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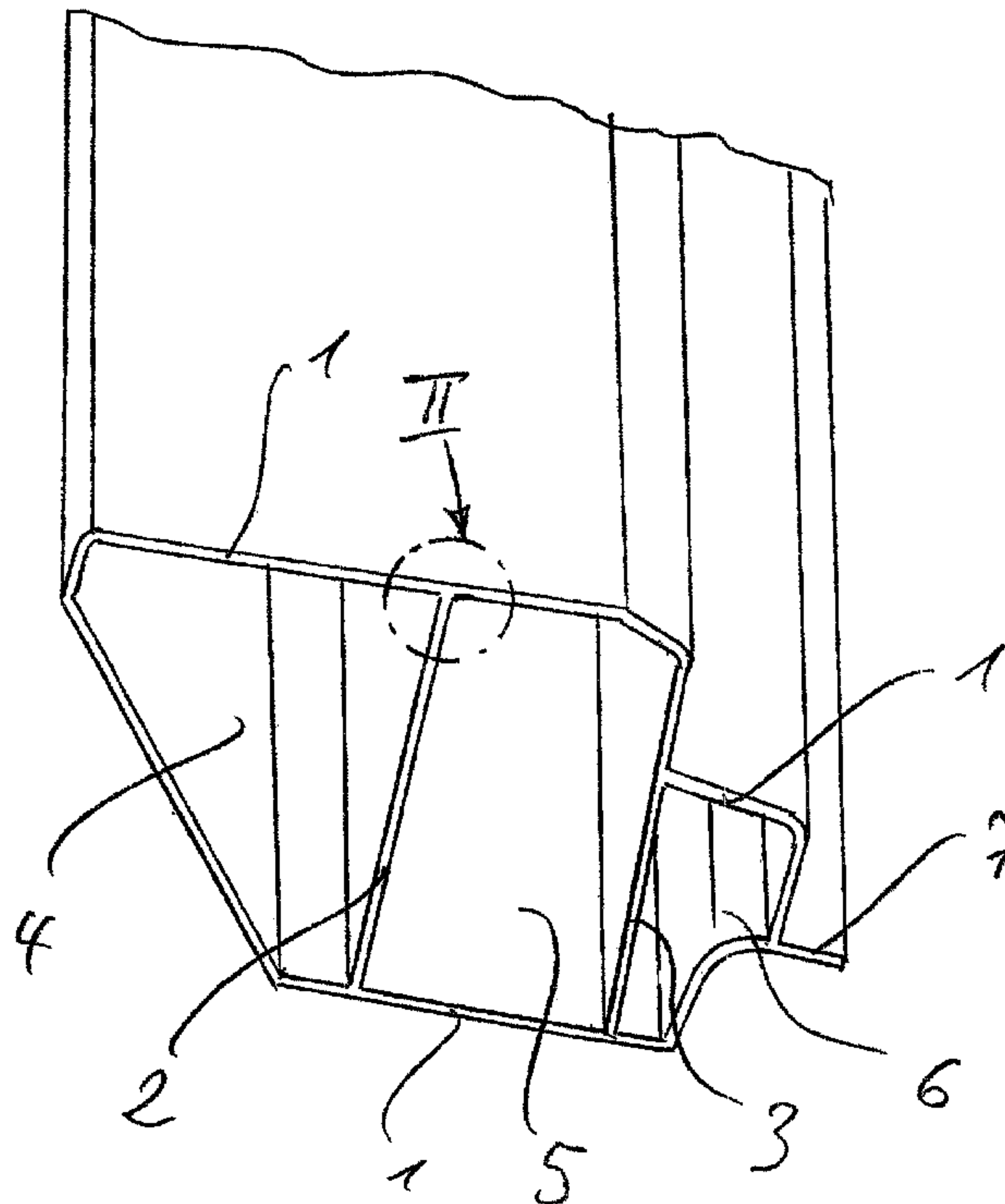
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(54) Title: METHOD AND APPARATUS FOR HIGH-PRESSURE INTERNAL SHAPING



(57) Abrégé/Abstract:

A method using high interior pressure to reshape structural section of continuously bounded overall cross-section, whereby the overall cross-section can be provided with extra walls or chambers and a stopper is forced radially against each end of the structural section.



Abstract

A method using high interior pressure to reshape structural section of continuously bounded overall cross-section, whereby the overall cross-section can be provided with extra walls or chambers and a stopper is forced radially against each end of the structural section.

**METHOD AND APPARATUS FOR
HIGH-PRESSURE INTERNAL SHAPING**

The present present invention relates first, to a method using high interior pressure to reshape structural section and second, to a device for carrying out the method.

The structural section being reshaped using high internal pressure may be tubing as disclosed in German 3 923 358 A1 and in US 4 414 834 A. Pieces with a non-circular cross-section, however, can also be reshaped. Such material is usually extruded.

To ensure unobjectionable fluid tightness, a stopper is forced radially against each end of the structural section. The end of the piece rests against an edge of the stopper, creating a seal. To reduce wear on the stoppers as much as possible, the seal-creating edge is made of a wear resistant material and is forced against the interior surface of the section subject to relatively high pressure.

It would also be desirable to similarly use high interior pressure to reshape pieces with extra walls or chambers

projecting into or out of their overall cross-section. There is, however, a drawback to such a procedure in that the walls or chambers tend to deform axially along the piece, allowing the edges to buckle or bulge out axially undefined. It is of course possible to counteract this tendency by making the edges of a softer material. This approach, however, increases wear on the edges.

The object of the present invention is accordingly a method of and a device for using high interior pressure to reshape structural section with walls or chambers that project into or out of its overall cross-section, whereby the stoppers are subjected to low wear and whereby the extra walls or chambers will buckle or bulge out only at their ends.

The major advantage of the present invention is that complex structural section with extra walls or chambers can be reshaped using high interior pressure, decreasing the cost of manufacture. Since the section is reshaped only slightly

1 at the ends, they will need to be trimmed only slightly if
2 at all as the material is further processed.

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4 One embodiment of the present invention will now be
5 specified with reference to the accompanying drawing,
6 wherein

7 Figure 1 is a view of one end of a length of extruded
8 structural section with several walls,

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10 Figure 2 is a larger-scale view of detail II in Figure 1,

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12 Figure 3 illustrates a stopper sealing off the end
13 illustrated in Figure 1,

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15 and

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17 Figure 4 is a larger-scale view of detail IV in Figure 3.

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20 Figure 1 depicts a length of typical extruded structural
21 section that is to be reshaped using high interior pressure.

22 The extrusion has a continuously bounded cross-section 1

23 partitioned by two walls 2 and 3 into three chambers 4, 5,

1 and 6. Finally, the section is provided with an independent
2 wall 7 that extends out of cross-section 1.

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4 While it is being reshaped and still inside the reshaping
5 tool, the ends of the piece are sealed by stoppers 8 forced
6 radially against them. Each stopper 8 is provided with a
7 seal-creating edge 9 established on the surface of a gasket
8 10 that rests against the stopper. Each edge 9 accordingly
9 fits tight into the structural section. Each stopper 8 is
10 provided with aligners 11, 12, and 13 that more or less fit
11 into chambers 4, 5, and 6, which they enter into as stopper
12 8 is advanced toward the piece. Partitioning walls 2 and 3
13 and overall cross-section 1 are accordingly secured
14 radially, the overall piece being introduced against and
15 correctly positioned in relation to each stopper 8. Gasket
16 10 and aligners 11, 12, and 13 can now attach the
17 schematically illustrated connectors 14, 15, and 16 to
18 stopper 8. Connectors 14, 15, and 16 can also convey the
19 fluid that provides the reshaping pressure.

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21 To ensure a well controlled buckling or bulging out by walls
22 2, 3, and 7, they are provided with slots 17 more or less
23 paralleling the inner surface 18 or outer surface of cross-
24 section 1. The slot 17 in the illustrated example is very

1 near inner surface 18. These slots are preferably produced
2 by an appropriately shaped bit on stopper 8 as the stoppers
3 are brought together.

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5 Figure 4 illustrates an alternative or additional embodiment
6 of the present invention. Gasket 10 is in this embodiment
7 provided with grooves 19 extending along the walls 2 and 3
8 that partition cross section 1. Grooves 19 allow
9 partitioning walls 2 and 3 to stretch axially without
10 buckling or bulging as the section is reshaped. Since the
11 independent wall 7 that extends out of cross-section 1 does
12 not rest against stopper 8, the measures addressing this
13 wall in the foregoing will obviously not be necessary. What
14 is on the other hand essential is that grooves 19 do not
15 extend all the way to edge 9, providing the overall
16 structural section with a well defined continuous seal.

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CLAIMS

1. A method for reshaping with high interior pressure a structural section of continuously-bounded overall cross-section with a continuous boundary and forming thereby a hollow profile structural section, comprising the steps of: providing said structural section with at least one inwardly extending supplemental wall in addition to walls forming the overall cross-section and dividing said hollow profile into a plurality of chambers by said supplemental wall; forming slots on said supplemental wall by pressing a sealing stopper against each end of said structural section with a tool contour on said stopper corresponding to the slots to be formed by said pressing step; and sealing with said stopper said structural section only at said continuous boundary.

2. A method as defined in claim 1, wherein said slots extend substantially out of an inner surface and out of an outer surface of said overall cross-section.

3. A method as defined in claim 2, wherein said slots are less than 1 cm deep.

4. A method as defined in claim 2, wherein said plurality of chambers are formed at intersections between said supplemental wall and branches thereof.

5. An arrangement for reshaping with high interior pressure a structural section of continuously-bounded overall cross-section with a continuous boundary and forming thereby a hollow profile structural section, comprising: at least one inwardly extending supplemental wall in addition to walls forming the overall cross-section and dividing said hollow profile into a plurality of chambers; a sealing stopper pressed against each end of said structural section with a tool contour on said stopper corresponding to slots to be formed on said supplemental wall when said sealing stopper is pressed against each end of said structural section; said stopper sealing said structural section only at said continuous boundary.

6. An arrangement as defined in claim 5, wherein said stopper has grooves matching the shape of said supplemental wall.

7. An arrangement as defined in claim 6, wherein said grooves extend substantially to the boundary of said overall cross-section.

8. An arrangement as defined in claim 6, wherein said grooves are less than 1 cm deep.

9. An arrangement as defined in claim 6, wherein said plurality of chambers are formed by additional grooves at intersections between said supplemental wall and branches thereof.

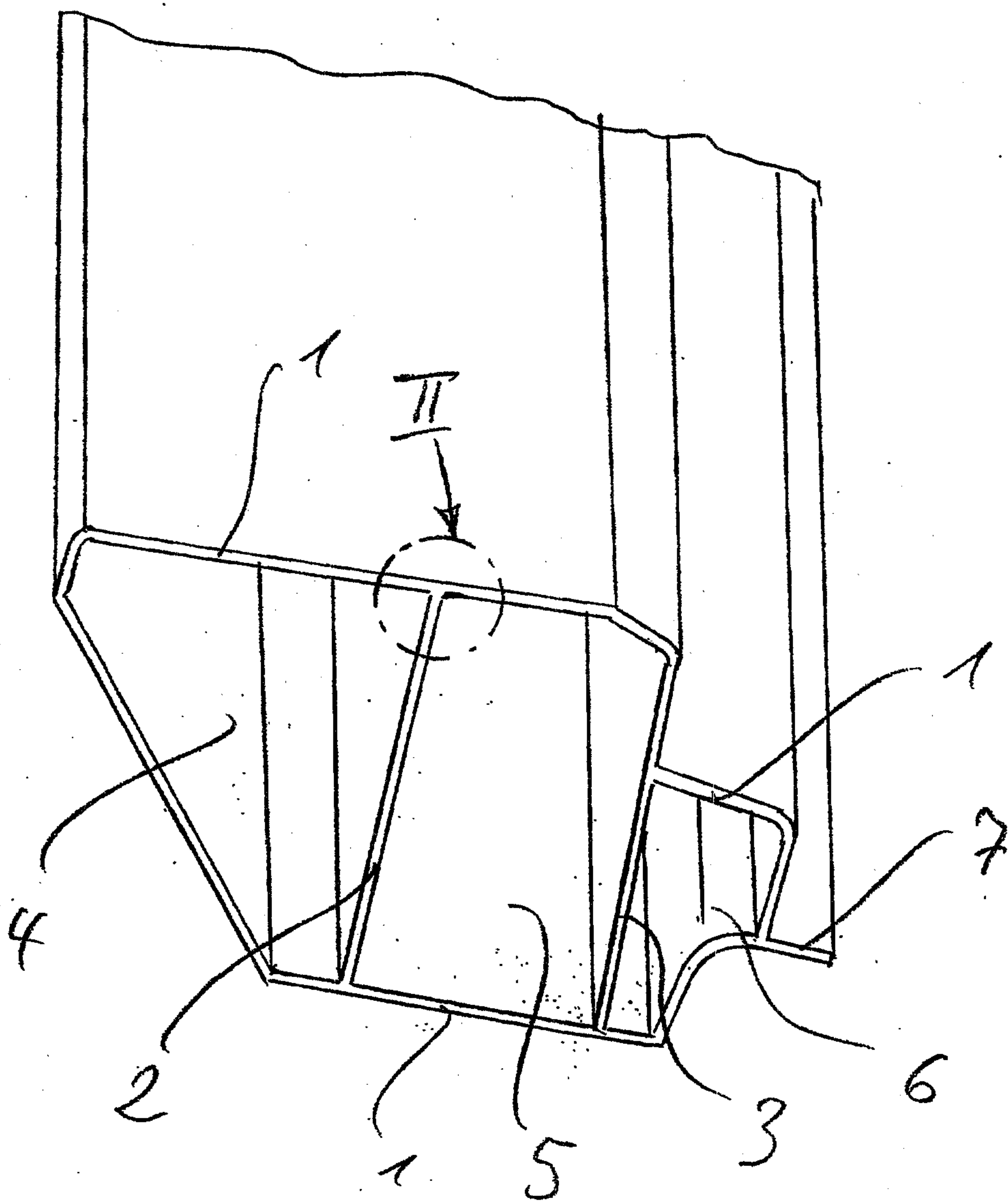


Fig. 1

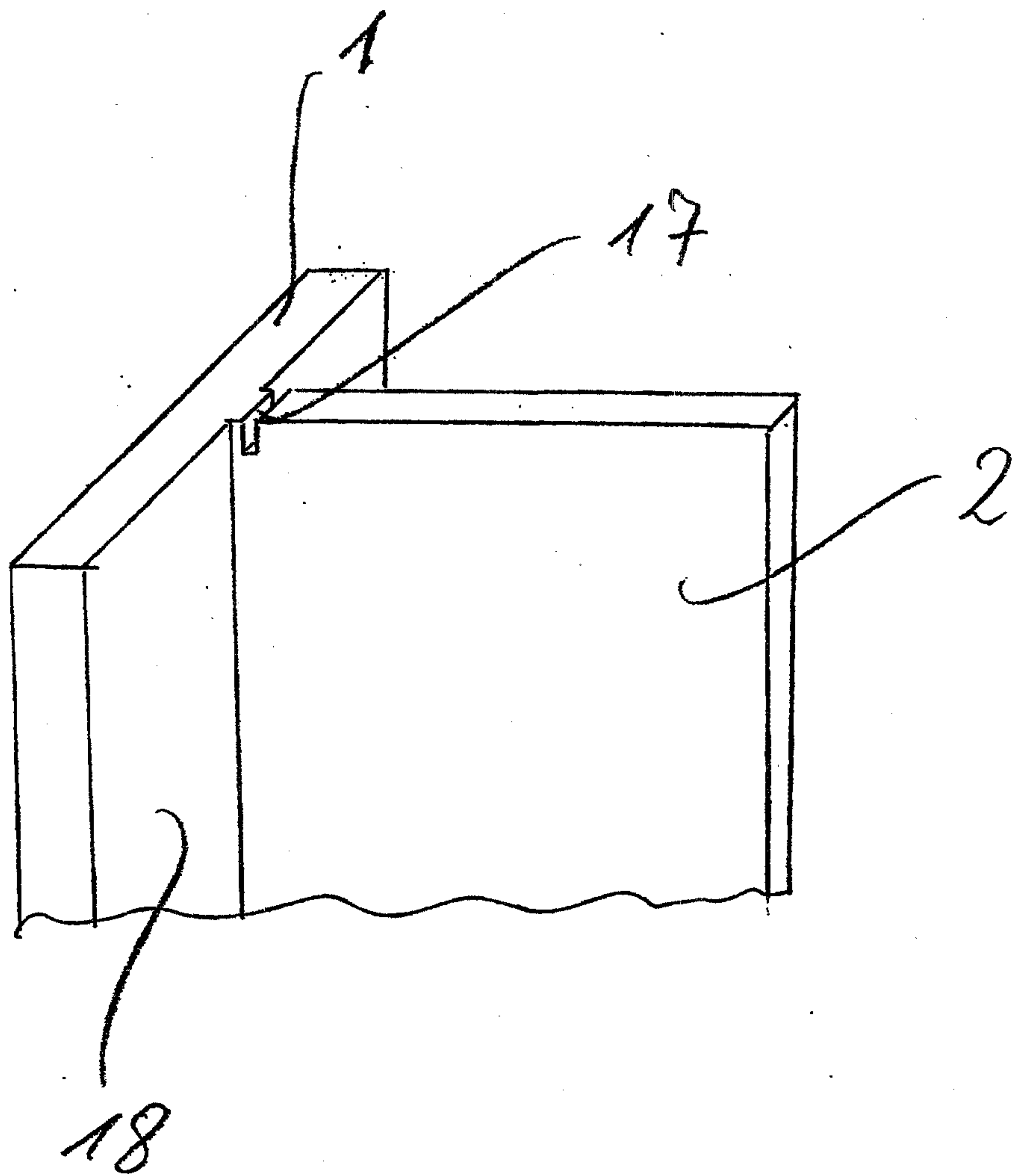


Fig. 2

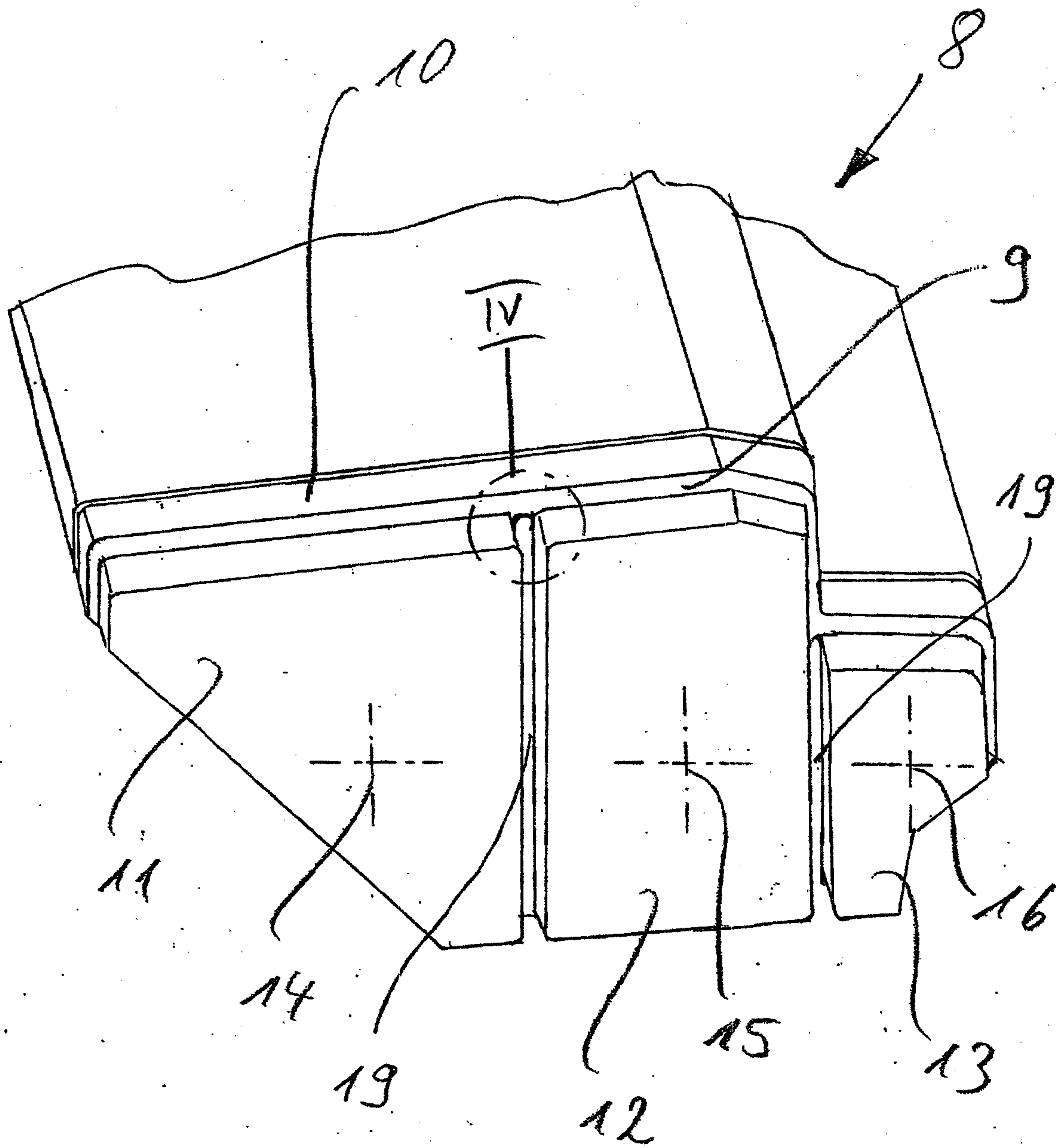


Fig. 3

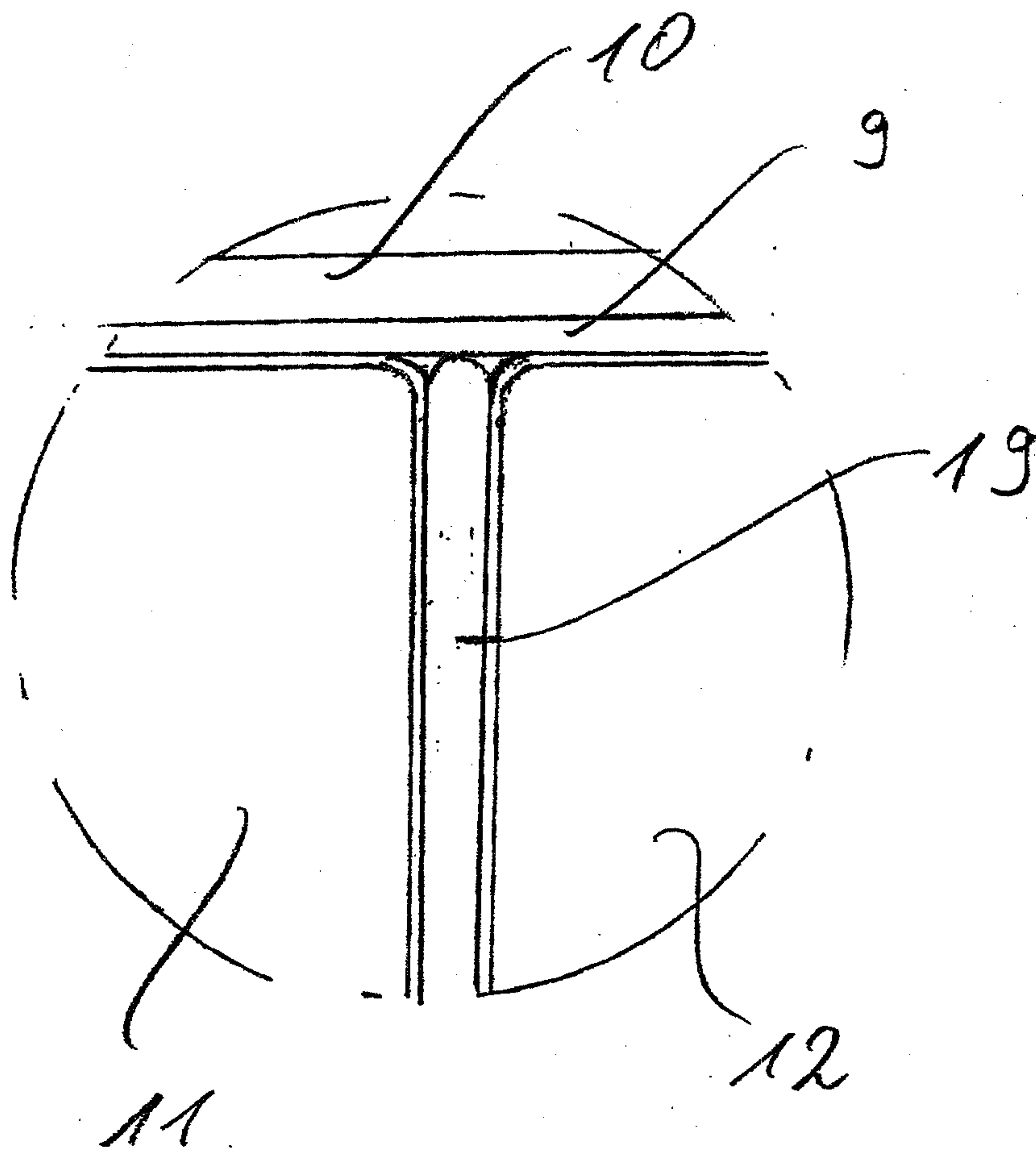


Fig. 4

