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(54) **DEVICE ABSORBING IMPACT ON THE REAR PART OF A VEHICLE EQUIPPED WITH A FOLDABLE RAMP**

VORRICHTUNG ZUM ABSORBIEREN EINES AUFPRALLS AM HECK EINES FAHRZEUGES MIT EINER FALTBAREN RAMPE

DISPOSITIF ABSORBANT LES CHOCS SUR LA PARTIE ARRIÈRE D'UN VÉHICULE ÉQUIPÉ D'UNE RAMPE PLIABLE

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(56) References cited:
WO-A1-2010/003387
WO-A1-2013/105313
US-A1- 2014 255 138

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Description

Field of the invention

[0001] The invention concerns a device absorbing impact on the rear part of a vehicle equipped with a foldable ramp designed particularly to move manual and electric wheelchairs into and out of a vehicle through the rear door.

Background of the invention

[0002] There are many devices facilitating movement into and out of vehicles, as well as for transport, of persons bound to a wheelchair and they can be also used for electric scooters and similar equipment provided with travel wheels. The devices differ depending on the purpose and type of the vehicle. At present, an important portion of vehicles are those operated in the so-called combined operation. This means that vehicles are used alternately for transport of healthy persons or regular loads and also for transport of disabled persons, persons with health-related limitations or physical disability who need to use wheelchairs. In practical terms, they include vehicles used by e.g. taxi services, hotels, travel agencies, as well as family cars used intermittently for regular daily transport for private and business purposes, as well as for transport of a person in a wheelchair.

[0003] It is therefore desirable that the foldable ramp takes up as little space inside the vehicle as possible and that normal operation of the vehicle is possible when the ramp is folded. It is also necessary to make the control of folding of the ramp in and out simple, safe and physically undemanding even for persons who are not physically strong or who may have certain limitations due to their health condition or age.

[0004] Such requirements are ideally met by foldable ramps pivotally attached in the rear part of the vehicle's lowered floor and described in the patent files US2014/255138, WO2013/105313 GB 2275030, WO 97/02171, EP 0390431, WO 03059685 and US 5137413. The entry platform of the ramp is in the entry position folded out of the vehicle from the rear door towards the ground and in the transport position it is vertically lifted between the wheelchair and the rear door.

[0005] An improved solution of a foldable entry ramp has been described in the published patent application WO 0009060. The entry platform is attached to the edge of the floor well by means of a pivotal hinge. If the platform is made of one part, after the wheelchair drives into the vehicle, the platform is lifted to a vertical transport position between the wheelchair and the door and it is locked with a safety latch. After the wheelchair moves out of the vehicle, the platform is folded into the vehicle, while the pivotal hinge is moved into another height configuration, and the platform covers the floor well. In this position there is a luggage room created in the rear part of the vehicle corresponding to common vehicles, with no limitation of access. If the platform is made of two parts there is no need to change the height configuration of the pivotal hinge. In the entry position and in the transport position both parts are in an interlocking position. After the wheelchair moves out of the vehicle the lock is released and the second part of the platform is folded on the floor well, while the first part creates the rear face.

[0006] Finally, there is a solution of a foldable entry ramp under EP 2293755. According to this solution in the rear part of the vehicle there are two tiltable side parts arranged on the opposite sides, pivotally attached to the bottom edge of the floor well, with the moving entry platform between them. Tiltable side parts turn on the hinges from the vertical position to the entry position and vice versa. In the vertical position they are secured with side latches. The moving fit of the entry platform in the tiltable side parts makes it possible, with the tiltable side parts in the vertical position, to fold the entry platform inside the vehicle at its floor level into the so-called passive position. For this purpose, the entry platform is provided with metal sheet carriers on its sides that perform rotationally translational movement in respect to the tiltable side parts. The trajectory of this movement is defined by guiding grooves created in the tiltable side parts and in the carriers and by pins that engage into the guiding grooves. The vertical position of the entry platform is called the transport position. The rear door in this position is closed and the wheelchair with the transported person is located and secured in front of the entry platform arrested in the transport position.

[0007] The problem with installation of foldable ramps in the rear part of the vehicle consists in the fact that it is necessary to remove a central part of the rear bumper which would otherwise prevent the ramp from folding out into the entry position. On the lengthwise main bearers of the self-supporting body there are only the left part and the right part of the rear bumper. Between them there is the bottom part of the foldable ramp provided with a transverse brace that replaces the missing central part of the bumper. Although vehicles redesigned in this way meet the requirements for approval, crash tests have shown that in case of an impact from the back on the rear door and on the bottom part of the foldable ramp or its transverse brace the impact force is not sufficiently transferred to the lengthwise main bearers that are for this purpose provided with deformation elements. Consequently, the deformation is directed inside the rear part of the vehicle, i.e. where the passenger is sitting in the wheelchair and the passenger is only protected with the rear door and the entry platform of the foldable ramp in the vertical transport position. However, this is not sufficient from the viewpoint of safety of the transported persons. Moreover, even small impacts may deform the rear part of the vehicle and make it wider from the center to the sides, which means that a relatively small impact may cause a damage requiring an extensive repair of the rear part.

[0008] This invention seeks to eliminate the shortcomings described above and to create a device for efficient

absorption of impacts on the rear part of vehicles provided with a foldable ramp.

Summary of the invention

[0009] This task has been resolved in a vehicle provided with a ramp by the device under this invention in accordance with claim 1.

[0010] The device consists of two interlocking modules. Each interlocking module is situated between the end of the horizontal brace of the bottom part of the foldable ramp and the adjoining main bearer. Each interlocking module consists of a fixed interlocking element connected with the main bearer and a moving interlocking element connected with the brace and moving with it, while in the transport position the bottom parts of the interlocking elements mutually snap in. The interlocking module thus forms a firm connection between the main bearers and the brace, horizontally in the driving direction of the vehicle and also in the direction perpendicular to it. The force of an impact on the rear side is transferred via the interlocking modules to the main bearers in the driving direction and, at the same time, the interlocking modules prevent deformation of the body in the direction perpendicular to the driving direction, i.e. from the center to the sides.

[0011] In one advantageous embodiment the fixed interlocking element is not connected directly to the main bearer but to a bracket connected with the main bearer. The bracket may also have an additional function as we will describe below.

[0012] In another advantageous embodiment the fixed interlocking element; consists of a dowel pin linked with a retainer and the movable interlocking element consists of the side wall of the brace provided with a groove and a stop, while in the transport position the dowel pin engages in the groove and rests on the stop and the retainer falls behind the side wall inside the brace.

[0013] In another advantageous embodiment the brace is made out of a hollow steel U-shaped section with its open side towards the bottom part of the foldable ramp.

[0014] The vertical retainer is L-shaped, its one arm forming the retainer and the other arm is attached to the bracket connected to the main bearer.

[0015] Another advantageous design of the bracket has the base attachable to the end of the main bearer and its arm is perpendicular to the base in the extended direction of the main bearer towards the end of the brace, while the fixed interlocking element is attached to the arm of the bracket.

[0016] Another advantageous design of the bracket arm is provided with a front hitch with openings, arranged in parallel with the base, and with an upper hitch with openings, arranged perpendicularly to the base, with a deformation element between the front hitch and the base, which is attached to the hitches with screws placed in the openings.

[0017] Advantages of the device under this invention consist in the fact that even if the impact hits the center of the rear part of the vehicle the force will be transferred to the lengthwise main bearers with deformation elements and an extensive deformation of the vehicle in the driving direction will be prevented. At the same time, the device under this invention prevents deformation of the rear part also in the transversal direction from the center to the sides.

Brief description of drawings

[0018] The invention will be explained in detail by means of the drawings.

- Fig. 1 view of a rear part of a vehicle with a foldable ramp in transport position A,
- Fig. 2 perspective view of a lowered floor well with a foldable ramp in transport position A,
- Fig. 3 perspective section of a vehicle's side with the main bearer and a bracket with a fixed interlocking element,
- Fig. 4 perspective view of a bracket with a fixed interlocking element,
- Fig. 5 perspective section of a vehicle's side with the main bearer, a bracket with a fixed interlocking element and a deformation element,
- Fig. 6 side view of a foldable ramp in entry position B,
- Fig. 7 side view of a foldable ramp in the upright transport position A,
- Fig. 8 view of a cutout of the vehicle's side and a foldable ramp in the position before locking of the interlocking module,
- Fig. 9 view of a cutout the vehicle's side and of a foldable ramp when the interlocking module is in transport position A.

Preferred embodiments of the invention

[0019] It is understood that the below described and depicted particular cases of embodiment of the invention are presented for illustration and not to limit the invention to such examples.

[0020] The vehicle **1** is in its rear part, i.e. in the luggage compartment, provided with a lowered floor well **2** which is embedded in the floor between two main bearers **3, 3'** arranged lengthwise under the sides of the vehicle **1** and under the rear wheel houses. Ends of the main bearers **3**, **3'** are linked with deformation elements **20** that carry a left segment of the bumper **23** and a right segment of the bumper **23'**.

[0021] A platform-like bottom part **6** of the foldable ramp **4** is pivotally attached on hinges to the rear edge of the lowered floor well **2.** The bottom part **6** has tiltable side parts revolving on hinges and thus the bottom part **6** moves from the transport position **A** to the entry position **B** and vice versa. The tiltable side parts are provided with moving carriers connected with the entry platform **5.**

When the bottom part **6** is in the transport position **A** the carriers can be used to fold the platform **5** into the vehicle on edges of the lowered floor well **2,** into the so-called passive position not shown in Figures 1 - 9. The foldable ramp **4** is also provided with a system of pulleys that conduct ropes attached to springs to ensure smooth movement of the foldable ramp **4** between the individual working positions.

[0022] The bottom part **6** of the foldable ramp **4** is provided with a horizontal brace **7.** The brace **7** is supposed to retain an impact on the rear part of the vehicle **1** and it consists of a steel "U" section with its open side towards the bottom part **6** of the foldable ramp **4** and it stretches all along its length. However, the brace **7** can have a number of other possible embodiments.

[0023] At the ends of the brace **7** there are interlocking modules that arrest the brace **7** in relation to the main bearers **3, 3'** in the transport position **A** and create a firm connection between them that prevents displacement of the brace **7** and the whole bottom part **6** inside towards the front part of the vehicle **1** during impact from the back. The connection is also firm in the perpendicular direction to the vehicle's driving direction **1** and thus it also prevents transverse deformation in the direction from the center to the sides.

[0024] Each interlocking module consists of a fixed interlocking element **8** attached to the main bearer **3, 3**' and from a moving interlocking element **9** attached to the brace **7.** The movable interlocking element **9** moves on a trajectory in the shape of a part of a circle, jointly with the brace **7** and the bottom part **6** of the foldable ramp **4.** In the transport position **A** the movable interlocking element **9** snaps in with the fixed interlocking element **8** and the firm connection is created in the mentioned directions.

[0025] Figures 1 through 9 illustrate an example of embodiment in which the fixed interlocking element **8** consists of a dowel pin **10** and a related retainer **11.** The dowel pin **10** is arranged horizontally and the retainer **11** is a flat slab formation arranged vertically. The dowel pin **10** and the retainer **11** form an integral steel weldment. The movable interlocking element **9** is integrated in the brace **7** so that the side wall **12** that closes both ends of the hollow brace **7** has an arched groove **13** that engages the dowel pin **10**. At the end of the groove **13** there is radius forming the stop **14** on which rests the dowel pin **10** in the transport position **A** and in case of an impact it prevents displacement of the brace **7** to the front. The dowel pin **10** passes through the groove **13** inside the brace **7**, along with the retainer **11**, which is at the end of the dowel pin **10.** In case of an impact from the back on the brace **7** the retainer **11** rests from the inside on the side wall **12** of the brace **7** and prevents the fixed interlocking element **8** from shifting from the end of the brace **7**. As the fixed interlocking element **8** is connected with the main bearers **3**, **3'**, it prevents deformation of the vehicle **1** in the transverse direction perpendicular to the driving direction. Another specific embodiment of the fixed interlocking element **8** and moving interlocking element **9** may feature signs of inverse kinematics or it may be resolved by another method obvious to persons skilled in the art.

[0026] Despite the fact that Figures 1 through 9 show only one interlocking module, specifically at the left main bearer **3**, the other interlocking module at the right main bearer **3'** is designed identically, only as the mirror image. The connection of the interlocking element **8** with the main bearers **3**, **3'** is implemented with a bracket **15**. The bracket **15** is a die stamping with a flat base **16** attached to the end of the main bearer **3**, **3'**. The base **16** forms the right angle with the flat arm **17** that runs toward the back in the extended direction of the main bearer **3**, **3'**. The fixed interlocking element **8** made of an L-section with the retainer **11** and the dowel pin **10** is welded to the arm **17.** In parallel with the base **16,** at the end of the arm **17,** there is a front hitch **18** with openings **19.** Lengthwise with the arm **18, 21** and the base **16** there is the existing deformation element **20**, attached with screws in the openings **19**, **22**. The deformation element **20** continues with the left segment of the bumper **23** on one side of the vehicle **1** and the right segment of the bumper **23**' on the other side of the vehicle **1.**

[0027] The bracket 1**5** is not indispensable but it is advantageous, among other things, also for placement of the deformation element **20.** The fixed interlocking element **8** may be attached to the main bearer **3, 3'** directly or indirectly via a simple arm or strut.

[0028] The device under this invention is used in vehicles equipped with a rear foldable ramp.

Reference numbers in the drawings

[0029]

1	vehicle
2	lowered floor well
3	main bearer
3'	main bearer
4	foldable ramp
5	entry platform
6	bottom part of the foldable ramp
7	brace
8	fixed interlocking element
9	moving interlocking element
10	dowel pin
11	retainer
12	side wall brace
13	groove
14	stop
15	bracket
16	bracket base
17	bracket arm
18	front hitch
19	opening in the front hitch
20	deformation element
21	upper hitch

22 opening in the upper hitch
23 left segment of the bumper
24 right segment of the bumper

A transport position of the foldable ramp
B entry position of the foldable ramp

Claims

1. A vehicle (1) comprising a device absorbing impact on the rear part of the vehicle (1), provided with a lowered floor well (2), arranged between two main bearers (3, 3') and with a foldable ramp (4) consisting of an entry platform (5) and a bottom part (6) carrying the entry platform (5), where the bottom part (6) is pivotally attached to the edge of the lowered floor well (2) and it can move between a transport position (A), when it is set vertically inside the vehicle (1) and locked by locking mechanism (10, 11) in the transport position (A), and an entry position (B), when it is folded out from the vehicle (1), while the bottom part (6) is provided with at least one horizontal brace (7), **characterized in that** the device absorbing impact consists of two interlocking modules, each of the interlocking modules is arranged between the end of the horizontal brace (7) and the adjoining main bearer (3, 3'), each interlocking module consists of a fixed interlocking element (8) connected to the main bearer (3, 3') and of a moving interlocking element (9) connected to the brace (7), while in the transport position (A) the bottom parts (6), the interlocking elements (8, 9) mutually snap in and the interlocking module forms a firm connection of the main bearers (3, 3') with the brace (7), horizontally in the driving direction of the vehicle (1) and in the direction perpendicular to the driving direction of the vehicle (1).

2. The vehicle (1) according to the claim 1 **characterized in that** the fixed interlocking element (8) is attached to the bracket (15) connected with the main bearer (3, 3').

3. The vehicle (1) according to the claim 1 **characterized in that** the fixed interlocking element (8) has a dowel pin (10) with a retainer (11), the movable interlocking element (9) has a side wall (12) of the brace (7) provided with a groove (13) and a stop (14), while in the transport position (A) the dowel pin (10) engages in the groove (13) and rests on the stop (14) and the retainer (11) falls behind the side wall (12) inside the brace (7).

4. The vehicle (1) according to any of the claims 1 through 3 **characterized in that** the brace (7) is made up of a hollow U-shaped steel section with its open side towards the bottom part (6) of the foldable ramp (4).

5. The vehicle (1) according to the claim 3 **characterized in that** the vertical retainer (11) is L-shaped, its one arm forms the retainer (11) and the other arm is fixed to the bracket (15) connected with the main bearer (3, 3').

6. The vehicle (1) according to the claim 2 or 5 **characterized in that** the bracket (15) has a base (16) that can be attached to the end of the main bearer (3, 3') and an arm (17) perpendicular to the base (16) in the extended direction of the main bearer (3, 3') towards the end of the brace (7), while the fixed interlocking element (8) is attached to the arm (17).

7. The vehicle (1) according to the claim 6 **characterized in that** the arm (17) is provided with a front hitch (18) with openings (19), arranged in parallel with the base (16), an upper hitch (21) with openings (22), arranged perpendicularly to the base (16), and between the front hitch (18) and the base (18) there is a deformation element (20) attached to the hitches (18, 21) with screws in the openings (19, 22).

Patentansprüche

1. Ein Fahrzeug (1), umfassend eine Vorrichtung, die einen Aufprall auf den hinteren Teil des Fahrzeugs (1) absorbiert, ausgestattet mit einer abgesenkten Bodenwanne (2), die zwischen zwei Hauptträgern (3, 3') angeordnet ist, und mit einer klappbaren Rampe (4), bestehend aus einer Einstiegsplattform (5) und einem die Einstiegsplattform (5) tragenden Unterteil (6), wobei das Unterteil (6) schwenkbar am Rand der abgesenkten Bodenwanne (2) befestigt ist und sich zwischen einer Transportstellung (A), wenn es senkrecht in das Fahrzeug (1) gestellt und durch den Verriegelungsmechanismus (10,11) in der Transportstellung (A) verriegelt wird, und einer Einstiegsstellung (B) bewegen kann, wenn es aus dem Fahrzeug (1) herausgeklappt ist, während das Unterteil (6) mit mindestens einer horizontalen Strebe (7) versehen ist, **dadurch gekennzeichnet, dass** die Stoßabsorptionsvorrichtung aus zwei Formschlussmodulen besteht, wobei jedes der Formschlussmodule zwischen dem Ende der Horizontalstrebe (7) und dem angrenzenden Hauptträger (3, 3') angeordnet ist, jedes Formschlussmodul aus einem mit dem Hauptträger (3, 3') verbundenen festen Formschlusselement (8) und einem beweglichen, mit der Strebe (7) verbundenen Formschlusselement (9) besteht, während in der Transportstellung (A) die Unterteile (6) die Formschlusselemente (8, 9) ineinander einrasten und das Formschlussmodul eine feste Verbindung der Hauptträger (3, 3') mit der Strebe (7) herstellt, horizontal in Fahrtrichtung des

Fahrzeugs (1) und senkrecht zur Fahrtrichtung des Fahrzeugs (1).

2. Das Fahrzeug (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** das feste Formschlusselement (8) an der mit dem Hauptträger (3, 3') verbundenen Halterung (15) befestigt ist.

3. Das Fahrzeug (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** das feste Formschlusselement (8) einen Passstift (10) mit einem Halter (11) aufweist, das bewegliche Formschlusselement (9) eine Seitenwand (12) der Strebe (7) aufweist, die mit einer Nut (13) und einem Anschlag (14) versehen ist, während in der Transportstellung (A) der Passstift (10) in die Nut (13) eingreift und auf dem Anschlag (14) ruht und der Halter (11) hinter die Seitenwand (12) innerhalb der Strebe (7) fällt.

4. Das Fahrzeug (1) nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Strebe (7) aus einem hohlen U-förmigen Stahlprofil besteht, dessen offene Seite zum unteren Teil (6) der klappbaren Rampe (4) zeigt.

5. Das Fahrzeug (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** der vertikale Halter (11) L-förmig ist, einer seiner Arme den Halter (11) bildet und der andere Arm an der mit dem Hauptträger verbundenen Halterung (15) befestigt ist (3, 3').

6. Das Fahrzeug (1) nach Anspruch 2 oder 5, **dadurch gekennzeichnet, dass** die Halterung (15) eine Basis (16) hat, die am Ende des Hauptträgers (3, 3') befestigt werden kann, und einen Arm (17), der senkrecht zur Basis (16) in erweiterter Richtung des Hauptträgers (3, 3') zum Ende der Strebe (7) hin ausgerichtet ist, während das feste Formschlusselement (8) am Arm (17) befestigt ist.

7. Das Fahrzeug (1) nach Anspruch 6 **dadurch gekennzeichnet, dass** der Arm (17) mit einer Frontkupplung (18) mit parallel zur Basis (16) angeordneten Öffnungen (19), einer oberen Kupplung (21) mit senkrecht zur Basis (16) angeordneten Öffnungen (22) versehen ist und sich zwischen der Frontkupplung (18) und der Basis (16) ein Deformationselement (20) befindet, das mit Schrauben in den Öffnungen (19, 22) an den Kupplungen (18, 21) befestigt ist.

Revendications

1. Véhicule (1) comprenant un dispositif absorbant les chocs sur la partie arrière du véhicule (1) pourvu d'un puit à plancher abaissé (2) disposé entre deux supports principaux (3, 3') et d'une rampe pliable (4) constitué d'une plate-forme d'entrée (5) et d'une partie inférieure (6) portant la plate-forme d'entrée (5), où la partie inférieure (6) est fixée de manière pivotante au bord du puits à plancher abaissé (2) et qui peut se déplacer entre un position de transport (A), lorsqu'il est placé verticalement à l'intérieur du véhicule (1) et verrouillé par un mécanisme de verrouillage (10, 11) en position de transport (A), et une position d'entrée (B), lorsqu'il est placé à l'intérieur du véhicule (1), tandis que la partie inférieure (6) est munie d'au moins une entretoise horizontale (7) **caractérisé en ce que** le dispositif absorbant les chocs est constitué de deux modules de verrouillage, chacun des modules de verrouillage est disposé entre l'extrémité de l'entretoise horizontale (7) et le support principal adjacent (3, 3'), chaque module de verrouillage est constitué d'un élément de verrouillage fixe (8) relié au support principal (3, 3') et d'un élément de verrouillage mobile (9) relié à l'entretoise (7), tandis qu'en position de transport (A), les parties inférieures (6), les éléments de verrouillage (8, 9) s'enclenchent mutuellement et le module de verrouillage forme une liaison solide entre les supports principaux (3, 3') avec l'entretoise (7), horizontalement dans la direction de marche du véhicule (1) et dans la direction perpendiculaire à la direction de marche du véhicule (1).

2. Véhicule (1) selon la revendication 1 **caractérisé en ce que** l'élément de verrouillage fixe (8) est fixé au support (15) relié au support principal (3, 3').

3. Véhicule (1) selon la revendication 1 **caractérisé en ce que** l'élément de verrouillage fixe (8) comporte une goupille (10) avec un dispositif de retenue (11), l'élément de verrouillage mobile (9) comporte une paroi latérale (12) de l'entretoise (7) pourvue d'une rainure (13) et d'une butée (14), tandis qu'en la position de transport (A), la goupille (10) s'engage dans la rainure (13) et repose sur la butée (14) et le dispositif de retenue (11) tombe derrière la paroi latérale (12) à l'intérieur de l'entretoise (7).

4. Véhicule (1) selon l'une des revendications 1 à 3 **caractérisé en ce que** l'entretoise (7) est constituée d'un profilé d'acier creux en forme de U dont le côté ouvert est orienté vers la partie inférieure (6) de la rampe pliable (4).

5. Véhicule (1) selon la revendication 3 **caractérisé en ce que** le dispositif de retenue vertical (11) est en forme de L, son bras forme le dispositif de retenue (11) et l'autre bras est fixé au support (15) relié au support principal (3, 3').

6. Le véhicule (1) selon la revendication 2 ou 5 **caractérisé en ce que** le support (15) comporte une base (16) qui peut être fixée à l'extrémité du support prin-

cipal (3, 3') et un bras (17) perpendiculaire à la base (16) dans la direction d'extension du support principal (3, 3') vers l'extrémité de l'entretoise (7), tandis que l'élément de verrouillage fixe (8) est fixé au bras (17).

7. Véhicule (1) selon la revendication 6 **caractérisé en ce que** le bras (17) est pourvu d'un attelage avant (18) avec des ouvertures (19) disposé parallèlement à la base (16), d'un attelage supérieur (21) avec des ouvertures (22) disposé perpendiculairement à la base (16), et entre l'attelage avant (18) et la base (16) se trouve un élément de déformation (20) fixé aux attelages (18, 21) avec des vis dans les ouvertures (19, 22).

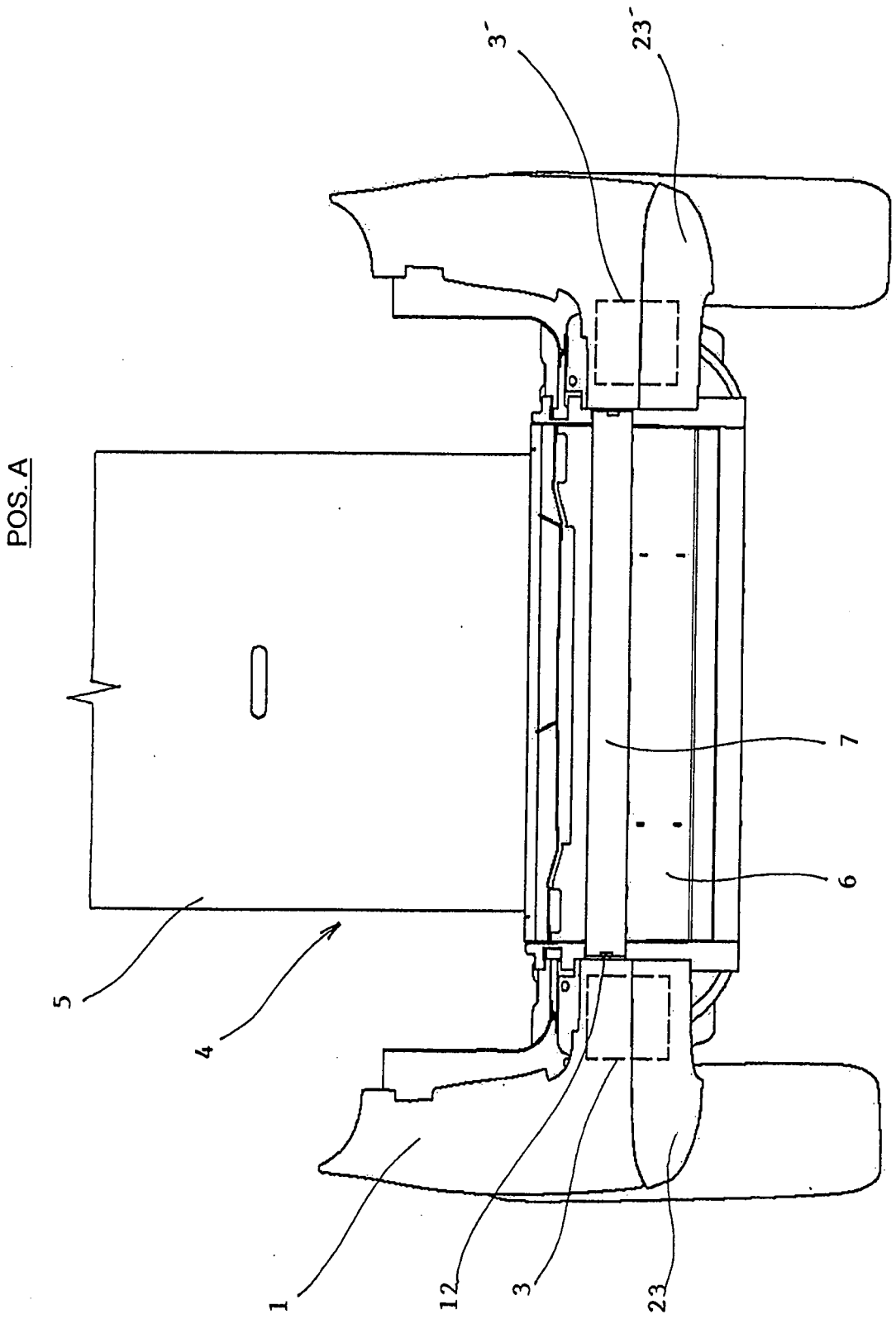


FIG. 1

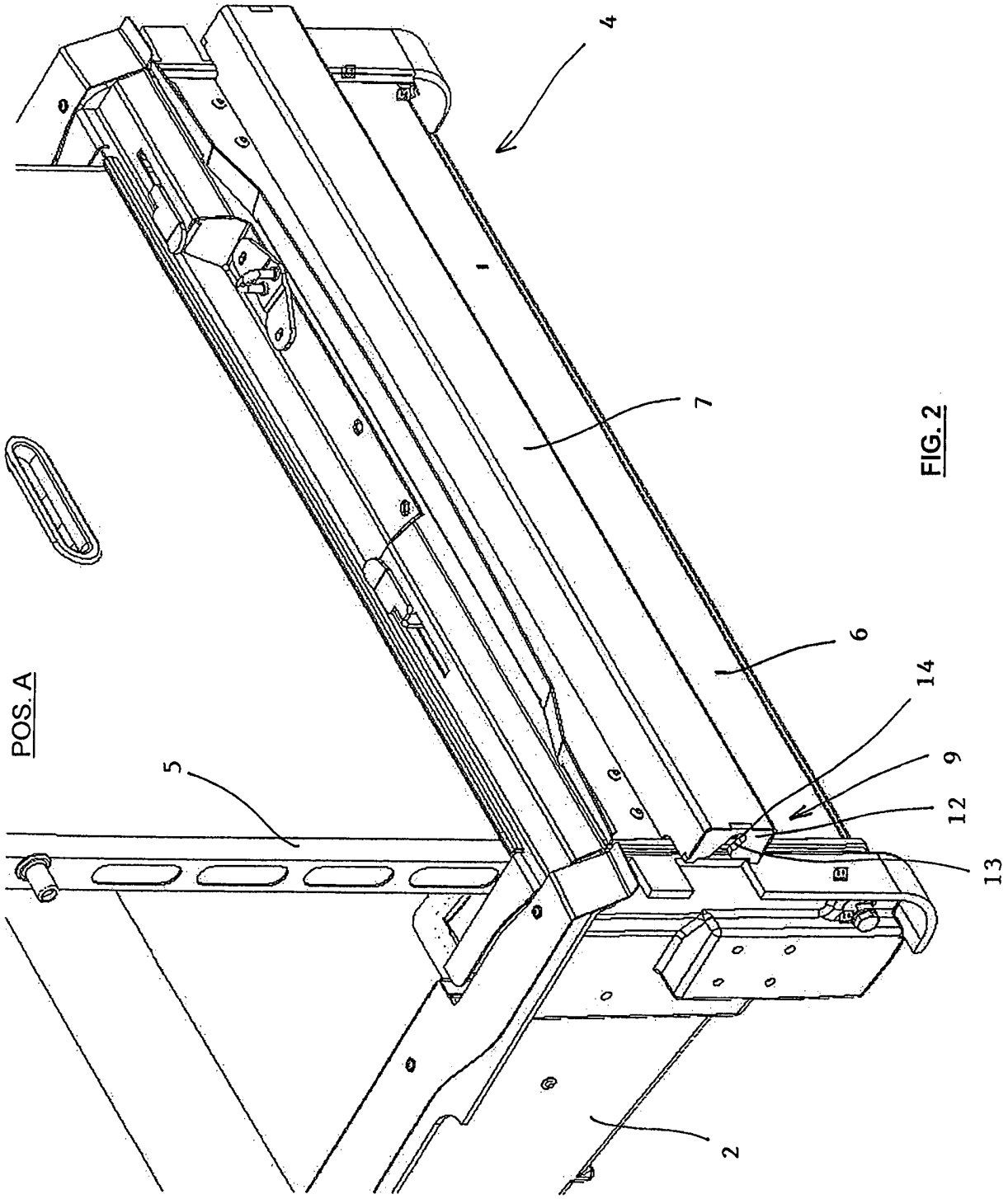


FIG. 2

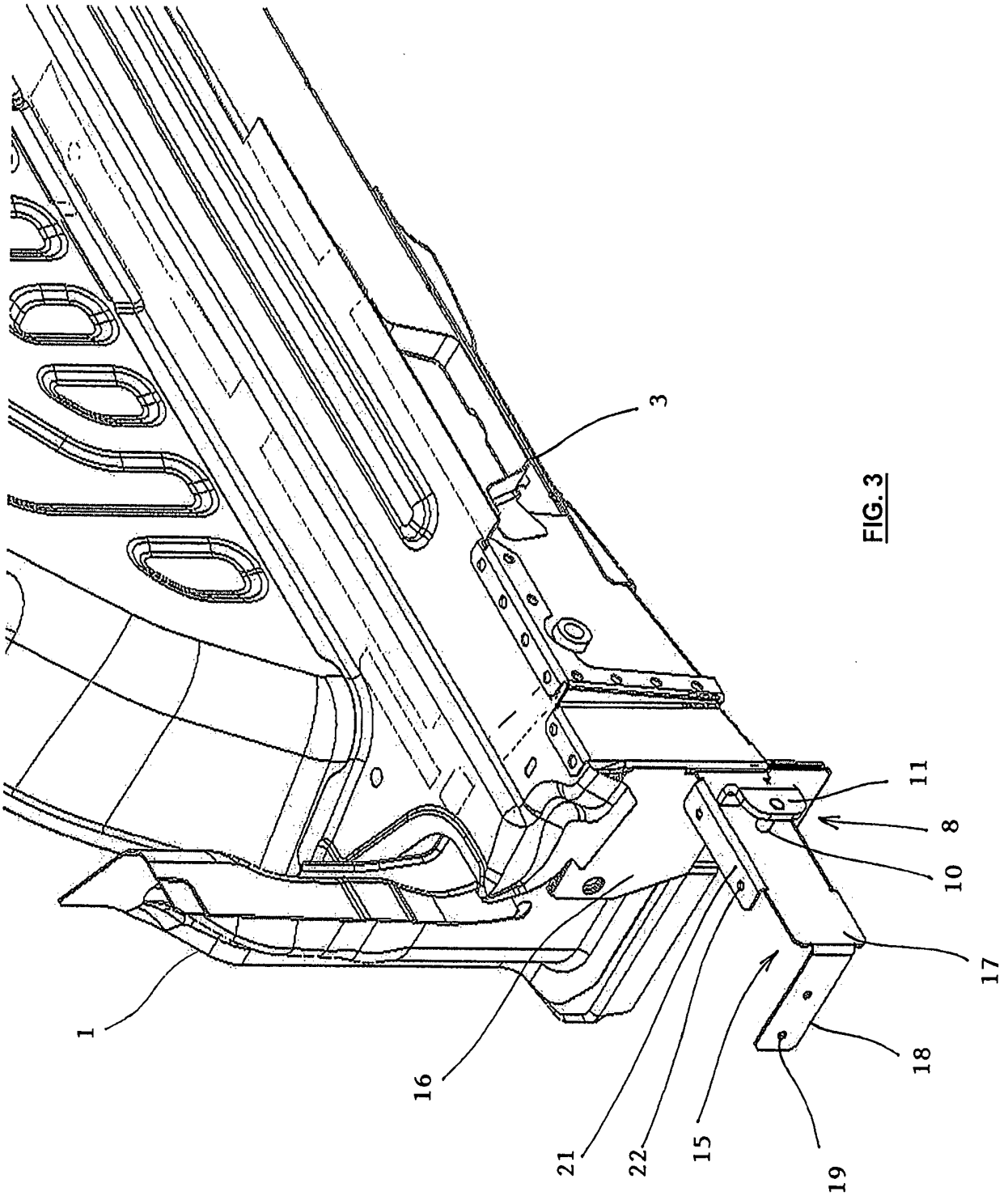


FIG. 3

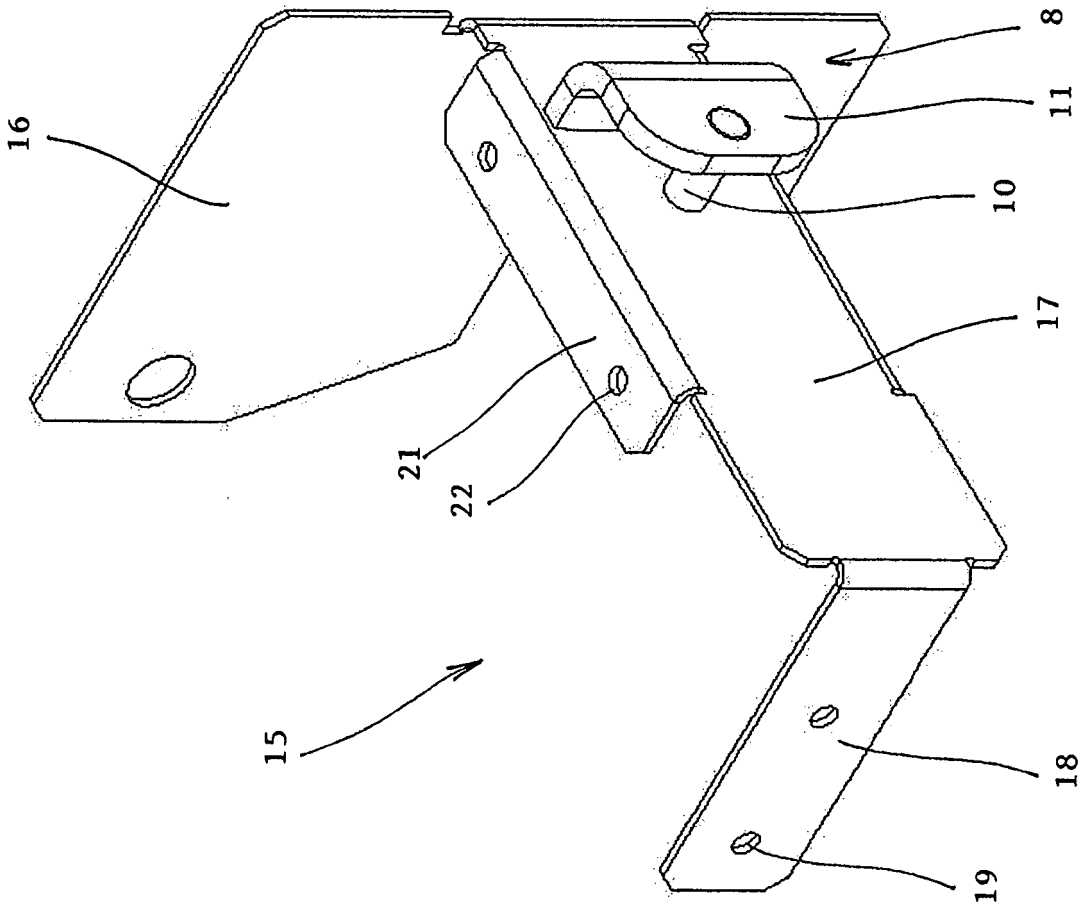


FIG. 4

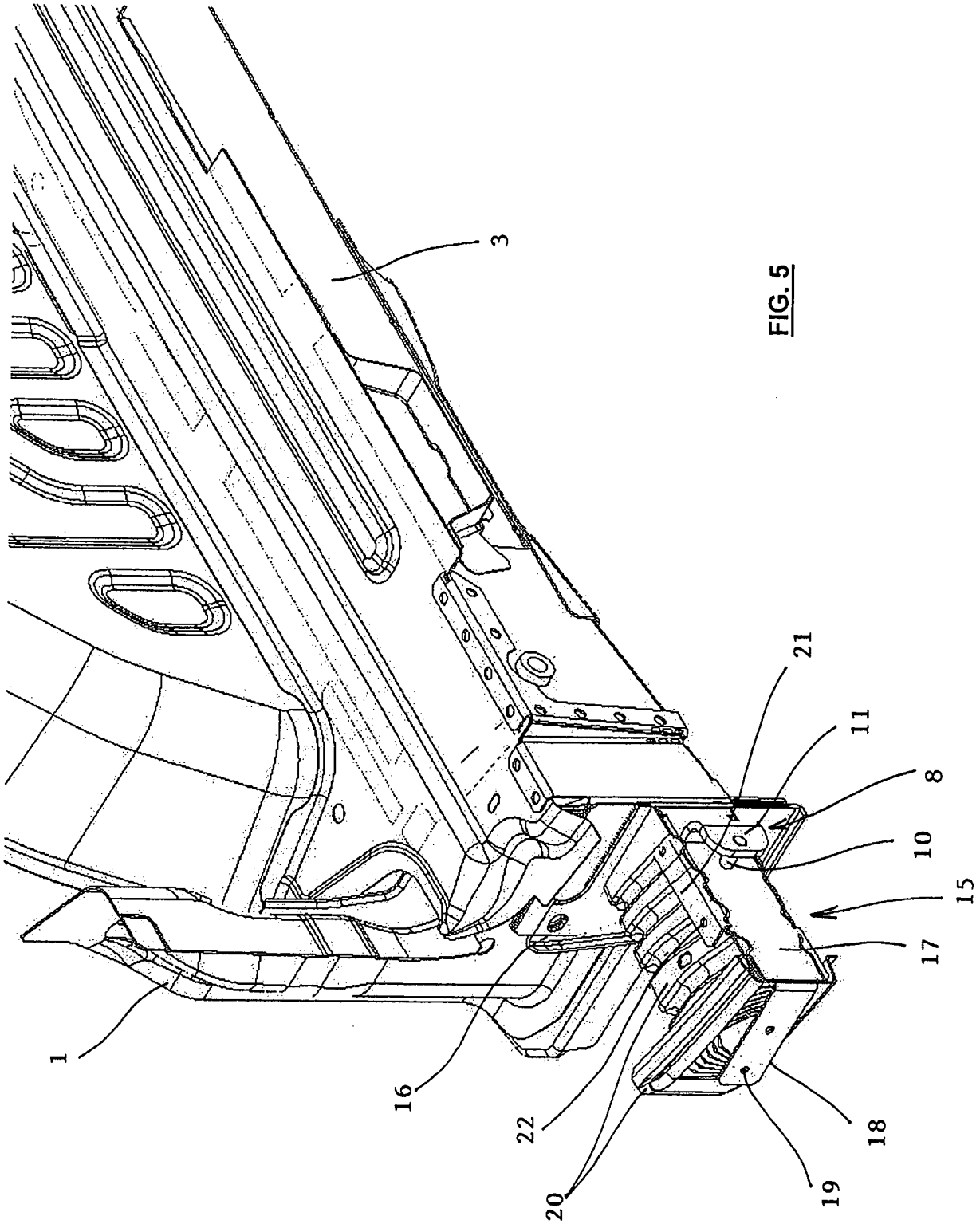
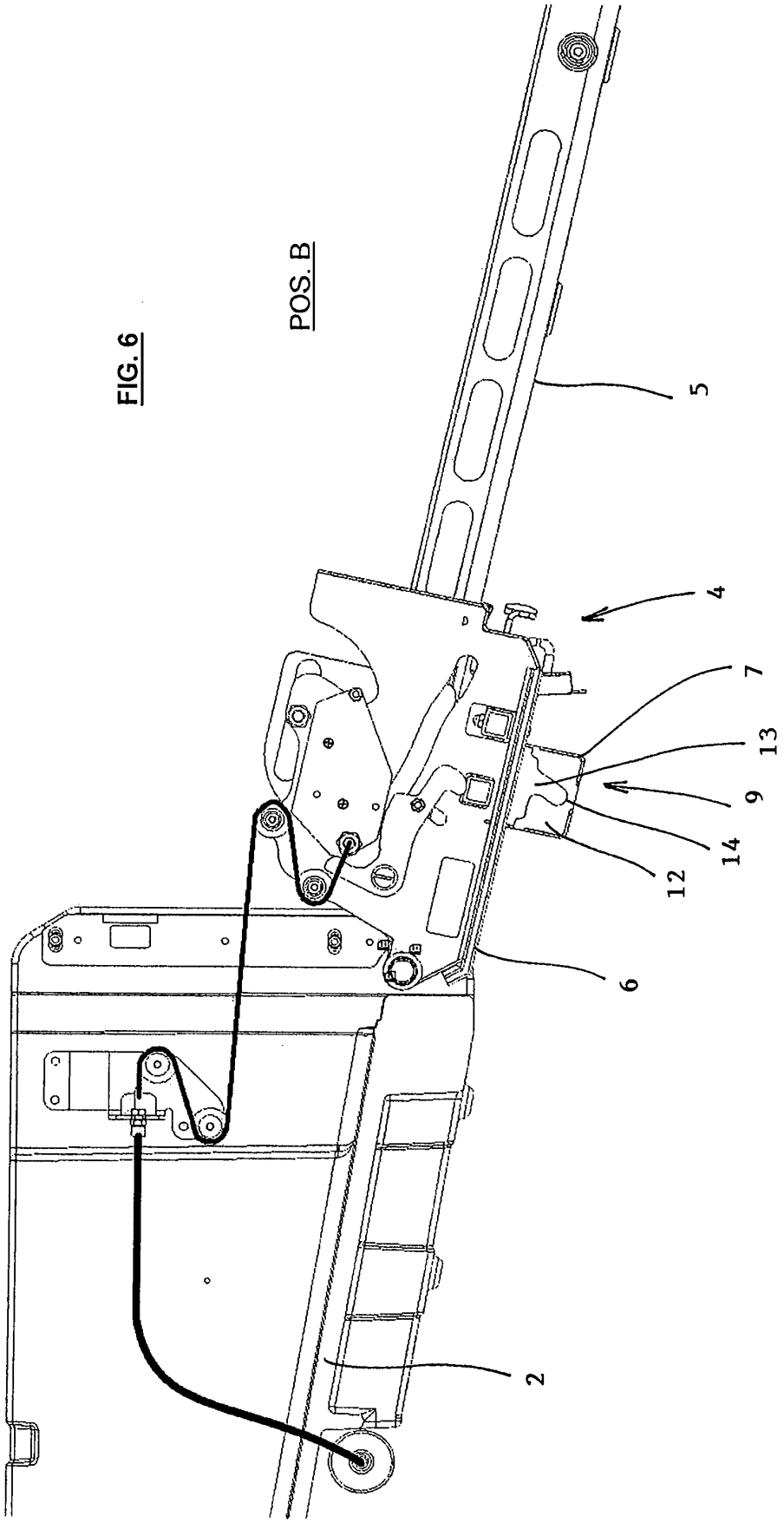


FIG. 5

FIG. 6

POS. B



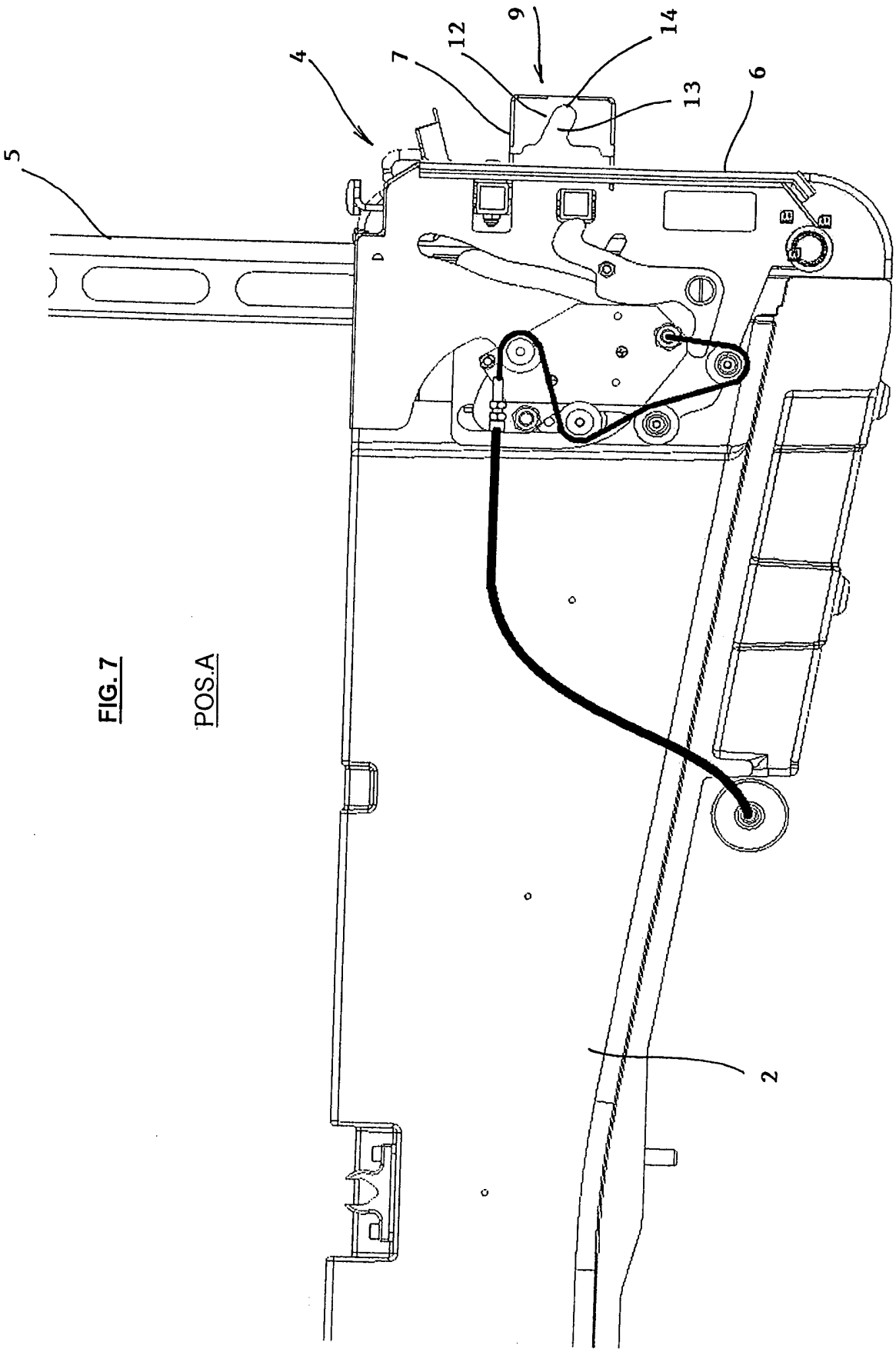


FIG. 7

POS.A

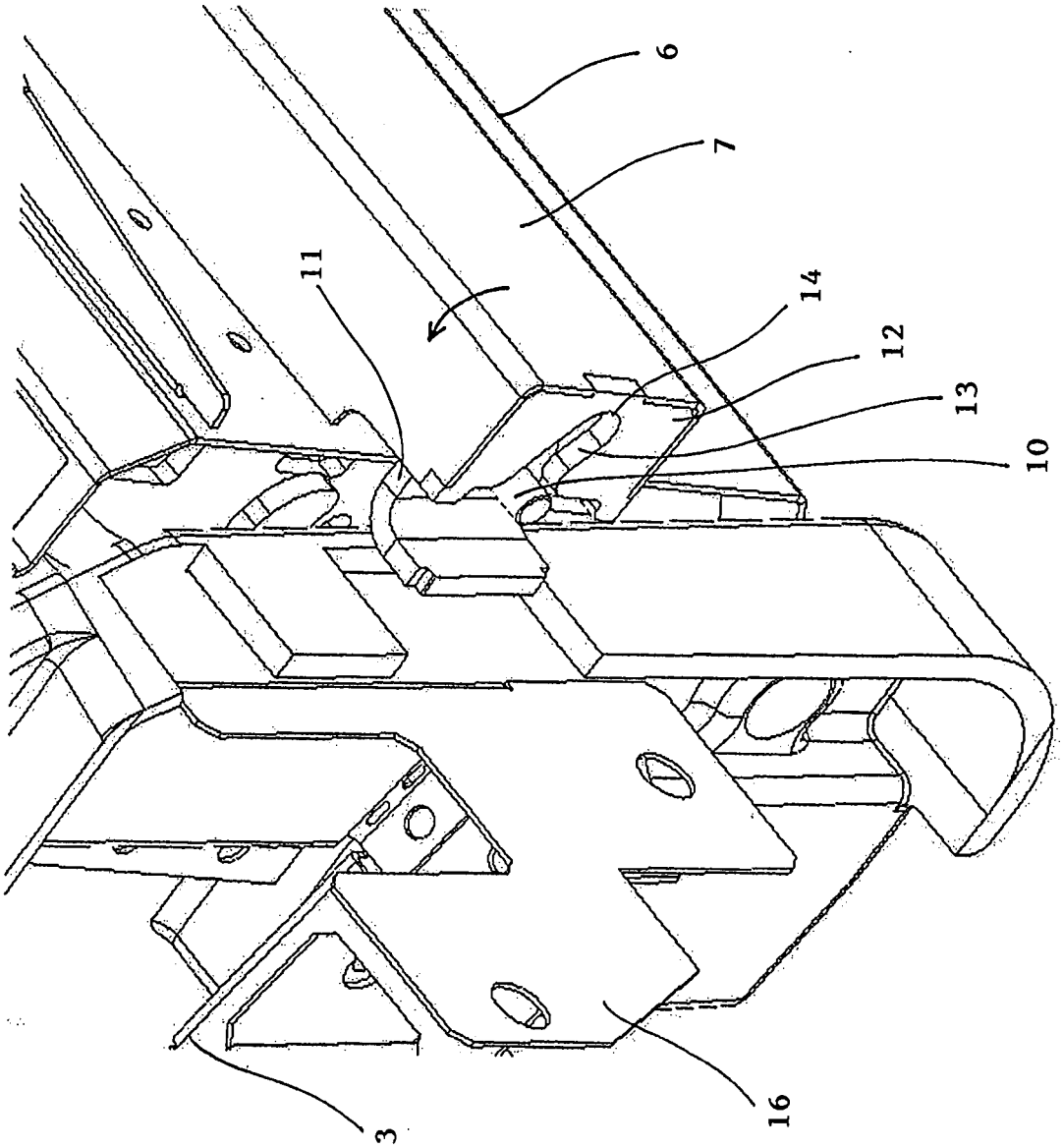


FIG. 8

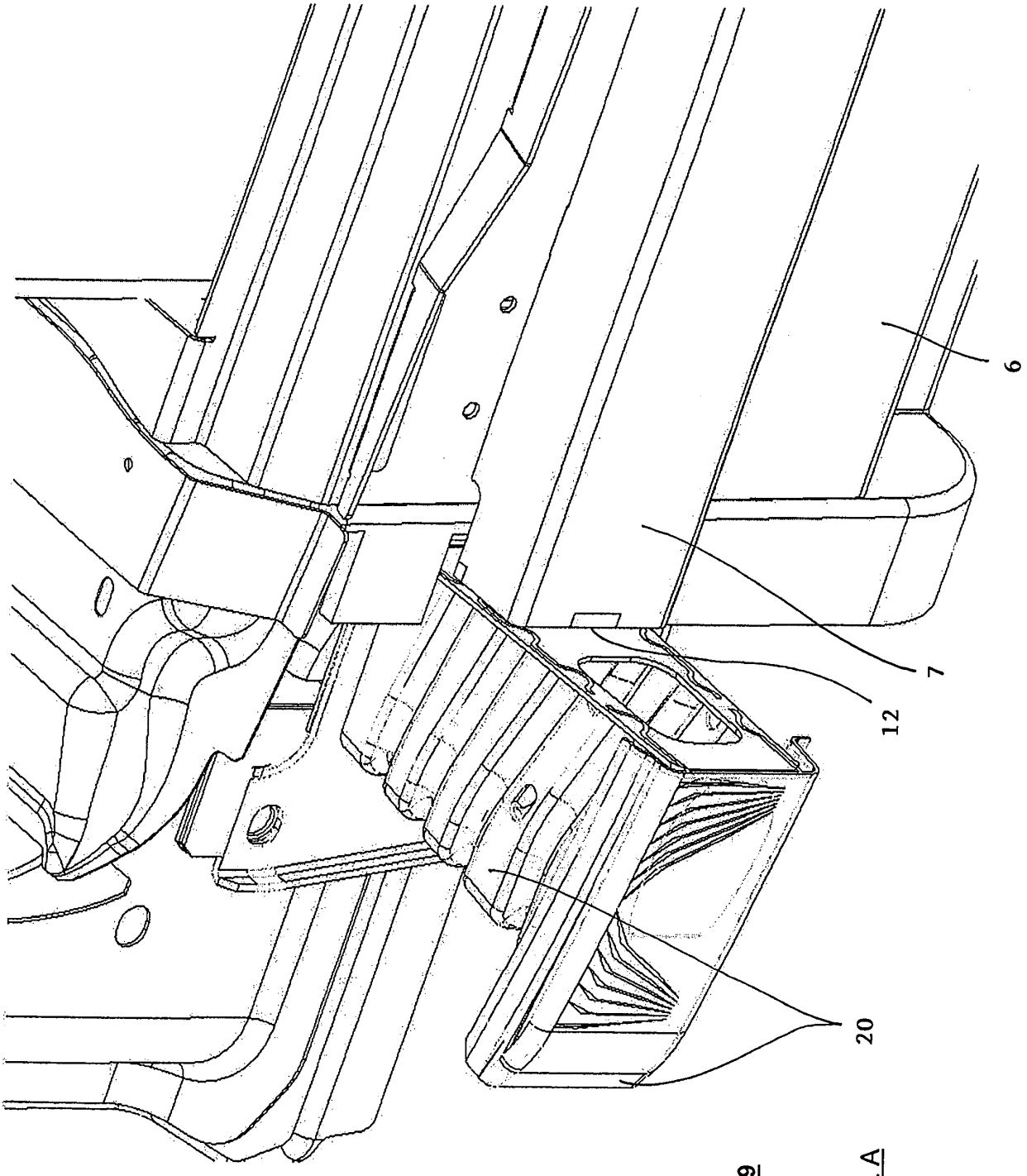


FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2014255138 A **[0004]**
- WO 2013105313 A **[0004]**
- GB 2275030 A **[0004]**
- WO 9702171 A **[0004]**
- EP 0390431 A **[0004]**
- WO 03059685 A **[0004]**
- US 5137413 A **[0004]**
- WO 0009060 A **[0005]**
- EP 2293755 A **[0006]**