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(54) **Snowplough blade**

(57) The invention relates to a snowplough blade (6), which is elastically fastened to the lower section of a plough wing (7). According to the invention the snowplough blade (6) is manufactured of one or more long sections, and the blade (6) is provided with elastic sections (9) chamfered of their rear surface, between which there is a more rigid, controlled and sprung blade element. The snowplough blade comprises or is connected with a wiper section (10), which is arranged to slide along the movements of the blade on the surface of the lower section of the wing.

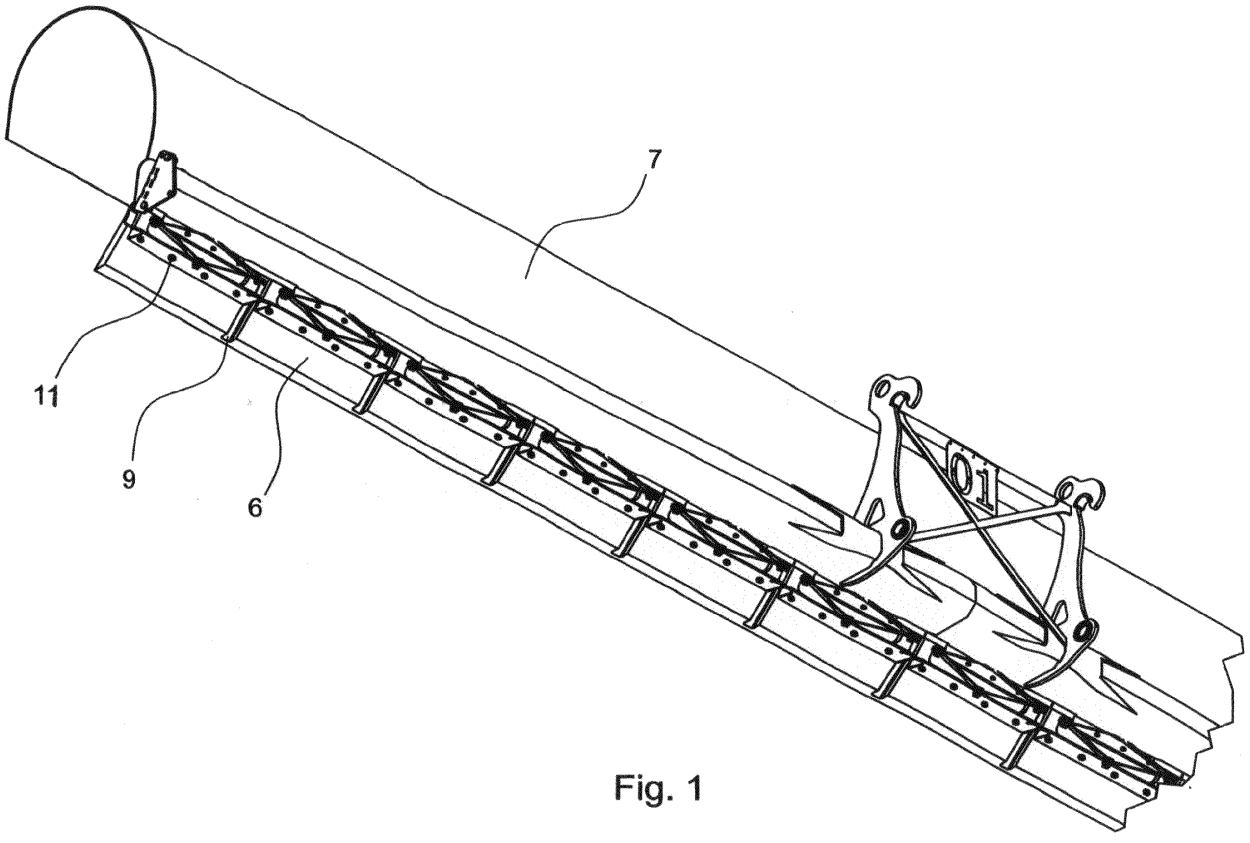

Fig. 1

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Description

[0001] The invention relates to a snowplough blade, which is elastically fastened to the lower section of the plough wing.

[0002] Surfaces being ploughed by snowploughs have irregularities due to the preparing methods of the surface, the wear of pavement surfaces, possible frost damages, and equipment installed on the surface. When the surfacing is performed by lanes with a certain work width, the pavement can include irregularities between the lanes. Furthermore, e.g. cambers required for water removal cause irregularities. Pit cover plates and possible lights engineered on the pavement increase the irregularities of the surface. Surfaces built of concrete slabs can be very irregular due to errors in the installation of the slabs. The wear of the surface also causes local depressions. Frost damages are factors increasing the irregularity of the surface, which occur, frequently in cold conditions.

[0003] The main operation of a snowplough is removing snow from a surface being ploughed. Furthermore, the snowplough can be used for removing slush or even water before it freezes, which has a great effect in preventing slipperiness before freezing. All removed moisture directly decreases the amount of ice to be formed on the ploughed surface and the requirement of de-icing chemicals and assists in keeping the surface unfrozen.

[0004] When ploughing by the snowplough, the snowplough blade should follow the surface being ploughed as precisely as possible even in the irregularities of the surface if aiming at a good cleaning result. Challenges in following the surface increase even more along with the increase in the work widths of the snowplough. Another important requirement is the tightness of the snowplough blade, which is yet emphasised when trying to remove also water from the area being ploughed.

[0005] There have been attempts to improve the following ability of the snowplough blade by manufacturing it of an elastic material and by fastening the elastic blade stationarily of its top edge as an extension of the snowplough wing. However, this arrangement is not sufficient when requiring a good cleaning result.

[0006] A second common arrangement is to manufacture the snowplough of relatively short, separate elements of the width of 0.8-1.0 m moving in the vertical direction, where the elastic blade connects as an extension of the wing section by a bolt connection. Each element follows the highest point of the ground as the elasticity of the blade follows in a limited way. As the elements move in the vertical direction, the shape of the wing is limited to quite large circular arches because, otherwise, gradation is created on the wing from the mutual moving of the elements. It is not possible to realise the shape of the wing most advantageous for dry frost snow with a smaller radius of curvature. A problem of the element-structured snowplough is leaks from between the elements. Element-structured snowploughs are heavy and this problem is particularly emphasised as the work width of snowploughs increases. The large mass of the moving elements together with a quite high running speed induce large loads applied to the blades when hitting obstacles.

[0007] A third common and known elastic blade arrangement of a snowplough is to divide the snowplough blade to elements of the length of 0.8-2.0 m which are elastically suspended as the extensions of a uniform snowplough wing or a divided one in a folding-wing snowplough. In these arrangements, the blade element is also able to tilt, whereby the surface following ability is better than that of element snowploughs at least with the same blade lengths. Disadvantages are leaks from between the blade elements and connecting the moving blade to the fixed wing without leaks.

[0008] To tighten the construction, there are known arrangements where the moving blade section is connected with a rigid extension, which slides controlled or uncontrolled on the front surface of the wing. A known arrangement is also an elastic plate or clothe fastened to the moving blade and the fixed wing.

[0009] An object of the invention is to introduce a snowplough blade, which eliminates disadvantages related to prior-art blades. A particular object of the invention is to introduce a snowplough blade, which follows well the irregularities of a surface being ploughed, and removes effectively snow, slush and water. Furthermore, an object of the invention is to introduce a snowplough blade having a tight construction, which also enables the ploughing of water.

[0010] The object of the invention is achieved with a snowplough blade, which is characterised by what is presented in the claims.

[0011] According to the invention, the snowplough blade is of one construction without gaps between the blade sections, and the blade is provided with elastic points chamfered of their rear surface, between which, there is a more rigid, controlled and sprung blade element. The blade is as long as possible thus minimising the number of blade connections as possible leaks points. The elastic points connect the blade elements jointlessly without leaks, and the elastic point operates as a blade like the blade element. Furthermore, to the snowplough blade is connected a wiper section or the wiper section is part of the blade, which is arranged to slide along with the movements of the blade on the surface of the lower section of the wing. Such a construction is elastic, it follows the irregularities of the surface, but is tight.

[0012] In an advantageous embodiment of the invention, the blade is manufactured of one or more long sections. There still are elastic points between them or they include elastic points.

[0013] In another advantageous embodiment of the invention, the blade is provided with points more elastic than the other construction at regular intervals. At the elastic point, the blade bends more easily and yields also in the longitudinal direction more easily. The elastic

points enable delivering the blade as rolled up, thus facilitating the transport.

[0014] In an advantageous further embodiment of the invention, the more elastic points are chamfers in the massive blade element. By chamfering the massive blade, it is possible to provide a simple maintenance-free arrangement including few parts.

[0015] In an advantageous additional embodiment of the invention, the elements between the elastic points are controlled as sprung from the middle to their working position. The controlled support prevents the cutting angle of the blade from changing during ploughing, but allows the blade to move in accordance with the shapes of surfaces being ploughed.

[0016] In a further advantageous embodiment of the invention, there is a curved wiper section as the extension of the snowplough blade. The wiper section can be a separate section, which is fastened to the blade, or it is part of an expendable blade, which is tensioned against the wing and arranged to slide along with the movements of the blade on the surface of the lower section of the wing. The wiper section tensioned as curved operates as a small ramp when the material being ploughed slides over it, whereby the wiper presses more heavily against the plough wing as the material flow increases. As the force increases, the tightness of the connection improves. The wiper section makes the inner surfaces of the plough, on which the material slides, extremely tight and leakfree.

[0017] In an additional advantageous embodiment of the invention, there is a straight wiper section as the extension of the snowplough blade. The wiper section can be a separate section which is fastened to the blade or it is part of an expendable blade, which has been pretensioned straight to its use position against the wing and arranged to slide along with the movements of the blade on the surface of the lower section of the wing. The wiper section tensioned straight enables the smooth slide of snow from the blade to the plough wing such that the material being ploughed maintains its sliding contact to the snowplough as well as possible. With the long sliding contact of snow, the material being ploughed obtains a rotary motion within the plough. The wiper section makes the inner surfaces of the plough, on which the material slides, extremely tight and leakfree.

[0018] The blade element is controlled to move parallel with the tangent of the lower edge of the cylindrical wing. As the blade moves against irregularities, the sprung wiper section of the blade is tightly on the wing surface against it preventing the access of water or snow behind the blade. The outward motion of the blade element is limited and the extension is dimensioned considering the required normal elastic travel and keeping the wiper on top of the wing in all situations.

[0019] The construction allows a simple blade replacement without extra work compared with the normal blade replacement.

[0020] The invention will now be described in more detail with reference to the accompanying drawings in which

Fig. 1 shows a rear view of a snowplough blade according to the invention fastened to a plough wing,

Fig. 2 shows the blade according to Fig. 1 at a larger scale,

Fig. 3 shows a cross section of the blade according to Fig. 1 in its working position, and

Fig. 4 shows a side view of the blade.

[0021] Fig. 1 shows a rear view of a snowplough blade 6 fastened to a snowplough wing 7. The blade includes chamfers i.e. elastic points 9 at regular intervals on its rear surface. They increase the elasticity of the blade and it's setting on the irregular ground. The blade elements include fastening holes 11 for its fastening.

[0022] Fig. 2 shows the blade at a larger scale and the chamfered elastic point 9 of the fastening elements. The front surface of the wing is the same as with the blade. The elastic point operates as a blade in the same way as the other blade.

[0023] Fig. 3 shows a cross section of the blade 6 in its working position. The lower surface of the blade is parallel with the ground. As an extension of the blade, there is an elastic wiper section 10 the top section of which is tensioned against the wing 7 and arranged to slide along the movements of the blade on the surface of the lower section of the wing.

[0024] Fig. 4 shows a side view of the blade and its suspension to the wing. The snowplough blade 6 is fastened to blade holders 4. To the blade holder is fastened a slide 1. To the snowplough wing is fastened a support construction 8, which includes a slide guide 2, which is parallel with the tangent of the lower edge of the wing. The slide 1 fastened to the blade holder is located to the slide guide and it slides in the slide guide 2 parallel with the tangent of the lower edge of the wing. A spring section 3 is between the blade holder and the support construction 8 and it is arranged to press the blade holder 4 downwards. Above the slide guide, there is a limiter 5, which is arranged to stop the movement of the slide downwards. The limiter 5 enables the pretensioning of the spring section 3 in the rest position.

[0025] The blade holders are shorter than the distance between the elastic points. Each blade holder includes two slide guides with their springs. The slides are loose in the lateral direction allowing tilting and small longitudinal movements of the blade. The location of the blade element in relation to the wing plate 7 pretensions the top edge of the wiper section 10 against the wing plate.

[0026] The construction shown in the figures illustrates one implementation alternative. The characteristic features of the invention are the continuous blade construction without leaking gaps between the blade sections and the pretensioned wiper extension of the moving blade

connected to the stationary wing section against the wing plate.

[0027] The invention is not limited to the advantageous embodiment described, but it can vary within the scope of the inventive idea presented in the claims.

Claims

1. A snowplough blade (6), which is elastically fastened to the lower section of a plough wing (7), ***characterised* in that** the snowplough blade (6) is manufactured of one or more long sections, and that the blade (6) is provided with elastic sections (9) chamfered of their rear surface, between which there is a more rigid, controlled and sprung blade element, and that the snowplough blade is fastened with a wiper section (10) or it is part of the blade, which is arranged to slide along the movements of the blade on the surface of the lower section of the wing.

2. A snowplough blade according to claim 1, ***characterised* in that** the blade is manufactured of sections tightly connected to each other.

3. A snowplough blade according to claim 1 or 2, ***characterised* in that** the blade is provided with points more elastic than the other construction at regular intervals.

4. A snowplough blade according to claim 3, ***characterised* in that** the more elastic points are chamfers in the massive blade element.

5. A snowplough blade according to claims 1 and 3, ***characterised* in that** the elements between the elastic points are controlled as sprung to their working position.

6. A snowplough blade according to any one of claims 1-5, ***characterised* in that** the snowplough blade includes or it is connected with a straight wiper section (10), which is tensioned against the wing.

7. A snowplough blade according to any one of claims 1-5, ***characterised* in that** the snowplough blade includes or it is connected with a curved wiper section which is pretensioned straight to its use position against the wing.

8. A snowplough blade according to any one of claims 1-7, ***characterised* in that** the blade (6) is fastened to blade holders (4), to which is fastened a slide (1), and that to the snowplough wing is fastened a support construction (8), which includes a slide guide (2), which is parallel with the tangent of the lower edge of the wing, and that the slide (1) fastened to the blade holder is located to the slide guide and it is arranged to slide in the slide guide (2) parallel with the tangent of the lower edge of the wing, and the construction includes a spring section (3), which is between the blade holder (4) and the fastening section (8) and it is arranged to press the blade holder (4) downwards.

9. A snowplough blade according to claim 8, ***characterised* in that**, above the slide guide, there is a limiter (5) which is arranged to stop the movement of the slide downwards.

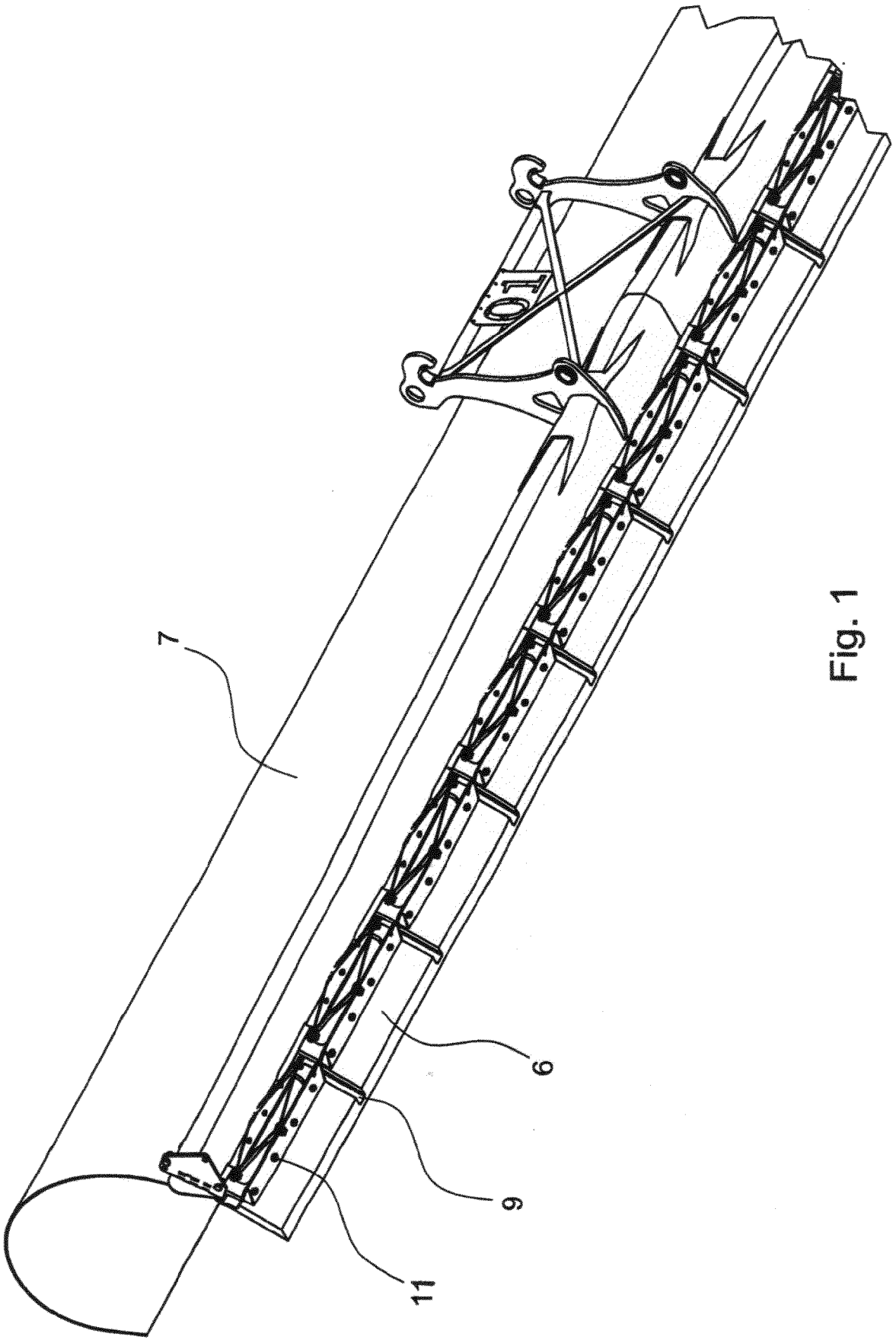

Fig. 1

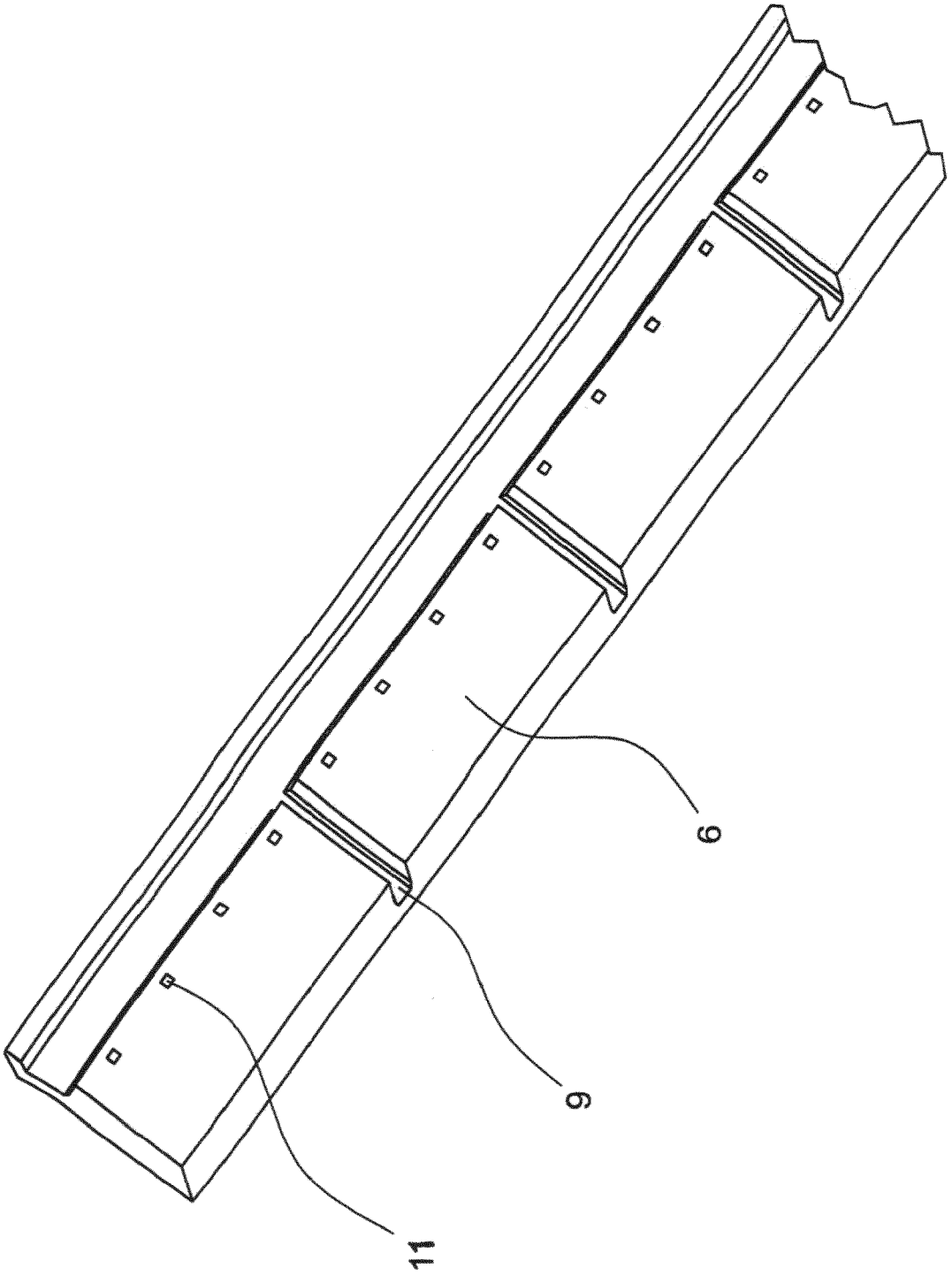

Fig. 2

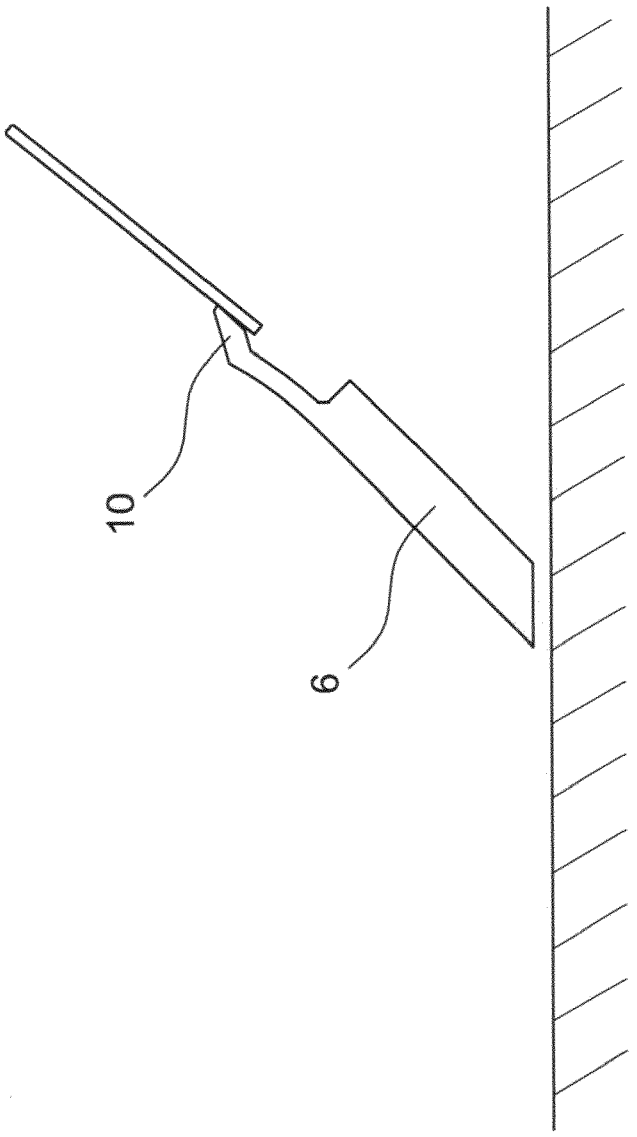

Fig. 3

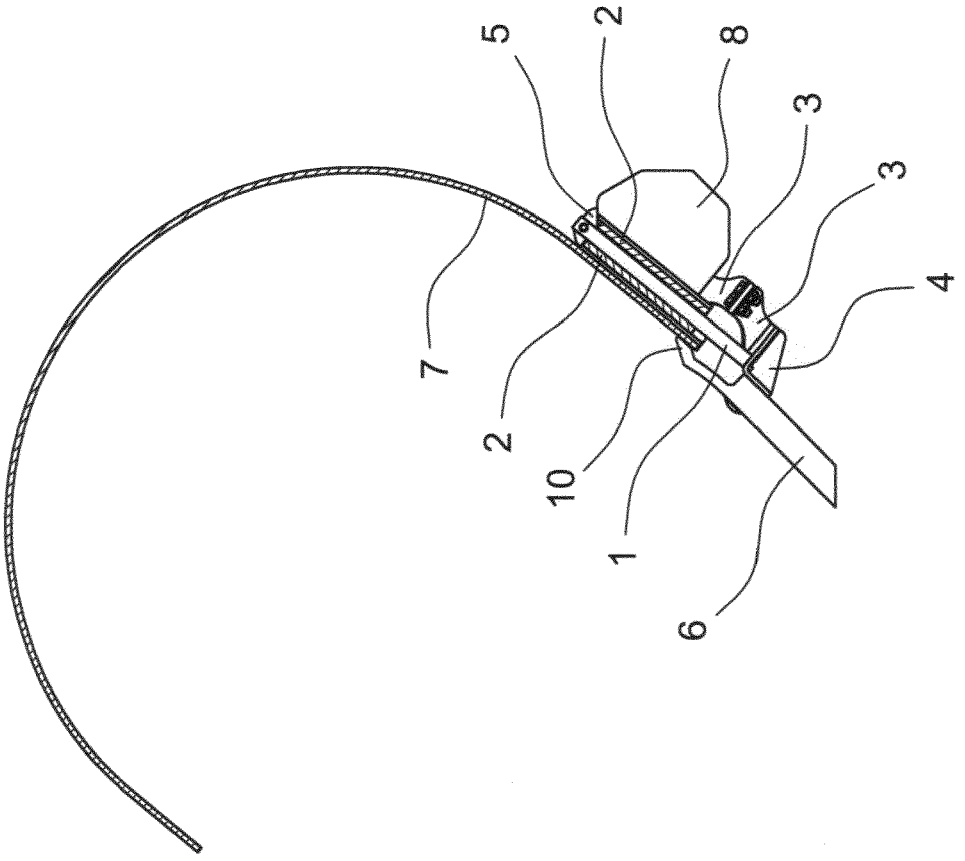

Fig. 4