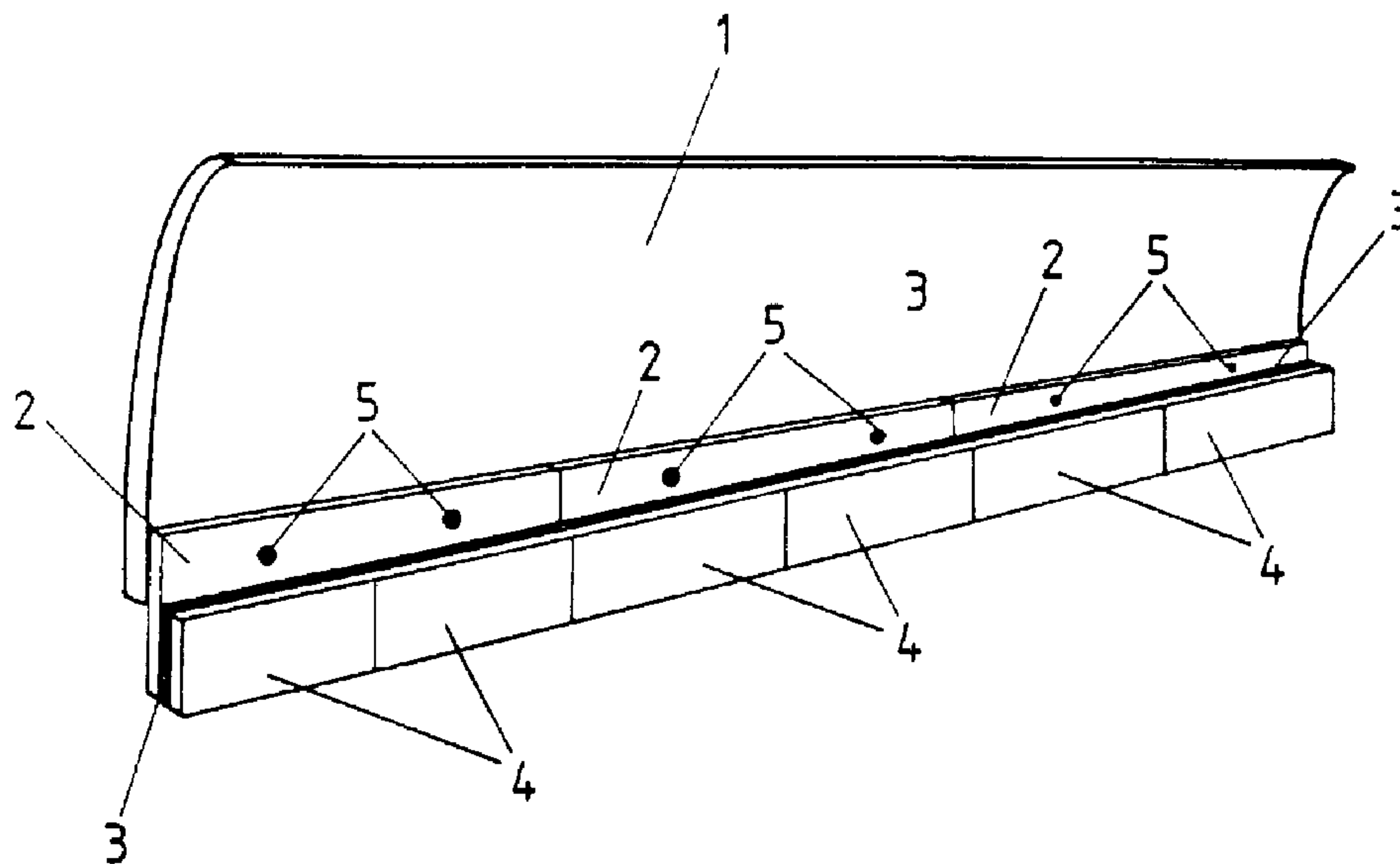




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(57) Abrégé/Abstract:

The object of the invention is a plough blade arrangement, advantageously in a snow-plough, which plough (1) is intended to be attached to a vehicle, advantageously a tractor or lorry. The plough blade arrangement includes a frame (2) consisting of a flat part removably attached to the plough (1), several blade plates (4) covering the desired working width, and attachment members for securing the blade plates (4) to the frame (2). The aforesaid attachment members consist of flexible members (3), which are arranged to permit the movement of the blade plates (4) essentially in only one direction in the direction of the surface of the frame (2) when the blade plate (4) strikes an obstacle or pit. In addition, the working width is divided into separate, independently flexible parts.

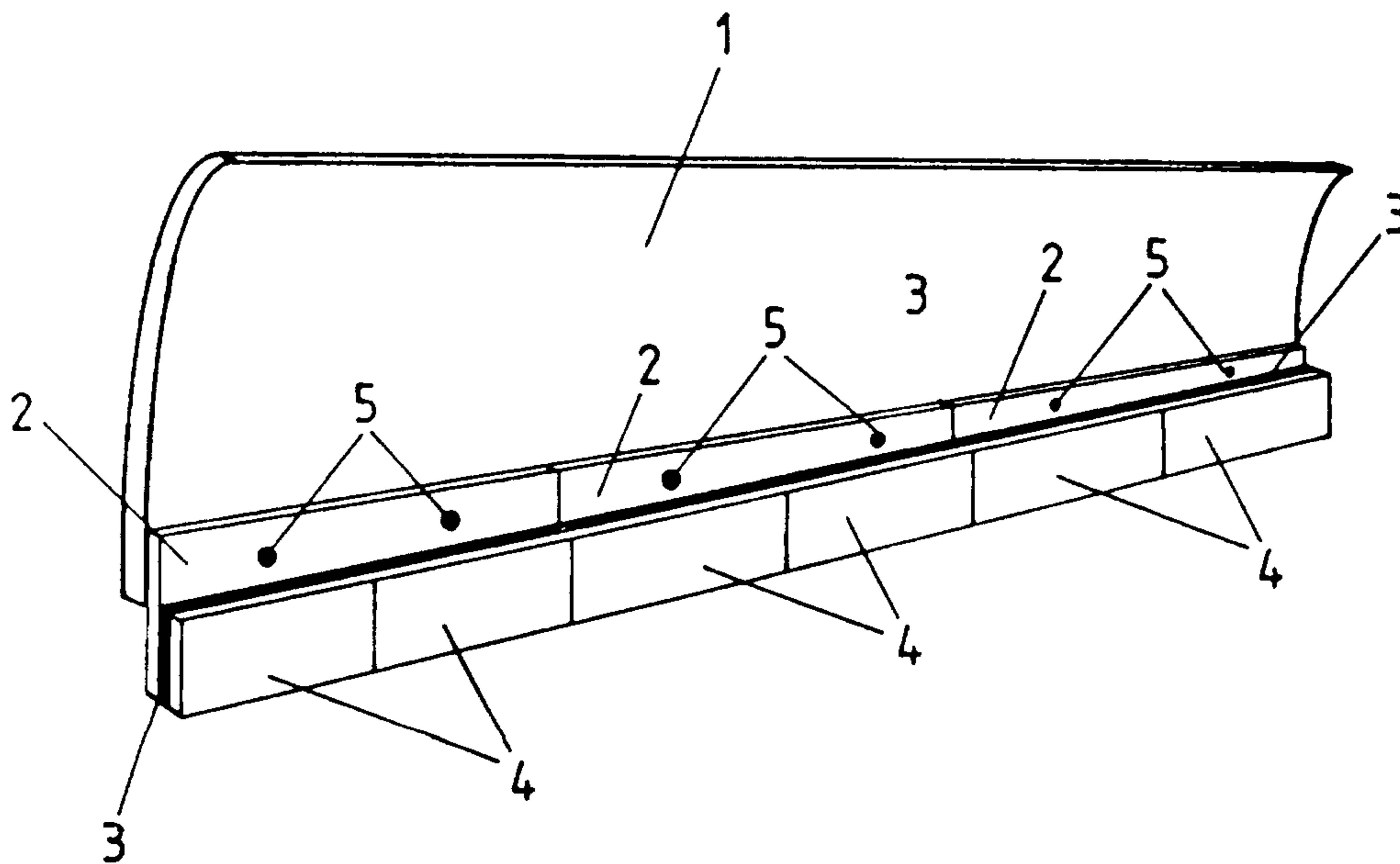




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(54) Title: BLADE ASSEMBLY IN A PLOUGH



(57) Abstract

The object of the invention is a plough blade arrangement, advantageously in a snow-plough, which plough (1) is intended to be attached to a vehicle, advantageously a tractor or lorry. The plough blade arrangement includes a frame (2) consisting of a flat part removably attached to the plough (1), several blade plates (4) covering the desired working width, and attachment members for securing the blade plates (4) to the frame (2). The aforesaid attachment members consist of flexible members (3), which are arranged to permit the movement of the blade plates (4) essentially in only one direction in the direction of the surface of the frame (2) when the blade plate (4) strikes an obstacle or pit. In addition, the working width is divided into separate, independently flexible parts.

BLADE ASSEMBLY IN A PLOUGH.

The object of this invention is a plough blade arrangement, advantageously in a snow-plough, which plough is intended to be attached to a vehicle, advantageously a tractor or lorry, the plough blade arrangement including a frame consisting of a flat part removably attached to the plough, a blade plate, and attachment devices for securing the blade plate to the frame. The plough blade arrangement in accordance with the invention is used especially in connection with the ploughing of asphalt-surfaced highways, when the intention is to clean the asphalt surface.

There is a previously known use in ploughs of various vertically and horizontally stiff blades attached to the plough, when the wear caused by friction is not directed onto the plough itself, but onto a separate, changeable blade component manufactured from, for example, steel, hard metal, or similar. These blade components are typically plate-like irons 300 mm high and 8 mm thick, the width of which varies with the width of the plough, in such a way that several blades can be attached next to the plough next to one another. During ploughing, the angle between the blade and the road is generally about 55 - 70°, when the lower edge of the blade is further forward than the upper in the direction of travel. The blade then presses against the road with a force corresponding to about 1000 kg.. The greatest problem with known blades used in ploughing is their rapid wear, which is considerably promoted by unevennesses in the road. On the basis of experience it has been demonstrated that even a plough blade of hard metal will wear very rapidly, especially if there are many unevennesses in the road being ploughed. In addition to this, the road surface too wears. The wear is due above all to the fact that when the stiff plough blade hits an unevenness in the road, and the plough blade is pressed down with a force corresponding to 1000 kg, then either the plough blade or the road surface will be damaged before the plough has been raised sufficiently to clear the unevenness. In addition, the surface left by stiff blades is unsatisfactory, especially on a rutted road, on account of which use is also made of ploughs, in which there is, for example, a plough in front

equipped with a large, stiff, steel blade, and behind it a small plough equipped with a small rubber blade for final cleaning.

5 The intention of this invention is to create a plough blade arrangement, by means of which the ploughed surface is better, and in which unevenness in the road cause considerably less wear compared to known blades, and which correspondingly wears the road being ploughed less than known plough blades.

10 The invention is based on the idea that the blade component in contact with the road is flexibly attached to the plough, in which case the blade component flexes upwards when it strikes an unevenness in the road. The most significant advantage of the invention is thus that the blade component of the plough, and the road being ploughed wear significantly less than when using known plough blade arrangements. In addition, when using a plough blade arrangement in accordance with the invention, there is the advantage that when the plough
15 strikes an unevenness in the road extending over only part of the width of the plough the blade component does not rise over its entire width, but only at the point of the unevenness and/or from the angle on the side of the unevenness, when the blade component of the plough and the road surface are momentarily at a certain angle to one another. A significantly better cleaning result is
20 achieved, especially on rutted roads, by means of a plough blade arrangement in accordance with the invention, in which separate components are used that yield to the surface of the road.

A plough blade in accordance with the invention is described in what follows with the aid of two advantageous forms of application, with reference to the
25 accompanying drawings in which

Figure 1 shows the first form of application of the plough blade seen from in front,

Figure 2 shows the plough blade of Figure 1 seen from the side,

Figure 3 shows the second form of application of the plough blade seen from in front,

Figure 4 shows a cross-sectional view of the plough blade in Figure 3 along the line IV - IV in Figure 3,

5 Figure 5 shows one independently flexible flexing member,

Figure 6 shows a plough blade arrangement using the flexing member in Figure 5,

Figure 7 shows another blade arrangement using the flexing member in Figure 5,

10 Figure 8 shows a third blade arrangement using the flexing member in Figure 5,

Figures 9 and 10 show the slide member of Figure 5 in detail.

Figure 1 shows one plough blade in accordance with the invention
15 as seen from in front. The plough blade includes three frames 2, which are attached to the plough by means of bolts penetrating holes 5 of the flat frames 2. There are two separate blade plates 4 attached to lower part of each frame 2 by means of a component 3 manufactured from a flexible material, advantageously
20 ly for example rubber, polyurethane, or a corresponding flexible material. The blade plates 4 are manufactured from some material that has a high wear resistance, such as e.g. steel or hard metal. There may be gaps between the blade plates 4, in which case grooves will form in the track of the plough. Each blade
25 plate 4 can flex vertically independently of the others if the plate in question strikes an unevenness in the road surface. The frames 2 shown in Figure 1 can naturally be replaced by a single unified frame component.

30 Figure 2 shows the blade attached to the plough 1 in Figure 1, seen from the side. The plough shown in the Figure moves to the right during ploughing. The plough frame 2 is attached by bolts to plough 1 (not seen in the Figure). Plate 3, manufactured from flexible material, is attached to frame 2. Blade plate 4, which
35 is manufactured from some material that has a high wear resistance, is attached to the flexible plate 3. Blade plate 3 is thus flexibly attached to frame 2. From the point of view of the invention it is essential that the blade of the plough cannot

bend or rotate backwards in relation to the direction of ploughing, even though the blade plate of the plough strikes the road surface. If this should happen the blade of the plough would catch on the road surface with even greater force than previously. The reason for the above catching would be that as a result of bending or rotating backwards the blade of the plough would move vertically increasingly further downwards from its normal position, because the angle between the plough blade and the road is about 55 - 70°. The abovementioned problem does not appear in connection with the use of the blade in accordance with the invention shown in Figure 2, because the stiff frame 2 extends vertically nearly as far down as the blade plate 4, so that it supports the blade plate in the direction of ploughing. The flexing of the blade plate 4 also takes place mainly vertically, and more precisely in the direction of the surface of frame 2.

Figures 3 and 4 show another rotatable plough blade arrangement in accordance with the invention. In these Figures the same reference numbers as above are used for operationally similar components. In Figure 3 the plough blade is seen from in front, and in Figure 4 it is seen in cross-section along line IV - IV in Figure 3. The three frames shown in Figure 1 have been replaced in Figure 3 by four separate frames 2, which are attached to solid blade plates 4 by means a component manufactured from a flexible material. The blade plates 4 are thus flexibly attached to each separate frame 2. When the blade plate 4 fitted to the lower part of the frames 2 has been completely worn, the frames 2 are separated from the plough and re-attached to it the other way round in such a way that the blade plate 4 that was previously upper becomes lower.

In Figures 5 - 10 too the same reference numbers as above are used for operationally similar components. In the forms of application of Figure 1 - 4 the blade plate itself acts as the wearing blade, but in the forms of application presented later blade plate 4 is attached by means of a snap-fit to a separate wear component. The flexible member in accordance with Figure 5

makes the snap-fit possible in such a way that it is attached to the base plate of the plough 1 by holes 5 visible in the installation opening 7, and a wearing blade component, of which Figures 6 - 8 show various alternative versions, is attached to this by corresponding snap-fit bolts. The wearing blade in Figure 6 is formed of a second flexible member 6' similar to flexible member 6, in which case a greater overall flexibility is achieved. A conventional blade plate 4' to be attached to flexible member 6 is shown in Figure 7. Because separate flexible members 6 make it possible for separate blades 4' to conform to the road surface, these wear considerably less than previously. Figure 8 shows a spiked blade 4' to be attached to the flexible member 6. The Figure also shows a cross-section of flexible member 6 at the point of the installation openings.

Flexible member 6 consists of blade plate 4 of frame 2 in accordance with the above, as well as the flexible material 3 that secures these. Frame 2 is attached to the base plate of plough 1 by means of snap-fit bolts 8. For this purpose there are holes 5 in frame 2, which are located in the centre of the installation opening 7. This installation opening 7 extends through the blade plate 4 to the flexible material, freeing the space required for the installation of bolt 8. Opening 5 is square, as is the shank of the bolt, thus making it easy for the securing nut to be screwed tight. On the opposite side there is a similar installation opening 7', which extends through the frame 2 and the flexible material to the blade plate 4, in which there is a corresponding square hole 5'. The wear blade component, here spiked blade 4', is attached to blade plate 5 by means of bolts 8'. According to the Figure the thickness of the flexible material 3 is small compared to its height, so that the rotation of blade plate 4 in relation to frame 2 is avoided. This kind of construction forces the blade plate 4 to move essentially upwards in the direction of frame 2. The thickness of the flexible material may be at most 1/4, but most advantageously 1/10 ~ 1/5 of its height. Considering an overall working width of about four meters the width of the separate flexible components may be at most 1 m, but more advantageously 40 - 80 cm. By means of a 20 cm high flexible component a total

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flex of 15 mm is obtained, when the thickness of the flexible vulcanized rubber is about 20 mm.

The loading of the flexible material can be reduced, especially under great loadings by the use of a slide member, which can be attached to the stop that limits movement. The slide member in accordance with Figures 9 and 10 is located in the flexible member 6. In Figure 9 the blade plate 4 and the flexible material have been considered as having been removed, so that the slide device 10 can be seen in its entirety. The slide device 10 includes a rail 11 attached to frame 2 and a slide 12 adapted to this, which is attached to blade plate 4. Stops 13 and 13' are also attached to frame 2. Flexible component 14, which damps the stop, is attached to the former of these. Stops 13 and 13' limit slide 12 and thus the movement of blade plate 4 and prevent the overloading of flexible material 3.

The accompanying Figures and the related description are intended only to illustrate the invention being referred to. In details the plough blade in accordance with the invention can vary within the frame work of the Patent Claims. Thus a plough blade arrangement in accordance with the invention can also be used, for example, in large-area ploughs, bulldozer blades, foundation and road graders, and corresponding purposes, even though the plough blade arrangement in accordance with the invention has been described above mainly for snow-ploughing on highways. It should be noted in addition, that even though the description above states that there is only a single component manufactured from flexible material, this component can naturally be replaced by several separate flexible components. It is also possible to alter the number of separate blade and frame components as required, in order that the resulting effect is as desired, for example, grooved in the case of ploughing/grading packed snow and ice.

CLAIMS

1 1. A plough blade arrangement, advantageously in a snow-plough, which
2 plough (1) is intended to be attached to a vehicle, advantageously a tractor or
3 lorry, the plough blade arrangement including a frame (2) consisting of a flat
4 part removably attached to the plough (1), several blade plates (4) covering the
5 desired working width, covering the working width with discrete, mutually
6 separated parts, and flexible attachment members (3) for securing the blade
7 plates (4) to the frame (2) and consisting of vulcanized or other flexible
8 material between the frame and the blade plates, characterized in that each
9 flexible member (3) consists of a flexible plate having essentially an even
10 thickness and having one surface on the frame and the opposite surface on the
11 blade plate (4) and each flexible member has essentially thickness at most 1/4,
12 most advantageously 1/10 - 1/5 of their height, whereby the flexible members
13 are arranged to permit the movement of the blade plates (4) essentially in only
14 one direction in the direction of the surface of the frame (2) when the blade
15 plate (4) strikes an obstacle or pit.

1 2. A plough blade arrangement in accordance Patent Claim 1,
2 characterized in that the arrangement includes a stop (13), which limits the
3 movement of the blade plate (4) component.

1 3. A plough blade arrangement in accordance with Patent Claim 2,
2 characterized in that the stop (13) is made flexible in such a way that when the
3 blade plate (4) approaches the extreme position, its movement demands
4 increasing force.

1 4. A blade arrangement in accordance with Patent Claims 1 or 2,
2 characterized in that the arrangement includes several separate flexible
3 elements (6), each one of which includes a frame (2), a flexible member (3),
4 and a blade plate (4).

1 5. A blade arrangement in accordance with one of Patent Claims 1 - 4,
2 characterized in that it includes slide members (10), which force the blade plate
3 (4) to move only along a desired track.

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6. A blade arrangement in accordance with one of Patent Claims
1 - 5, characterized in that the frame (2) and /or the blade
plate (4) include an attachment arrangement which consists of
attachment holes (5, 5') with bolts or other attachment members,
5 and installation openings (7, 7') in the opposing plate and in
the flexible member (3).

7. A blade arrangement in accordance with Patent Claims 1 - 6,
characterized in that the working width of the independently
10 flexible blade plates is at most 1 m, most advantageously 40 -
80 cm.

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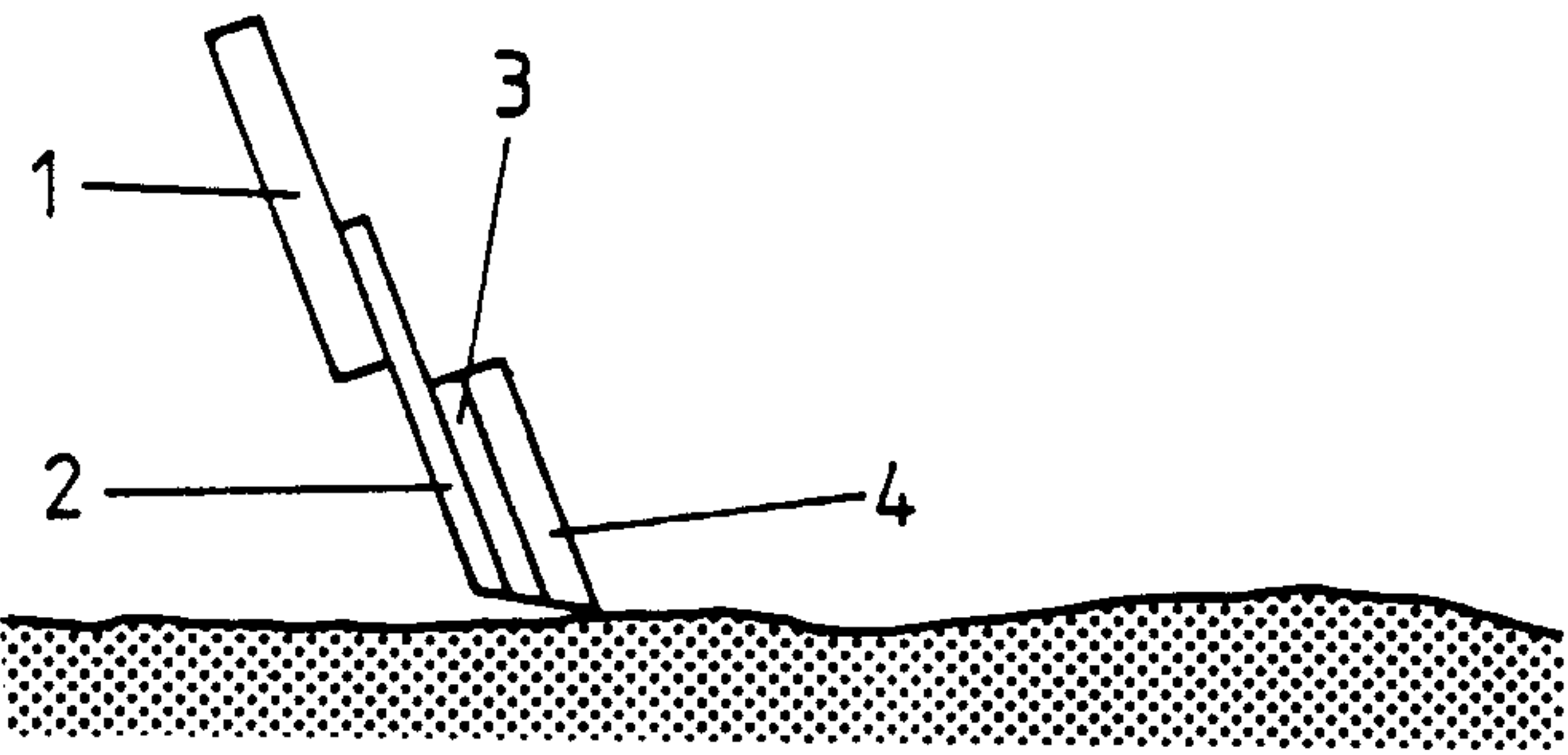
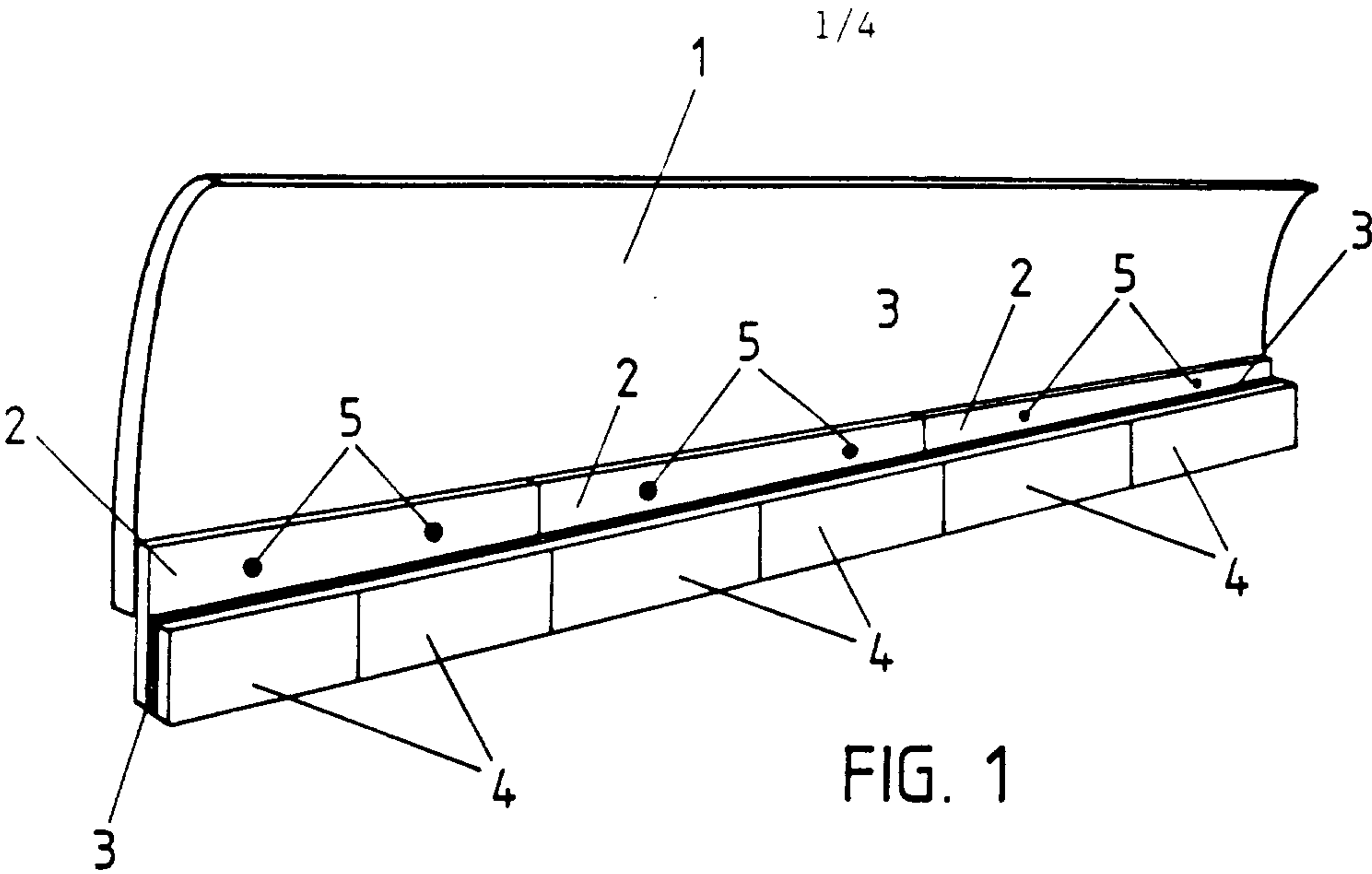


FIG. 2

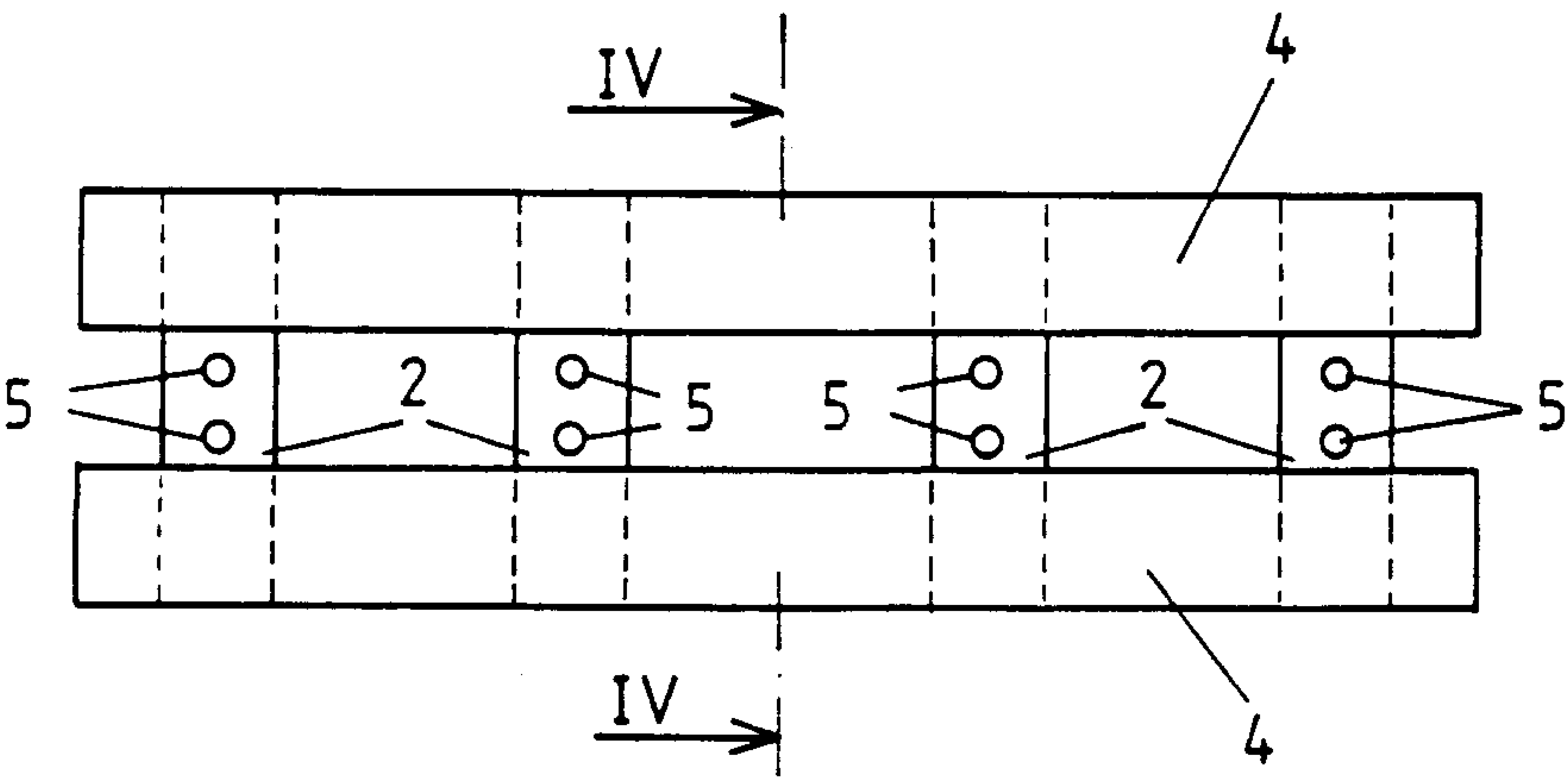


FIG. 3

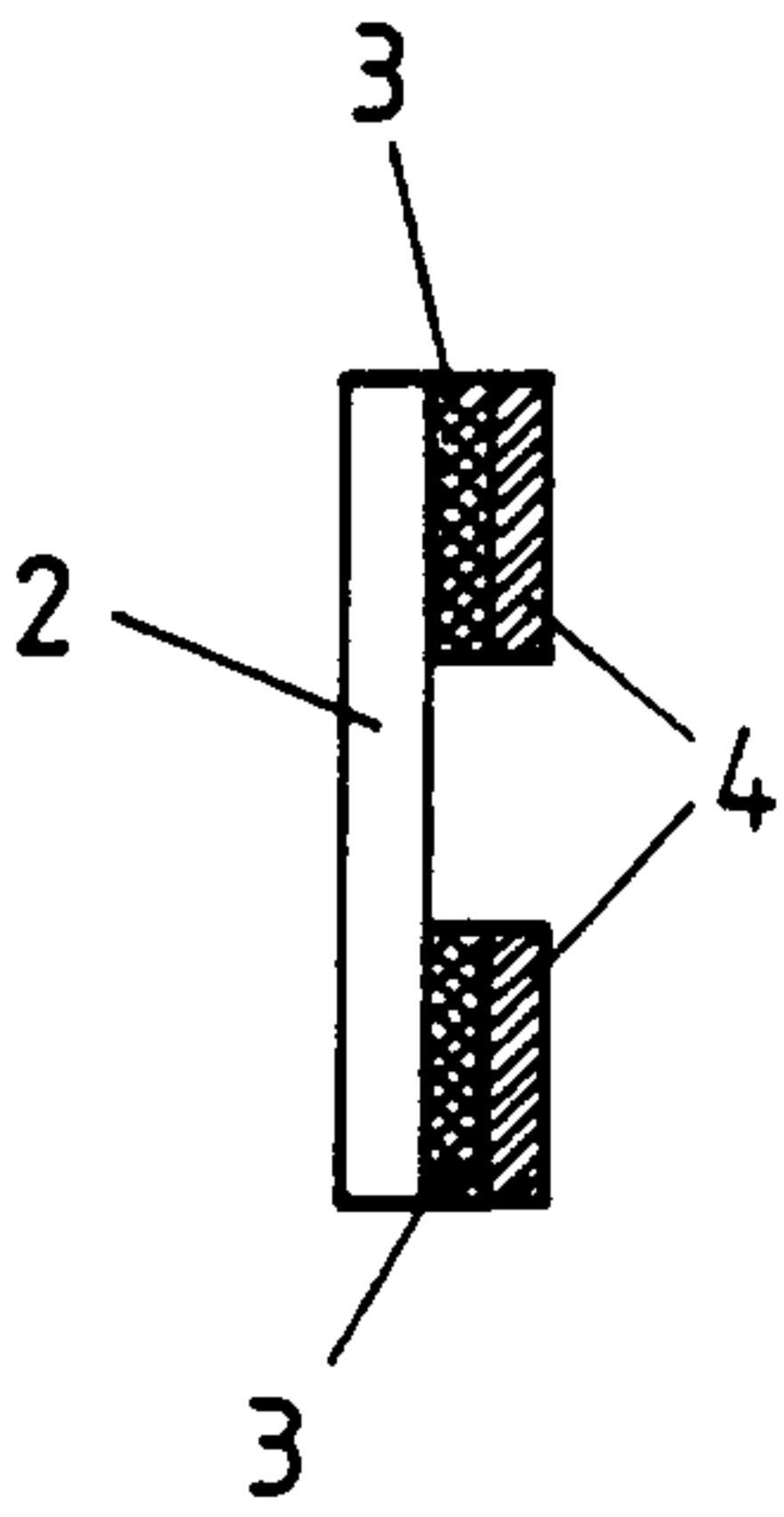
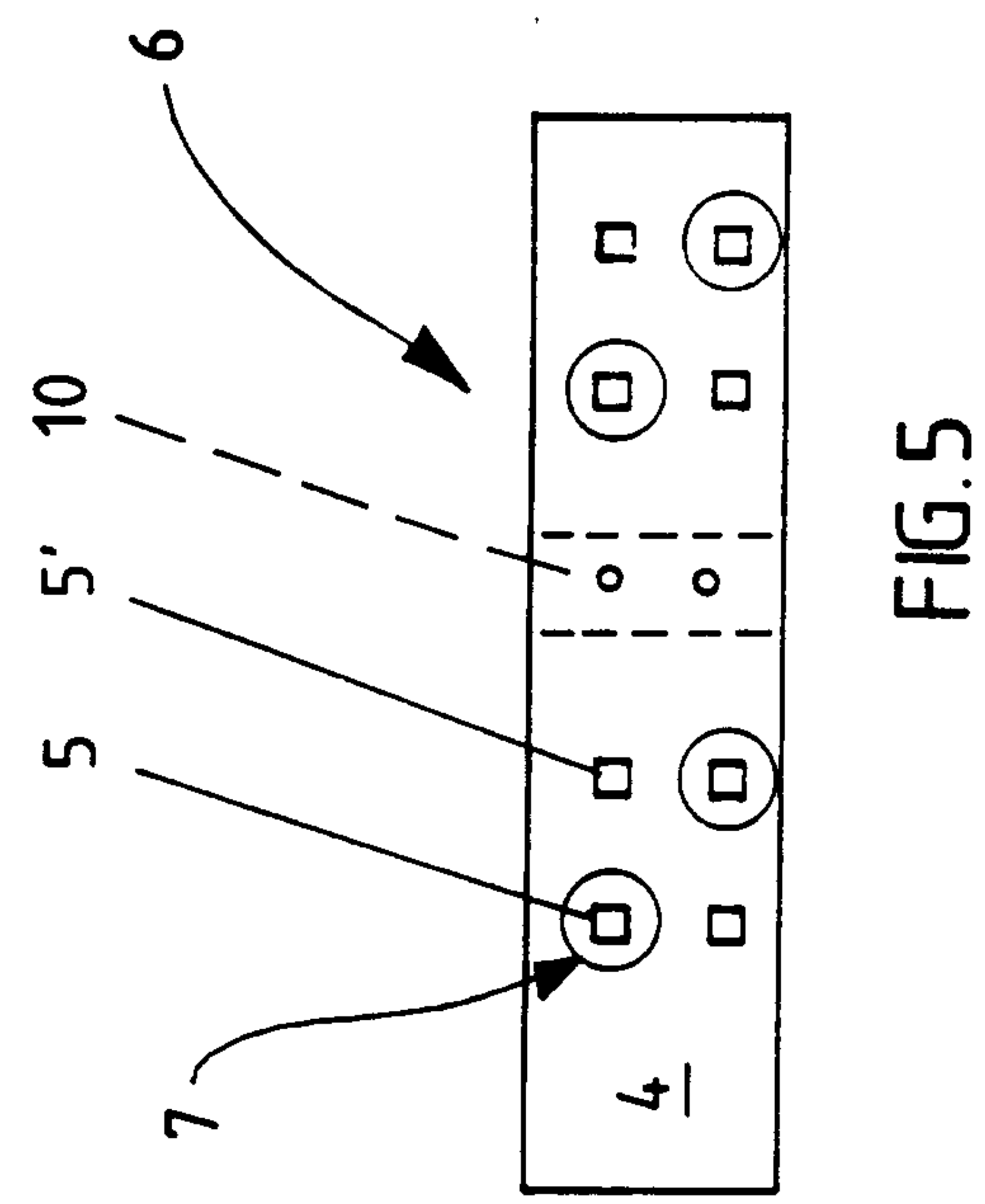
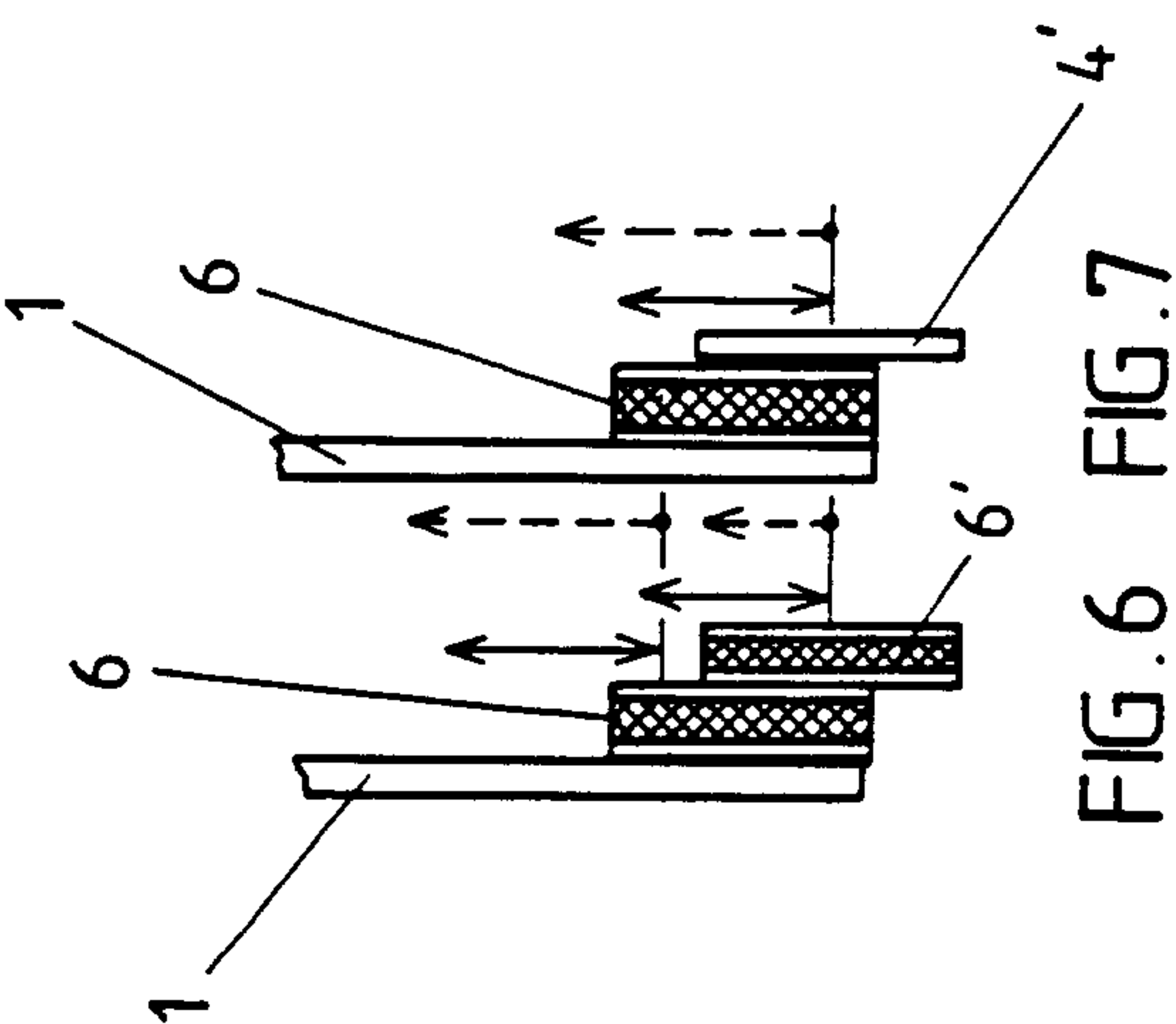


FIG. 4



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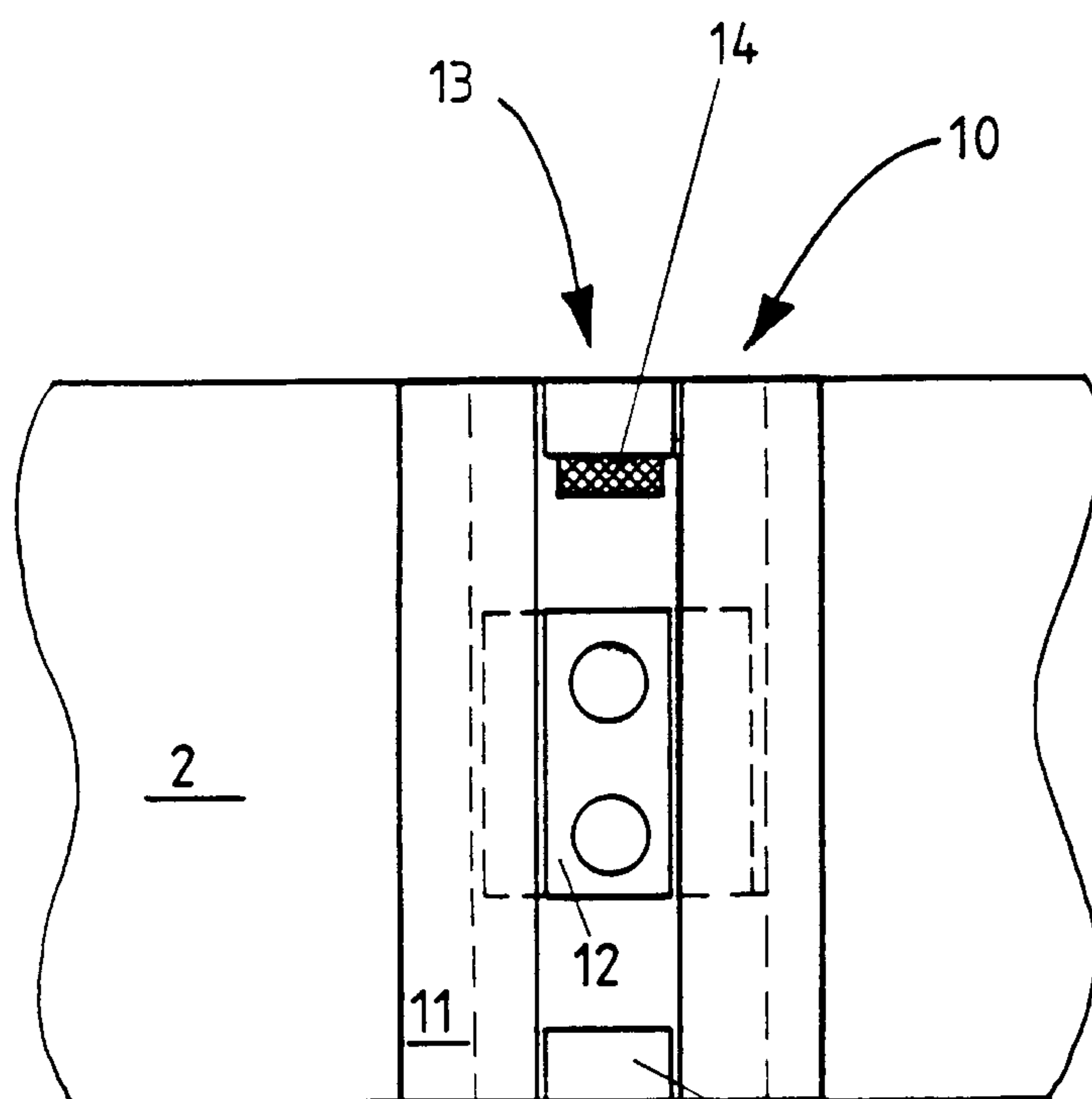


FIG. 9

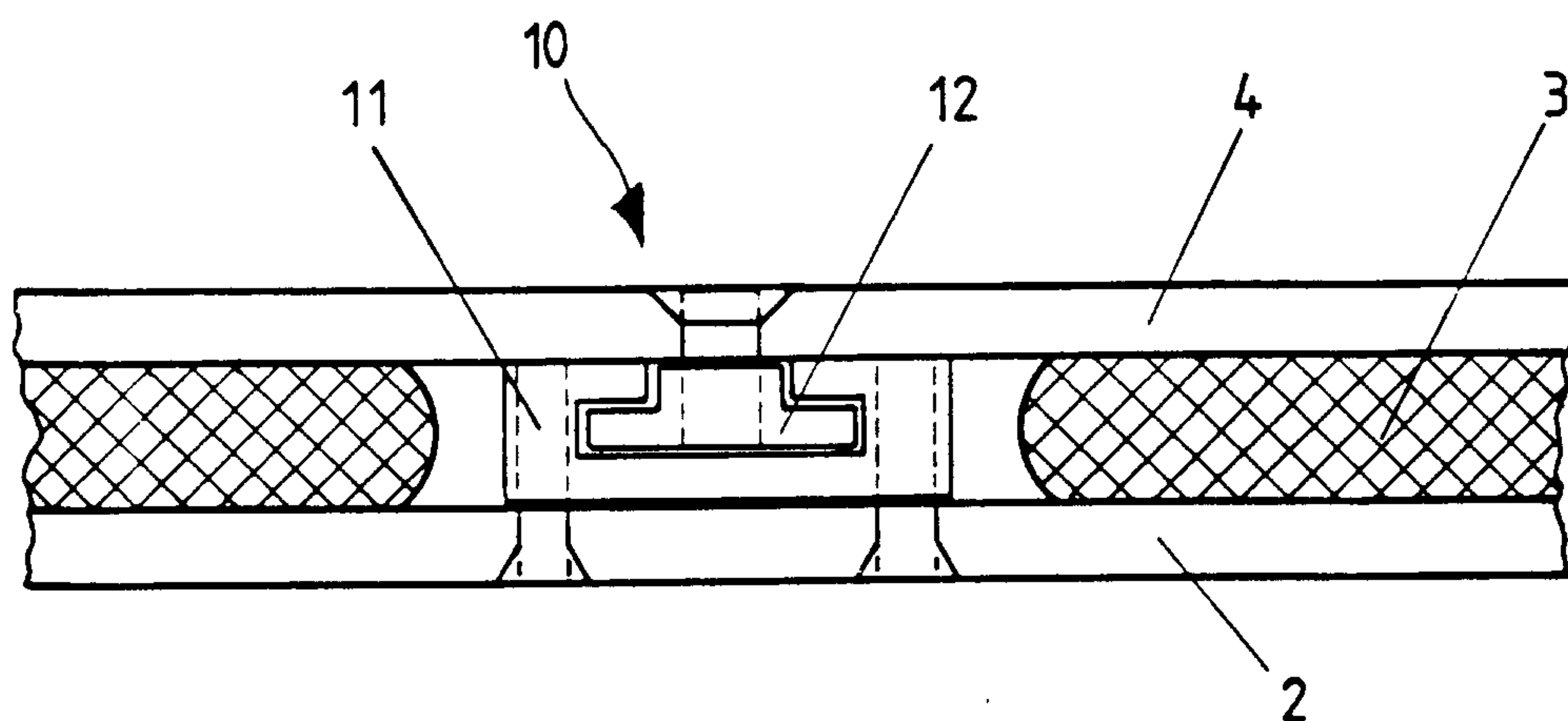


FIG. 10

