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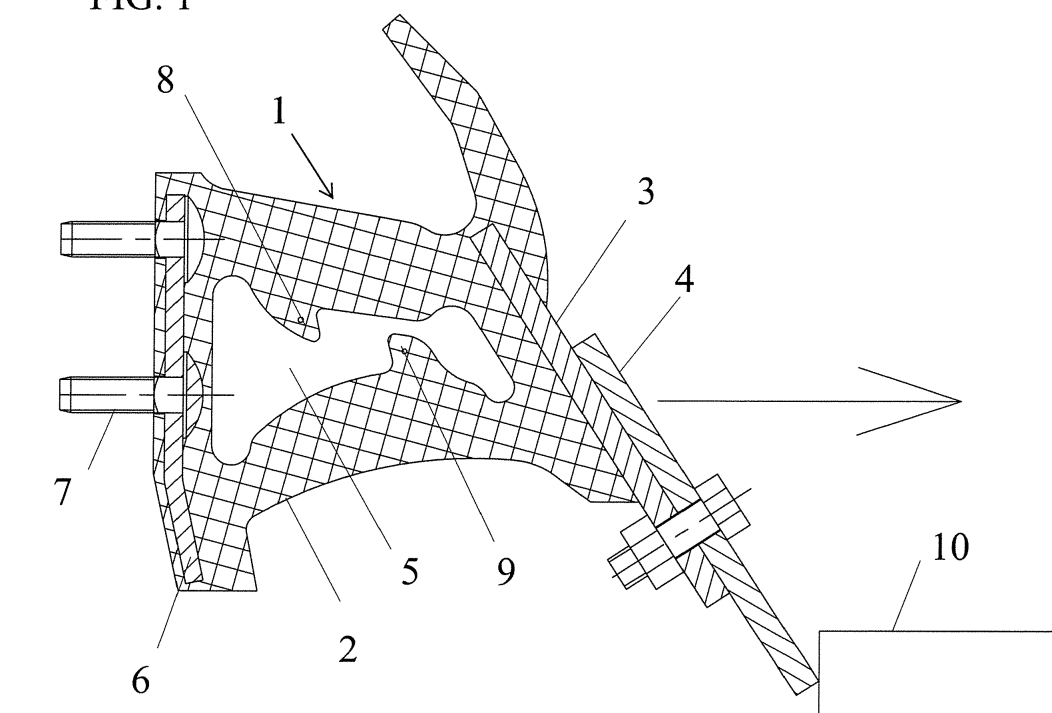
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(54) **PLOUGH BLADE HOLDER OF A ROAD MAINTENANCE VEHICLE**

(57) The invention is related to design of plough blade holder of a road maintenance vehicle. The blade holder of the invention comprises a part made of elastically deforming material, which has a air filled space. Blade holder from elastically deforming material has locking teeth in the hollow space side, which are adopted to hook with each other on moving over an obstacle on the

road. Thanks to this hooking is guaranteed greater returning force into initial position and avoided situation, where the blade holder may stay into opearting position without return. Optionally the blade holder has a tightening means in order to pre-adjust the position of the blade so, that the angle between the blade and the road surface normal is according to a specific need.

FIG. 1



Description

Field of the invention

[0001] The invention relates to the field of mechanical engineering, and more specifically, constructions of blades of vehicles used for the maintenance of roads and large areas.

State of the art

[0002] Blade constructions of road maintenance vehicles, scrapers and snowploughs are known from the state of the art.

[0003] Patent Application publication WO 2004/031490 discloses a blade holder carrier connecting its blade to the lower edge of a snow-clearing device so that the blade has been given a definite angle in relation to the surface of the road. The blade holder enables the lower part of the blade to fold backwards when running into an obstacle on the road, thereby preventing possible damage to the blade. After passing the obstacle, the blade resumes its original position.

[0004] US5743032 discloses a road grader blade, preferably a snowplough blade construction intended to be attached preferably to a tractor or lorry. The road grader blade construction consists of a frame constituting a flat part that is attached detachably to the road grader, and several blade plates covering the desired working width; whereby there is a section consisting of elastic material between the flat part and the blade plates. The elastic material part is intended to allow the movement of the blade plates in only one direction when the blade plate strikes an obstacle.

[0005] DE 2519112 discloses a road grader construction in which a blade is attached to a mouldboard of the road grader 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 cleaning edge of a snow grader cleaning blade, which includes a rubber or plastic fastening element that has a fastening strip on one end and the blade on the other end; whereby the fastening element has sufficient horizontal and vertical movement, so that road irregularities do not cause the blade to jump or break.

[0007] DE 2552058 discloses a snowplough construction in which a blade is attached to the mouldboard of the snow 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 lower edge of the grader. On the lower part of the supporting frame, a flexible spring guide is fixed. On the other end of the spring, a metal strip is attached, which is in contact with the road surface; whereby the metal strip is fixed to the lower part of the grader

with another band of elastic material. Such a construction enables, if an obstacle is encountered, the blade to trip and then resume its original position.

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

[0010] Patent Application No EE 201100057 discloses a plough blade holder of a road maintenance vehicle the blade holder of which is made of an elastically deforming, including from an elastomeric, material; whereby a blade equipped with this elastic blade holder allows for the irregularities of a processed surface to be followed. The invention's blade holder includes a deforming material part, in which there are one or several gaps filled with air, as a result of which the blade holder functions in a manner similar to a parallelogram (four bar linkage).

[0011] The present patent application has an objective to further develop of Application No EE 201100057. The purpose is to offer a blade holder construction the deformation of which would be more easily managed when passing an obstacle, and which would enable adjusting the angle between the plough blade and the surface of the road, if necessary.

Summary of the invention

[0012] The purpose of this invention is to offer a construction of plough blade of a road maintenance device, for example a construction of a snowplough blade holder, from a deforming, including from an elastomeric, material. The invention's blade holder includes an elastically deforming material part, which has a hollow space filled with air, as a result of which, such a blade holder operates in a manner similar to a parallelogram (four bar linkage). The deforming material part of the blade holder has cogs in the two opposite sides of the hollow space filled with air, which are adapted to hook with each other when the blade is moving over an obstacle on the road. Such a hooking ensures greater restoring force into the initial position for the blade holder and prevents a situation in which the blade holder remains in the operating position without restoring. In addition to the lockable cogs in the hollow space of the blade holder part, the blade holder may have a tensioning device to pre-adjust the elastically deforming material part and to pre-adjust the position of the blade so that the angle between the blade and road surface normal would correspond to the specific requirements. For this purpose, the blade holder has a tensioner, which is adapted to modify the angle between the plough blade and the road surface normal.

[0013] The blade holder of this invention consists of short side-by-side positioned modules. Positioned next to each other, these modules enable using blades of different widths as required. With the use of different blade widths, it is possible to vary the rigidity and ability to im-

itate the road surface of the blade holders. At the same time, it is also possible to attach only one short blade to one module. This makes the blade holder module universal for snowploughs of all different widths.

List of drawings

[0014] The preferred embodiment of the invention is described by referring to the accompanying drawings, where:

FIG. 1 illustrates the cross section of a preferred embodiment of the invented blade holder with cogs;
 FIG. 2 illustrates the blade holder of FIG. 1 in a deformed state due to road irregularities;
 FIG. 3 illustrates the cross section of a preferred embodiment of the invented blade holder with cogs and a tensioner as accessory equipment;
 FIG. 4 illustrates the cross section of the preferred embodiment of the invented blade holder with cogs and an alternative tensioner as accessory equipment;
 FIG. 5 illustrates the blade holder of FIG. 4 in a deformed state due to road surface irregularities.

Example of the embodiment of the invention

[0015] An example of the embodiment of the invented plough blade holder of a road maintenance vehicle is described for a snow plough blade holder, however, the construction of the invention is not limited to a snowplough, but may be used to produce other types of plough blade holders of road maintenance vehicles. FIG. 1 illustrates the novel blade holder 1 made of an elastically deforming material, which consists of an elastically deforming material part 2 and the attachment plate 3 placed therein for the attachment of blade 4. The elastically deforming material part 2 operates on the principle of a parallelogram due to the fact that the blade holder has a hollow space 5. Blade holder 1 is attached to the plough mouldboard carrier (not shown on the drawings) with connection plate 6 and mounting screws 7. In the operating position, the blade holder has in the upper part of the hollow space the first cog 8 in the whole width of the hollow space, and in the lower part of the hollow space the second cog 9 in the whole width of the hollow space. If snow plough blade 4 moves against an obstacle 10 (movement is in the direction of the arrow) and starts to deform to pass the obstacle, then in the stage of passing the obstacle (FIG. 2), the first cog 8 and the second cog 9 hook behind each other, ensuring improved return into the operating position after passing the obstacle. Locking cogs 8 and 9 avoids the danger that the blade remains in the deformed position after passing the obstacle, in an operating position with no return (remains at a negative angle). A blade holder with an elastomeric material part may have an accessory device for pre-adjusting, if necessary, the pre-tension of the elastomeric material part,

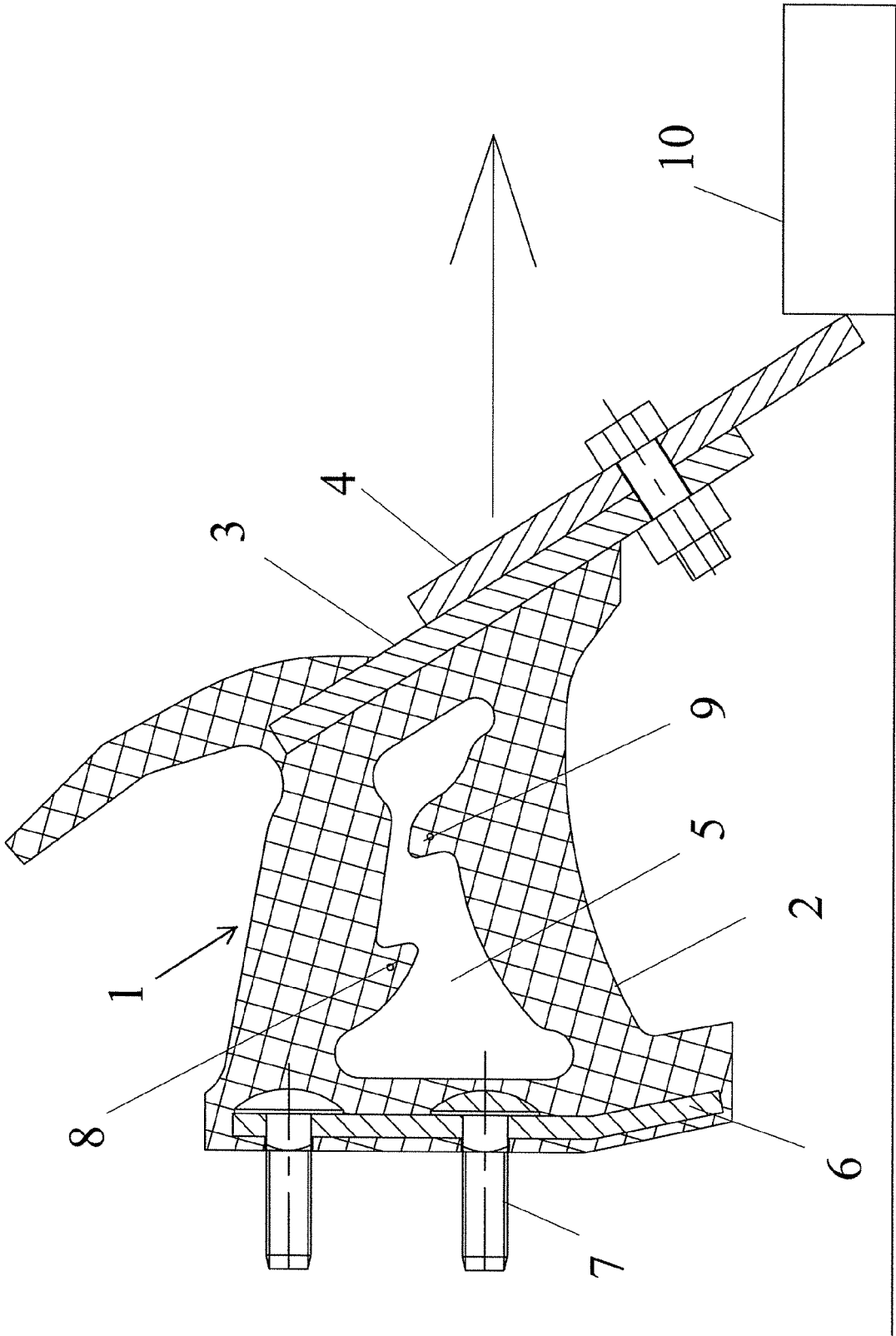
and/or for pre-adjusting the position of the blade in a way that angle α between the blade and the road surface normal (see FIG. 3) would correspond to the specific requirements. Such pre-tensioning and/or an angle α of the blade can be adjusted with the tensioner shown on FIG. 3. The tensioner comprises a cable, chain or another tensioning device 11 from a similar material, which on one end is attached to the attaching plate side part 12 of the blade of the blade holder, and on the other end, is attached to the connection plate 6 so that the length of the tensioning device 11 can be adjusted. By altering of the length of the tensioning device, the tension of the elastomeric material part and angle α between the blade and the road surface normal changes. To alter the tension of the elastomeric material part and/or modify the angle of the blade, the length of tensioning device 11 is modified with a screw or a similar tool 13. In a preferred embodiment, screw 13 has a thread 14, which can be used to adjust the positioning of the screw in reference to connection plate 6. The screw in the extent of its whole length has an opening 15 through which tension device 11 extends. At the end of the cable or chain of the tensioning device, there is a stopper disk 16 (FIG. 4 and 5) the diameter of which is greater than the diameter of opening 15 so that although the tensioning device moves freely forwards and backwards in the opening passing the screw, the stopper disc prevents the end of the cable or chain from going through the screw opening. FIG. 5 illustrates a situation in which as a result of the deformation of the blade holder, the end of the tensioning device has moved away from the screw. With the modification of the length of the tensioning device 11, angle α between blade 4 and road surface normal changes and pre-tension is thus generated in the blade holder. Alternatively, the stopper disc side end of the tensioning device may be rigidly connected to the end of the screw, for example with a sleeve joint, so that the tensioning device does not turn with the screw when screw 13 is screwed. In this case, the end of the tensioning device will not move in relation to connection plate 6 when the blade holder deforms, but the free middle part of the tensioning device relaxes as the distance between the ends of the cable or chain of the tensioning device decreases when the blade holder deforms. Pre-tensioning also makes the blade holder more rigid and prevents possible jumping of the plough on an uneven road. At the same time, the parallelogram characteristics of the blade holder are retained. Modifying the angle of the blade is also necessary when using different types of blades, in which a different angle of the blade in relation to the ground is required.

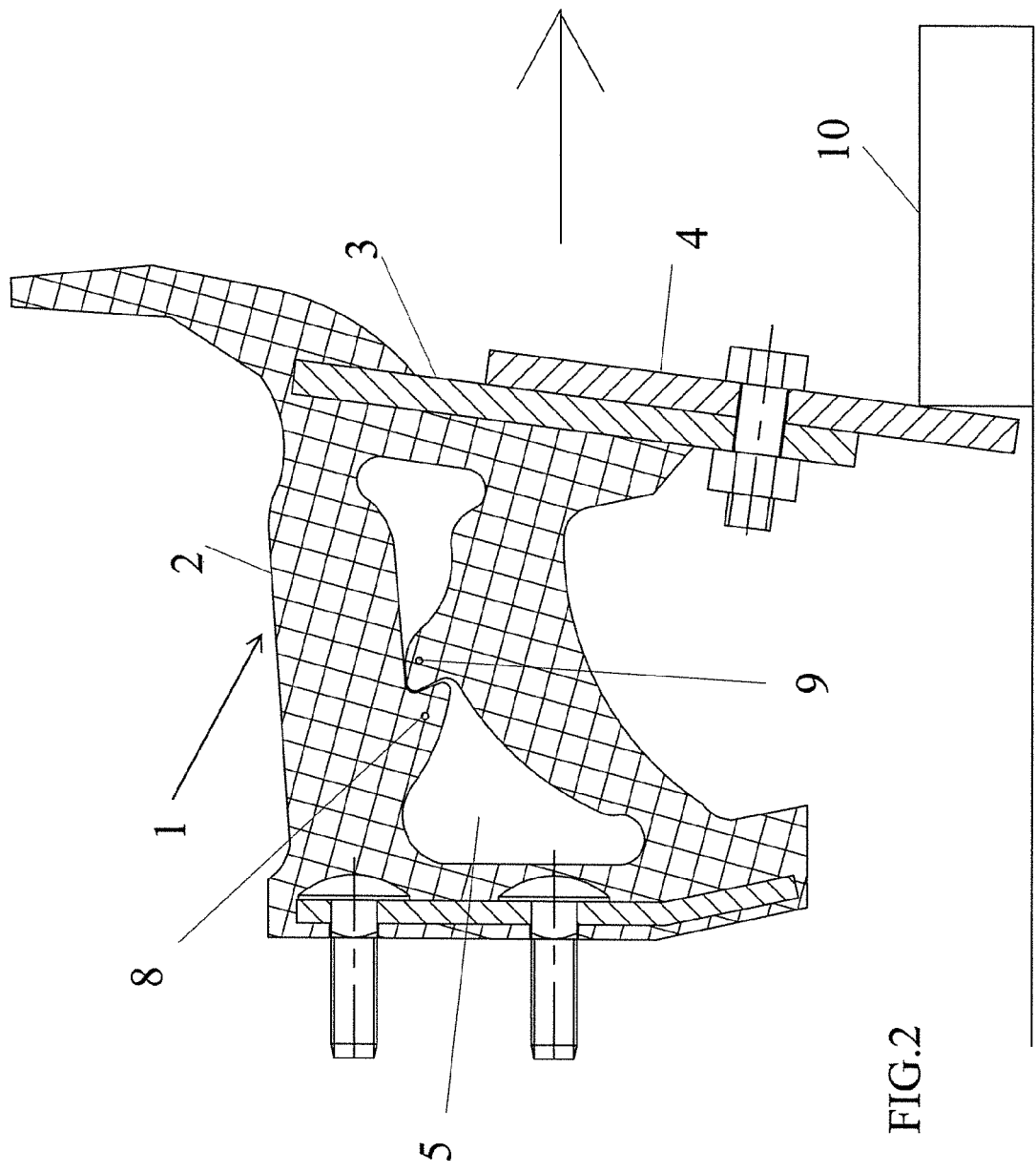
Claims

1. Plough blade holder of a road maintenance vehicle (1) for attaching the plough blade (4) to the mouldboard of the plough, which consists of an elastically deforming material part (2) provided with a hollow

- space filled with air, adjusted to operate as a parallelogram, which is attached to the carrier of the mouldboard of the plough on one side and the plough blade is attached to the other side, **characterised in that** in the operating position of the plough, the elastically deforming material part (2) has a first cog (8) at the upper part of the hollow space in its whole width and a second cog (9) at the lower part of the hollow space that hooks with cog (8) when the deforming material part (2) deforms, and/or a tensioning device (11) for creating pre-tension in the deforming material part (2) and adjusting the angle (α) between the blade and the normal of the surface of the road.
2. Plough blade holder of a road maintenance vehicle according to claim 1 **characterised in that** the elastically deforming material part is from polyurethane elastomer.
 3. Plough blade holder of a road maintenance vehicle according to claim 1 **characterised in that** the first cog (8) at the upper part of the hollow space is further away from the blade (4) than the second cog (9) at the lower part of the hollow space.
 4. Plough blade holder of a road maintenance vehicle according to claim 1 **characterised in that** the second cog (9) at the lower part of the hollow space is adjusted to move towards and hook with the first cog (8) at the upper part in case of deforming of the elastically deforming material part.
 5. Plough blade holder of a road maintenance vehicle according to claim 1 **characterised in that** one end of the tensioning device (11) is fixed adjacent to the attaching plate of the blade and the other end is fixed to the connection plate in a moving or stationary manner.
 6. Plough blade holder of a road maintenance vehicle according to claim 1 **characterised in that** the tensioning device (11) is a cable or a chain or a similar the length of which is adjustable.
 7. Plough blade holder of a road maintenance vehicle according to claim 6 **characterised in that** a screw (13) is provided for adjusting the length of the cable or chain or a similar piece of equipment of the tensioning device (11).
 8. Plough blade holder of a road maintenance vehicle according to claim 7 **characterised in that** the screw (13) has an opening in the extent of its whole length so that the cable or chain or other similar piece of equipment of the tensioning device (11) extends through this opening.
 9. Plough blade holder of a road maintenance vehicle according to claim 1 **characterised in that** there is a stopper disk (16) at the connection plate (6) side end of the cable or chain or other similar piece of equipment of the tensioning device (11), the diameter of which is greater than the diameter of the opening (15).
 10. Plough blade holder of a road maintenance vehicle according to claim 1 **characterised in that** the end of the cable or chain or a similar piece of equipment of the tensioning device (11) is connected with a screw (13) by a sleeve joint so that the said end of the cable or chain or other similar piece of equipment is fixed in relation to the longitudinal axis of the screw (13).

FIG. 1





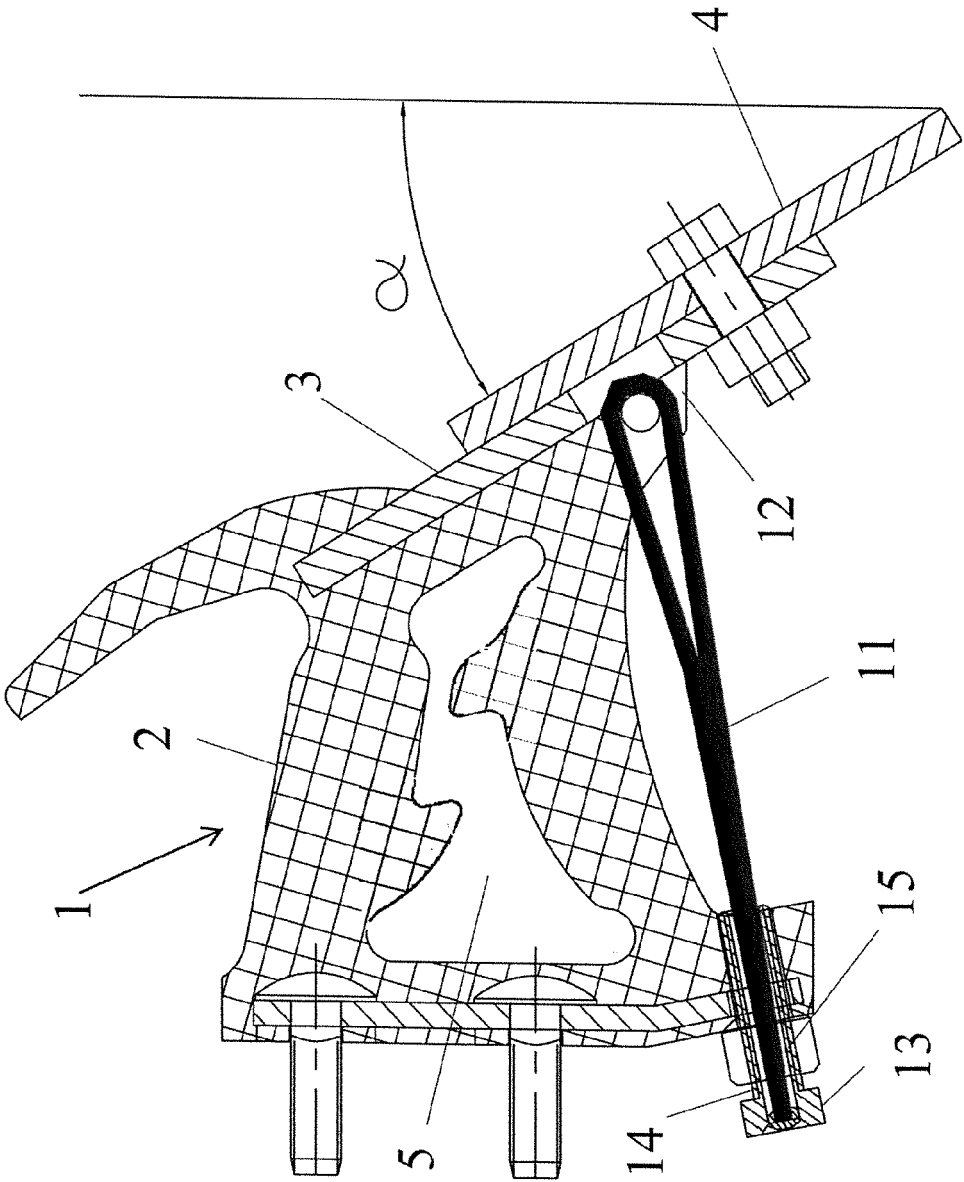


FIG. 3

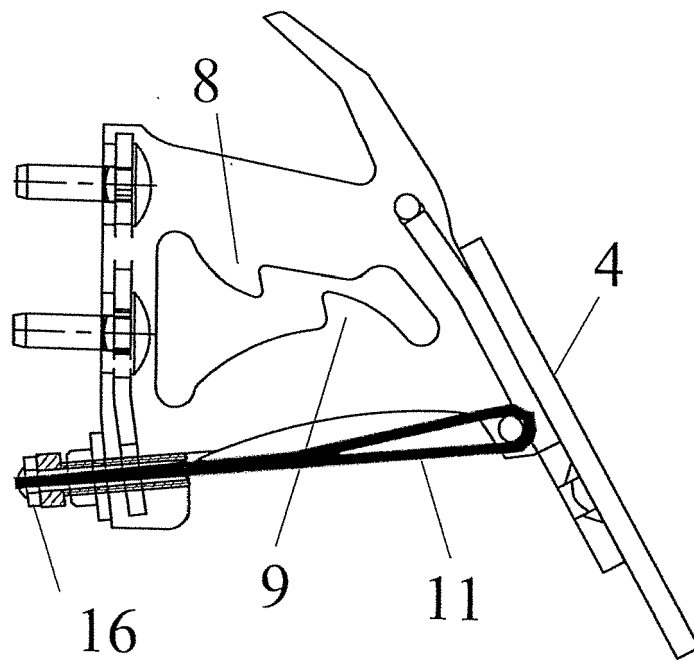


FIG. 4

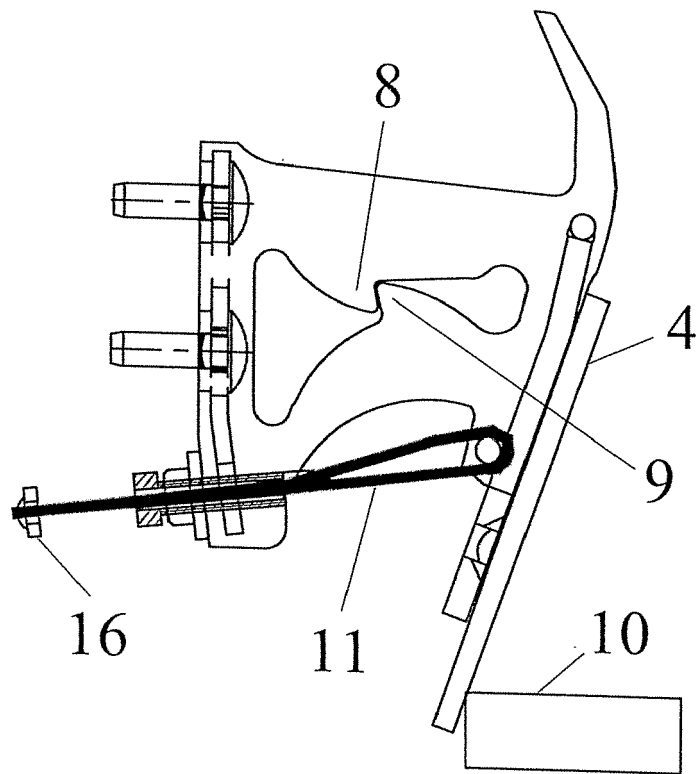


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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