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(54) Benævnelse: **Sikkerhedskøreprofil samt flytbart portblad med et sikkerhedskøreprofil**

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DE-U1-202007 000 460
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Safety guide profile and movable door leaf comprising a safety profile

The invention relates to a safety guide profile for use in movable door leaves which, starting from a fixing leg, has lateral guide legs which merge into terminating legs at the ends, there being an opening area between the terminating legs. The invention also relates to a movable door leaf which, on its side edges, is provided with guide rollers that engage in stationary guides which comprise safety guide profiles.

An extremely wide range of lateral guides for movable door leaves are known. For example, DE 10 2015 015 499 A1 has described guide rollers for a roller door which have straight guide surfaces. Analogously designed guide rollers can also be gathered from DE 10 2015 112 633 A1. Cylindrical pins which engage in lateral guide rails are disclosed by US 4,037,639. These pins are guided only in an opening area of the guide member, the latter being provided with rounded portions. When the door leaf is under a high loading, for example as a result of wind loads, blockages and impermissible wear of the guide means repeatedly occur laterally between the rollers or pins within the lateral guide rails in the aforementioned embodiments, which makes proper, permanent operation of the doors impossible.

DE 20 2007 000 460 U1 has disclosed a guide roller which is used within a C-shaped guide rail having straight guide surfaces and which has a convex course on its circumference. This type of design is also afflicted by deficiencies, since such an embodiment can be used for friction-free operation only when there are low external attacking forces on the door leaf.

A sectional door, the door leaf of which comprises individual sections connected to one another in an articulated manner and which are guided by means of rollers in lateral guides, wherein the lateral guides merge from a vertical course into a curved course of a parking position and which, in the parking position of the door leaf, are arranged

in the lintel area, is disclosed by EP 2 557 264 B1. The curved course of the parking position consists of circular arc sections running concentrically, the radii of which taper from circular arc section to circular arc section, wherein the circular arc sections are alternately based on two circular arc centres spaced apart at a distance.

An adjusting device in a combined design of a supporting roller-friction drive device for single leaf door leaves that can be moved overhead is reproduced by DE 76 26 729 U1. By means of this design, in the course of dynamic door movements, the roller is to be prevented from lifting off the base of the guide rail, since the axle of the roller is pressed continuously against the base of a C-shaped guide rail by the pressure of a spring.

DE 20 2012 012 514 U1 discloses a spiral door, the door leaf of which comprises individual door elements connected to one another by rotary joints, which are guided by means of guide rollers in lateral guide rails, wherein the lateral guides merge from a vertical course into a continuously curved course with an interspace present between the guide rails and, in the parking position, are arranged in the lintel area, wherein the curved course of a spiral or the like is composed of circular arc sections running concentrically.

DE 20 2007 000 460 U1 describes a roller door having a door leaf which, starting from a closed position, in the course of an opening movement along a track predefined by a guide arrangement, can be wound from a multi-layer coil and preferably comprises a plurality of with their longitudinal axes transversely, in particular approximately at right angles to the direction of the opening movement. The lateral guides have straight or C-shaped surfaces for guide rollers.

As the prior art shows, an extremely wide range of ideas have been implemented in order to deal with an old problem of running safety in movable doors. Since such door leaves assume greater and greater dimensions, the designs from the prior art are no longer suitable to ensure friction-free operation of such door leaves since, because of the incidents, it is ever more frequently reported that such rollers can move out of the lateral guides or tilt or jam within the guides.

It is an object of the invention to devise a guide means for rolling bodies which can be used for an extremely wide range of door designs. This guide means should be usable in movable door leaves in which the rolling bodies must not come out of the guide means or else tilt or jam even under high loadings on the door leaf such as, for example, transverse forces resulting from wind loads or in substantially horizontal parking positions. Furthermore, such a design, in addition to durability and the high loading, should be easy to mount and to process during production.

The object of the invention is achieved by the features of the respective Claims 1, 7 and 13. The sub-claims respectively following the independent claims reproduce a further refinement of the idea according to the invention.

To achieve the object, the invention provides a safety guide profile which meets all the required demands with regard to unrestricted operation in the use in movable door leaves. Such a safety guide profile essentially comprises a straight fixing leg, which can be simply mounted via holes or apertures both on side frames or doorframes or else on mounting plates. In order that necessary mounting means for fixing the safety guide profile cannot project into the movement space of a rolling body and hamper the movement of the door leaf, spacer legs are moulded on the ends of the fixing leg such that a fixing space is formed between the spacer legs and the fixing leg. This fixing space thus offers the possibility of simple and effective fixing, irrespective of the rolling means used in the safety guide profile.

Starting from the spacer legs, in continuation of the fixing space, inclined limiting legs pointing away are designed to form a running space for the rolling body. The limiting legs have been designed in an inclined position which is directed outwards. At the ends, the limiting legs on each side merge via radii into rounded guide legs, at the ends of which straight terminating legs are formed, likewise via radii but in this case directed inwards. This design produces an internal space which, apart from the fixing space, includes a substantially C-shaped design and has an opening area between the opposite terminating legs.

The previously described design of the safety guide profile is distinguished in its cross section in particular also by the fact that all the transitions between the different legs

are softly rounded and not bizarrely tilted. As a result, in addition to a harmonious, appropriate curvature of the cross section of the safety guide profile, an internal space for the secure guidance of rolling bodies is also produced. The course of the opposite guide legs has been configured in such a way that guide surfaces which are opposite the guide legs and have a substantially larger guide surface than, for example, the thickness of the rolling body are produced from the common centre within the internal space of the safety profile. This is achieved by the alignment of the limiting legs and the terminating legs also substantially at the same angles in relation to the centre within the internal space, since these, spreading outwards, extend as far as the guide legs. As a result, the length of the guide surface becomes greater than a distance dimension between the limiting leg and the terminating leg. In this design, for example, the course of the left-hand limiting leg is aligned substantially parallel to the right-hand terminating leg, and the right-hand limiting leg is aligned substantially parallel to the left-hand terminating leg. This produces the widening of the guide surface with respect to the distance dimension. This opens up a substantially larger movement clearance to an inserted rolling body without the rolling body being able to be moved out of the safety guide profile by external forces on the door leaf, as is possible in the prior art. The movement clearance is also enlarged by the fact that the rolling body, when introduced, is initially not in contact with the guide surfaces on all sides within the internal space. As a result it is possible that, even when the rolling body is skewed, which is, for example, produced by loading forces on the door leaf, the axles of the rolling bodies continue to guarantee a sufficient and secure movement sequence within the safety guide profile as a result of an inclined position. Tilting of rolling bodies or guide means, such as is known in the prior art, is reliably avoided thereby. Likewise, by means of the safety guide profile in conjunction with rolling bodies, the guide surfaces of which have a rounded or highly curved course, the frictional forces that are produced when a door leaf is moved are virtually eliminated.

To increase the runnability of a rolling body, it is thus important that their diameter is less than the dimension between the opposite guide surfaces of the safety guide profile. Furthermore, the rolling body running surfaces should be provided with a contour which is rounded, substantially semi-circular. As a result, secure and harmonious running of these rolling bodies within the safety guide profile is ensured.

Such a safety guide profile is suitable for an extremely wide range of applications in movable door leaf designs. Thus, even in the case of lifting doors, this safety guide profile can be used in the same way as in sectional doors or roller doors which are moved overhead. Furthermore, the safety guide profiles can also be used in roller doors or spiral doors or high-speed doors having door leaves which comprise individual sections connected to one another in an articulated manner and are guided by rollers in the lateral safety guide profiles. In addition to the straight design of the safety guide profile, this also applies to embodiments of the safety guide profile that are deformed over radii.

The above-described safety guide profile can, for example, be fabricated from a metal sheet in a rolling operation. A design in a plastic or aluminium extrusion can be produced cost-effectively in rod designs and also in curved sections.

The invention is explained in more detail below by using various possible exemplary embodiments:

Figure 1 shows a possible embodiment of a safety guide profile in cross section;

Figure 2 shows the use of a safety guide profile;

Figure 3 shows the use of a safety guide profile to form a parking position, as is used, for example, in roller doors or sectional doors or high-speed doors;

Figure 4 shows the use of a rolling body within the safety profile.

Figure 1 reproduces a safety guide profile 1 in its cross-sectional view. Starting from a fixing leg 2, rounded spacer legs 3 pointing away are formed at its lateral ends. Thus, a fixing space 4 is produced between the fixing leg 2 and the spacer legs 3, in order to be able to fix the safety guide profile 1 to stationary constructions in such a way that the fixing means do not have a disruptive effect on a movement of a door leaf. Following the spacer legs 3, there are limiting legs 5 moulded on both sides, likewise via radii. These limiting legs 5 have inclined positions, which are directed towards the outer side of the fixing legs 2, i.e. towards their base. Following the fixing legs 5 there

are formed guide legs 6 bent outwards via radii 9, which merge at the ends into terminating legs 8 via radii 10. This design produces an internal space 11 within the safety guide profile 1. Between the terminating legs 8 directed towards the internal space 11 there is an opening area 16, so that the internal space 11 is accessible from outside, for example for axles 25 of rolling bodies 24. The guide legs 6 have guide surfaces 7 on the inside, which have a rounded course, for example a radius, which is formed in relation to a centre 22 of the internal space 11. On these guide surfaces 7, on each side of the safety guide profile 1, a rolling body 24 can thus still be guided securely, even when in an inclined position. The rolling body 24 can be designed, for example, in the form of rollers which have a rounded or convex running surface. As a result of the rounded guide surfaces 7, it is thus possible for contact to be provided always on one side of the guide surfaces 7, even with an inclined position of the rolling body 24. It likewise becomes clear that, as a result of this design of the safety guide profile 1, frictional losses can be substantially reduced or else eliminated entirely.

In order that such a rolling body 24 can be guided with appropriate play between the guide surfaces 7 within the safety guide profile 1, there is a distance dimension A, which is measured between the ends of the terminating legs 8 directed towards the internal space 11 and the start of the limiting legs 5. Figure 1 makes it clear that the distance dimension A is smaller than the guide surface 7. This design makes it possible that a rolling body 24, in particular in a spiral body according to Figure 3, cannot come out of the guide area of the safety guide profile 1 or tilt or jam therein.

In particular in wide and heavy door leaves, it is possible for high loadings of the rolling bodies 24 and their axles 25 to occur in the parking position, that is to say in a substantially horizontal position or in a spiral body. In the parking position of the door leaf, these assume, so to speak, a horizontal position, so that the entire weight loads the axles 25 as transverse forces. As a result of these forces, it is possible for skewing of the axles 25 to occur, which results in the rolling bodies 24 also making a rotational movement in themselves. This rotational movement can lead to jamming or tilting or, in the extreme case, even to the rolling bodies 24 leaving the guide profile. Such blockages lead to a stoppage of the door leaf and give rise to a service intervention. This circumstance is taken into account completely by the formation of the safety guide

profile 1 and avoids an increase in costs in roller doors, sectional doors, high-speed doors or spiral doors.

By means of the cross-sectional illustration of the safety guide profile 1 according to Figure 4 in conjunction with a rolling body 24 which is connected by its axle 25 to an element of a door leaf, not shown, it quickly becomes clear that the rolling body 24 cannot move out of the internal space 11 of the safety guide profile 1 over the opening area 16 even with unusual transverse loadings, nor is jamming possible. As a result of a rounded running surface of the rolling body 24 in conjunction with the likewise rounded guide surface 7 of the safety guide profile 1, it is ensured that the rolling body 24 always remains ready for use during a lateral deflection from the centre line 23. This is ensured even in the event of large angles α above and below the centre line 23.

Furthermore, Figure 4 makes it clear that there is very large play between the running surfaces of the rolling body 24 and the guide surfaces 7 of the safety guide profile 1, so that even in the illustrated inclined position of the axle 25, there is sufficient movement space. This ensures that the rolling body 24 can always come into contact with one of the opposite guide surfaces 7. Since, in such special situations, there is also only a point loading between the rolling body 24 and a guide surface 7, frictional forces that arise here are also negligibly small.

Figure 1 makes it clear that the cross section of the safety guide profile 1 is distinguished by its appropriate curvature and has no hard edges. This also makes the production process easier and at the same time reduces the production costs of the safety guide profile 1, for example in a rolling operation in a metal embodiment or in an injection moulding process in a plastic embodiment.

In Figure 2, the safety guide profile 1 has been illustrated in a possible use. A straight section 13 is followed via a joint 15 by a curved section 14. The fixing of the straight section 13 and the curved section 14 can be made via apertures 12 which are introduced into the fixing leg 2.

A further exemplary embodiment is reproduced by Figure 3, in which a spiral body, for example for a roller door or a high-speed door in the parking position, can be created

from the safety guide profile 1. The spiral embodiment is achieved via circular arc sections 17. While the course of the individual circular arc sections 17 decreases via centre points, not shown, it is possible to design such an embodiment of a spiral with circular arc sections 17. However, for this purpose it is necessary for semi-circular circular arc sections 17 to be connected to one another in relation to two centre points, alternately via joints 15. It goes without saying that in this case the semi-circular circular arc sections 17 always decrease in their own clear diameters. In order, for example, to achieve secure retention of the circular arc sections 17 on a mounting plate, retaining elements 18 have been used in the joint area 15. These retaining elements 18 are configured in such a way that they engage laterally over the safety guide profile 1 and are thus placed over the terminating leg 8. The retaining elements 18 are likewise fixed to the mounting plate.

Depending on the diameter and design of the spirals, it may be necessary for a compensating element 19 to be introduced into the area of the joint between two circular arc sections 17 that butt up against each other.

The preferred use of the safety guide profile 1 is not limited to the formation of curved circular arc sections 17, but can also be used in straight courses.

The safety guide profile 1 also offers the possibility, for example, of being combined with guide elements in a J shape as a profile 20 with the insertion of a transition profile 21.

Reference symbols

1	Safety guide profile
2	Fixing leg
3	Spacer leg
4	Fixing space
5	Limiting leg
6	Guide leg
7	Guide surface
8	Terminating leg
9	Radius
10	Radius
11	Internal space
12	Aperture
13	Straight section
14	Curved section
15	Joint
16	Opening area
17	Circular arc sections
18	Retaining element
19	Compensating element
20	J profile
21	Transition profile
22	Centre point
23	Centre line
24	Rolling body
25	Axle
A	Distance dimension
α	Angle

PATENTKRAV

1. Sikkerhedskøreprofil (1) til flytbare portblade, hvorpå der lateralt via aksler (25) er anbragt rullelegemer (24), hvor sikkerhedskøreprofilets (1) tværsnit er udformet således, at dette udgående fra et fastgørelsesben (2) omfatter afstandsben (3) på sine ender, som er rettet mod et inderrum (11) i sikkerhedsprofilet (1), således at der mellem afstandsbenene og fastgørelsesbenet (2) dannes et åbent fastgørelsesrum (4), **kendetegnet ved, at** der i fortsættelse af afstandsbenene (3) pegende væk fra fastgørelsesrummet (4) på hver side er udformet begrænsningsben (5), hvis lige orienteringer spredt ud i skråstillinger er rettet udad i forhold til et midtpunkt (22) og efterfølgende via radier (9) går over i rundede køreben (6), hvor kørebenene (6) på endesiden via radier (10) ender i lige afslutningsben (8), som er orienteret i forhold til midtpunktet (22), således at inderrummet (11) med åbningsområdet (16) dannes derved, og at kørebenene (6) pegende mod inderrummet (11) er forsynet med køreflader (7) til rullelegemerne (24), hvor kørefladens (7) længde er større end en afstandsdimension (A) mellem en ende af afslutningsbenene (8) og overgangen mellem afstandsbenet og begrænsningsbenet (5).

2. Sikkerhedskøreprofil ifølge krav 1, **kendetegnet ved, at** i tværsnittet udmærker sikkerhedskøreprofilet (1) sig i sine overgange mellem de individuelle forskellige ben ved en hensigtsmæssig krumning.

3. Sikkerhedskøreprofil ifølge krav 1, **kendetegnet ved, at** forløbet af de modsatstående køreben (6) med kørefladerne (7) dannes under radier, hvis fælles midtpunkt (22) ligger i midten af inderrummet (11).

4. Sikkerhedskøreprofil ifølge et af de foregående krav, **kendetegnet ved, at** begrænsningsbenenes (5) og afslutningsbenenes (8) orientering i forhold til midtpunktet (22) inde i inderrummet (11) forløber i det væsentlige under den samme vinkel spredt ud mod kørebenene (6) således, at kørefladernes (7) længde er

større end afstandsdimensionen (A) mellem begrænsningsbenet (5) og afslutningsbenet (8).

5. Sikkerhedskøreprofil ifølge et eller flere af de foregående krav, **kendetegnet ved, at** det venstre begrænsningsbens (5) forløb er udformet i det væsentlige parallelt med det højre afslutningsben (8), og det højre begrænsningsbens (5) forløb er udformet i det væsentlige parallelt med det venstre afslutningsben (8).

6. Sikkerhedskøreprofil ifølge krav 1, **kendetegnet ved, at** rullelegemerne (24) er udformet som ruller, hvis diameter er mindre end dimensionen mellem de modsatliggende køreflader (7), og at rullelegemernes (24) køreflader har en i det væsentlige halvcirkelformet kontur.

7. Flytbart portblad, som på sine sidekanter er forsynet med styreruller, som griber ind i stationære styringer, i en udformning som sikkerhedskøreprofiler (1), som omfatter et fastgørelsesben (2), på hvis ender der forekommer udragende afstandsben (3), således at der mellem fastgørelsesbenet (2) og afstandsbenene (3) dannes et fastgørelsesrum (4), og at der i fortsættelse af afstandsbenene (3) forekommer begrænsningsben (5), hvis lige udformninger under skråstillinger spredt ud fra fastgørelsesrummet (4) er rettet udad i forhold til et midtpunkt (22) og på endesiden via radier (9) går over i modsatstående buede køreben (6), som omfatter det fælles midtpunkt (22), hvor kørebenenes (6) ender er forsynet med mod inderrummet (11) rettede lige afslutningsben (8), mellem hvilke der forekommer et åbningsområde (16) mod et inderrrum (11), og at kørebenene (6) pegende mod inderrummet (11) er forsynet med køreflader (7) til rullelegemer (24), hvor hvert af sikkerhedskøreprofilerne (1) er udformet ifølge et af kravene 1-6.

8. Flytbart portblad ifølge krav 7, **kendetegnet ved, at** i tværsnittet udmærker sikkerhedskøreprofilet (1) sig i sine overgange mellem de individuelle forskellige ben ved en hensigtsmæssig krumning.

9. Flytbart portblad ifølge krav 7, **kendetegnet ved, at** de modsatstående kørebens (6) forløb med kørefladerne (7) dannes under radier, hvis fælles midtpunkt (22) ligger i midten af inderrummet (11).

10. Flytbart portblad ifølge et af de foregående krav 7 til 9, **kendetegnet ved, at** begrænsningsbenenes (5) og afslutningsbenenes (8) orientering i forhold til midtpunktet (22) inde i inderrummet (11) forløber i det væsentlige under den samme vinkel spredt ud mod kørebenene (6) således, at kørefladernes (7) længde er større end en afstandsdimension (A) mellem begrænsningsbenet (5) og afslutningsbenet (8).

11. Flytbart portblad ifølge et af de foregående krav 7 til 10, **kendetegnet ved, at** det venstre begrænsningsbens (5) forløb er udformet i det væsentlige parallelt med det højre afslutningsben (8), og det højre begrænsningsbens (5) forløb er udformet i det væsentlige parallelt med det venstre afslutningsben (8).

12. Flytbart portblad ifølge et af de foregående krav 7 til 11, **kendetegnet ved, at** portbladet består af individuelle, indbyrdes ledforbundne sektioner, som er udformet med laterale styreelementer i form af rullelegemerne (24), som griber ind i sikkerhedskøreprofilerne (1), som udgående fra et i det væsentlige vertikalt forløb udføres i et buet og efterfølgende i et i det væsentlige horisontalt forløb, hvor rullelegemerne (24) er udformet således, at disses diameter er mindre end dimensionen mellem de modsatstående køreflader (7), og rullelegemernes (24) køreflader har en i det væsentlige halvcirkelformet kontur.

13. Lateral styring til et rulleports- eller sektionsports- eller spiralports- eller hurtigkørende portblad, som består af individuelle indbyrdes ledforbundne sektioner eller elementer, som styres i laterale styringer ved hjælp af ruller eller rullelegemer (24), hvor styringerne har et i det væsentlige vertikalt forløb med et på oversiden buet forløb i parkeringspositionen som opviklingsstilling, hvor det buede forløb består af koncentrisk forløbende, individuelle cirkelbueafsnit, som er

forskellige i diameter, og som er monteret på en montageplade, hvor styringerne har en tværsnitsudformning begyndende med et fastgørelsesben (2), på hvis ender der er udformet udragende afstandsben (3) således, at der dannes et fastgørelsesrum (4) mellem de tre ben (2, 3), **kendetegnet ved, at** der pegende væk fra fastgørelsesrummet (4) på hver side forekommer begrænsningsben (5), hvis lige udformninger spredt ud under skråstillinger er rettet udad fra fastgørelsesrummet (4) i forhold til et midtpunkt (22) og på endesiden via radier (9) går over i modsatstående, udadbuede køreben (6) med køreflader (7) på indersiden, hvor kørebenenes (6) ender er forsynet med mod et inderrum (11) med midtpunktet (22) rettede lige afslutningsben (8), således at der opstår et åbningsområde (16) mod inderrummet (11), hvori rullelegemerne (24), som er forbundet med portbladet via aksler (25), dykker ned i, hvor kørefladens (7) længde er større end en afstandsdimension (A) mellem afslutningsbenenes (8) ender og overgangen mellem afstandsbenene (3) og begrænsningsbenene (5).

14. Lateral styring ifølge krav 13, **kendetegnet ved, at** i tværsnittet udmærker sikkerhedskøreprofilet (1) sig i sine overgange mellem de individuelle forskellige ben ved en hensigtsmæssig krumning.

15. Lateral styring ifølge krav 13, **kendetegnet ved, at** de modsatstående kørebens (6) forløb med kørefladerne (7) dannes under radier, hvis fælles midtpunkt (22) ligger i midten af inderrummet (11).

16. Lateral styring ifølge et af de foregående krav 13 til 15, **kendetegnet ved, at** begrænsningsbenenes (5) og afslutningsbenenes (8) orientering i forhold til inderrummets (11) midtpunkt (22) forløber i det væsentlige under den samme vinkel spredt ud mod kørebenene (6) således, at kørefladens (7) længde er større end afstandsdimensionen (A), hvor det venstre begrænsningsbens (5) forløb er udformet i det væsentlige parallelt med det højre afslutningsben (8), og det højre begrænsningsbens (5) forløb er udformet i det væsentlige parallelt med det venstre afslutningsben (8).

17. Lateral styring ifølge de foregående krav 13 til 16, **kendetegnet ved, at** sikkerhedskøreprofilet (1) kan fremstilles af blik, kunststof eller aluminiums-ekstrudering i en bukkemetode.

18. Lateral styring ifølge et af de foregående krav 13 til 17, **kendetegnet ved, at** rullelegemerne (24) er udformet som ruller, hvis diameter er mindre end dimensionen mellem de modsatliggende køreflader (7), hvor rullelegemernes (24) køreflader har en i det væsentlige halvcirkelformet kontur.

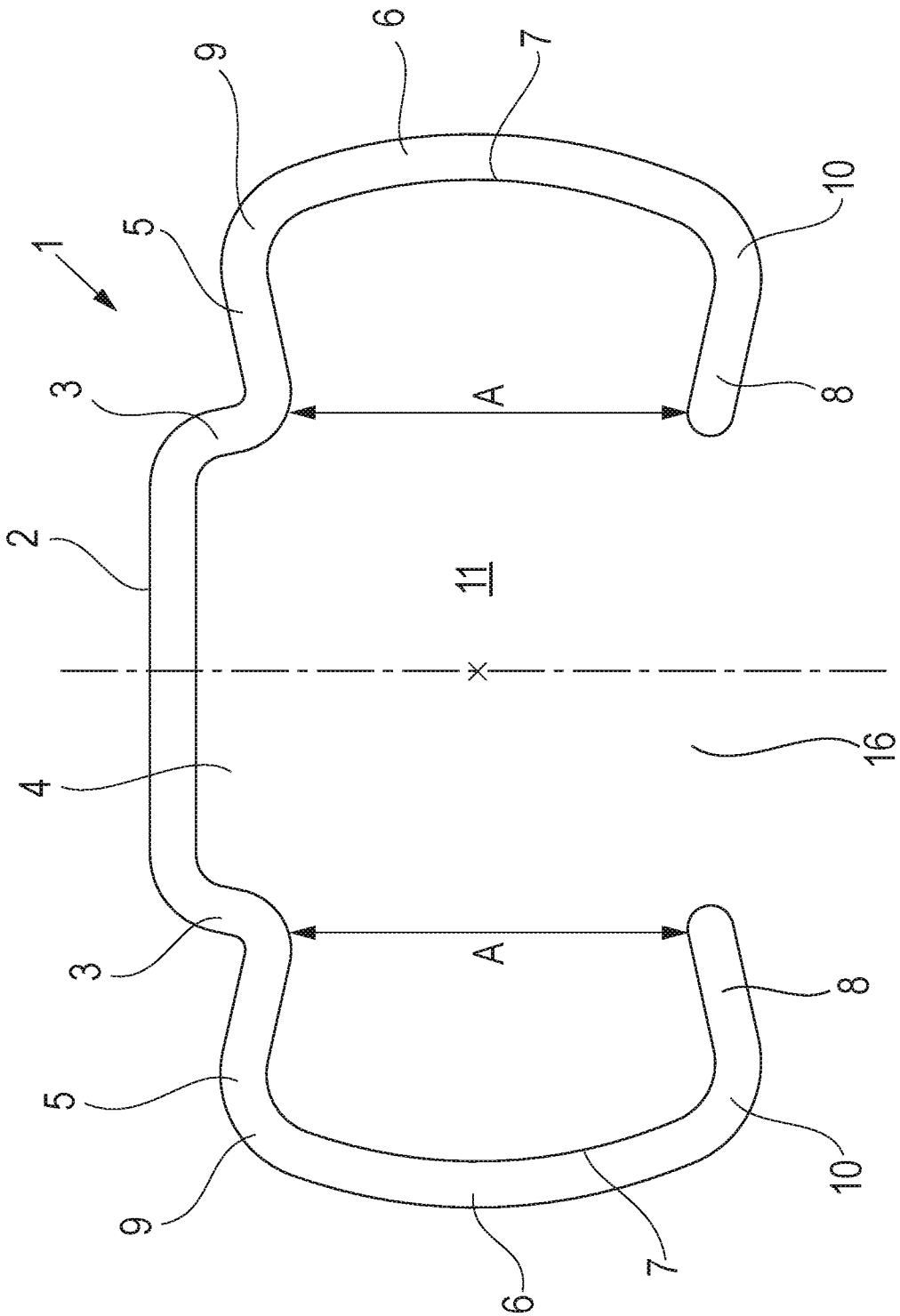


Fig. 1

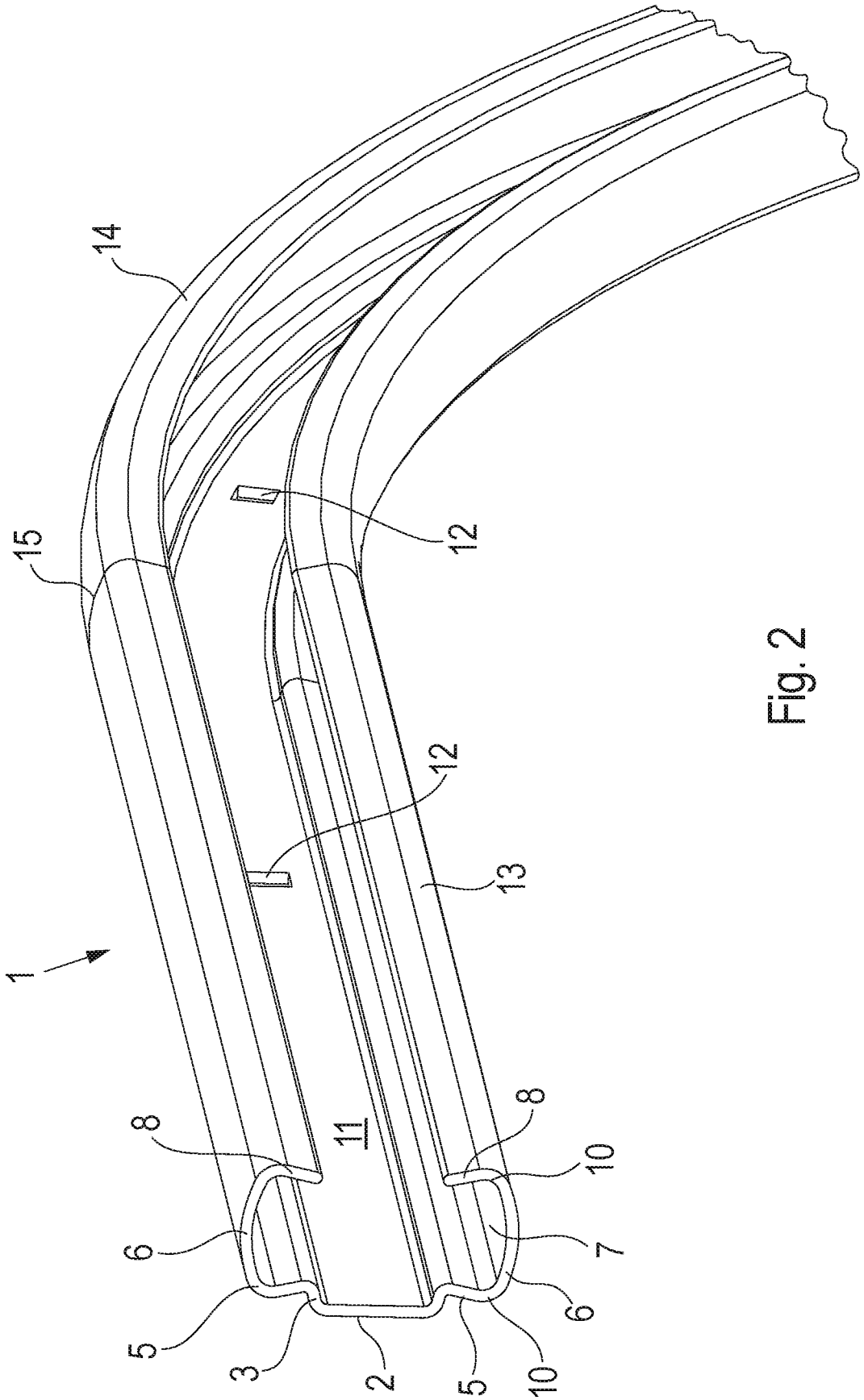


Fig. 2

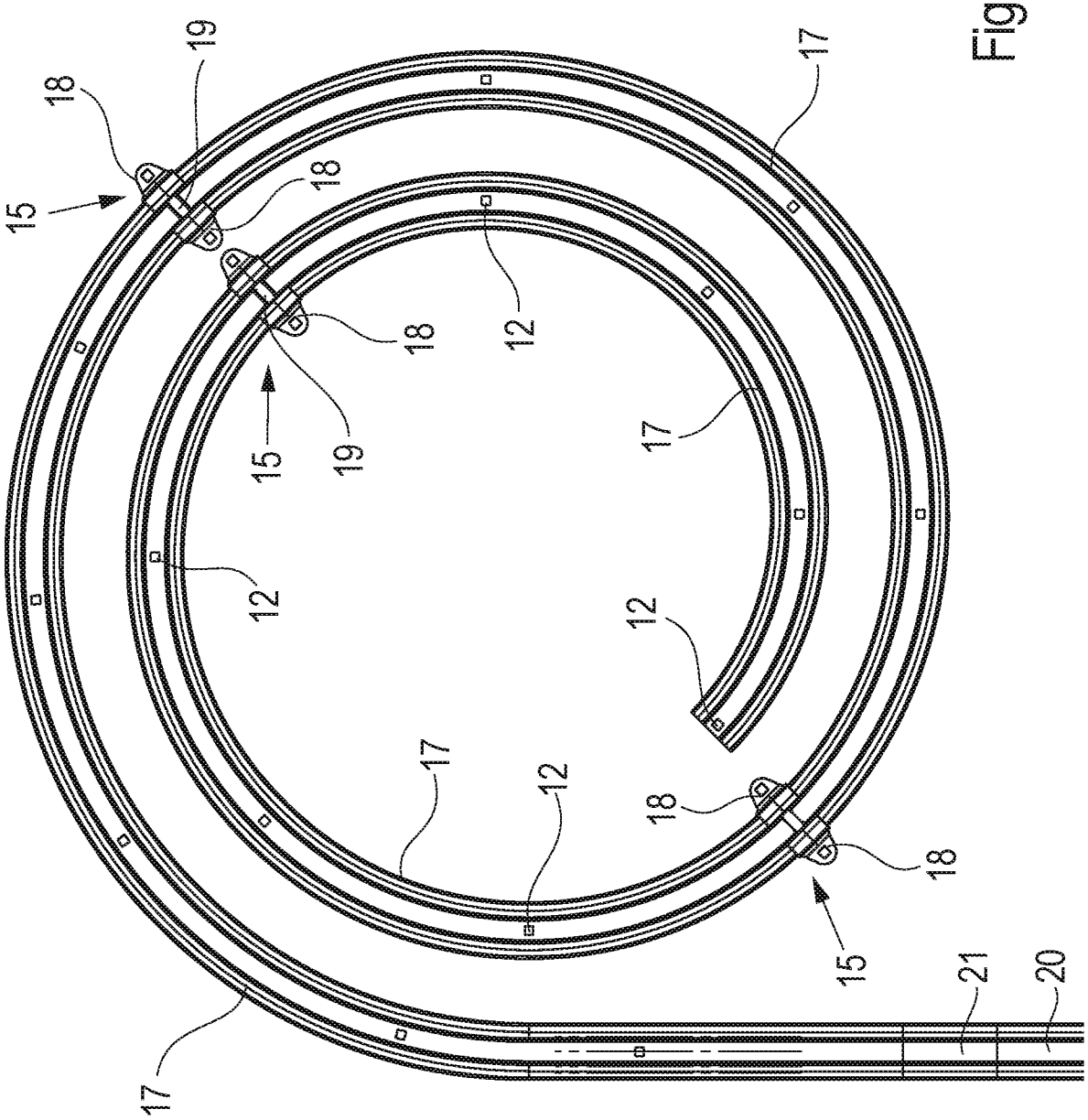


Fig. 3

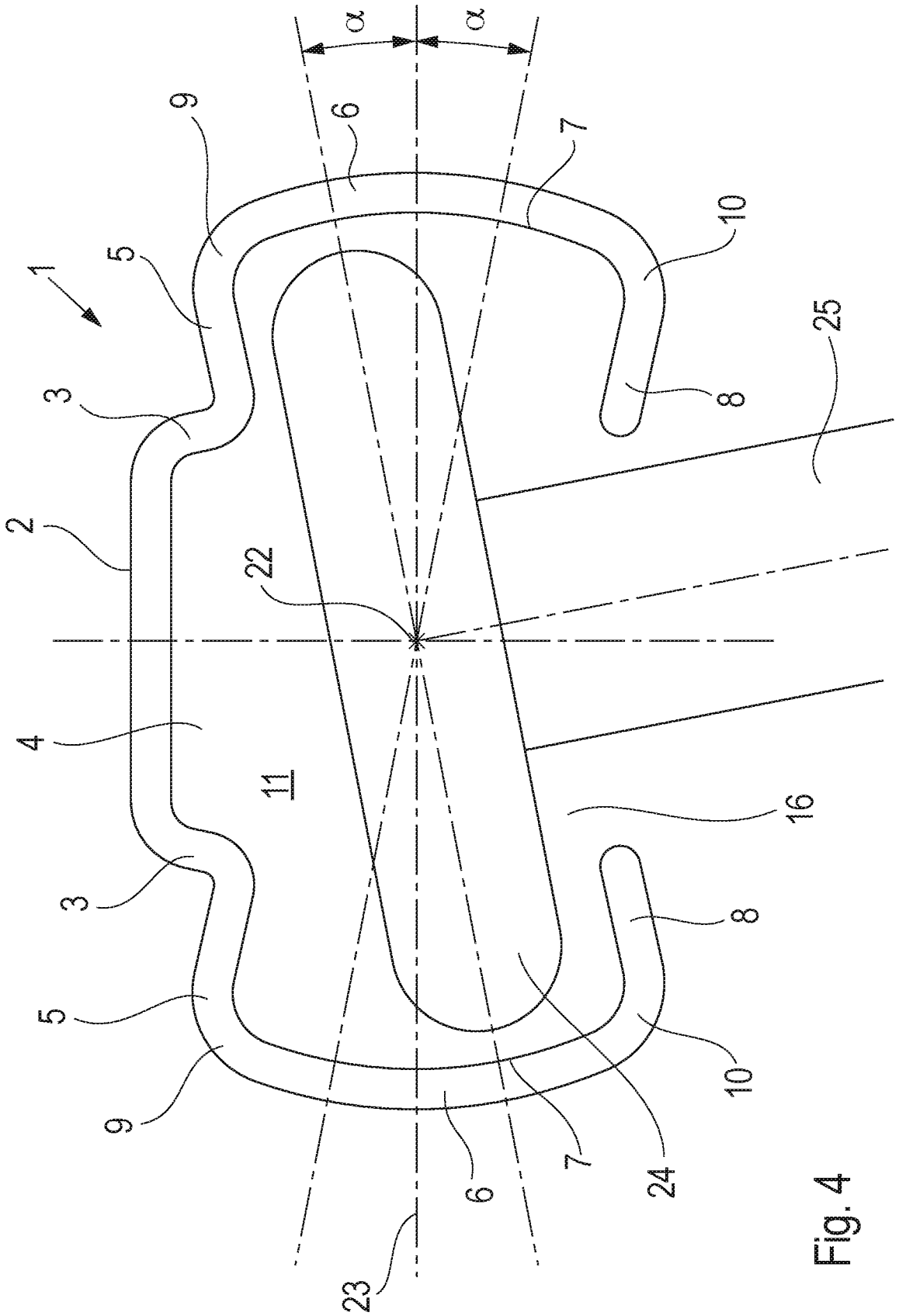


Fig. 4