(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 091 150 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.11.2016 Bulletin 2016/45

(21) Application number: **16170774.0**

(22) Date of filing: **29.06.2009**

(51) Int Cl.:
E05B 15/02 *(2006.01)* ***E05C 17/28*** *(2006.01)*
E05C 17/34 *(2006.01)* ***E05C 3/06*** *(2006.01)*
E05B 15/16 *(2006.01)* *E05B 17/00* *(2006.01)*
E05B 17/20 *(2006.01)*

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
09008483.1 / 2 281 984

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Remarks:
This application was filed on 23-05-2016 as a divisional application to the application mentioned under INID code 62.

(54) **A LOCK ASSEMBLY**

(57) A lock assembly is provided with two locking arms (22) that have pawl members (20) protruding through the casing (10) of the lock and the pawl members are configured to engage guide services (18) and a locking face of a striking plate. At least a portion of the pawl member is tapered as a result of the sides of the pawl member converging to the tip of the pawl member.
Fig. 3

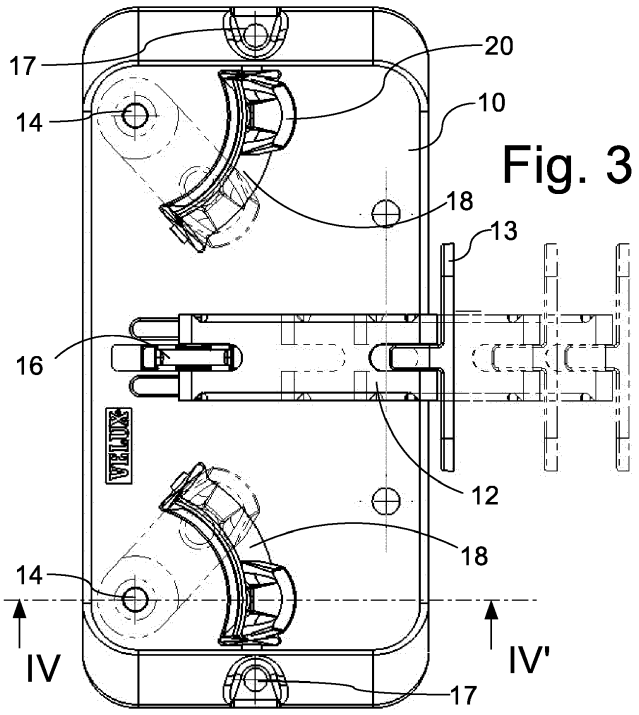

Fig. 3

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a lock assembly for a ventilating window having a sash arranged to be openable with respect to a main frame by pivotal movement about an axis parallel to a pair of opposed sash members.

BACKGROUND OF THE INVENTION

[0002] EP 1 873 336 discloses a lock assembly for a ventilating window having a sash arranged to be openable with respect to a main frame by pivotal movement about an axis parallel to a pair of opposed sash members. This lock assembly comprises a striking plate fixed to a main frame member opposite one of the pair of sash members and a casing fixed to one sash member opposite the striking plate. A locking mechanism is arranged in the casing and the locking mechanism is operable by an operator member accessible from the inside of the window via an actuator slide displaceable in a slot in the casing between a first end position defining the unlocked position, a second end position defining the locked position and a third, intermediate position where the window is slightly open to achieve ventilation. Two pawl members protrude through slots in the casing. When the window is shut the pawl members come into engagement with a fixed striking plate whereby they are forced sideward and snap into their locked position. For the purpose of ventilation, the actuator slide is pulled half way back towards a first position by use of the operator member without the pawl members being displaced.

[0003] It is a requirement that windows are burglar proof to highest possible extend, though of course without increasing the cost of the window and the locks to an unacceptable level.

[0004] The lock assembly disclosed in EP 1 873 336 has an improved means for preventing intrusion, primarily in the area around the actuator slide by means of an added shield.

[0005] This known lock assembly has proven to be reliable, user-friendly and a generally very satisfying product with good burglar proof characteristics.

DISCLOSURE OF THE INVENTION

[0006] However, it has been realized that the capacity of resisting a large impact force (such as by a heavy object hitting the window with considerable speed), could be improved. It was discovered the locking arm with these pawl members was a weak link in the prior art to lock assembly when the letter was exposed to a large impact force.

[0007] On this background, it is an object of the present invention to provide a lock assembly that has an improved resistance to open upon an impact force.

[0008] This object is achieved by a lock assembly for a ventilating window having a sash arranged to be openable with respect to a main frame by pivotal movement about a pivot axis parallel to a pair of opposed sash members, the lock assembly comprises a casing, a locking arm of plate material, one end of the locking arm is pivotally suspended from the casing, the other end of the locking arm is bent to form a pawl member at an angle with the rest of the locking arm and creating a bend in the locking arm, a major portion of the pawl member protrudes through a slot in the casing, a locking mechanism arranged in the casing for enabling the locking arm to be displaceable the slot in the casing between a first end position defining an unlocked position and a second end position defining a locked position, wherein at least a portion of the pawl member is tapered as a result of the sides of the pawl member converging to the tip of the pawl member.

[0009] Preferably, the pawl member is provided with narrow sides that converge towards the tip of the pawl member.

[0010] The tip of the pawl member can be provided with an abutment face at a substantially right angle with the rest of the locking arm.

[0011] In an implementation at least a portion of the pawl member closest to the bend is profiled

[0012] In another implementation the cross-section of the profiled portion has central retracted area and protruding portions at the edges of the cross-section of the arm.

[0013] In yet another implementation wherein the angle of the bend is between 115° and 120°.

[0014] In a further implementation a reinforcement member pivotally suspended from casing at the same position as the pawl member, but on the opposite side of the casing, and the reinforcement member supporting the pawl member against being bend over.

[0015] In anther implementation a reinforcement member is located in the bend.

[0016] In another implementation the reinforcement member is a plate bridging the pawl member to the rest of the locking arm.

[0017] Preferably, the cross-section of the profiled portion has central protrusion and retracted areas at the edges of the cross-section of the arm.

[0018] Alternatively, the cross-section of the profiled portion has central retracted area and protruding portions at the edges of the cross-section of the arm.

[0019] Preferably, the angle of the bend is between 115° and 120°.

[0020] By having an angle substantially greater than 90° the force required to bend over the pawl member is further increased and thereby the resistance of the lock withstand to a large impact force without opening is further improved.

[0021] The tip of the pawl member can be provided with an abutment face at a substantially right angle with the rest of the locking arm.

[0022] According to another aspect there is provided a lock assembly for a ventilating window having a sash arranged to be openable with respect to a main frame by pivotal movement about a pivot axis parallel to a pair of opposed sash members, the lock assembly comprises a casing, an walking arm of plate material, one end of the locking arm is pivotally suspended from the casing, the other end of the locking arm is bent to form a pawl member at an angle with the rest of the arm and creating a bend in the locking arm, a major portion of the pawl member protrudes through a slot in the casing, a locking mechanism arranged in the casing for enabling the locking arm to be displaceable the slot in the casing between a first end position defining an unlocked position and a second end position defining a locked position, wherein a reinforcement member pivotally suspended from the same position on the opposite side of the casing, and the reinforcement member supporting the pawl member against being bend over.

[0023] The object above is also achieved by providing lock assembly for a ventilating window having a sash arranged to be openable with respect to a main frame by pivotal movement about a pivot axis parallel to a pair of opposed sash members, the lock assembly comprises a casing, an locking arm of plate material, one end of the locking arm is pivotally suspended from the casing, the other end of the locking arm is bent to form a pawl member at an angle with the rest of the locking arm and creating a bend in the locking arm, a major portion of the pawl member protrudes through a slot in the casing, a locking mechanism arranged in the casing for enabling the locking arm to be displaceable the slot in the casing between a first end position defining an unlocked position and a second end position defining a locked position, whereby a reinforcement member located in the bend.

[0024] Preferably, the reinforcement member is a plate bridging the pawl member to the rest of the locking arm.

[0025] The object above is also achieved by providing a striking plate assembly for a ventilating window having a sash arranged to be openable with respect to a main frame by pivotal movement about a pivot axis parallel to a pair of opposed sash members, the striking plate assembly comprises a metal base plate with a locking face that is configured to abut with a pawl of a lock assembly, a plastics material overlay on the base plate, the overlay defining a guide surface for guiding the pawl member of the lock assembly to a closed position where it can abut with the locking face.

[0026] The metal base plate provides for a strong and rigid looking face whilst the plastic overlay provides for smooth and silent operation.

[0027] Preferably, the upper side of the base plate is provided with one or more projections that are snugly fit into corresponding recesses in the overlay.

[0028] The under side of the base plate can be provided with three or more hollow legs.

[0029] The hollow in the legs can be through going so that a screw or bolt or the like can be inserted through the leg and the base plate.

[0030] The overlay can be provided with corresponding apertures so that the screw or bolt or the like can be inserted through the leg, the base plate and the overlay.

[0031] The overlay can be secured to the base plate by a snap fit connection.

[0032] Further objects, features, advantages and properties of the lock assembly striking plate according to the invention will become apparent from the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] In the following detailed portion of the present description, the invention will be explained in more detail with reference to the exemplary embodiments shown in the drawings, in which:

Figure 1 is a sectional view through the upper part of a ventilating window, where a lock assembly according to an embodiment of the invention and a striking plate assembly according to an embodiment of the invention are shown,
Figure 2 is a top view on the lock assembly of figure 1 and the striking plate assembly of figure 1,
Figure 3 is a top view of the 1 lock assembly of figure 1 showing both the locked and the unlocked position,
Figure 4 is a cross sectional view through the lock assembly of figure 1 along the line IV-IV' in figure 3,
Figure 5 is a Balkan view of the lock assembly of figure 1 in the open position,
Figure 6 is a detailed top view of a locking arm member used in the lock assembly according to figure 1,
Figure 7 is a detailed semi-sectional view of the locking arm member of figure 6,
Figure 8 is a detailed side view of the locking arm member of figure 6,
Figure 9 is a longitudinal sectional view through the locking arm of figure 6,
Figure 10 is a detailed elevated view of the locking arm member of figure 6,
Figure 11 is a longitudinal-sectional view through a locking arm member according to another exemplary embodiment of the invention,
Figure 12 is a longitudinal-sectional view through a locking arm member according to yet another exemplary embodiment of the invention, and
Figure 13 is a top view on the locking arm of figure 12.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0034] In the following detailed description the lock assembly and the striking plate according to the invention will be described by the exemplary embodiments.

[0035] Figures 1 to 5 show various views of a lock assembly according to an exemplary embodiment of the invention. In figure 1 the lock assembly and the striking

plate assembly are mounted in a ventilating window.

[0036] In figure 1 the casing 10 of the lock assembly is shown in a mounted position secured to the sash member 4 by means of screws inserted through fastening holes 17 and by the fastening pins 26 which extend from the casing 10. The operator arm 12 is secured to the operator member 2 of the window by means of screws through fastening holes of the operator hinge 13. In figure 1 the actuator slide 16 is shown in the locked position in which the window is locked and cannot be opened without activating the locking assembly. The operator member is pivotally suspended from the sash 4 by a hinge 9. An operator can grab the handlebar 3 that is connected to the operator member 2, to move the operator member 2 as indicated by the arrow between various positions whilst the operator member 2 pivots about the hinge 9.

[0037] A striking plate assembly 50 is secured to the window frame 5 by screws and fastening pins 56.

[0038] The lock assembly 1 has a casing 10 that encases a locking mechanism and comprises fastening holes 55 for mounting the locking assembly to a top sash member 4 of a window sash.

[0039] The locking mechanism includes two locking arm members 22 that are each provided with a pawl member 20. The pawl members 20 extend through curved slots 18 in the casing. The actuator slide 16 extends through a straight slot 15 in the casing. Fastening pins 14 are used for pivotally suspending the locking arm members 22 from the casing 10.

[0040] The actuator slide 16 is preferably mounted with a friction plate 49 and an operator arm 12 mounted with a hinge pin 21 to the part of the actuator slide 16 that extends through the casing 10. The other end of the operator arm 12 is connected to the operator member 2 by means of an operator hinge 13 with fastening holes.

[0041] The locking mechanism has link arms 24 with cutouts 23, and locking arm members 22 within one end bend over to form the pawl members 20. Thus, the locking arm members 22 have a substantially straight portion that ends at a bend 39 (figures 6 and 8) after which the locking arm 22 continues as the pawl member 20. The other end of the locking arm members 22 are suspended from the casing by a hinge that includes the fastening pins 14. The locking mechanism also has first spring wires 25 and second spring wires 27. Each of the locking arms 20 is connected near its bend 39 to a one end of a link arm 24 by a hinge 28. The other end of the link arms 24 is connected to the actuator slide 16 by a hinge 29.

[0042] The actuator slide 16 is moveable between three resting positions. A first, unlocked position in which the window is open or can be opened without activating the locking assembly, which is shown by the interrupted lines in figure 3 (with the operator hinge 13 in the position to the extreme right as seen in figure 3). The actuator slide can also rest in a second, locked position in which the window is locked in a closed position (figure 1) and a third, intermediate position where the window locked but the operator member is in a tilted position to slightly open the window for achieving ventilation (the intermediate position in fig. 3).

[0043] The actuator slide 16 and the locking arm members 22 are interconnected via the locking mechanism, which comprises a system of the second and the first spring-loaded link arms 24 and the first and the second spring wires 25, 27, which force actuator slide 16 to move stepwise between said three positions while the pawl members 22 only move between a locked position and an unlocked position. In figure 1 and 3 the pawl members 20 are shown in the locked position. In figure 3 that pawl members 20 are shown in the unlocked pawl by the interrupted lines. The locking mechanism operates symmetrically around the slot 15 and the actuator slide 16. The link arms 24 of the locking mechanism are connected to the actuator slide 16 via a hinge 29 and to locking arms 22 via the hinge 28.

[0044] The first spring wires 25 are mounted to the casing 10 via fastening pin heads 26 and fastened to the link arm hinges 28, and the second spring wires 27 are mounted on the link arms 24 and fastened to the hinge 29.

[0045] In figure 3 the operator arm 12 and the actuator slide 16 are shown in their three possible positions (two of the positions are indicated by interrupted lines.) In the position indicated by the uninterrupted lines the lock is the locking position. In the intermediate position the lock is locked but slightly open to achieve ventilation. When the position indicated with the interrupted lines with the operator hinge 13 in the extreme position to the right and assume the lock is in the open position and the window can be opened without any substantial resistance.

[0046] In the second, locked position the actuator slide 16 and the pawl members 20 are positioned at the ends of slots 15 and 18, respectively. The actuator slide 16 is held in the first, unlocked position by the second spring wires 27 and a first dead point of the locking mechanism. The actuator slide 16 is moved from the second, locked position to the third, intermediate position by moving the actuator slide 16 through said first dead point towards the opposite end of the slot 15. In the embodiment shown the first dead point is implemented as a combination of the second spring wires 27 mounted in the cutout 23 of the link arms 24 and the shape of the locking arms 22 and position of the first fastening/pivot pins 14. The position of the pawl members 20 is not affected by moving the actuator slide 16 between the second, locked position and the third, intermediate position.

[0047] In the third, intermediate position the actuator slide 16 is positioned between the ends of slot 15 as may be seen in figure 3, without having moved the locking arms 22 of the locking mechanism.

[0048] The actuator slide 13 is held in the third, intermediate position by the first dead point and a second dead point established by the first spring wires 27. In the second, locked position and third intermediate position of the actuator slide 16 the first spring wires 27 hold the pawl members 20 in a locked position at the opposite ends of the slots 18 compared to the position of the pawl

members 20 in the unlocked position (interrupted lines in figure 3).

[0049] Moving the actuator slide 16 from the third, intermediate position to the first, unlocked position, said second dead point is passed and the locking arms 22. In the first, unlocked position of the actuator slide 13 the first spring wires 25 hold the pawl members 20 in the unlocked position.

[0050] The second dead point is implemented by the first spring wires 25 operating on the hinges 28. The pawl members 20 are operating in conjunction with the hinges 28 and are implemented as an integrated part of the locking arms 22 of the operating mechanism.

[0051] When the window is closed, the pawl members 20 are urged to their locking position by guide surfaces 62 one the striking plate (the striking plate 52 and the guide surfaces 62 will be described in greater detail below). The movement of the pawl members 20 is transmitted to the actuator slide 16 via the locking mechanism and the actuator slide 16 is pulled back from the first, unlocked position to the intermediate position.

[0052] In the third, intermediate position the actuator slide 16 can be moved to the first, unlocked position as described above or moved to the second, locked position by passing the first dead point of the operating mechanism.

[0053] Figures 6 to 10 show the locking arm 22 in greater detail. The locking arm 22 is preferably made from plate material, in particular high tensile steel plate material. The locking arm 22 comprises a substantially straight portion that is provided at one end with an aperture 34 receiving the fastening/pivot pin 14 whilst the other end is bend over at a bend 39 to form the pawl member 20.

[0054] The straight remainder of the locking arm 22 is provided with an aperture 31 near the bend 39 for forming a rim 32 that is used to form a hinge 28 to connect to the link arm 24.

[0055] The pawl member 20 is at an angle α of approximately 118° with the remainder of the locking arms 22. The angle α can be anywhere between 115 and 120°. This range of angles has been found to give good results.

[0056] The outward surface at the tip of the pawl member 20 is formed as an abutment surface 36 for abutment with a locking face of the striking plate 50. The abutment surface 36 is substantially parallel with the hinge pin 14.

[0057] The pawl member 20 is provided with narrow sides 38 that converge towards the tip of the pawl member 20 for facilitating entry of the pawl member 20 into the slot 51 of the striking plate 50 (figures 14-17).

[0058] The portion of the pawl member 20 closest to the bend 39 is profiled to improve the resistance of the pawl member 20 to be bend over when a large force is applied to the abutment face 36. The profile can particularly be well recognized in the cross-sectional area in figure 7. The profile comprises a central protrusion 34 with retracted areas 35 at the short sides 38. In embodiment the profile can be reversed with it protruding parts near the short sides 38 and the retracted part being placed centrally in the pawl member 20.

[0059] Figure 11 illustrates another embodiment that is essentially identical with the embodiment described above except that the locking arm is reinforced in a different way. In this embodiment an additional reinforcement arm 22' has been added on the outside of the casing. The additional reinforcement arm 22' is pivotally suspended form the same pin 14 as the locking arm 22. The additional reinforcement arm 22' is also bend and in the upward bend tip of the additional reinforcement arm 22' supports the rear side of the pawl member 20.

[0060] Figures 12 and 13 illustrate another embodiment that is essentially identical with the first embodiment described above, except that the locking arm is reinforced in a different way. In this embodiment an additional reinforcement rib 20' is added in the angle between the pawl member 20 and the remainder of the locking arm 22. The rib 20' can be welded to the locking arm 20 or could be forged or cast with it in one part. Instead of one large rib 20' the locking arm 20 could be provided with a plurality of smaller ribs.

[0061] Figures 14 to 17 illustrate a striking plate assembly 50 according to en exemplary embodiment of the invention. The striking plate assembly 50 includes a metal base plate 52 and a plastic overlay 60. The metal base plate has two projecting reinforcing walls 57 that fit into corresponding slots in the plastic overlay 60 two improve the strength of the construction. The metal base plate is provided with a central fastening hole 53 and fastening holes 55 near the extremities of the metal base plate 52 for receiving a screw or bolt or similar fastener there through. The position of the holes 53,55 matches the position of the legs and 56 and the holes 53,55 form a hollow through the legs 56.

[0062] The metal base plate 52 is provided with a stationary locking wall 58 on two of its corners. The stationary locking wall 58 defines a locking face 59 for abutment with the abutment face 36 of the pawl members 20.

[0063] Together with the plastic overlay 60, the metal base plate 52 defines two slots 51 for receiving and guiding the pawl members 20.

[0064] The plastic overlay 60 is provided with two main protrusions 61 with recesses opening to the bottom of the plastic overlay 60 that fit snugly around the reinforcing plates 57 of the metal base plate 52.

[0065] On one side of each protrusion 61 there is provided a guide surface 62 for guiding/urging the pawl members 20 from the unlocked position to the locked position when the window is shut.

[0066] The plastic overlay 60 is also provided with a central fastening a whole 63 and two fastening holes 65 at its extremities, and these fastening holes 63,65 correspond to the position of the fastening holes 53,55 of the metal base plate 52.

[0067] The plastic overlay is further provided with two snap elements 69 for interaction with snap block elements 54 on the base plate, so that the plastic overlay 60 is automatically secured to the metal base plate 50 to

by a snap connection.

[0068] The metal base plate 52 is preferably made of cast metal for providing a high strength and rigidity. The plastic overlay 60 is preferably made from a durable and strong plastic with good friction properties with metal objects. The plastic overlay 60 ensures a smooth and silent operation of the lock, whilst the metal base plate 52 ensures that the striking plate assembly 50 is very strong and can withstand a large impact load.

[0069] The term "comprising" as used in the claims does not exclude other elements or steps. The term "a" or "an" as used in the claims does not exclude a plurality.

[0070] Although the present invention has been described in detail for purpose of illustration, it is understood that such detail is solely for that purpose, and variations can be made therein by those skilled in the art without departing from the scope of the invention.

Claims

1. A lock assembly for a ventilating window having a sash arranged to be openable with respect to a main frame by pivotal movement about a pivot axis parallel to a pair of opposed sash members, said lock assembly comprises:

   a casing,
   a locking arm of plate material,
   one end of said locking arm is pivotally suspended from the casing,
   the other end of the locking arm is bent to form a pawl member at an angle with the rest of the locking arm and creating a bend in the locking arm,
   a major portion of the pawl member protrudes through a slot in the casing,
   a locking mechanism arranged in said casing for enabling the locking arm to be displaceable said slot in the casing between a first end position defining an unlocked position and a second end position defining a locked position,
   characterized in that at least a portion of the pawl member is tapered as a result of the sides of the pawl member converging to the tip of the pawl member.

2. A lock assembly according to claim 1, wherein the pawl member is provided with narrow sides that converge towards the tip of the pawl member.

3. A lock assembly according to claim 1 or 2, wherein the tip of the pawl member has an abutment face at a substantially right angle with the rest of the locking arm.

4. A lock assembly according to any one of claims 1 to 3, wherein in that at least a portion of the pawl member closest to said bend is profiled

5. A lock assembly according to claim 4, wherein the cross-section of the profiled portion has central retracted area and protruding portions at the edges of the cross-section of the arm.

6. A lock assembly according to any of claims 1 to 5, wherein the angle of the bend is between 115° and 120°.

7. A lock assembly according to any one of claims 1 to 3, wherein a reinforcement member pivotally suspended from casing at the same position as the pawl member, but on the opposite side of the casing, and said reinforcement member supporting the pawl member against being bend over.

8. A lock assembly according to any one of claims 1 to 3, **characterized by** a reinforcement member located in said bend.

9. A lock assembly according to claim 8, wherein said reinforcement member is a plate bridging the pawl member to the rest of the locking arm.

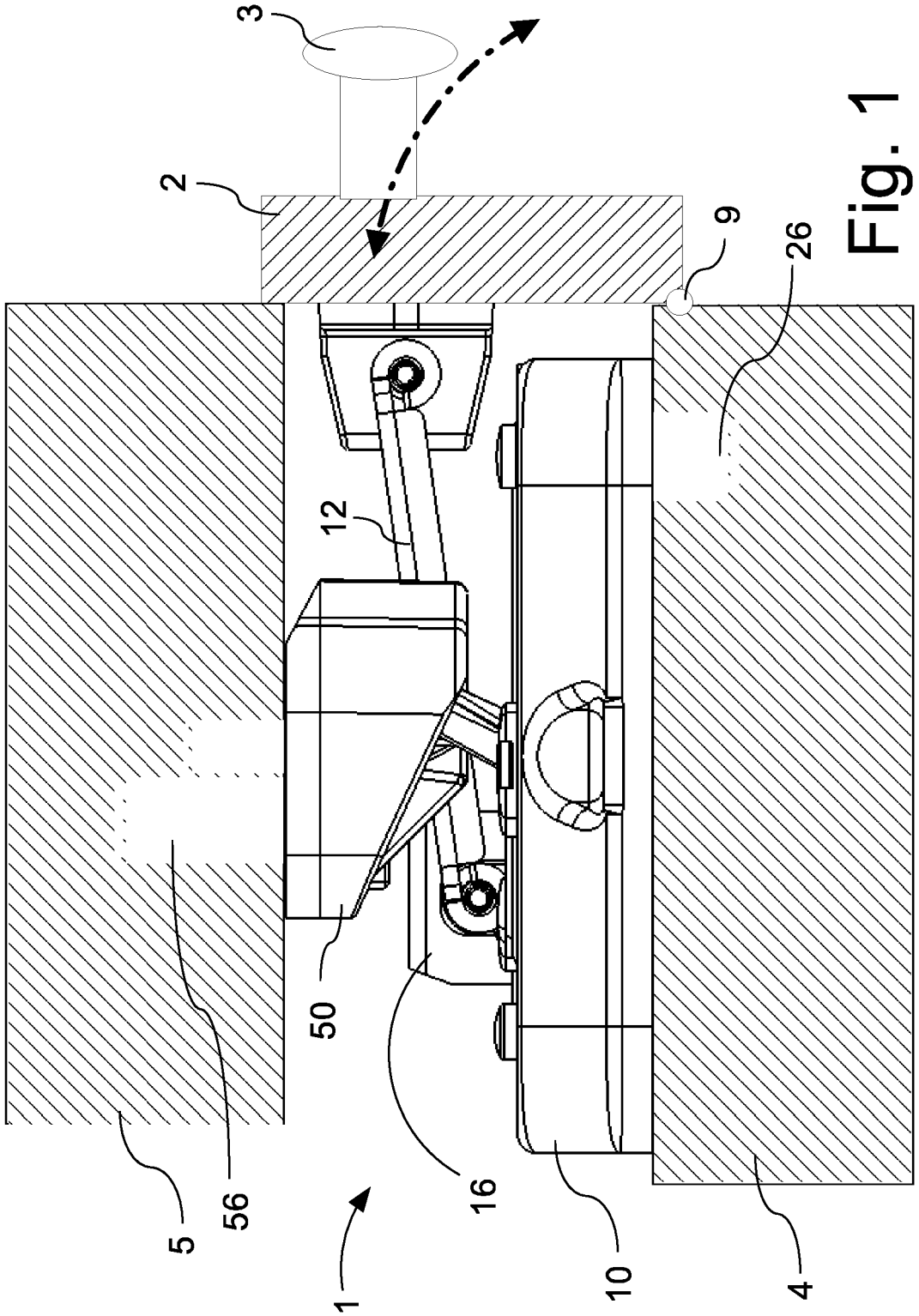

Fig. 1

Fig. 3

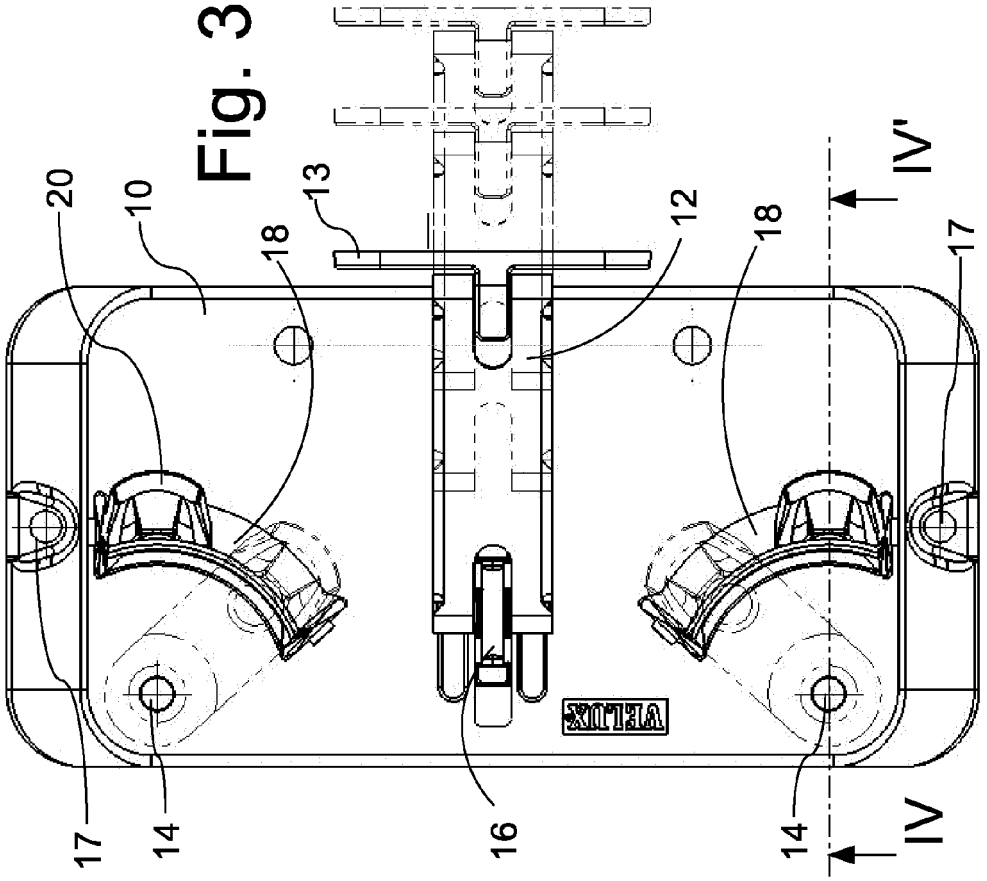
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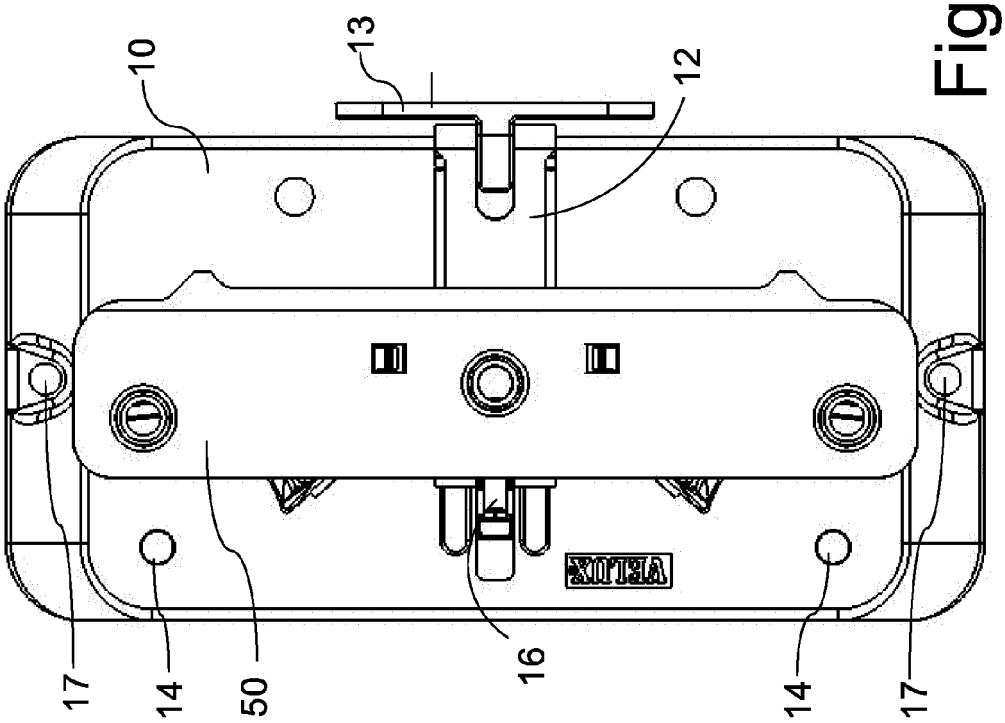
Fig. 2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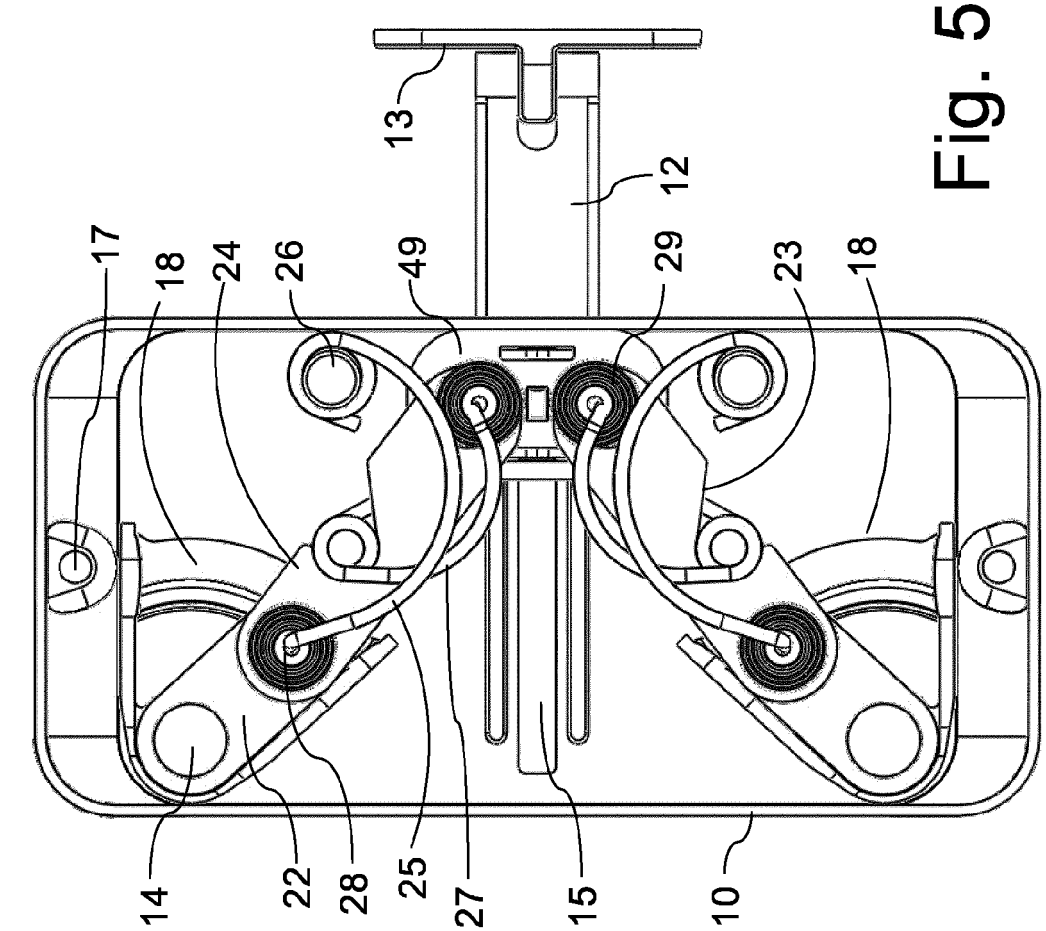
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Fig. 5

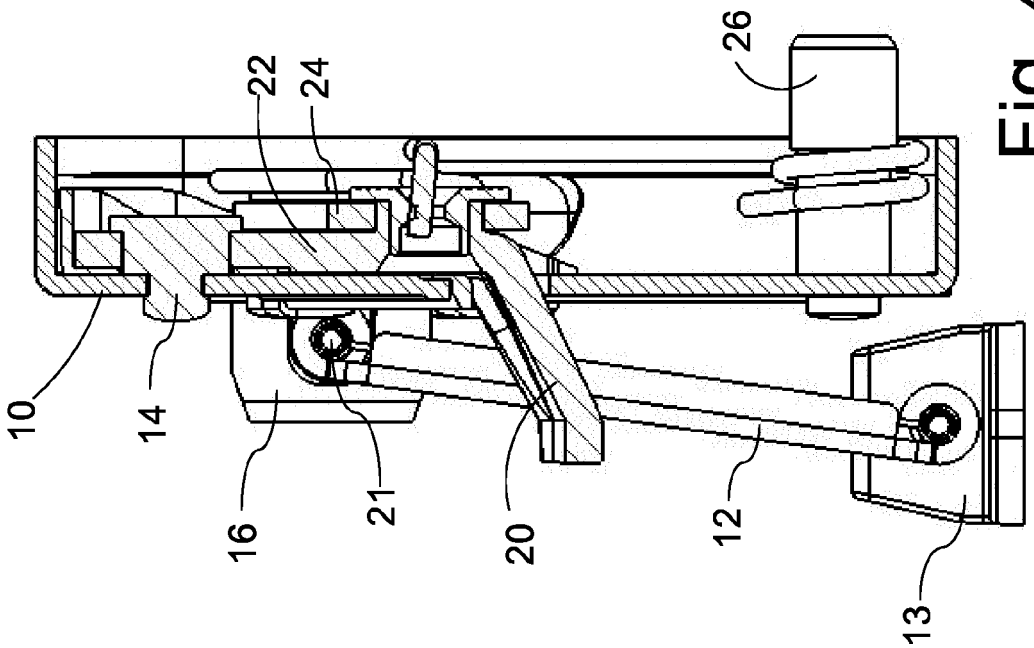
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Fig. 4

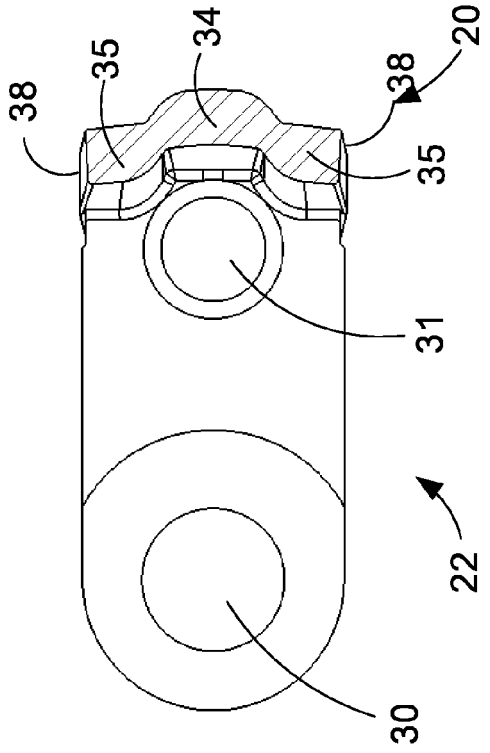

Fig. 7

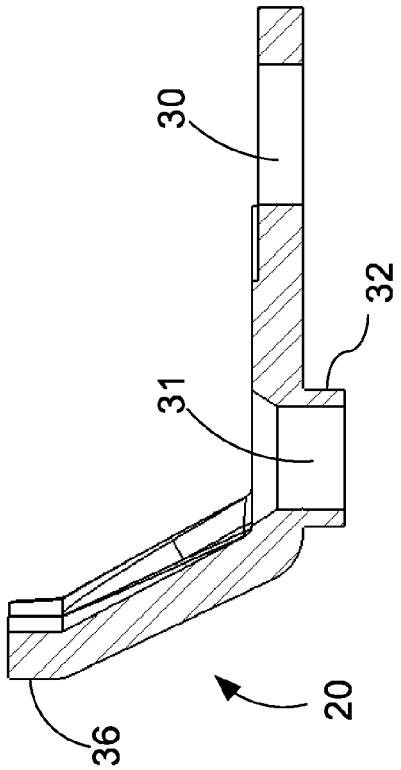

Fig. 9

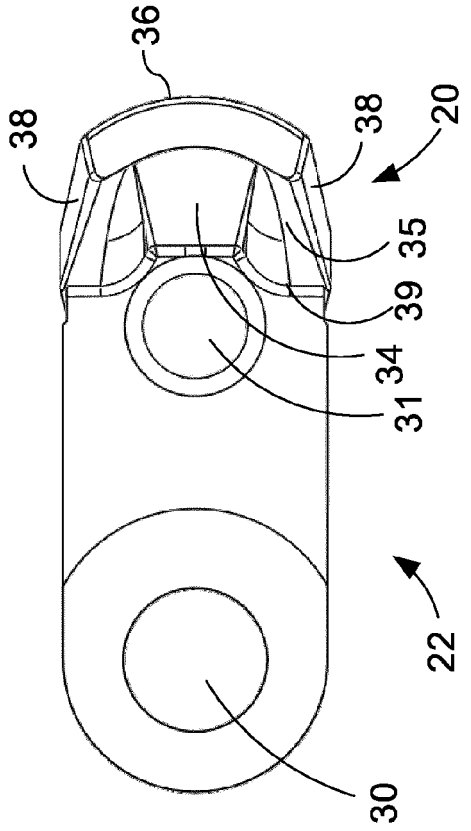

Fig. 6

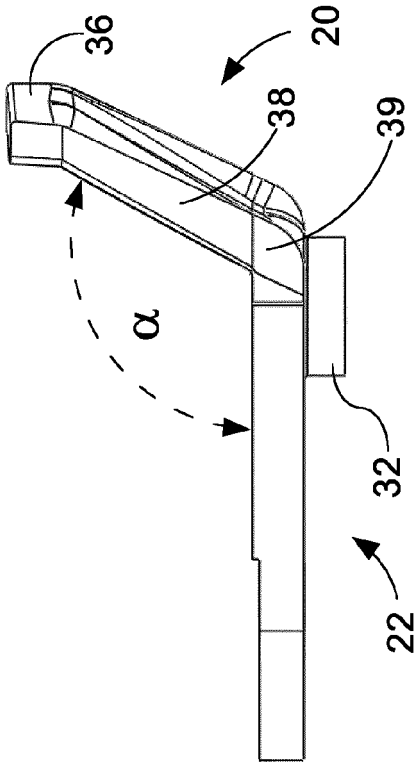

Fig. 8

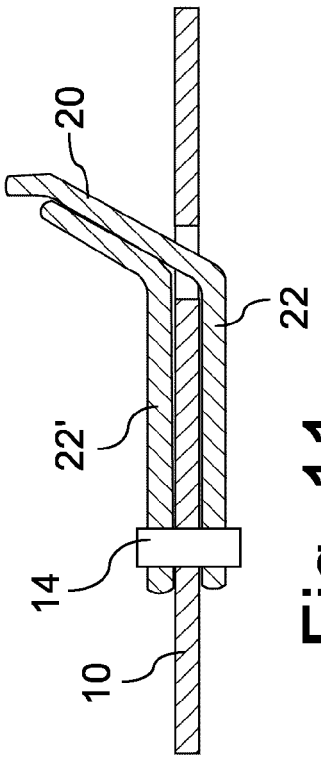

Fig. 11

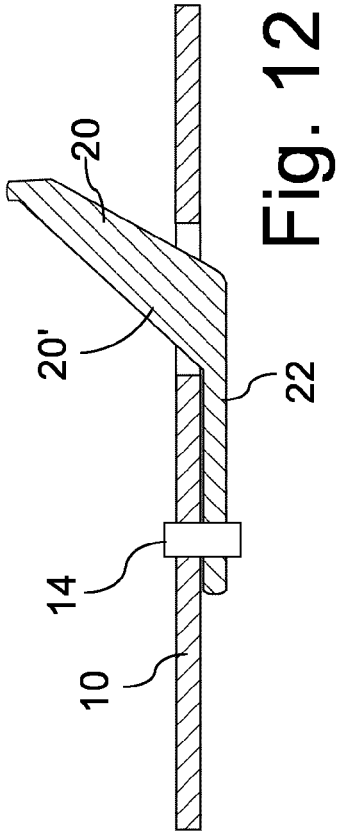

Fig. 12

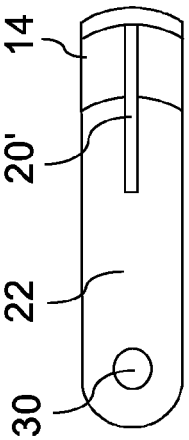

Fig. 13

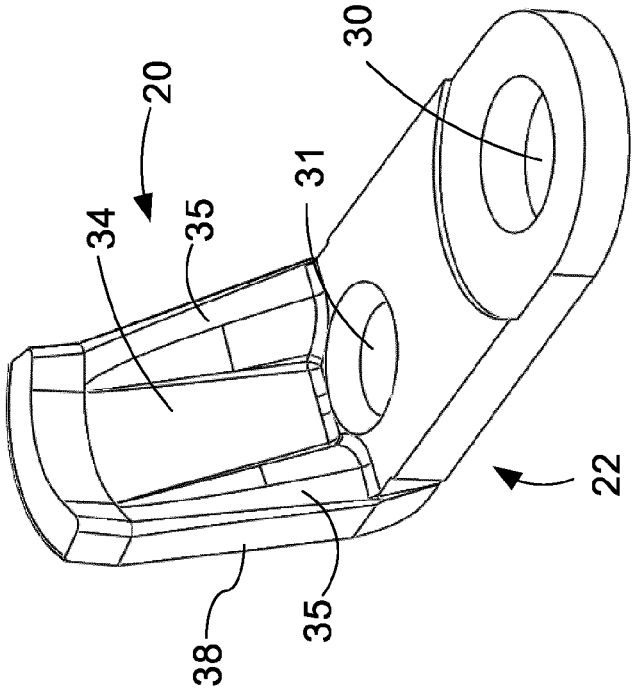

Fig. 10

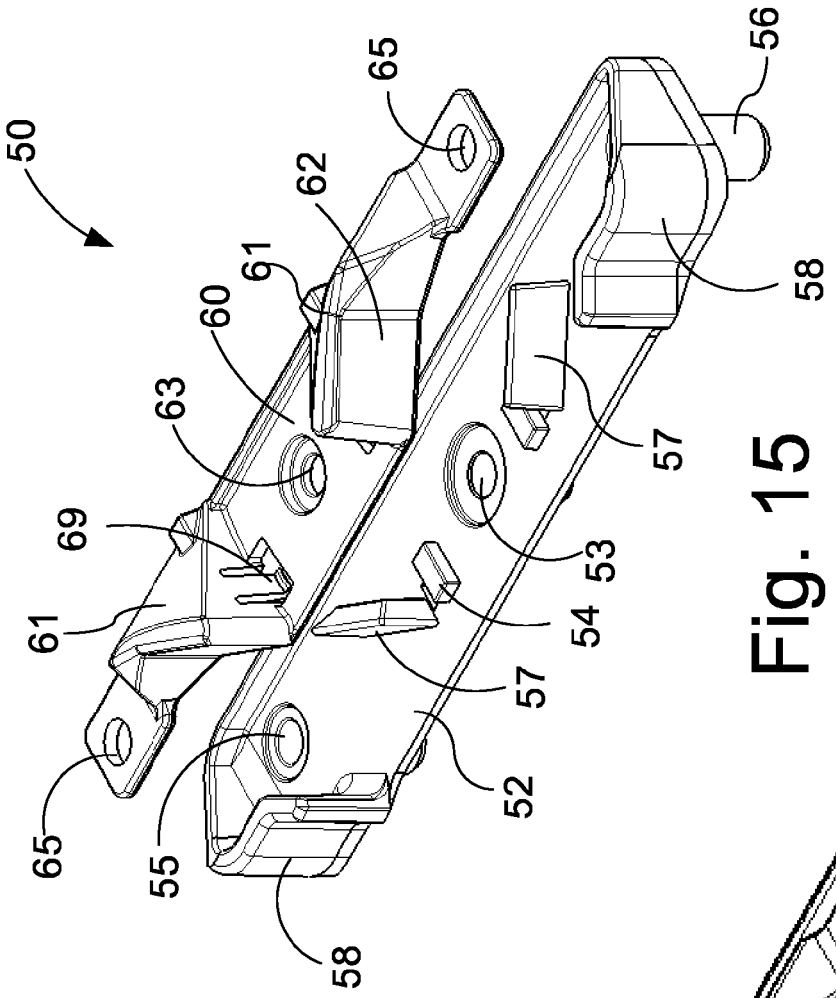
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Fig. 15

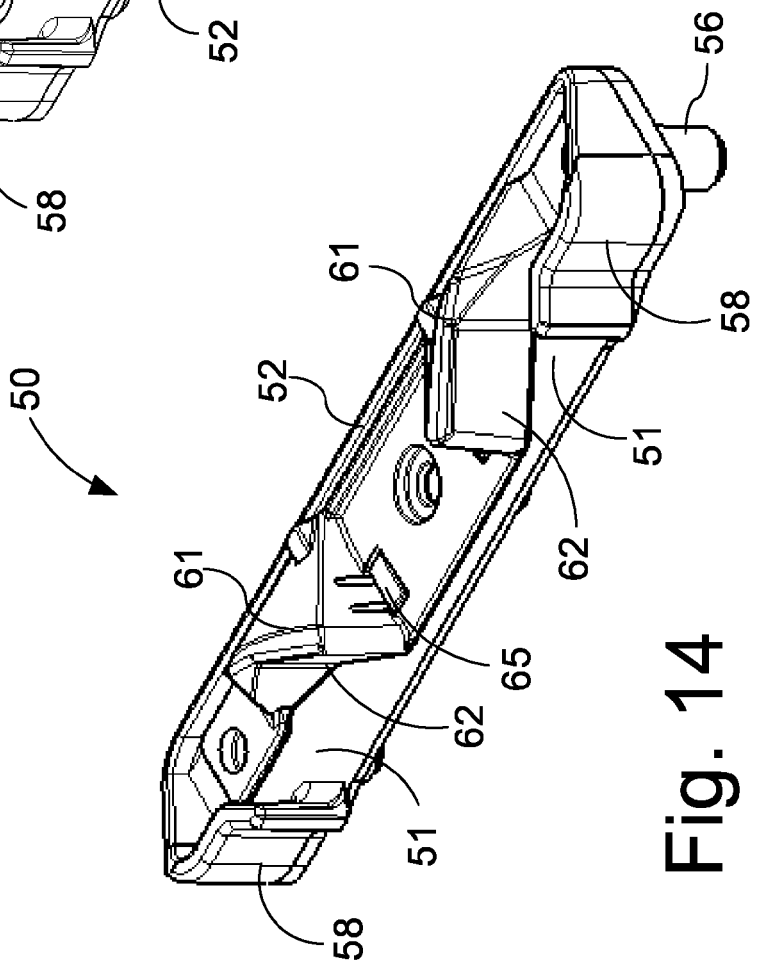
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Fig. 14

Fig. 16

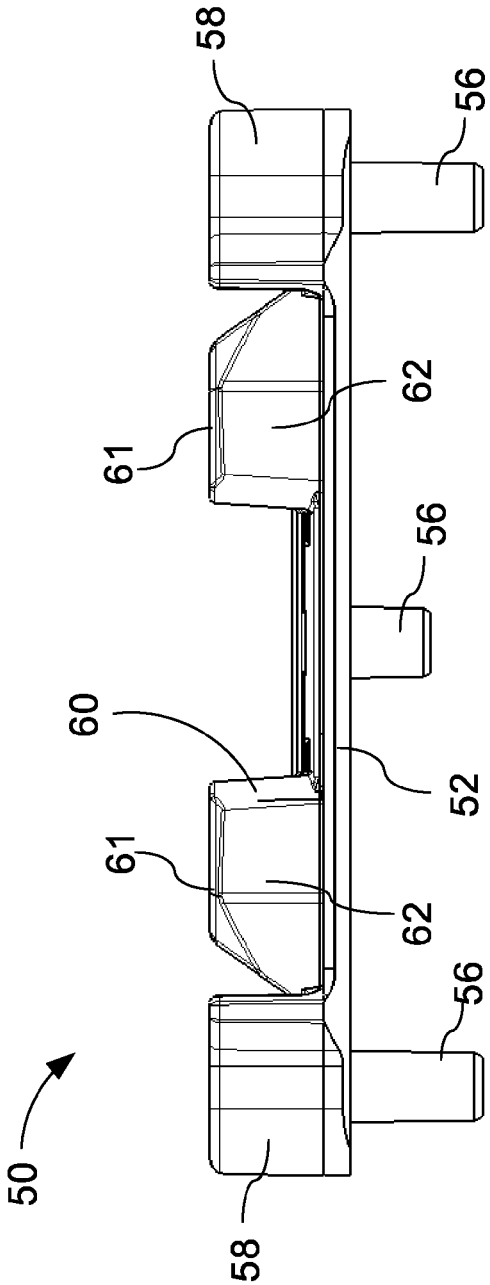
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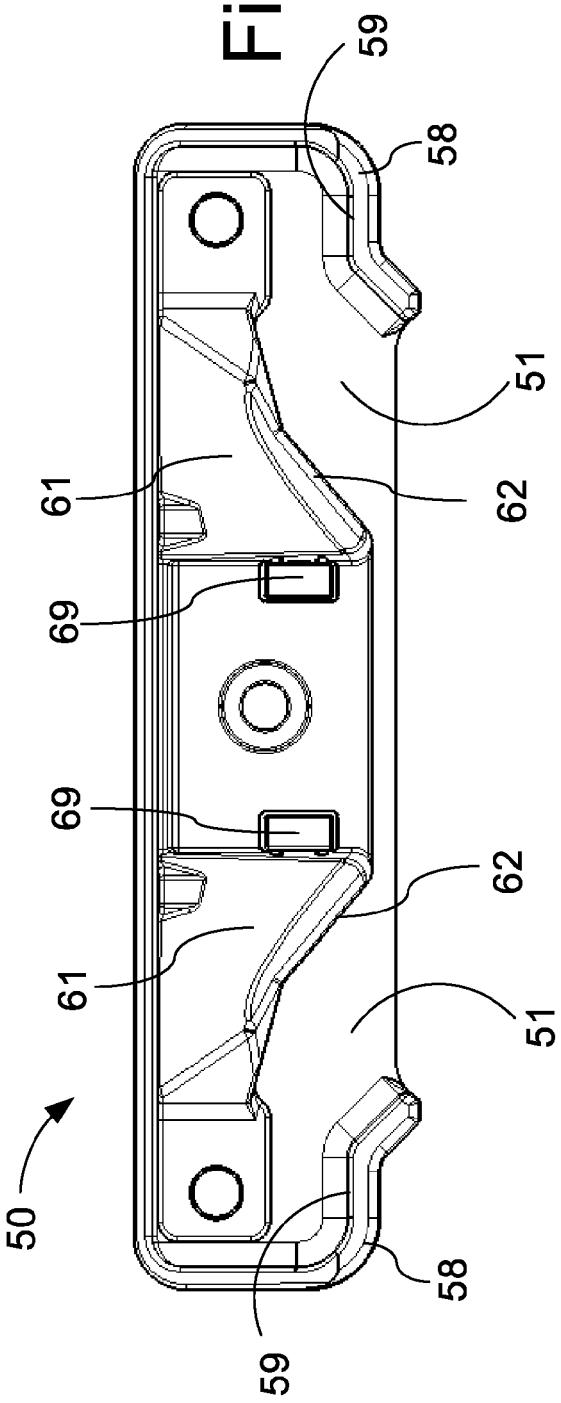
Fig. 17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EUROPEAN SEARCH REPORT

Application Number
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