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## (54) Mechanism for hanging a gate at an adjustable height on a support

(57) A trough-shaped rail (11) with a bottom and two flanks is provided on the support (3) and/or on the gate (1). The fixing element (8) for fixing the hinge (2, 4, 5) on the rail is on a sliding piece (10) which is slidable vertically in the rail (11), the flanks of the rail being clamped between parts (15) of said fixing element (8) and parts (14) of the sliding piece (10) when the fixing element (8) is bolted down on the sliding piece (10). In order to centre the fixing element (8) relative to the rail (11), and in order to counteract twisting or horizontal displacement of the fixing element (8) relative to the rail (11), at least the clamped parts of the flanks (13) each form an angle of inclination with the bottom of the rail (11), and said parts (15) of the fixing element (8) and said parts (14) of the sliding piece (10) in the fitted state each likewise form virtually the same angle of inclination with the bottom of the rail.

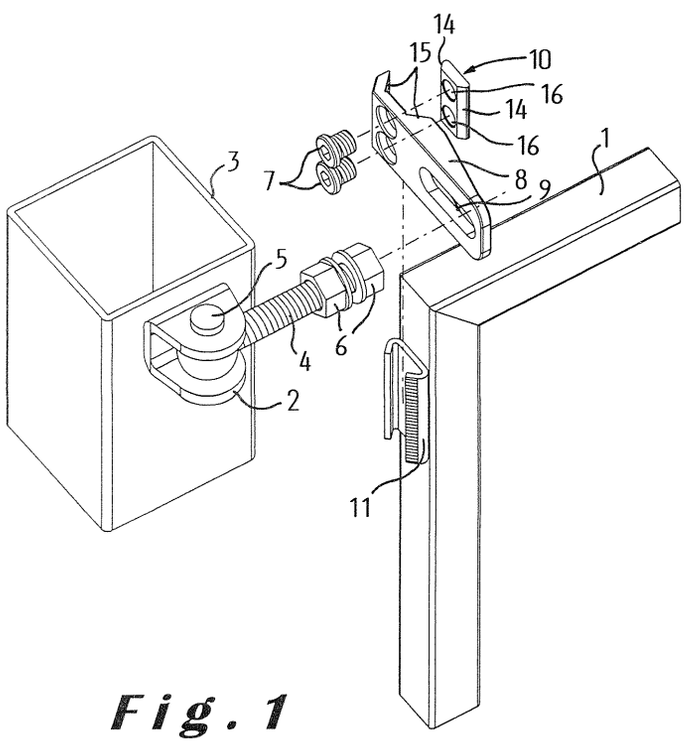


Fig. 1

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## Description

**[0001]** The present invention relates to relates to a mechanism for hanging a gate or door by means of a hinge at an adjustable height on a support, which mechanism comprises at least one trough-shaped rail, which is provided on the support and/or on the gate or the door and has a bottom and two flanks, a sliding piece which is slidable vertically in the rail, and a fixing element which can be bolted down on said sliding piece, in order to fix the hinge on the rail, at least a part of each of the flanks of the rail being directed towards each other and being provided in such a way that when the fixing element is bolted down on the sliding piece they are clamped between parts of said fixing element and parts of the sliding piece, said parts of the fixing element and said parts of the sliding piece each having a surface by means of which in the fitted state they make contact with the flank part against which they are clamped. The mechanism according to the invention is more particularly intended for metal gates or doors which are used in gardens and which are generally galvanized and subsequently possibly also lacquered or painted.

**[0002]** For the fixing of hinges to a garden gate, in practice two metal slats which extend beyond the plane of the gate, and which are galvanized and possibly lacquered together with the gate, are generally welded to the side of said gate. A slot extending perpendicularly to the plane of the gate is provided in the projecting part of the metal slat, in which slot a first part of the hinge, generally a bolt provided with an eye, can be fixed at the desired distance for the gate. By an adjustment of the position of the eye bolt relative to the gate in the slot and by adjustment of the length of the eye bolt (by means of the nuts bolted down on it on both sides of the metal slat), the gate can be hung vertically in all directions. A disadvantage of this known system is, however, that the height at which the gate is hung above the ground is not adjustable.

**[0003]** Adjustable hanging mechanisms for adjustment of the hanging height, with a rail, a sliding piece which is slidable in said rail and a fixing element which can be bolted down on the sliding piece, are already known from the patent literature. For example, DE-A-30 15 354 discloses a hanging mechanism for windows, doors and gates in which both the side of the window, the door or the gate and the support on which the latter are to be hung are provided with a rail containing a sliding piece which is slidable vertically and on which a first part of the hinge is bolted down. The rail is rectangular in cross section, a longitudinal opening being provided for bolting down the hinge part on the sliding piece. For centring the hinge part relative to the rail the hinge part has provided on it a projecting part which fits into the longitudinal opening of the rail. Said projecting part ensures not only centring of the hinge part relative to the rail, but also ensures that the hinge part cannot shift horizontally relative to the rail.

**[0004]** A disadvantage of such a hanging mechanism is that it is not suitable for use in the case of doors or gates which are galvanized and subsequently possibly also lacquered, as is the case, for example, with garden gates. This is because such treatments involve the application of one or more coatings, the thickness of which can vary. If such treatments were used on the hanging mechanism described in DE-A-30 15 354, there would then be problems with the insertion of the projecting part of the hinge part into the longitudinal opening in the rail. This is because the thickness of the coating can vary very greatly locally, for example because of runs or drips. Furthermore, the thickness of the coating is very dependent upon whether one or more further optional coats of lacquer are applied after galvanizing.

**[0005]** In view of the fact that in the hanging mechanism according to DE-A-30 15 354 the part projecting into the longitudinal opening of the rail cannot simply be left out without problems arising in connection with centring and sliding of the sliding piece in the rail, the object of the invention is to provide a new mechanism for hanging a door or gate by means of a hinge at an adjustable height on a support, which mechanism permits automatic centring of the fixing element relative to the rail, and which further prevents horizontal displacement or twisting of the sliding piece in the rail, without the presence of coatings of differing thickness being able to give rise to problems during the fitting of said hanging mechanism.

**[0006]** To this end, the mechanism according to the invention is characterized in that the parts of the flanks directed towards each other, which are clamped between the sliding piece and the fixing element bolted down on said sliding piece, each have an inside surface and an outside surface, each forming an angle of inclination with the bottom of the rail, and in that the contact surfaces of said parts of the fixing element and of said parts of the sliding piece between which the flanks of the rail are clamped in the fitted state each form an angle with the bottom of the rail which is virtually equal to the angle of inclination formed by the inside surface or outside surface of the flank part against which said part is clamped.

**[0007]** By providing the slanting arrangement of the flanks and bevelling the parts of the sliding piece and of the fixing element butting up to said flanks, it is ensured that said fixing element is automatically centred relative to the rail when being bolted down on the sliding piece. Furthermore, owing to the fact that it is held clamped between two slanting surfaces, the sliding piece cannot shift horizontally or twist, so that the gate or door is prevented from dropping. In view of the fact that, in contrast with the known prior art, these effects are not obtained by various parts fitting perfectly into one another, but by the slanting arrangement of the flanks of the rail and the bevelling of the sliding piece and of the fixing element, it is ensured that the fitting of the hanging mechanism according to the invention is not impeded by the pres-

ence of one or more coatings, and in particular by the possible variation in thickness of said coatings. It is clear that, since the flanks of the rail are clamped between the sliding piece and the fixing element, a change in the thickness of said flanks as a result of the presence of one or more coatings is of no consequence.

**[0008]** In a preferred embodiment of the mechanism according to the invention the inside surfaces and outside surfaces of the flanks of the rail extend at said angle of inclination virtually from the bottom of the rail to the part of the flanks which is provided for clamping between the fixing element and the sliding piece.

**[0009]** This embodiment gives the advantage that the slanting arrangement of the flanks ensures that said flanks are better able to absorb the tensile and twisting forces exerted upon them, without becoming deformed in the process.

**[0010]** The invention further relates to a set for fixing on a gate, door or support, comprising a rail, a sliding piece to be placed in said rail and a fixing element to be fixed on said rail.

**[0011]** Further advantages and details of the invention will emerge from the description which follows of a preferred embodiment of a hanging mechanism according to the invention. This description is, however, given only as an example, and is not intended to limit the scope of protection as determined by the claims. The reference numerals given in the description relate to the appended drawings, in which:

Figures 1 and 2 show two exploded views of a mechanism according to the invention, in which the hinge is fixed on a post, and the rail is fixed on the side of a gate;

Figures 3 and 4 show two perspective views of the same mechanism as that shown in the previous figures, but in the fitted state here;

Figure 5 shows, on a larger scale, a perspective view of the rail from the mechanism illustrated in the previous figures;

Figure 6 shows, likewise on a larger scale, a perspective view of the fixing element from the mechanism illustrated in the previous Figures 1 - 4;

Figure 7 shows an exploded view of a variant embodiment of the mechanism according to the invention, in which the hinge is again fixed on a post and the rail is fixed on the side of a gate, more particularly in such a way that in the fitted state the bottom of the rail is formed by the side of the gate;

Figure 8 shows a perspective view of the same mechanism as that shown in the previous figure, but in the fitted state here;

Figures 9 and 10 show a top view and a front view respectively of the mechanism illustrated in Figures 7 and 8; and

Figure 11 shows a perspective view of a variant embodiment of the mechanism according to the invention, in which the fixing element is formed by a first part of the hinge instead of by a separate element.

**[0012]** Figures 1 to 4 show a first embodiment of a mechanism for hanging a gate 1 or door (hereinafter called gate) by means of a hinge at an adjustable height on a support 3, in particular a post. In this first embodiment the hinge is formed by a U-shaped piece 2, which is welded onto the post 3 and in which an eye bolt 4 is fitted hingedly by means of a pin or a bolt 5. Such a hinge is generally used in practice and will therefore not be described in any further detail. What can further be pointed out here is that in the case of the existing gates the free end of the eye bolt 4 is inserted into a slot of a metal slat welded onto the gate, and that said slat is held clamped between two nuts 6 screwed onto the eye bolt 4 in such a way that by adjusting the position of the eye bolt 4 in the slot and by adjusting the position of the nuts 6 on the eye bolt 4, the gate can be hung fully vertically.

**[0013]** In order also to permit a vertical adjustment, in the mechanism shown in Figures 1 to 4 the slat welded onto the gate 1 is replaced by a fixing element 8 bolted down on said gate by means of bolts 7. As in the case of the known systems, a slot 9 is provided in said fixing element 8, for the vertical adjustment of the gate 1. The fixing element 8 is not fixed directly on the gate, but through the interposition of a sliding piece 10, which is slidable vertically in a trough-shaped rail 11 provided on the gate 1, and in which threaded holes 16 are provided, for bolting down of the bolts 7.

**[0014]** The rail 11 has a bottom 12 and two flanks 13. Each flank 13 has at least a part which is directed towards the other flank and which has an inside surface 21 and an outside surface 22 which forms an acute angle of inclination á with the bottom 12 of the rail 11. In this way a longitudinal slot is formed between the free edges of the flanks, the width of which slot is less than the width of the sliding piece 10. Owing to the fact that the fixing element 8 is also wider than the width of the longitudinal slot in the rail, the flanks 13 of the rail 11 are clamped between the sliding piece 10 and the fixing element 8 when the fixing element 8 is bolted down on the sliding piece 10. In this way the fixing element 8 is fixed securely on the rail 11.

**[0015]** In the embodiment shown the parts of the sliding piece 10 and of the fixing element 8 which are clamped against the flanks, more particularly the parts 14 and 15 respectively, are bevelled in such a way that the surfaces of said parts which make contact with the flank parts against which they are clamped form virtually the same angle with the bottom 12 of the rail 11 as the angle á formed by the inside surface 21 or outside surface 22 of the flank part against which they are clamped respectively. In this way, when the bolts 7 are tightened, a centring of the fixing element 8 relative to the rail 11 is obtained automatically, and the flanks 13 of the rail 11 can be clamped firmly between the sliding piece 10 and the fixing element 8. Moreover, any twisting of the fixing element 8 relative to the rail 11 is counteracted in such

a way that the gate 1 cannot drop under its own weight. In view of the distance between the sliding piece 10 in the rail 11 and the attachment of the eye bolt 4 to the fixing element 8, through the weight of the gate, substantial torsion forces are in fact exerted on the connection between the fixing element 8 and the rail 11. In this respect the fixing element 8 is preferably fixed on the sliding piece 10 by means of at least two bolts 7.

**[0016]** Figure 5 shows a first embodiment of the rail 11 in greater detail. The rail shown consists of a folded metal (iron) strip and is simply obtained by folding a flat metal strip along two parallel fold lines. The flanks 13 of the rail extend virtually from the bottom 12 of the rail 11 at the same angle á relative to the bottom as the angle á formed by the part of the flanks which is clamped between the fixing element 8 and the sliding piece 10. As a result of this, and also of the choice of the angle á, the rail can better withstand the torsion forces exerted upon it, without deforming in the process. The angle á in this case preferably lies between 15 and 75o, and most preferably between 25 and 65o. In the embodiment shown the angle á is, for example, approximately 45o.

**[0017]** In order to avoid all risks of the fixing element 8 shifting vertically relative to the rail 11, for example if the bolts 7 are not tightened sufficiently, the bevelled parts 15 of the fixing element 8 and the parts of the flanks 13 of the rail 11 against which said bevelled parts 15 are clamped are provided with interlocking surface structures, in particular with a rib structure (see Figures 5 and 6). As an alternative or in addition, such a surface structure could also be provided, if desired, on the bevelled parts 15 of the sliding piece 10 and on the inside of the flanks 13.

**[0018]** In the embodiment illustrated a rail 11 is provided for each hinge. However, if desired, one longer rail 11 can also be provided on the gate, which rail extends, for example, over the full height of the gate, and is formed, for example, by a section of the gate itself, in such a way that two or more hinges can be fixed on it. The rail or rails can be fixed on the gate by means of, for example, screws or rivets, but it is/they are preferably welded onto it in such a way that a sturdy fixing, which is durable in all weather conditions, is obtained.

**[0019]** In the embodiment illustrated the rails are fixed with their bottom 12 against the side of the gate. This has the advantage that the gate with the rails fixed on it can be used either as a left-hand or as a right-hand gate. A further advantage is that the flanks of the rail will be pulled less quickly askew under the weight of the gate, and can therefore be made of a lighter design.

**[0020]** In order to prevent rusting of the gate and of the rail preferably welded on it, the gate is preferably galvanized and/or lacquered. In practice, the gate is generally galvanized and subsequently subjected optionally to a powder coating process. The advantage of the hanging mechanism according to the invention in this case is that differences in thicknesses of the coatings applied in this way do not constitute any problem for the fitting of the sliding piece in the rail and for bolting the fixing element down on it.

**[0021]** A second possible embodiment of the mechanism according to the invention is shown in Figures 7 to 10. This embodiment differs in the main from the previous embodiment by the shape of the rail 11. This rail 11 consists of a piece which is cast or cut from metal. This has the advantage that the flanks can be made thicker, in order to increase the sturdiness in this way. The casting or cutting of the rail also makes it possible for the inside surface 21 and the outside surface 22 of the flanks 13 not to be made parallel to each other, and thus to form a different angle of inclination á with the bottom of the rail. This bottom is further formed by the side of the gate 1 or door against which the rail 11 is fixed, in particular is welded. The longitudinal slot 23 formed by the free ends of the flanks 13 directed towards each other is furthermore closed off at the top and bottom, in such a way that, should the bolts 7 possibly loosen slightly, the gate will always remain hanging on the support.

**[0022]** The longitudinal edges of the rail 11 are further provided with a lip 24, which forms a stop for the fixing element 8 if the gate is opened too far, in such a way that further opening is prevented by the hinges. These stops prevent the fixing mechanism from being forced in that case by the great force of the opening gate.

**[0023]** Figure 11 shows yet another variant embodiment, in which the fixing element 8 is not a separate element, but is a part of the hinge itself. The fixing element 8 in this case forms a joint by means of which the gate can be hooked on a pin 17 of the second hinge part 18. This embodiment is primarily of interest for hanging the gate on a wall or on a broader, generally brickwork post. The second hinge part 18 is provided with a plate part 19 for bolting to the wall or the post, and having longitudinal openings 20 for the screws, in such a way that some vertical adjustment of the gate is possible. Provided that the post or wall itself is standing in a vertical position, a vertical adjustment in this case in one direction, more particularly in the plane of the post or the wall, is adequate.

**[0024]** It will be clear to a person skilled in the art that the scope of the invention is not limited to the embodiments described above, but that all kinds of modifications may be made to them without going beyond the scope of the invention as determined by the appended claims.

**[0025]** So, for example, the two flanks of the rail and the parts of the sliding piece and the fixing element clamped against them can be disposed at a different angle á.

**[0026]** Furthermore, the same fixing element consisting of the rail, the sliding piece and the fixing element which can be bolted down on it can also be provided on the support, so that the height of the gate could be adjusted by adjusting the height of the hinge part fixed on the support. Such an adjusting mechanism with rail, sliding piece and fixing element could replace the adjusting

mechanism on the gate, but can also be used on the gate in combination with the adjusting mechanism described above, in order to permit additional adjusting possibilities in this way.

**[0027]** Finally, the scope of the invention is not limited to a gate or a support and the hanging mechanism fixed to it, but also extends to a set comprising a rail to be fixed either on the gate or on the support, a sliding piece to be fitted in said rail and a fixing element to be fixed on said rail.

## Claims

1. Mechanism for hanging a gate (1) or door by means of a hinge at an adjustable height on a support (3), which mechanism comprises at least one trough-shaped rail (11), which is provided on the support (3) and/or on the gate (1) or the door and has a bottom (12) and two flanks (13), a sliding piece (10) which is slidable vertically in the rail (11), and a fixing element (8) which can be bolted down on said sliding piece, in order to fix the hinge (2, 4, 5) on the rail, at least a part of each of the flanks (13) of the rail (11) being directed towards each other and being provided in such a way that when the fixing element (8) is bolted down on the sliding piece (10) they are clamped between parts (15) of said fixing element (8) and parts (14) of the sliding piece (10), said parts (15) of the fixing element (8) and said parts (14) of the sliding piece (10) each having a surface by means of which in the fitted state they make contact with the flank part against which they are clamped, **characterized in that** said parts of the flanks (13) each have an inside surface (21) and an outside surface (22), each forming an angle of inclination (á) with the bottom (12) of the rail (11 ), and **in that** the contact surfaces of said parts (15) of the fixing element (8) and of said parts (14) of the sliding piece (10) in the fitted state each form an angle with the bottom of the rail which is virtually equal to the angle of inclination (á) formed by the inside surface (21) or outside surface (22) of the flank part against which said part (14 and/or 15) is clamped.

2. Mechanism according to Claim 1, **characterized in that** the inside surfaces (21) and the outside surfaces (22) of the flanks (13) of the rail (11) extend at said angle of inclination (á) virtually from the bottom (12) of the rail (11) to the part of the flanks (13) which is provided for clamping between the fixing element (8) and the sliding piece (10).

3. Mechanism according to Claim 1 or 2, **characterized in that** the clamped parts of the flanks (13) are provided with a surface structure and the parts (14 and/or 15) of the fixing element (8) and/or of the sliding piece (10) between which these parts of the flanks (13) are clamped are provided with a surface structure interacting with the abovementioned surface structure, which surface structures are provided in order to counteract vertical displacement of the fixing element (8) relative to the rail (11), and are preferably formed by a rib structure.

4. Mechanism according to one of Claims 1 to 3, **characterized in that** the inside surfaces (21) of the clamped parts of the two flanks (13) form virtually the same angle of inclination (á) with the bottom (12) of the rail (11), and/or **in that** the outside surfaces (22) of the clamped parts of the two flanks (13) form virtually the same angle of inclination (á) with the bottom (12) of the rail (11).

5. Mechanism according to one of Claims 1 to 4, **characterized in that** said angle of inclination (á) lies between 15 and 75o, and preferably between 25 and 65o.

6. Mechanism according to one of Claims 1 to 5, **characterized in that** said rail (11) is formed by a folded metal strip.

7. Mechanism according to Claim 6, **characterized in that** the rail (11) is obtained by folding a flat metal strip along two parallel fold lines in order to form said bottom (12) and the two flanks (13) extending from the bottom (12).

8. Mechanism according to one of Claims 1 to 7, **characterized in that** the bottom (12) of the rail (11) is formed by the support (3) or by the gate (1 ) or the door on which the rail (11) is provided.

9. Mechanism according to one of Claims 1 to 8, **characterized in that** the rail (11) is welded onto the gate (1), the door or the support (3).

10. Mechanism according to one of Claims 1 to 9, **characterized in that** the gate (1), the door or the support (3) with the rail (11) provided on it is galvanized and/or lacquered.

11. Mechanism according to one of Claims 1 to 10, **characterized in that** the fixing element (8) is bolted down on said sliding piece (10) by means of at least two bolts (7).

12. Mechanism according to one of Claims 1 to 11, **characterized in that** the hinge comprises two parts which are hinged relative to each other, a first part being formed by said fixing element (8), which is provided for bolting down on the sliding piece (10).

**13.** Mechanism according to one of Claims 1 to 11, **characterized in that** the rail (11) is provided on said gate (1) or door and the hinge comprises two parts (2, 4) which are hinged relative to each other, the first part (4) of which is provided for fixing on said fixing element (8) by means of fixing means (6, 9) which permit fixing of the first hinge part (4) on the fixing element (8) at different distances from the gate (1) or door, measured perpendicular to the plane of said gate or door, which fixing means in particular comprise a slot (9) provided in the fixing element (8), in which slot the first part (4) of the hinge can be fixed in various positions.

**14.** Mechanism according to one of Claims 1 to 13, **characterized in that** the rail (11) is provided on the gate (1) or door, preferably on a side of said gate or door.

**15.** Set for fixing on a gate (1), door or support (3), comprising a rail (11), a sliding piece (10) to be placed in said rail and a fixing element (8) to be fixed on said rail, as defined in one of the preceding claims.

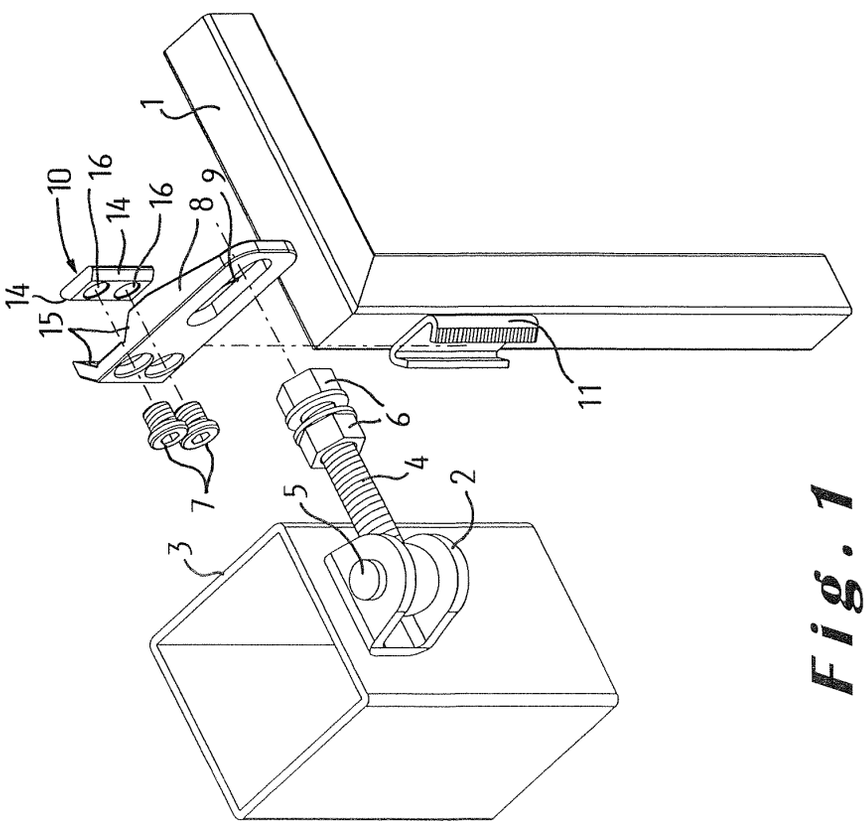
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Fig. 1

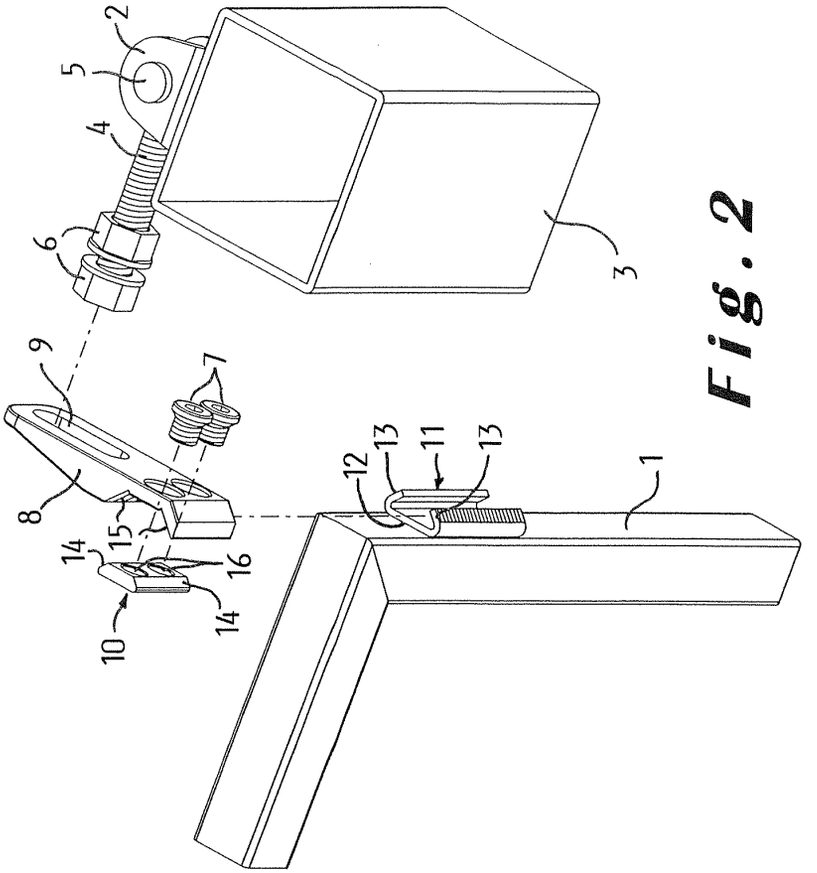
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Fig. 2

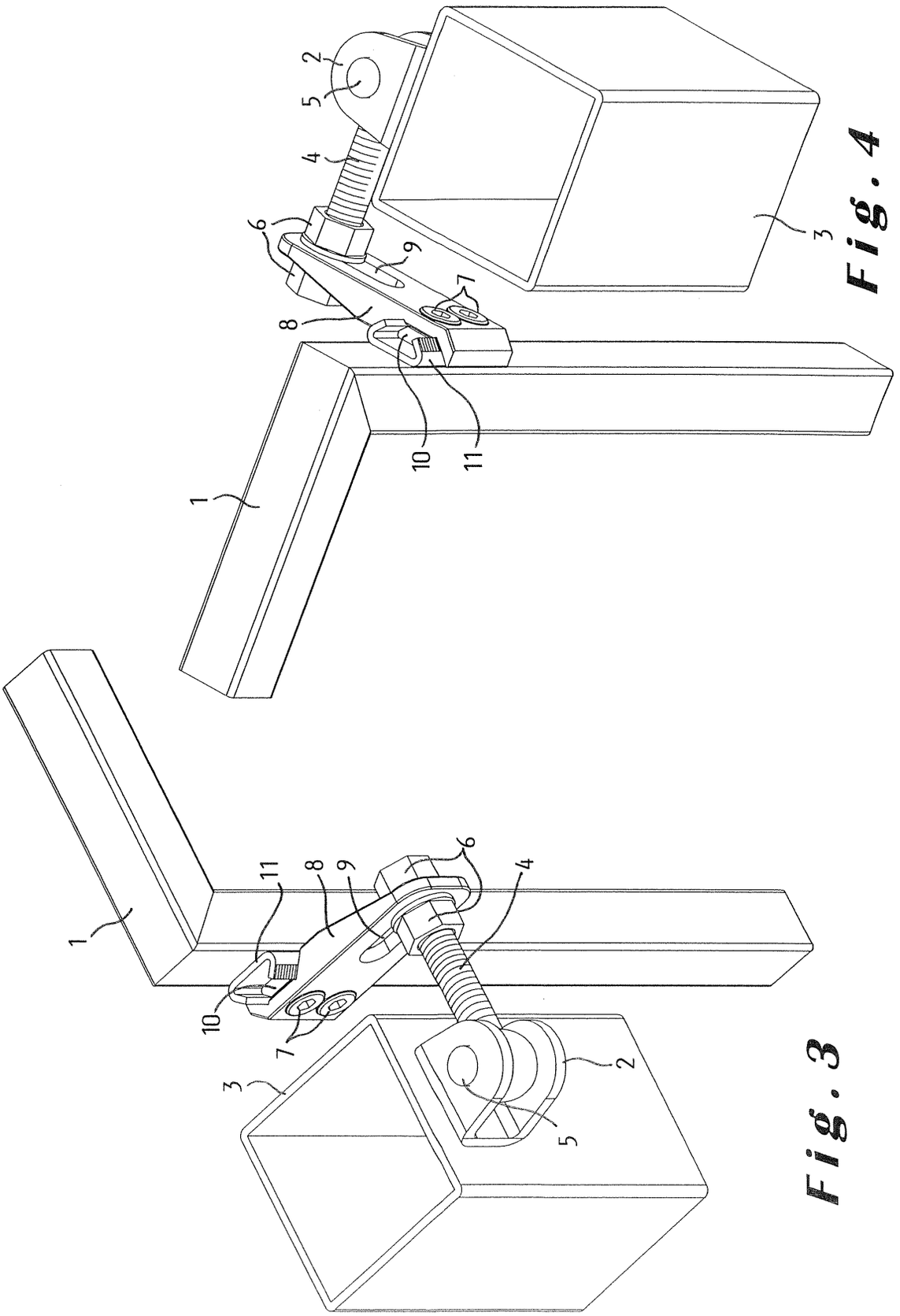


Fig. 3




Fig. 4

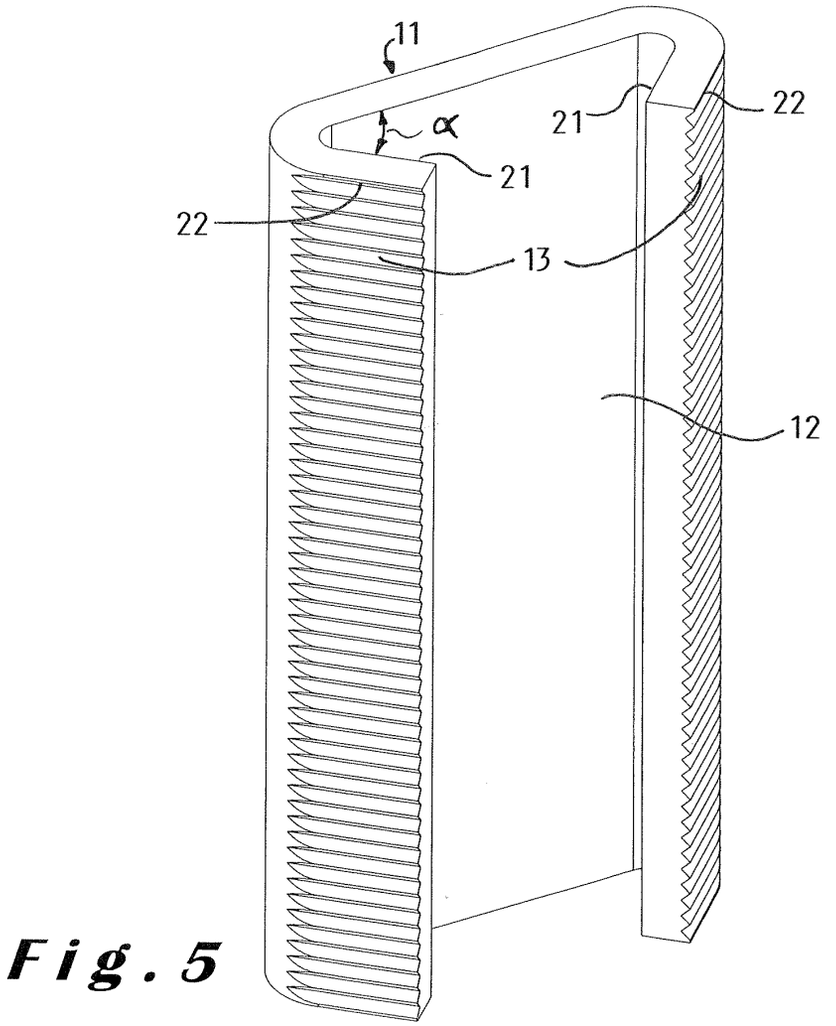


Fig. 5

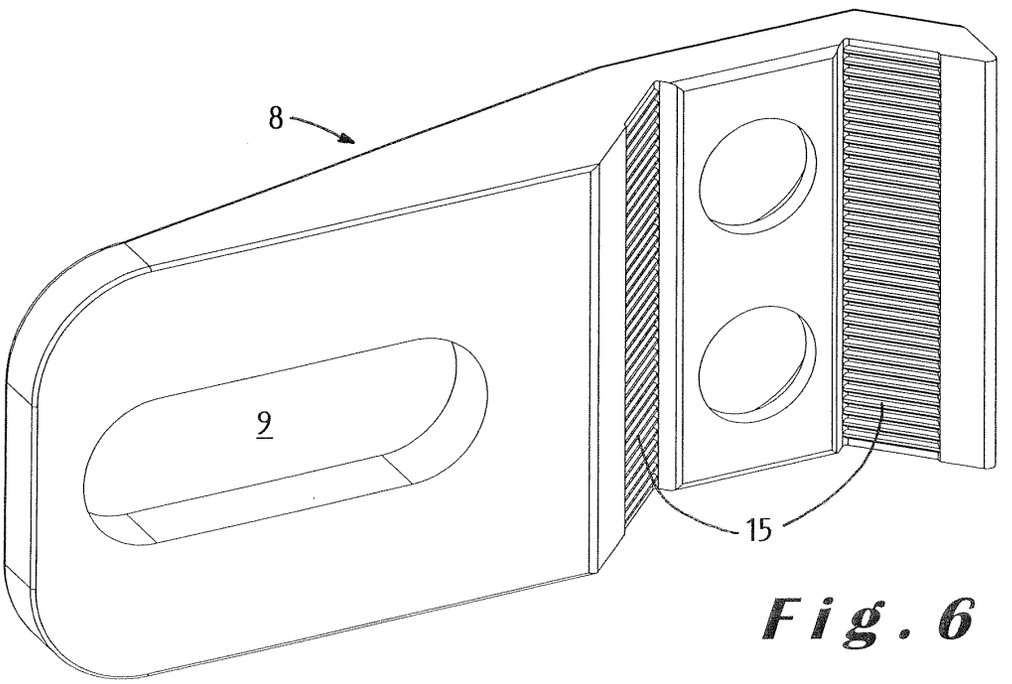


Fig. 6

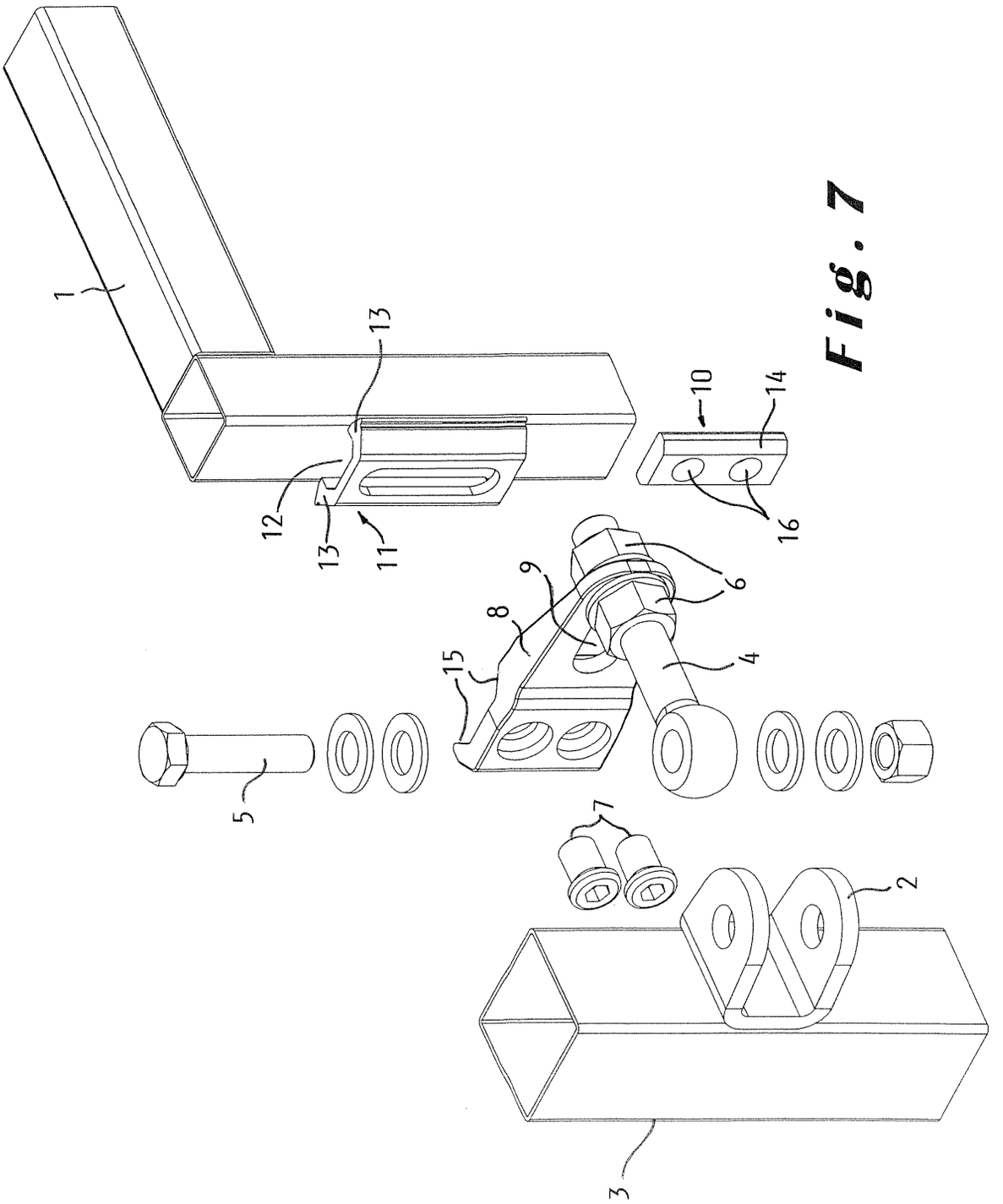


Fig. 7

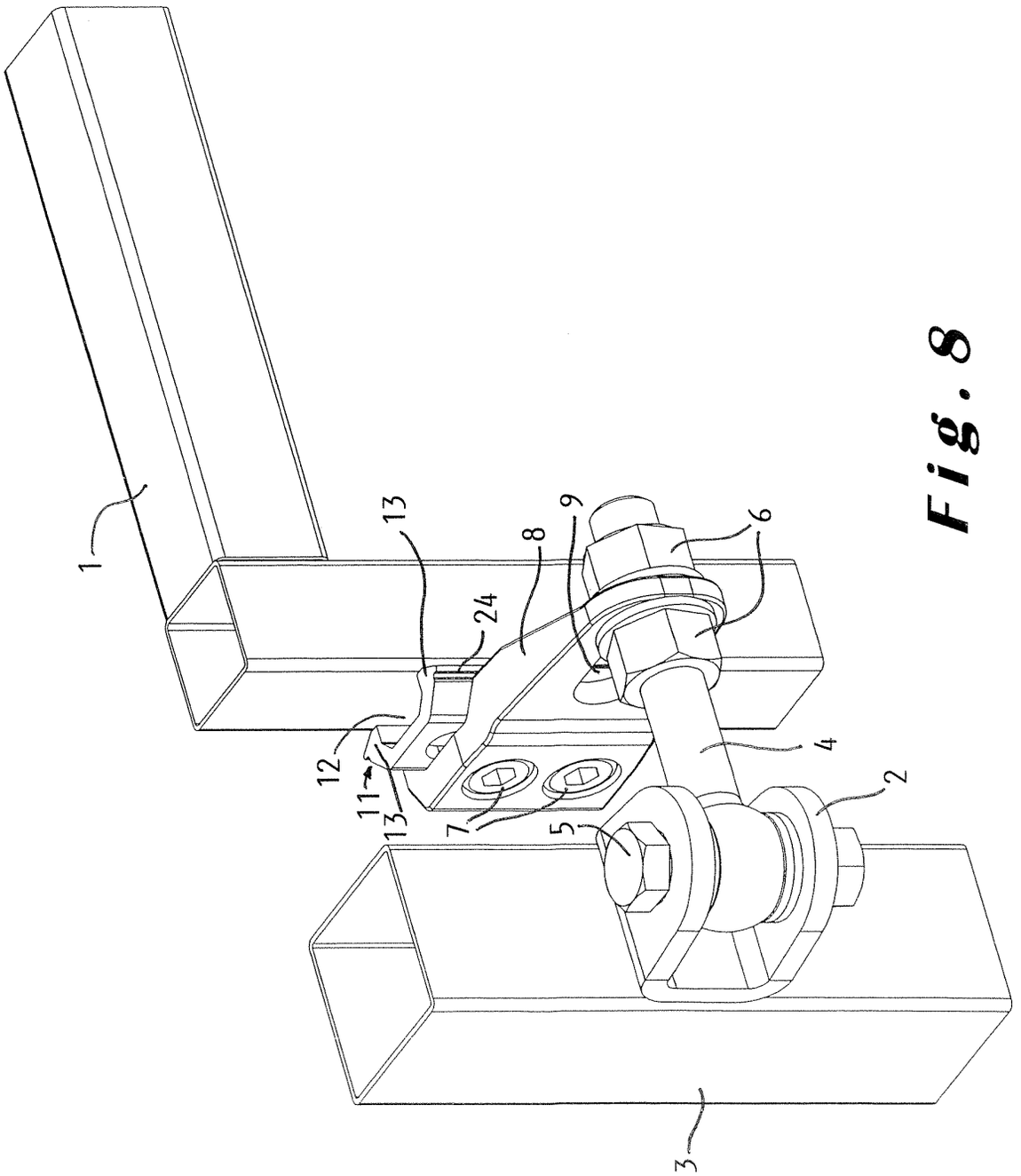


Fig. 8

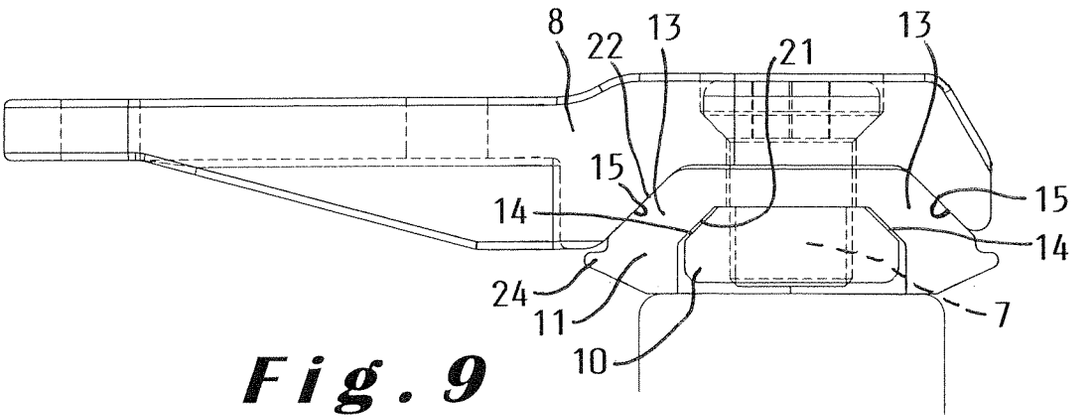


Fig. 9

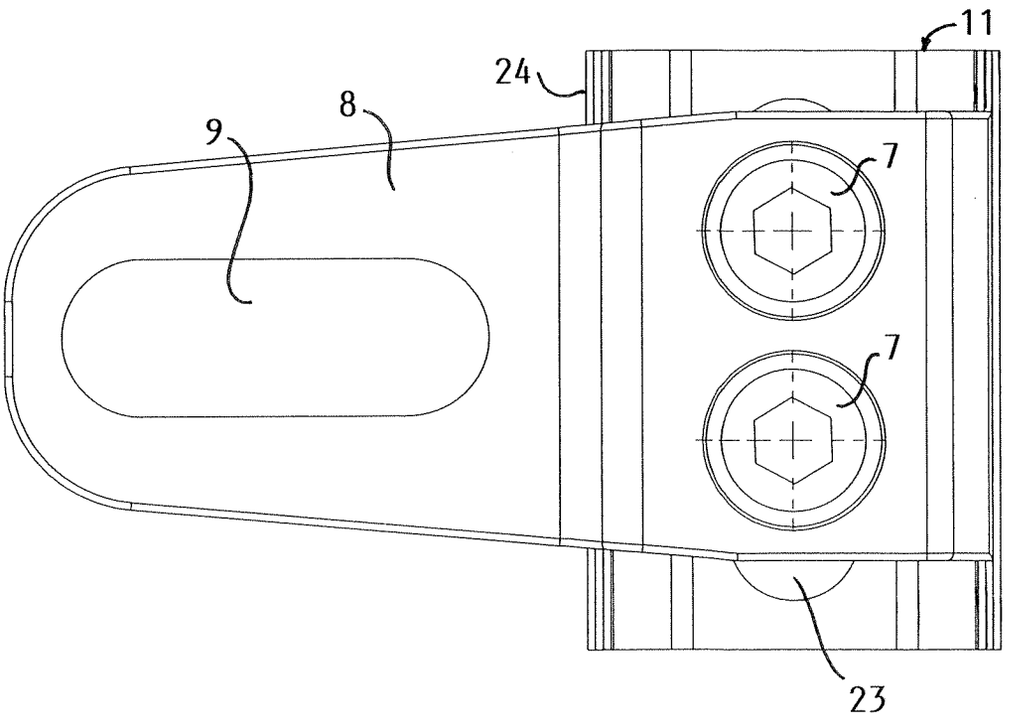


Fig. 10

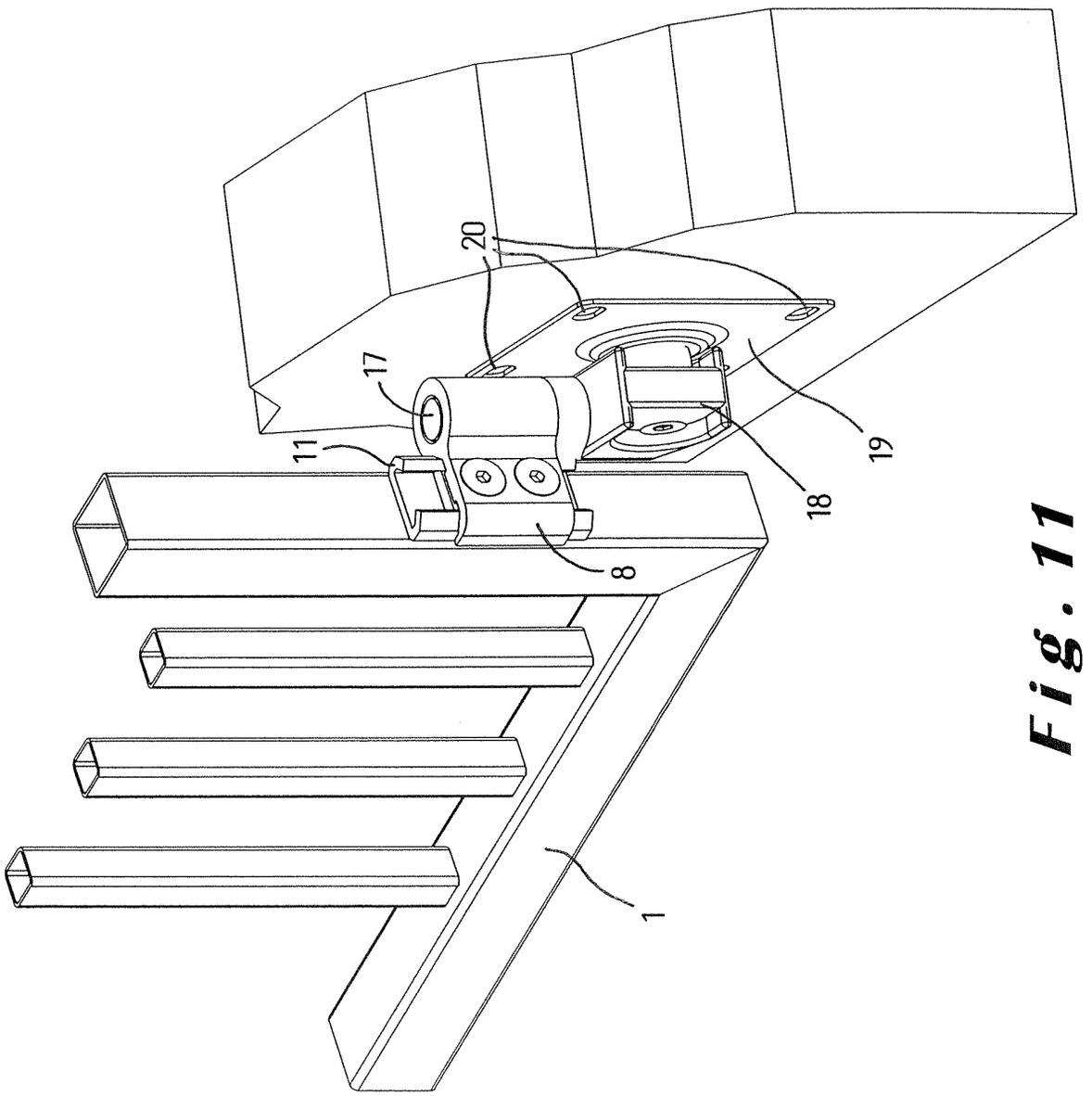


Fig. 11