening 111 when this fastener becomes secured to the mesh structure MS.

The housing 101 further comprises a second barb 127 (fig. 7 and 8a) protruding into the space 110, wherein the second barb 127 in the same way as the first barb 125 is allowing movement of fasteners 1 from the refill opening 112 to the supply opening 111, while preventing movement of fasteners 11 from the supply opening 111 to the refill opening 112.

In one aspect, the second barb 127 is protruding into the space 110 adjacent to or below the actuator 130.

In fig. 8a and fig. 9, it is shown that the housing 101 further comprises an actuator connection interface 140 for movably connecting the actuator 130 to the housing 101. The actuator connection interface 140 comprises an opening 141 in the housing 101 providing access for the actuator to fasteners 1 within the space 110. In addition, it comprises an actuator guide 146 configured to guide the actuator 130 during its movement. The actuator 130 further comprises a flexible tongue 132 protruding through the opening 140 into the space 110.

In fig. 9 it is also shown that the actuator 130 comprises a guide 136 for engaging the actuator guide 146 of the actuator connection interface 140. In the present embodiment, the actuator guide 146 comprises two recesses and the guide 136 comprises two protrusions engaged with the respective recesses.

In fig. 8a, a first and rear position P1 for the actuator 130 is shown. Here, a stop 134 of the flexible tongue 132 is abutting the rear end of the opening 141. It should be noted that the actuator 130 may be disassembled from the housing 101 by lifting the tongue 132 and hence also the stop 134 up from opening 141 and push the actuator further back. However, this is not done during normal use.

In fig. 8b, a second and front position P2 for the actuator is shown.

The flexible tongue 132 is configured to push the plurality of fasteners 1 towards the supply opening 111 when the actuator 130 is moved in a first direction parallel to the direction A1 at the location of the actuator 130, i.e. from the position P1 to the position P2. This is possible as an end 133 of the flexible tongue 132 engages the cross member 6 of the fastener 1.

When the actuator 130 is moved in the opposite direction, i.e. from the second position P2 to the first position P1, the fasteners 1 are held stationary with respect to the space 110 due to the first and second barbs 125, 127. Hence, due to the shape and flexibility of the tongue 132, the flexible tongue 132 will be pressed upwardly in fig. 8b due to the stationary fasteners and will slide relative to the fasteners until the end 133 of the flexible tongue reaches the gap G between two adjacent fasteners and is there allowed to move down into this gap. The tongue is now enabled to push the next fastener towards the supply opening. The actuator 130 is configured to

move the fasteners a length corresponding to the length of one of the fasteners at the time This length of one of the fasteners is indicated as LF in fig. 8b.

The actuator 130 is thumb-operated.

As shown in Fig 4 the housing has an observation window where a user can inspect the number of remaining fasteners 1.

Fig. 1 and Fig. 4 shows an example of the overall shape of the tool 100. The tool 100 is shown with curved S-shape. When the tool 100 is held parallel to a mesh structure MS, the handle 103 is elevated relative to the supply-opening 111 and the handle 103 is substantially parallel to the supply opening 111. This allows for gripping and manipulating the tool 100 easily when used. Thus, the curved S-shape provides desirable ergonomic properties

Use of the tool to apply a fastener

The tool 100 is used for fastening a heat cable HC to a mesh structure MS by means of a fastener 1.

As shown in Fig. 4 the tool 100 is loaded with a plurality of interconnected fasteners 1 by inserting the fasteners 1 via the refill opening into the space 110 until the first fastener 1 appears at the supply opening 111 and is supported by the first barb 125. The tool 100 is then fully loaded with fasteners 1 and ready for use.

The tool 100 is moved to a point on the mesh structure MS where the heater cable HC intersects with the material of the mesh structure MS. The tool 100 is then manipulated in such a way that the first and second leg member 2, 4 strides over the heater cable HC, leaving the first leg member 2 on one side of the heater cable and the second leg member 4 on the other side of the heater cable HC. As shown in Fig. 5 the tool 100 is further manipulated such that the first and second mesh structure interfaces 3, 5 engages with the mesh structure MS. The heater cable HC is then trapped between the mesh structure MS, the two leg members 2, 4 and the cross member 6 and held in place.

As shown in Fig 6 the tool 100 can now be rotated with respect to the longitudinal axis of the heater cable for tearing off the connection elements 9 and thereby freeing the fastener 1 from the supply opening 111. The fastener 1 is now securing the heater cable HC to the mesh structure MS at this location.

To make the tool 100 ready for another fastening, a new fastener 1 is introduced into the supply opening 111 by moving the actuator from P1 to P2 and then back to position P1 again. The actuator is now ready to use again.

CLAIMS

1. Fastener (1) for fastening of a heater cable (HC) to a mesh structure (MS), wherein the fastener (1) comprises:
 - a first leg member (2) with a first mesh structure interface (3);
 - 5 - a second leg member (4) with a second mesh structure interface (5);
 - a cross member (6) connecting the first leg member (2) and the second leg member (4), the cross member (6) being arranged at a distance (d) from the first and second mesh structure interfaces (3, 5),
 - wherein the first and second mesh structure interfaces (3, 5) are aligned with each other along a mesh structure interface line (MSIL).
 - 10
2. Fastener (1) according to claim 1, wherein the first leg member (2), the second leg member (4) and the cross member (6) together form a substantially U-shape.
3. Fastener (1) according to claim 1 or 2, wherein an angle (α) between respective leg members (2, 4) and the cross member (6) is $45^\circ - 90^\circ$, preferably $60^\circ - 90^\circ$,
 - 15 even more preferred ca 80° .
4. Fastener (1) according to any one of the above claims, wherein the fastener (1) further comprises:
 - a first guiding member (7) protruding in a direction away from the first leg member (2) and
 - 20 - a second guiding member (8) protruding in a direction away from the second leg member (4).
5. Fastener (1) according to claim 4, wherein the first guiding member (7) and the second guiding member (8) are protruding in a direction substantially in parallel with the mesh structure interface line (MSIL).
- 25 6. Fastener (1) according to any one of the above claims, wherein the fastener (1) comprises a connection element (9) for connection to an adjacent fastener (1).
7. Tool (100) for fastening of a heater cable (HC) to a mesh structure (MS) by means of a fastener (1), wherein the tool (100) comprises a housing (101) and an actuator (130) movably connected to the housing (101);
 - 30 wherein the housing (101) comprises:
 - a space (110) configured to contain a plurality of fasteners (1);
 - a supply opening (111) for supplying fasteners (1) from the space (110);
 - a refill opening (112) for refilling fasteners (1) into the space (110);
 - a handle (103) located adjacent to the actuator (130);
 - 35 wherein the actuator (130) is configured to move the plurality of fasteners (1) in a direction (A1) from the refill opening (112) towards the supply opening (111).

8. Tool (100) according to claim 7, wherein the space (110) comprises a guide (117, 118) for guiding the fastener (1) within the space (110) from the refill opening (112) to the supply opening (111).
- 5 9. Tool (100) according to any one of claims 7 - 8, wherein the housing (101) comprises a first barb (125) protruding into the space (110), wherein the first barb (125) is allowing movement of fasteners (1) from the refill opening (112) to the supply opening (111), while preventing movement of fasteners (1) from the supply opening (111) to the refill opening (112).
- 10 10. Tool (100) according to any one of claims 7 - 9, wherein the housing (101) comprises an actuator connection interface (140) for movably connecting the actuator (130) to the housing (101),
wherein the actuator connection interface (140) comprises:
- an opening (141) in the housing (101) providing access to fasteners (1) within the space (110);
15 - an actuator guide (146) configured to guide the actuator (130);
wherein the actuator (130) further comprises:
- a flexible tongue (132) protruding through the opening (140) into the space (110);
wherein the flexible tongue (130) is configured to push the plurality of fasteners (1) towards the supply opening (111) when moved in a first direction; and
20 wherein the flexible tongue (130) is moved relative to the plurality of fasteners (1) when moved in a second, opposite direction.

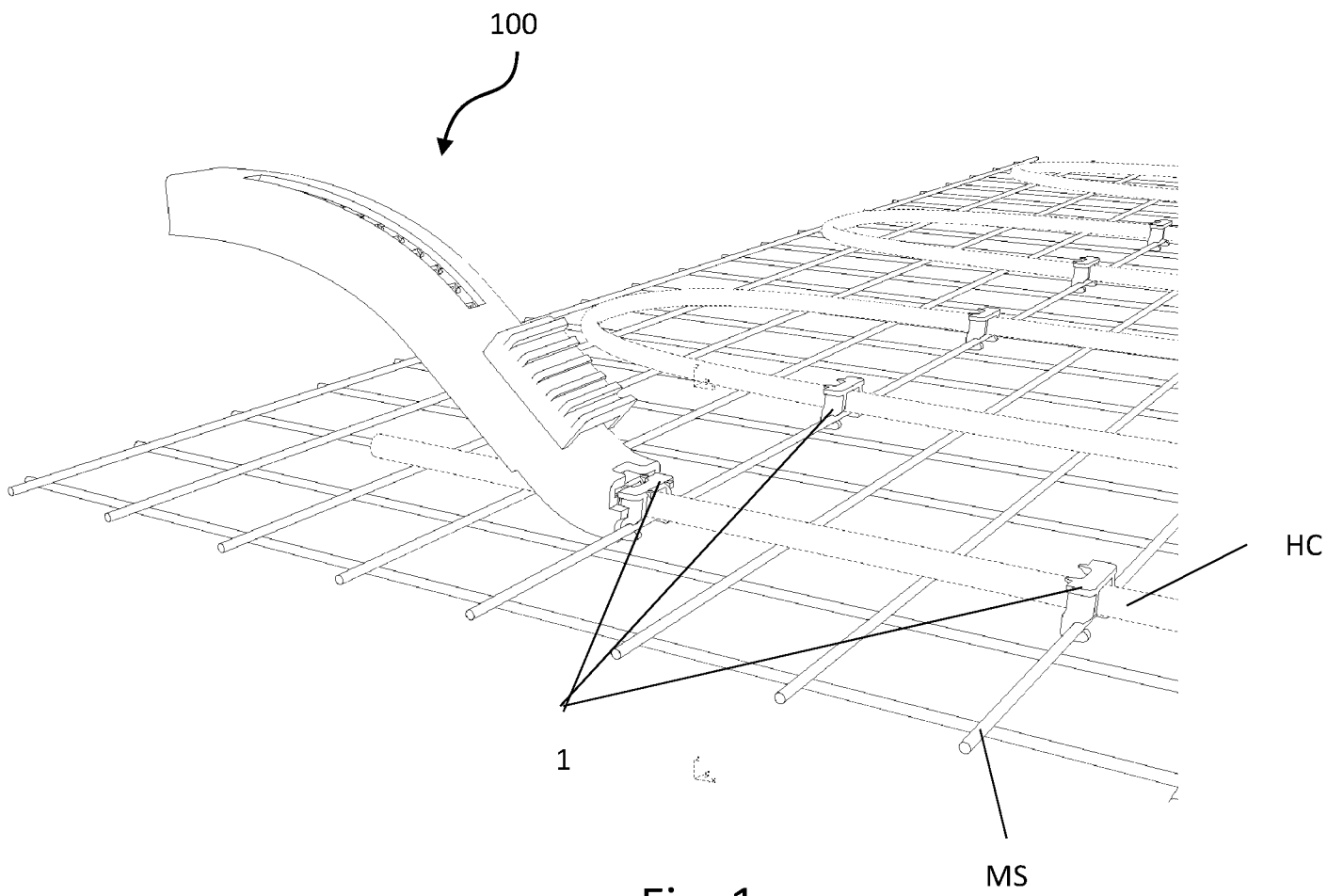
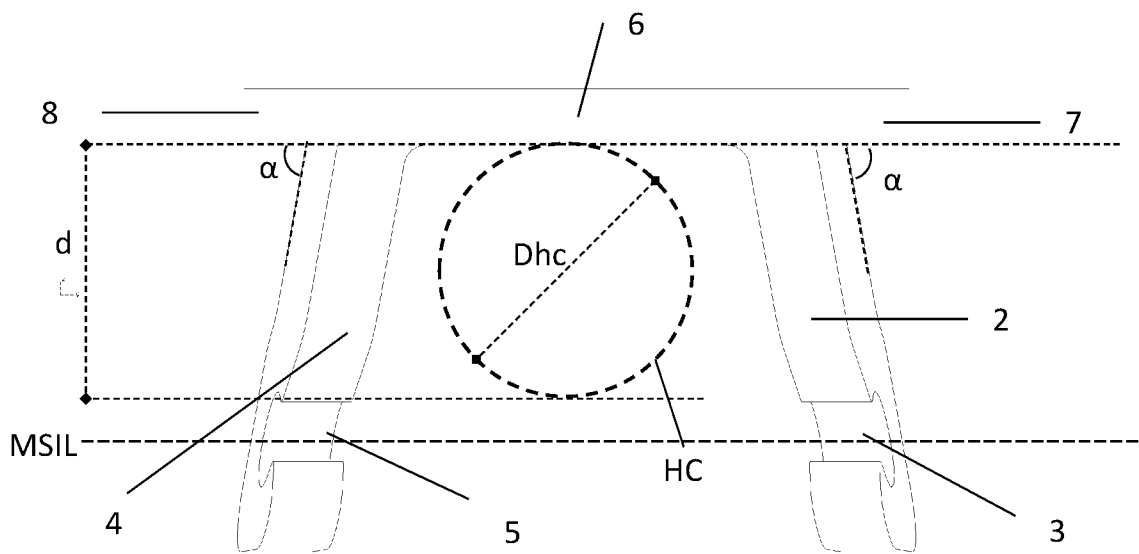
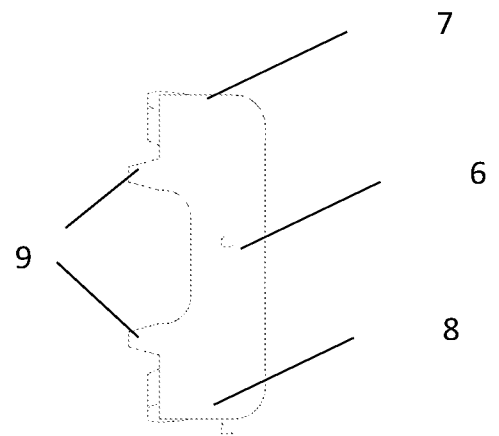
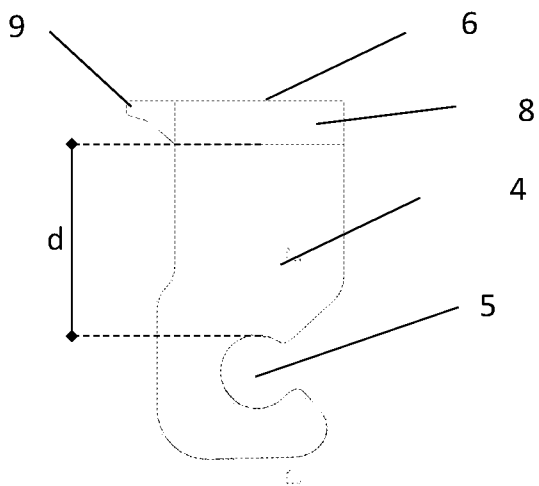
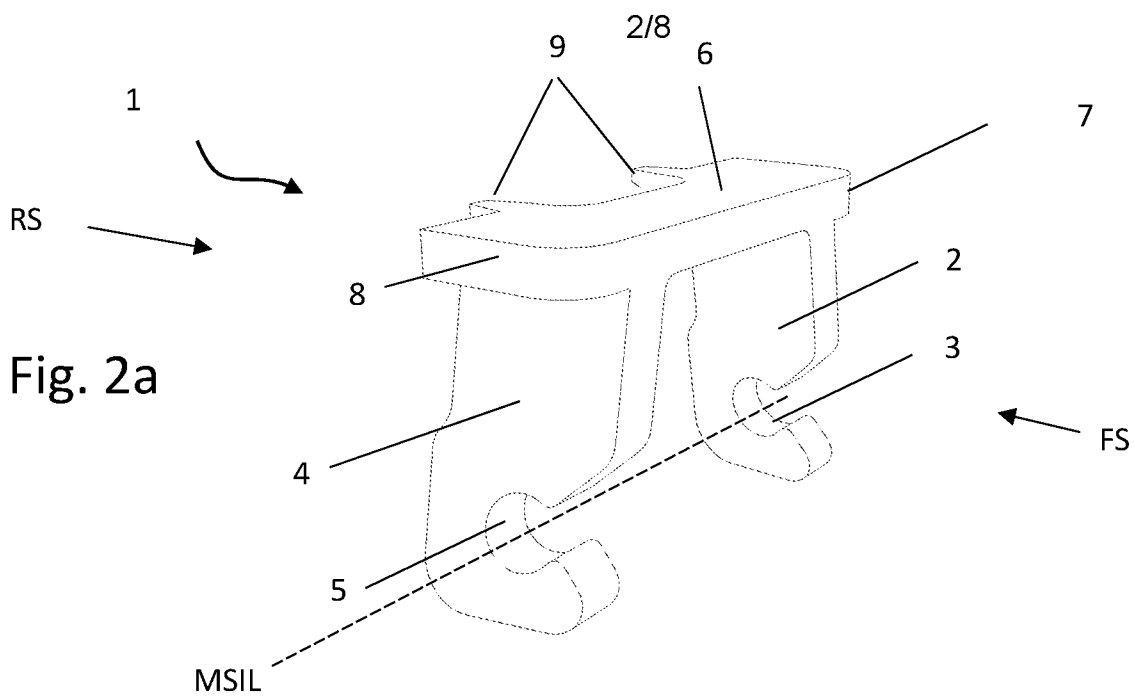


Fig. 1



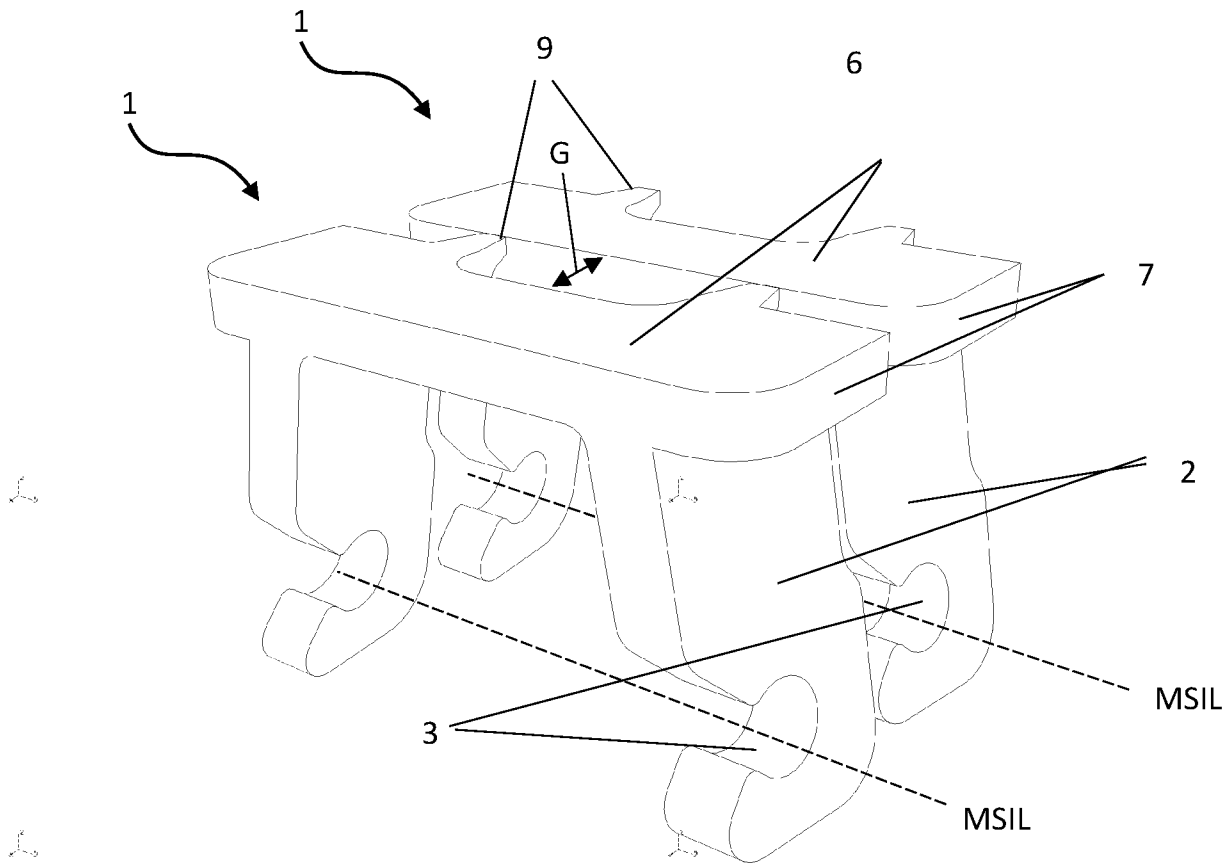


Fig. 3

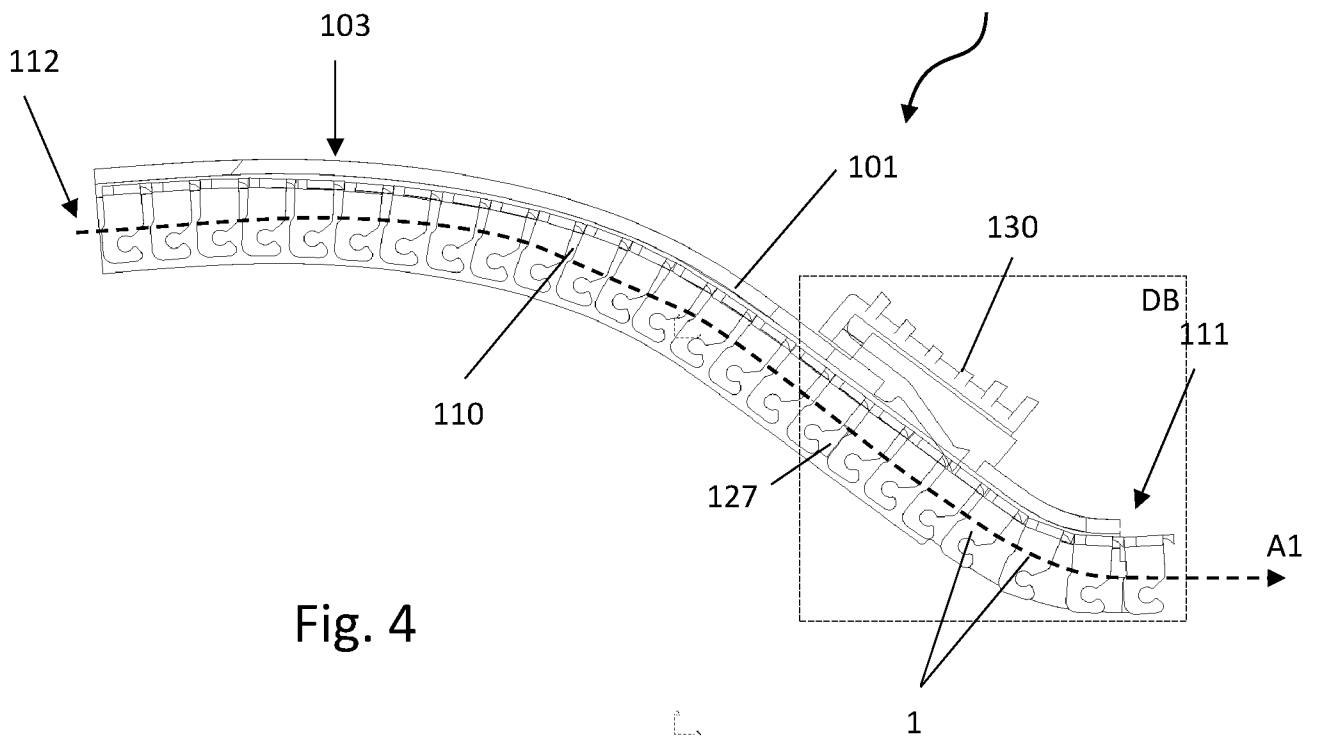


Fig. 4

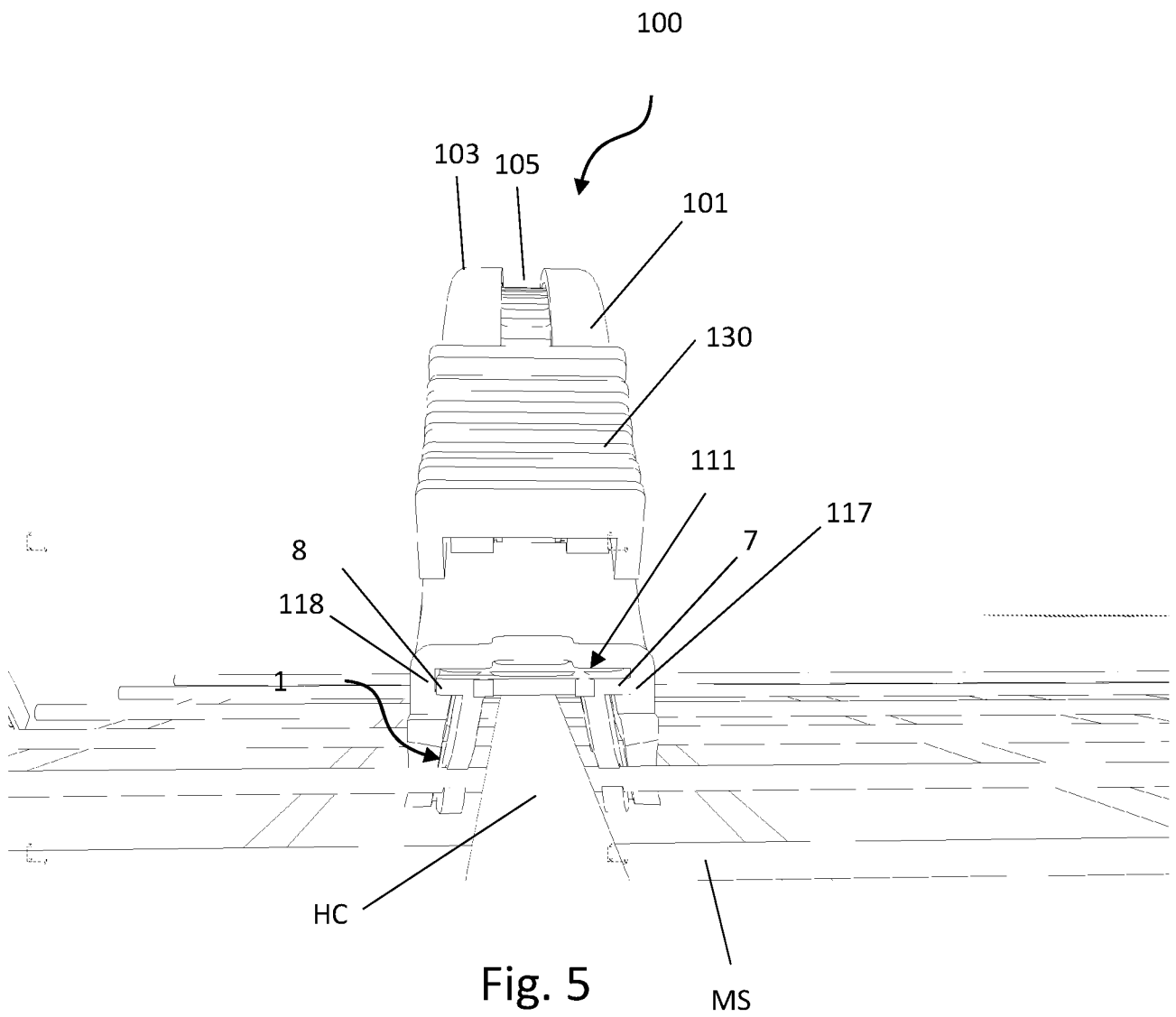


Fig. 5

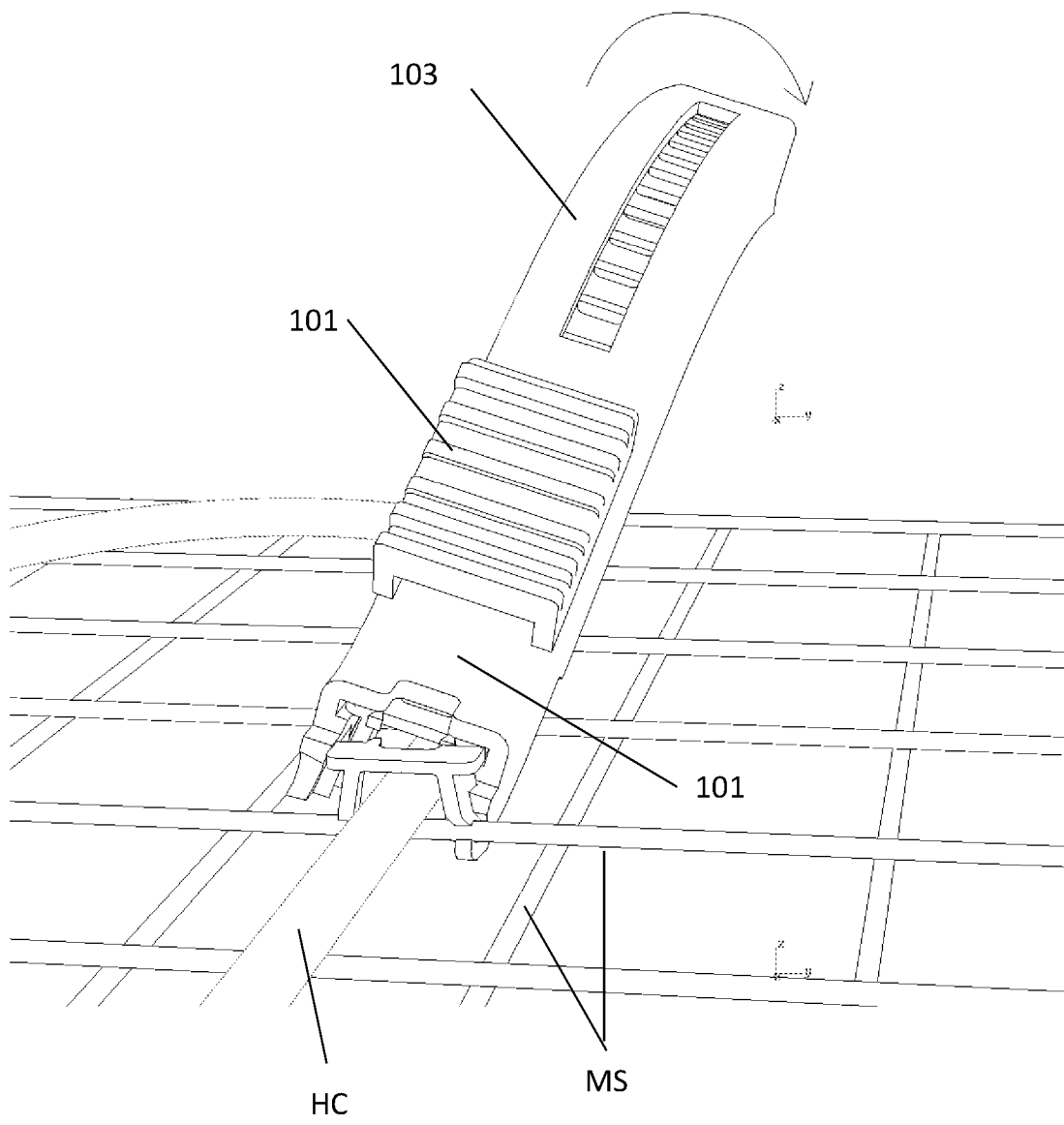


Fig. 6

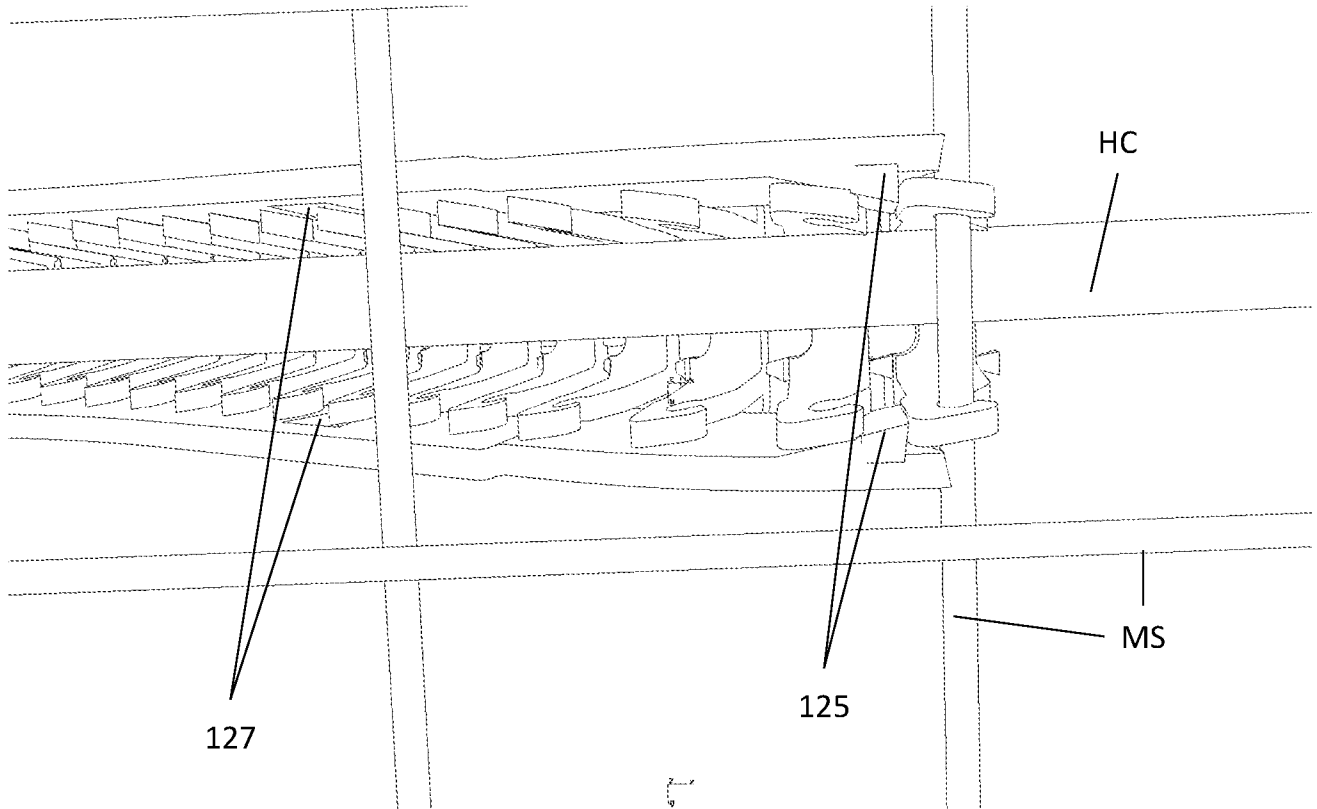
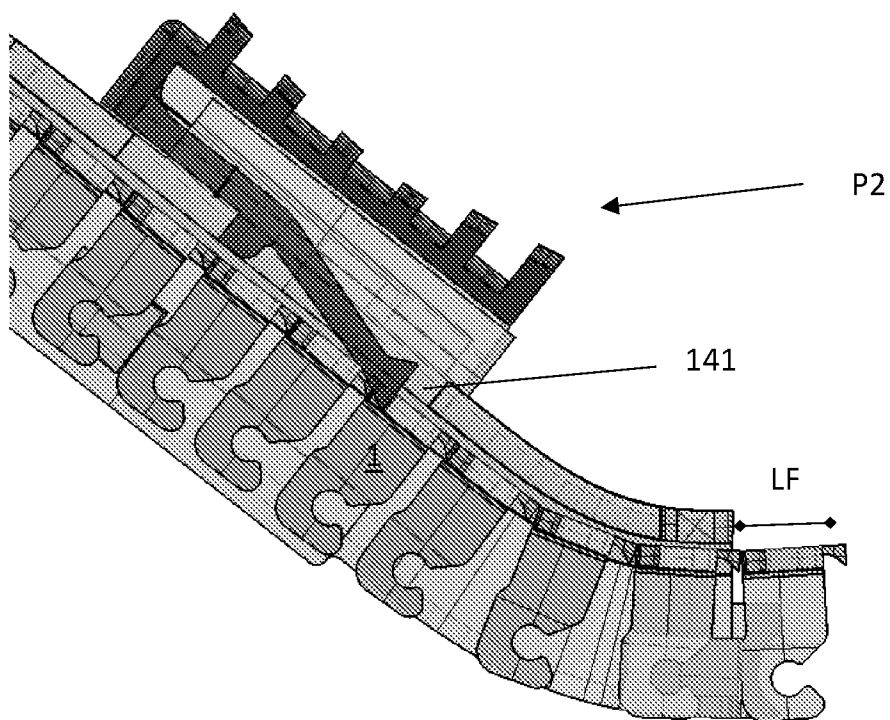
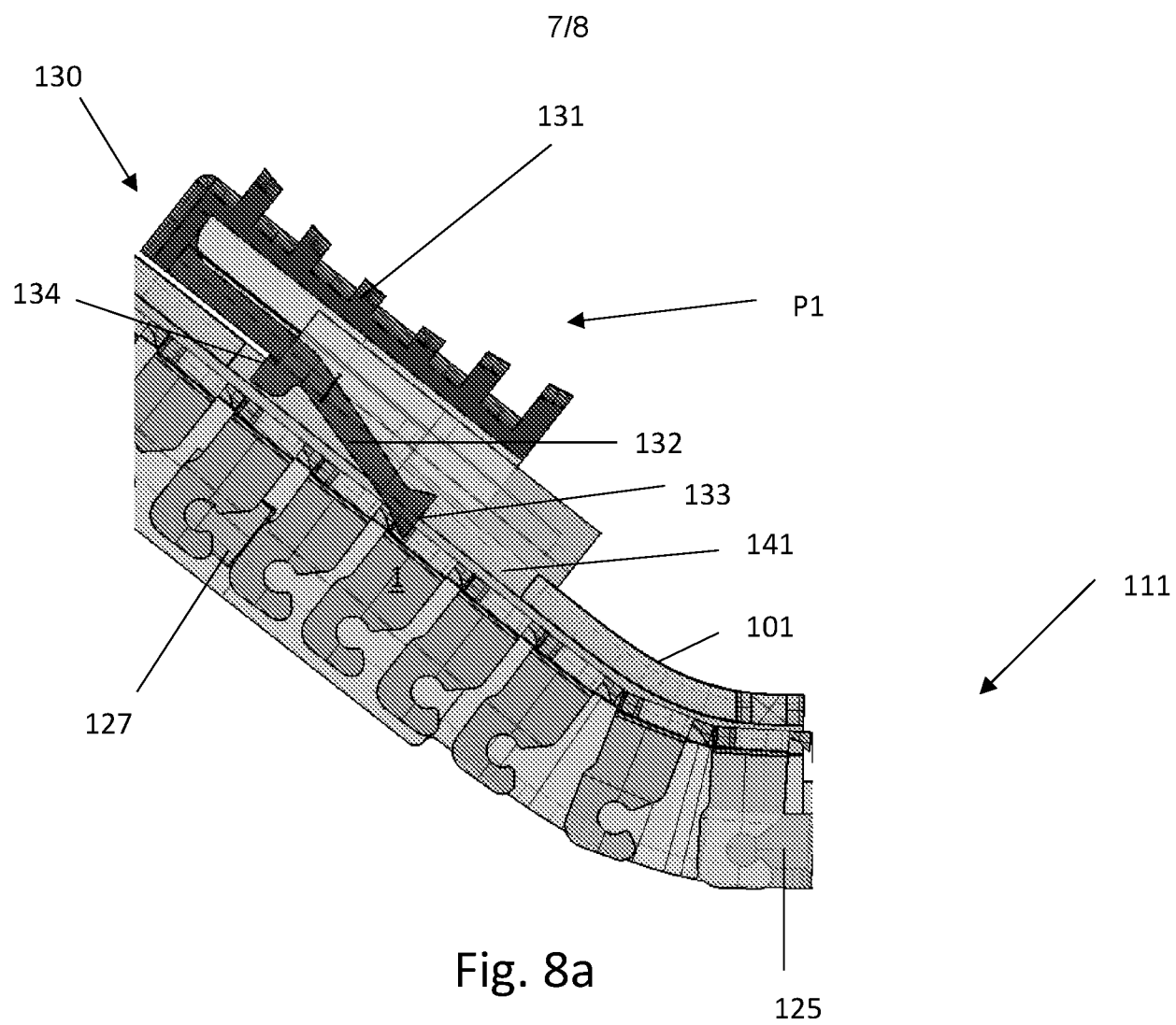


Fig. 7



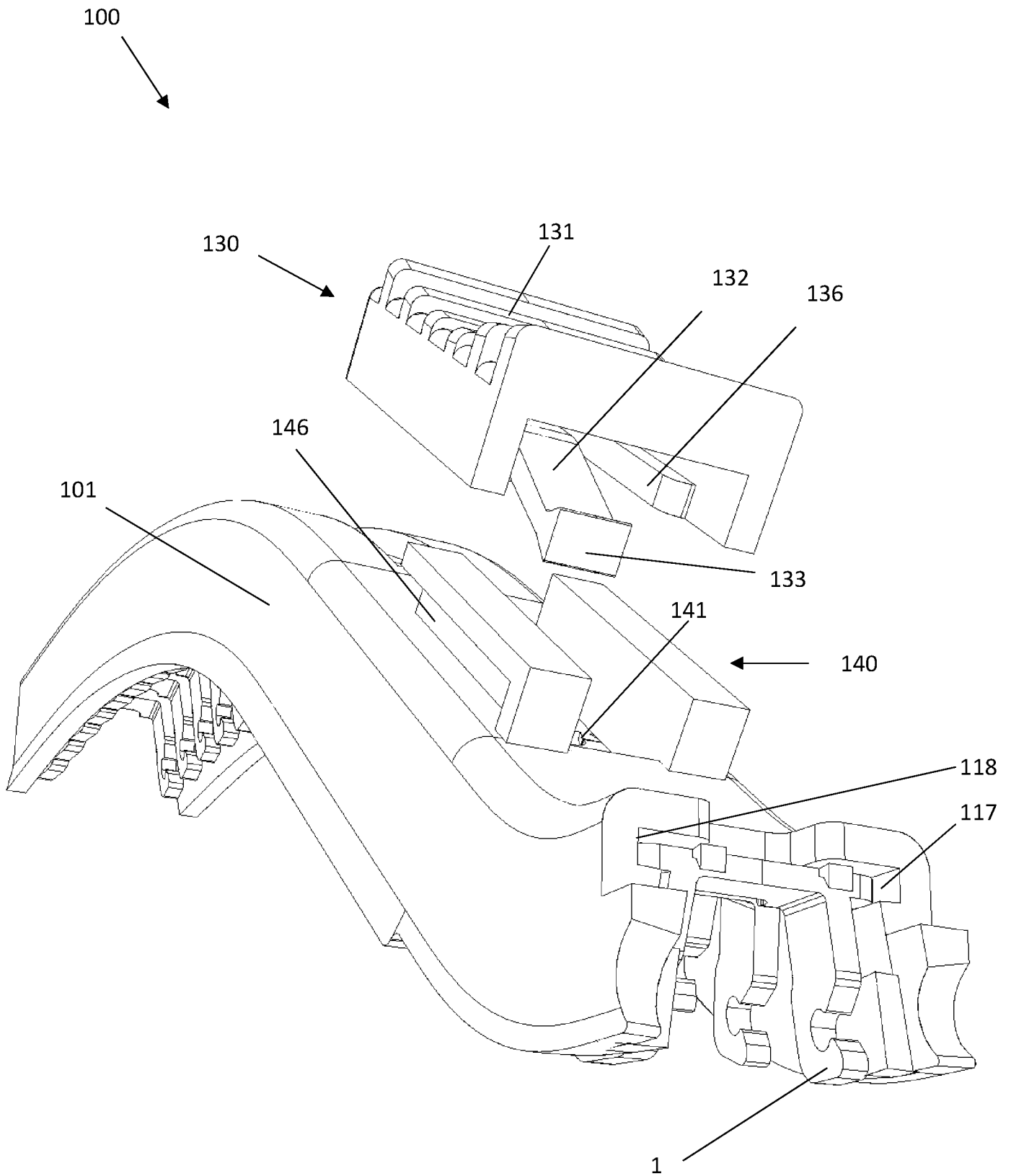


Fig. 9