

(19)



(11)

EP 2 581 496 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
27.01.2021 Bulletin 2021/04

(51) Int Cl.:
E01H 5/06 (2006.01)

(21) Application number: **12187848.2**

(22) Date of filing: **09.10.2012**

(54) **Blade holder for road maintenance plough**

Räumleistenhalter für Schneepflug

Support de lame pour chasse-neige

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **10.10.2011 EE 201100057**

(43) Date of publication of application:
17.04.2013 Bulletin 2013/16

(73) Proprietor: **Meiren Engineering OÜ**
11216 Tallinn (EE)

(72) Inventor: **Renser, Raoul**
11216 Tallinn (EE)

(74) Representative: **AAA Patendibüroo OÜ**
Tartu mnt 16
10117 Tallinn (EE)

(56) References cited:
WO-A1-98/30756 WO-A1-2004/031490
DE-A1- 2 552 058

EP 2 581 496 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

Technical field

[0001] The invention is related to the field of mechanical engineering, namely to the field of blade constructions for road and large area maintenance equipment.

State of the art

[0002] Blade constructions for road maintenance vehicles, scrapers and snow ploughs are known from the prior art.

[0003] Patent application publication WO 2004/031490 discloses the blade holder, in the form of a beam, connecting a blade to the lower edge of a snow-clearing device so that the blade has been given a definite angle to the base. The beam enables the lower part of the blade to fold backwards, thereby preventing possible damage to the blade when running into an obstacle on the road. After passing the obstacle, the blade resumes its original position. In one embodiment the beam is not massive, but has a cavity which is filled with a compressive material, e.g. foam plastic.

[0004] US5743032 discloses a grader blade; preferably a snow plough blade construction intended to be attached preferably to a tractor or lorry. The grader blade construction includes a frame consisting of a flat part that is detachable from the grader, and several blade plates covering the desired working width; whereas there is a section consisting of elastic material between the blade plates. The elastic material is arranged to permit the movement of the blade plates in only one direction when the blade plate strikes an obstacle.

[0005] DE 2519112 discloses a grader construction in which a blade is attached to a moldboard with an elastic section that enables, if an obstacle is encountered, the blade to trip and then resume its original position

[0006] DE 3640565 discloses a clearing edge of a snow grader blade. The clearing edge includes a rubber or plastic fastening element that has a fastening strip on one end and the blade on the other end, whereas the fastening element has sufficient horizontal and vertical movement, so that road irregularities does not cause the blade to jump or break

[0007] DE 2552058 discloses a snow plough construction in which a blade is attached to the moldboard of the plough with an elastic section that enables, if an obstacle is encountered, the blade to trip and then resume its original position.

[0008] DE 4204109 discloses a snow grader designed to be fixed to a vehicle or tractor. A supporting frame is attached to the snow grader. On the underside of the supporting frame a flexible spring guide is fixed. On the other end of the spring a metal strip, which is in contact with the road surface, is attached; whereby the metal strip is fixed to the underside of the grader with another band of elastic material. Such construction enables, if an

obstacle is encountered, the blade to trip and then resume its original position.

[0009] The deficiency of the known constructions is that in the case of an obstacle on the road surface the grader blade trips and the angle between the blade and the road surface changes, as a result of which cleaning efficiency is reduced during the period when the blade is clearing the obstacle.

[0010] The angle of the blade changes significantly with the up and down movement of the blade holders, since natural behaviour of the parallelogram (four bar linkage) is absent, which results in the bouncing of the snow plough when crossing road irregularities.

Summary of the invention

[0011] The purpose of this invention is to offer an elastically deforming, including from elastomeric material, snow plough blade holder construction; whereas a blade equipped with this elastic blade holder allows for the irregularities of a processed surface to be followed. This purpose is achieved by a blade holder according to independent claim 1.

[0012] The invention's blade holder includes an elastically deforming material part, in which there are one or several gaps, as a result of which the blade holder functions in a manner similar to a four bar linkage. In addition to this, the blade holder deforms elastically more easily due to one or several gaps in comparison with analogous gapless constructions. Suitable radius of curvature notches in the elastically deformable material help in permitting the natural movement of the articulation of the elastically deforming material (elastomer) characteristic of a four bar linkage.

[0013] The blade holder of this invention may comprise short, adjacently located modules. By being placed next to one another, these modules allow blades of various widths to be used according to need. By using blades of various widths it is possible to vary the rigidity of the blade holders and the ability to copy the road surface. At the same time, it is also possible to attach only one short blade to a module. This makes the blade holder module universal for all snow ploughs of varying widths.

List of drawings

[0014] The preferred application of the invention is described by making reference to the accompanying drawings, where:

Figure 1 illustrates the similarity of the cross section of the invented blade holder to a four bar linkage; Figure 2 illustrates a cross section of one of the preferred implementations of the invented blade holder made from elastically deforming material; Figures 3A, 3B and 3C, illustrate the shape of the invented blade holder made from elastically deforming material changed in accordance with the irregu-

larities in the road surface;

Figure 4 illustrates a top view of the blade attachment plate of the invented blade holder made from elastically deforming material;

Figure 5 illustrates a front view of the invented blade holder made from elastically deforming material;

Figure 6 illustrates a top view of the invented blade holder made from elastically deforming material;

Figure 7 illustrates a side view of the invented blade holder made from elastically deforming material;

Figure 8 illustrates section A-A of Figure 6;

Figure 9 illustrates a cross section of the preferred implementation of the invented blade holder made from elastically deforming material;

Figure 10 illustrates an axonometric view with a partial cross section of the invented blade holder made from elastically deforming material;

Figure 11 illustrates a side view of an alternative implementation of the invented blade holder made from elastically deforming material;

Figure 12 illustrates a side view of another alternative implementation of the invented blade holder made from elastically deforming material.

Example of the implementation of the invention

[0015] Figure 1 illustrates the new principle blade holder 1 made of an elastically deforming material, which is comprised of an elastically deforming material part 2 and the attachment plate 3 for the blade placed within. The elastically deforming material part 2 operates on the principle of a four bar linkage. It differs from existing blade holders with elastically deforming details in that the blade holder has one or several gaps 4, as a result of which the blade holder operates in a manner similar to a four bar linkage. In addition to this, the blade holder deforms elastically more easily due to one or several gaps, in comparison to similar gapless constructions. The blade holder is comprised of four joints: the upper moving joint 5, the lower moving joint 6, the front moving joint 7 and the rear moving joint 8. The joints are connected to each other conditionally with hinges 9. The result of the newly shaped blade holder ensures the excellent kinematics of the elastically deforming parts, sufficient rigidity and at the same time endurance.

[0016] According to Figure 2, the blade holder 1 of the invention is made from elastically deforming material part 2 is attached to the holder 11 located along the bottom edge of the plough's moldboard 10 with attachment bolts 13 extending from the mounting plate 12 poured inside the part 2. Attached to the blade's mounting plate 3 is a snow plough blade 14. A sealing strip 15 extends outward from the upper edge of the elastically deforming material part 2, which prevents snow from ending up in the blade holder's gaps.

[0017] Figure 3A-3C illustrates the plough's blade holder in its working position and the plough's blade position on a smooth surface (Figure 3A), in the case of an

obstacle with evenly rising edges (Figure 3B), and in the case of incremental obstacles (Figure 3C). In the case of graded obstacles, which do not permit the blade to freely move up and down, the lower joint 6 (Figure 1) of part 2 made from elastically deforming material gives way according to the principle of a parallelogram and the snow plough's blade 14 is able to move backward while at the same time moving upwards, allowing the obstacle to be crossed. Therefore, due to the presence of one or several gaps in the part 2 of the snow plough's blade 14 made from elastically deforming material, the blade can move up and down in relation to the snow plough's moldboard 10, remaining at approximately the same angle to the surface of the ground. The given blade holder permits greater upward movement of the blade in comparison with the known solutions, thereby permitting improved coping of the road surface when crossing over rounded obstacles.

[0018] The invented blade holder 1 may be in a single piece that is the entire width of the plough's moldboard or may be comprised of short modules. By being placed next to one another, these modules allow blades of various widths to be used according to need. By using blades of various widths it is possible to vary the rigidity of the blade holders and the ability to copy the road surface. At the same time, it is also possible to attach only one short blade to a module. This makes the blade holder module universal for all snow ploughs of varying widths.

[0019] The positions of attachment openings 16 (Figure 4) in the blade 14 attachment plate 3 are selected in such a manner to allow attachment of all snow plough blades of standard measurements and several different nonstandard measurements. The attachment plate 3 has openings 17 for the improved connectedness between the elastically deforming material (such as elastomer) part 2 and the attachment plate 3. In addition, the attachment plate 3 has attachment anchors 18 to improve the connectedness between the elastomer and the attachment plate 3.

[0020] The detailed technical solution of the blade holder is illustrated in Figure 9. Suitable radius of curvature notches (19 and 20) help in permitting the natural movement of the articulation of the elastically deforming material (elastomer) characteristic of a four bar linkage. A suitable radius of curvature notch 21 permits the sealing strip 15 to adjust according to the snow plough's moldboard in the case of the various working positions of the blade holder. The blade attachment plate 3 may be bent (see Figures 9 to 12), in order to avoid its breaking out from the elastomer. In order to ensure better adhesion, the blade holder may be equipped with additional anchors 22. To allow for the removal of snow, the blade holder 1 on the beam side 11 has a step 23 (Figure 8) on one side.

[0021] The blade holder may have different types of modifications. Figure 11 illustrates one of the possible alternative implementations of a blade holder, where the elastically deforming material (elastomer) part 2 has a

suitable radius of curvature notch 24 which ensures the greater buckling of the lower joint when crossing over a graduated obstacle. Figure 12 illustrates a blade holder 2, the bottom of which has an extending part 25, which is designed for restricting the movement of the blade holder upon hitting an obstacle, blade attachment bolt 26 (see Figure 2) protection 27 in the case of the buckling of the elastically deforming material (elastomer) part 2. In another alternative implementation the elastically deforming material (elastomer) part 2 has an elevation of 28, which restricts the buckling of the lower joint 6.

Claims

1. Blade holder (1) for a road maintenance plough for attaching a blade (14) to the plough's moldboard (10), which blade holder (1) comprises an elastically deforming material part (2); an attachment part for the attachment of the blade holder (1) to the plough's moldboard (10) and a blade attachment part for attachment of the blade (14) to the blade holder (1), the blade holder (1) comprising a connection plate (12) placed inside the elastically deforming material part (2) and the blade attachment part comprising an attachment plate (3) for the blade (14), **characterised in that** the elastically deforming material part (2) comprises one or more empty gaps (4) so that the blade holder can operate as a four bar linkage formed by an upper moving joint (5), a lower moving joint (6), a front moving joint (7) and a rear moving joint (8), and **in that** the elastically deforming material part (2) has notches (19, 20) with suitable radius of curvature for helping in permitting a natural movement of articulation of the elastically deforming material part (2) as a four bar linkage.
2. Blade holder for road maintenance plough according to the claim 1, **characterised in that** the attachment plate (3) is rectangular shaped.
3. Blade holder for road maintenance plough according to the claim 1, **characterised in that** the upper part of the attachment plate (3) is bent.
4. Blade holder for road maintenance plough according to the claim 1, **characterised in that** a sealing strip (15) extends out from the upper edge of the elastically deforming material part (2).
5. Blade holder for road maintenance plough according to the claim 1, **characterised in that** the blade holder (1) is comprised of adjacently located modules.
6. Blade holder for road maintenance plough according to the claim 1, **characterised in that** the attachment plate (3) has openings (17) for achieving improved

connectedness between the elastically deforming material part (2) and the attachment plate (3) and **in that** the attachment plate (3) has attachment anchors (18).

7. Blade holder for road maintenance plough according to the claim 1, **characterised in that** the blade holder (1) is equipped with additional anchors (22) for better adhesion, the elastically deforming material part (2) has an elevation (28) for restricting the buckling of the lower joint (6), a bottom of the elastically deforming material part (2) has an extending part (25) for restricting the movement of the blade holder (1) upon hitting an obstacle, and a protection (27) for an attachment bolt (26) is provided in the case of the buckling of the elastically deforming material part (2).
8. Blade holder for road maintenance plough according to the claim 1, **characterised in that** the attachment plate (3) and the connection plate (12) have been covered with a coating prior to being placed in the elastically deforming material part (2).
9. Blade holder for road maintenance plough according to the claim 1, **characterised in that** the elastically deforming material part (2) has a step (23) for the removal of snow.

Patentansprüche

1. Räumleistenhalter (1) für ein Schneepflug für die Befestigung einer Räumleiste (14) an das Streichblech (10) eines Pfluges, wobei der Räumleistenhalter (1) ein Teil aus einem elastisch verformbarem Material (2) umfasst; ein Anbauteil für den Anbau des Räumleistenhalters (1) an das Streichblech (10) des Pfluges und ein Anbauteil der Räumleiste zum Anbau der Räumleiste (14) an den Räumleistenhalter (1), wobei der Räumleistenhalter (1) eine Anschlussplatte (12), die sich innerhalb des Teils aus elastisch verformbarem Material (2) befindet, und einen Anbauteil für die Räumleiste umfasst, der eine Befestigungsplatte (3) für die Räumleiste (14) umfasst, **dadurch gekennzeichnet, dass** der Teil aus elastisch verformbarem Material (2) einen oder mehrere Spalten (4) umfasst, damit der Räumleistenhalter als einen aus einem oberen beweglichen Verbindungsstück (5), einem unteren beweglichen Verbindungsstück (6), einem vorderen beweglichen Verbindungsstück (7) und einem hinteren beweglichen Verbindungsstück (8) bestehenden Gelenkviereck funktionieren kann; und dadurch, dass der Teil aus elastisch verformbarem Material (2) Aussparungen (19, 20) mit einem passenden Krümmungsradius hat, die dabei helfen, eine natürliche Gelenkbewegung des Teils aus elastisch verformbarem Material (2) als einen Ge-

lenkviereck zu erlauben.

2. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** die Befestigungsplatte (3) eine rechteckige Form hat.
3. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** die Oberseite der Befestigungsplatte (3) verbogen ist.
4. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Dichtleiste (15) sich aus dem oberen Rand des Teils aus elastisch verformbarem Material (2) erstreckt.
5. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** der Räumleistenhalter (1) angrenzende Baugruppen umfasst.
6. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** die Befestigungsplatte (3) Öffnungen (17) für eine bessere Verbundenheit zwischen dem Teil aus elastisch verformbarem Material (2) und der Befestigungsplatte (3) hat, und dadurch, dass die Befestigungsplatte (3) Befestigungsanker (18) hat.
7. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** der Räumleistenhalter (1) mit zusätzlichen Ankern (22) für bessere Haftung ausgestattet ist, der Teil aus elastisch verformbarem Material (2) eine Anhebung (28) zur Verhinderung einer Verbiegung des unteren Verbindungsstücks (6) hat, eine Unterseite des Teils aus elastisch verformbarem Material (2) einen sich herausstreckenden Teil (25) zur Verhinderung der Bewegung des Räumleistenhalters (1) nach einem Aufprall mit einem Gegenstand hat, und ein Schutz (27) für eine Befestigungsschraube (26) ist bereitgestellt, falls der Teil aus elastisch verformbarem Material (2) sich verbiegt.
8. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** die Befestigungsplatte (3) und die Anschlussplatte (12) sind vor dem Einsetzen in den Teil aus elastisch verformbarem Material (2) mit einer Beschichtung überzogen.
9. Räumleistenhalter für ein Schneepflug nach Anspruch 1, **dadurch gekennzeichnet, dass** der Teil aus elastisch verformbarem Material (2) einen Ansatz (23) zur Beseitigung von Schnee hat.

Revendications

1. La porte-lame (1) pour charrue d'entretien routier pour fixer une lame (14) au versoir de la charrue (10), dans lequel la porte-lame (1) comprend une partie une pièce en matériau élastiquement déformable (2); une pièce de fixation pour la fixation de la porte-lame (1) au versoir de la charrue (10), ainsi qu'une pièce de fixation de la lame pour la fixation de la lame (14) à la porte-lame (1), la porte-lame (1) comprenant plaque de connexion (12) placée à l'intérieur de la pièce en matériau élastiquement déformable (2), et la pièce de fixation de la lame comprenant une plaque de fixation (3) pour la lame (14), **caractérisé en ce que** la pièce en matériau élastiquement déformable (2) comprend un ou plusieurs espaces vides (4) de sorte que la porte-lame puisse fonctionner en tant qu'une liaison à quatre barres, composée d'une articulation mobile supérieure (5), d'une articulation mobile inférieure (6), d'une articulation mobile antérieure (7), ainsi que d'une articulation mobile postérieure (8), et **en ce que** la pièce en matériau élastiquement déformable (2) présente des encoches (19, 20) d'un rayon de courbure approprié pour faciliter à permettre le mouvement naturel de l'articulation de la pièce en matériau élastiquement déformable (2) en tant qu'une liaison à quatre barres.
2. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** ladite plaque de fixation (3) est de forme rectangulaire.
3. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** la partie supérieure de la plaque de fixation (3) est coudée.
4. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** qu'une bande d'étanchéité (15) dépasse le bord supérieur de la pièce en matériau élastiquement déformable (2).
5. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** la porte-lame (1) est constitué de modules adjacents.
6. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** la plaque de fixation (3) dispose des ouvertures (17) pour l'obtention d'une liaison améliorée entre la pièce en matériau élastiquement déformable (2) et la plaque de fixation (3), **et en ce que** la plaque de fixation (3) comprend des ancrages de fixation (18).
7. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** la porte-lame (1) est équipé d'ancrages supplémentaires

(22) pour l'obtention d'une meilleure adhérence, la pièce en matériau élastiquement déformable (2) présente une surélévation (28) pour limiter le flambage de l'articulation inférieure (6), la partie inférieure de la pièce en matériau élastiquement déformable (2) a une partie en saillie (25) pour limiter le mouvement de la porte-lame (1) en cas de collision avec un obstacle, et une protection (27) pour le boulon de fixation (26) est prévu pour les cas de flambage de la pièce en matériau élastiquement déformable (2).

8. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** la plaque de fixation (3) et la plaque de connexion (12) sont couvertes d'un revêtement avant d'être placées dans la pièce en matériau élastiquement déformable (2).
9. La porte-lame pour charrue d'entretien routier selon la revendication 1, **caractérisé en ce que** la pièce en matériau élastiquement déformable (2) dispose d'une marche (23) pour le déneigement.

25

30

35

40

45

50

55

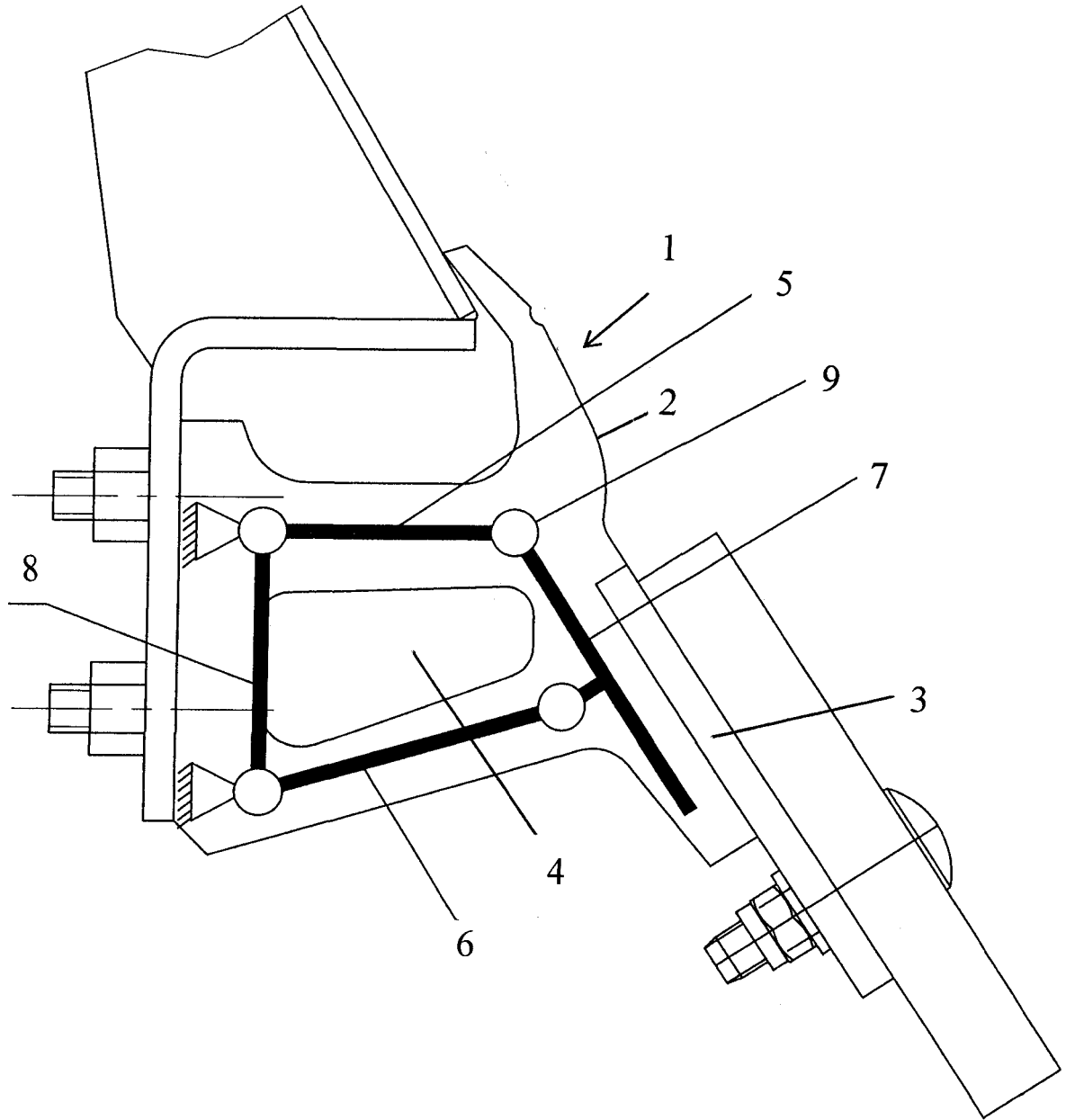
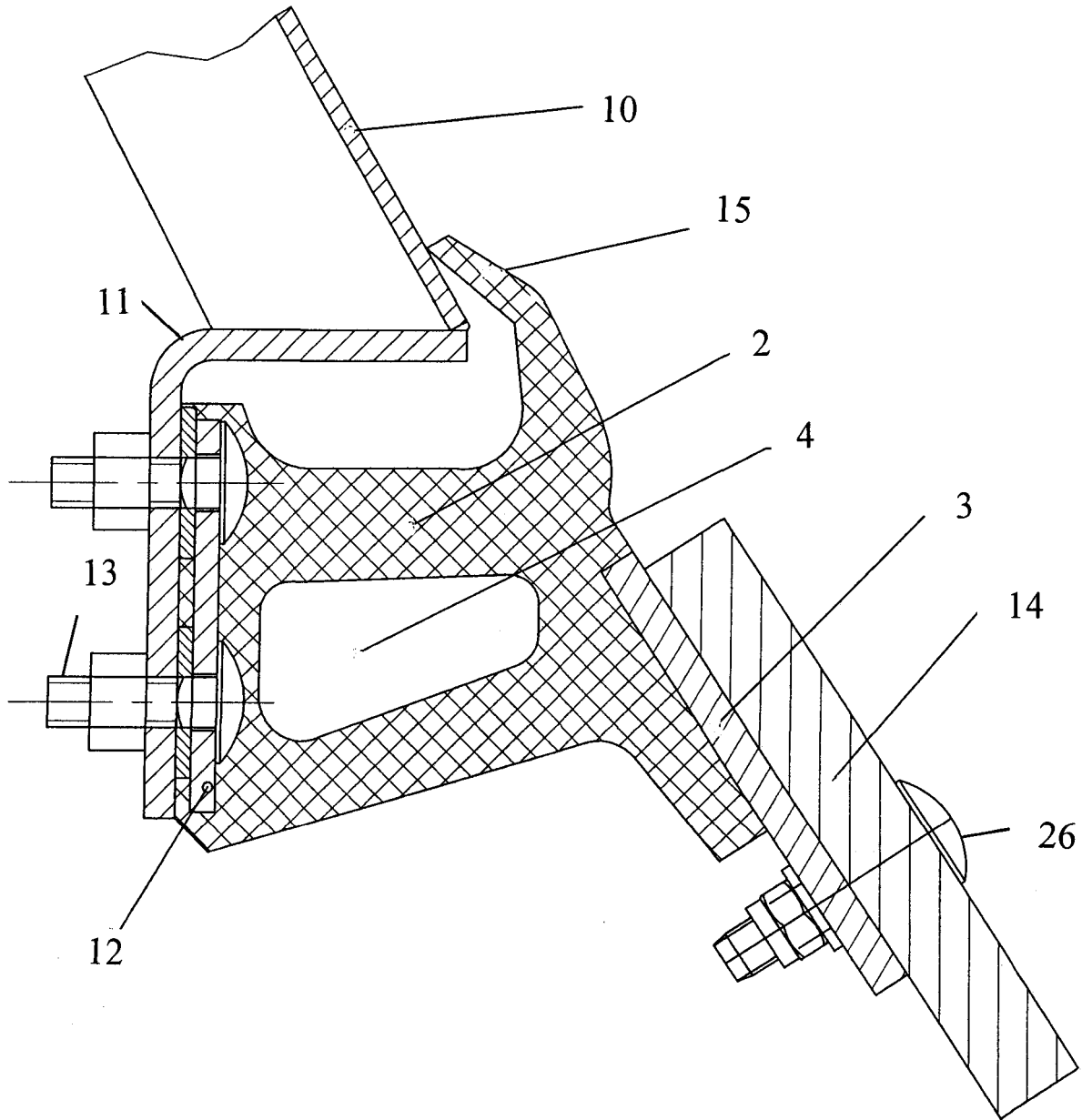


FIG 1



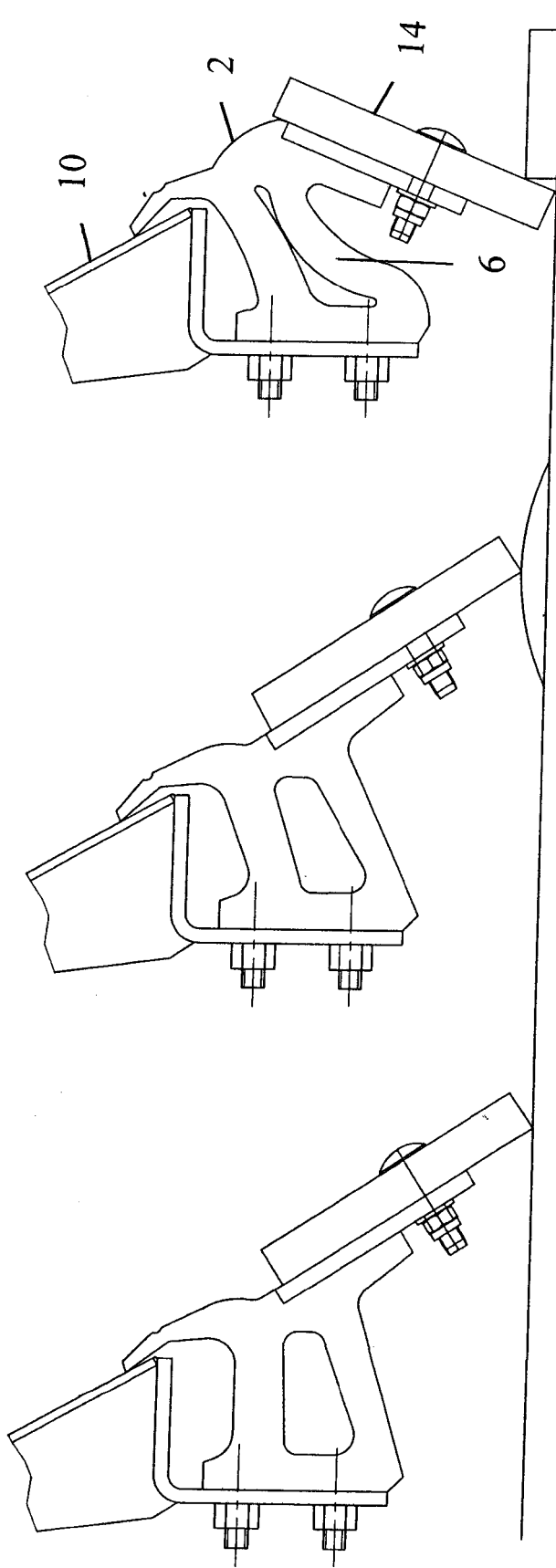


FIG 3A

FIG 3B

FIG 3C

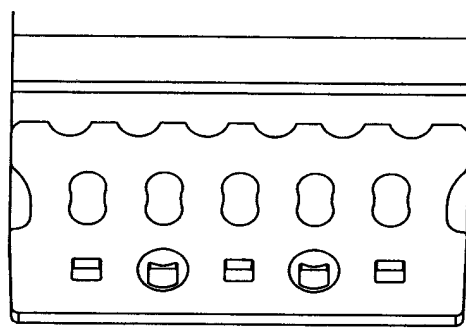
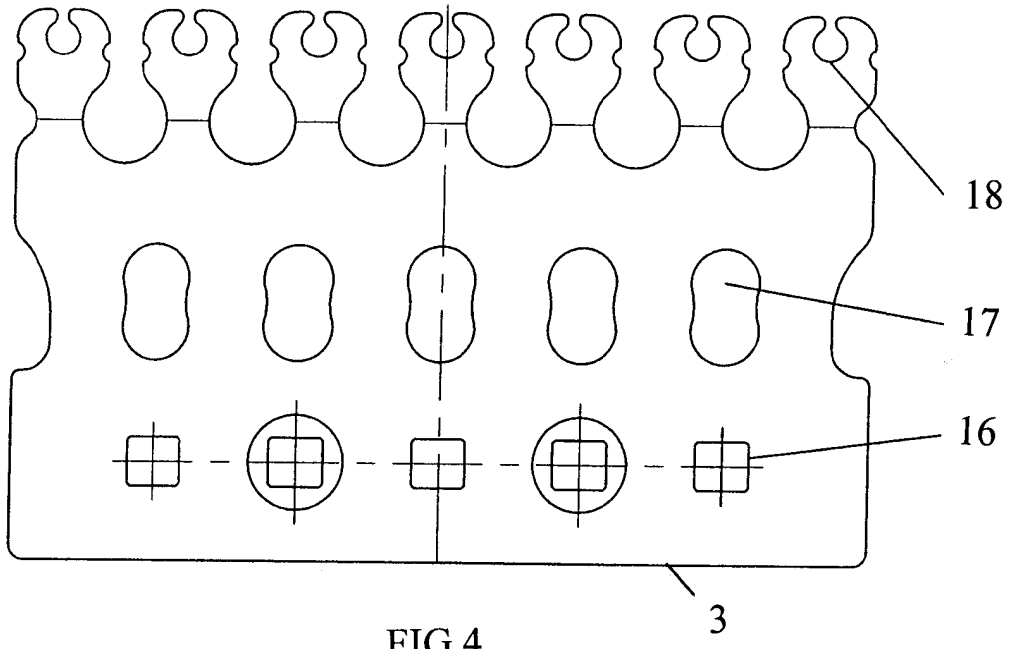


FIG 5

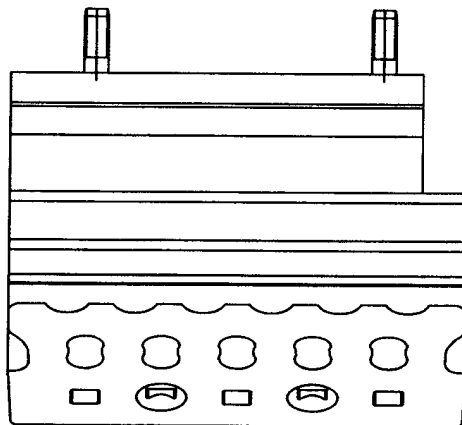


FIG 6

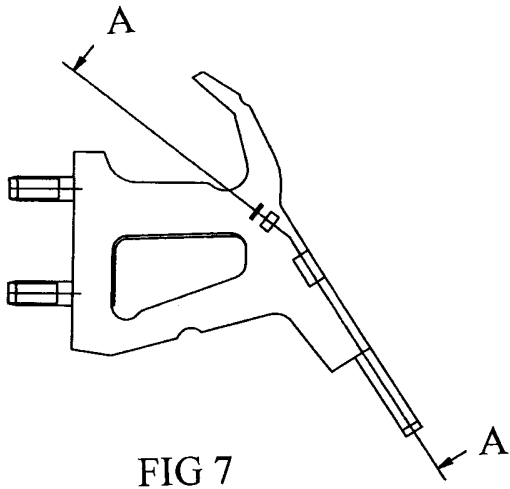


FIG 7

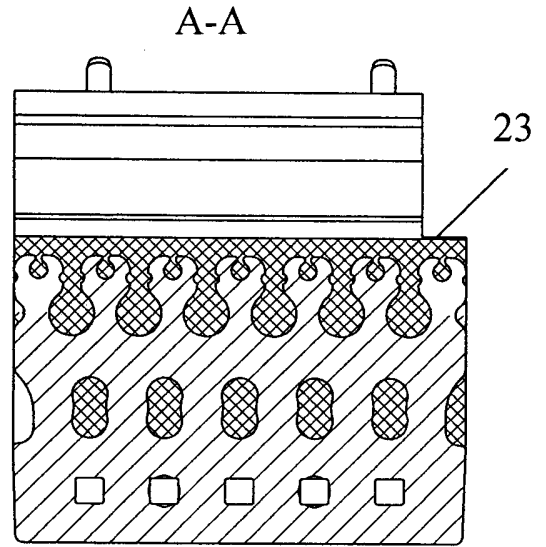


FIG 8

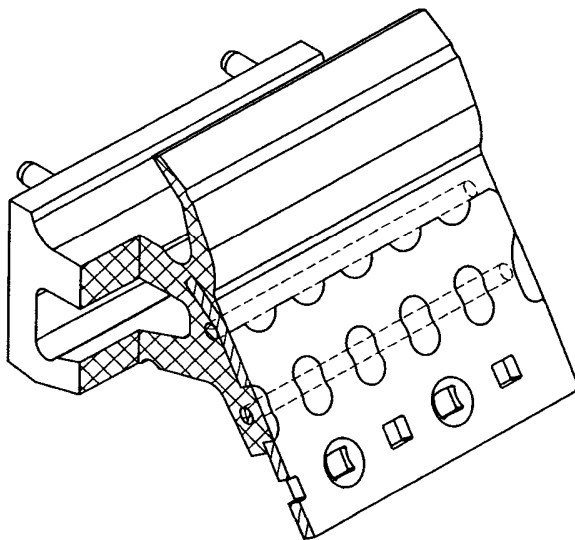


FIG 10

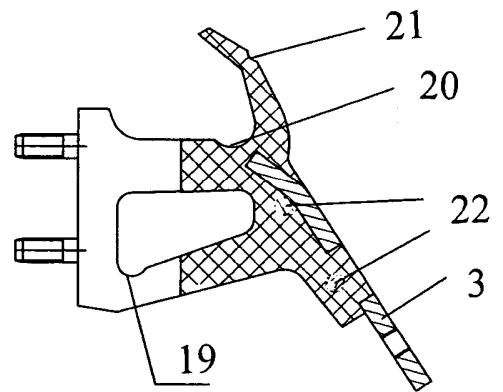
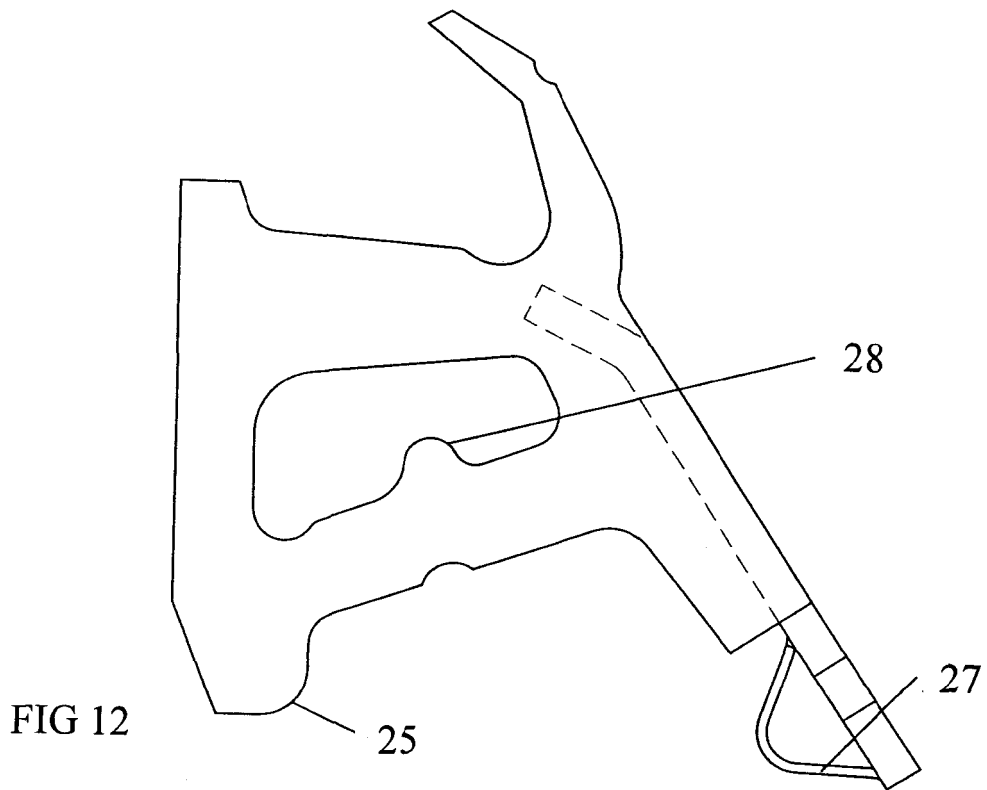
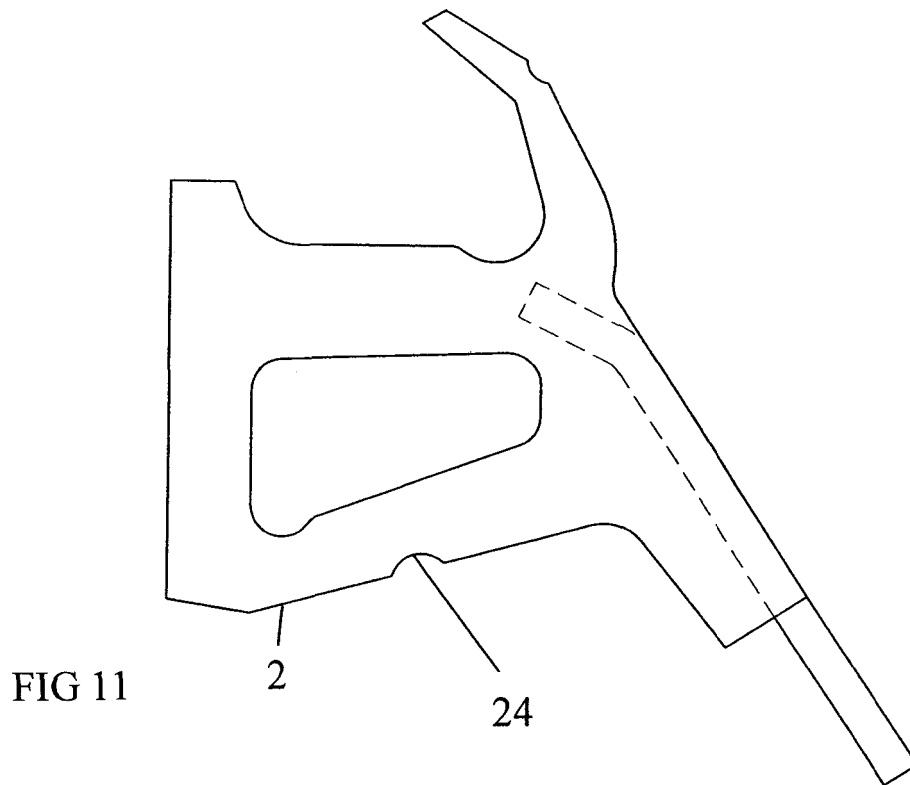


FIG 9



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2004031490 A [0003]
- US 5743032 A [0004]
- DE 2519112 [0005]
- DE 3640565 [0006]
- DE 2552058 [0007]
- DE 4204109 [0008]